

Vision Sensor

FZ5 Series

## Vision System

### User's Manual

FZ5-6□□

FZ5-6□□-□□

FZ5-8□□

FZ5-8□□-□□

FZ5-11□□

FZ5-11□□-□□

FZ5-12□□

FZ5-12□□-□□

FZ5-L35□

FZ5-L35□-□□



# Introduction

---

Thank you for purchasing the FH/FZ5.

This manual provides information regarding functions, performance and operating methods that are required for using the FH/FZ5.


When using the FH/FZ5, be sure to observe the following:

- The FH/FZ5 must be operated by personnel knowledgeable in electrical engineering.
- To ensure correct use, please read this manual thoroughly to deepen your understanding of the product.
- Please keep this manual in a safe place so that it can be referred to whenever necessary.

## NOTE

- All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of OMRON.
- No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

## Trademarks

- Sysmac and SYSMAC are trademarks or registered trademarks of OMRON Corporation in Japan and other countries for OMRON factory automation products.
- This software is based in part on the work of the Independent JPEG Group.
- Microsoft, Windows, Windows Vista, Excel, and Visual Basic are either registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.
- Intel, Core and Pentium are trademarks of Intel Corporation in the U.S. and/or other countries.
- EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
- ODVA, CIP, CompoNet, DeviceNet, and EtherNet/IP are trademarks of ODVA.
- The SD and SDHC logos are trademarks of SD-3C, LLC. 
- QR Code is a registered trademark of DENSO WAVE INCORPORATED.
- MELSEC, GX-Developer are a registered trademarks of Mitsubishi Electric Corporation.

Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.

## Copyrights

Microsoft product screen shots reprinted with permission from Microsoft Corporation.

## Structure of FH/FZ5 Manuals

The following table gives the manual configuration of the FH/FZ5.

Name of Manual	Cat. No.	Model	Purpose	Contents
Vision System FH Instruction Sheet	9607479-9	FH-1□□□ FH-1□□□-□□ FH-3□□□ FH-3□□□-□□	To confirm the safety and usage precautions of the Vision System FH series Sensor Controller.	Describes the definitions of basic terms, meaning of signal words, and precautions for correct use of FH series in the manual.
Vision System FH-L Instruction Sheet	9606631-1	FH-L□□□ FH-L□□□-□□	To confirm the safety and usage precautions of the Vision System FH-Lite series Sensor Controller.	Describes the definitions of basic terms, meaning of signal words, and precautions for correct use of FH-L series in the manual.
Vision System FZ5 Instruction Sheet	9524422-4	FZ5-6□□ FZ5-6□□-□□ FZ5-11□□ FZ5-11□□-□□	To confirm the setup procedures, safety and usage precautions of the Vision System FZ5-600, FZ5-1100 series Sensor Controller, including I/O setup and wiring	Describes the definitions of basic terms, meaning of signal words, and precautions for correct use of FZ5-600, FZ5-1100 series in the manual.
Vision System FZ5 Instruction Sheet	9308317-7	FZ5-8□□ FZ5-8□□-□□ FZ5-12□□ FZ5-12□□-□□	To confirm the setup procedures, safety and usage precautions of the Vision System FZ5-800, FZ5-1200 series Sensor Controller, including I/O setup and wiring	Describes the definitions of basic terms, meaning of signal words, and precautions for correct use of FZ5-800, FZ5-1200 series in the manual.
Vision System FZ5-L Instruction Sheet	9910002-2	FZ5-L35□ FZ5-L35□-□□	To confirm the setup procedures, safety and usage precautions of the Vision System FZ5-L Series Sensor Controller, including I/O setup and wiring.	Describes the definitions of basic terms, meaning of signal words, and precautions for correct use of FZ5-L series in the manual.
Vision System FH/FZ5 Series User's Manual	Z365		When User want to know how to setup the Sensor Controller of the Vision System FH/FZ5 series.	Describes the soft functions, setup, and operations to use Sensor Controller of the Vision System FH/FZ5 series.
Vision System FH/FZ5 series Hardware Setup Manual	Z366	FH-1□□□ FH-1□□□-□□ FH-3□□□ FH-3□□□-□□ FH-L□□□	When User want to know about the Hard-ware specifications or to setup the Sensor Controller of the Vision System FH/FZ5 series.	Describes FH/FZ5 series specifications, dimensions, part names, I/O information, installation information, and wiring information.
Vision System FH/FZ5 series Macro Customize Functions Programming Manual	Z367	FH-L□□□-□□ FZ5-L35□ FZ5-L35□-□□	When User operate or programming using Macro Customize functions.	Describes the functions, settings, and operations for using Macro Customize function of the FH/FH5-series.
Vision System FH/FZ5 series Processing Item Function Reference Manual	Z341	FZ5-6□□ FZ5-6□□-□□ FZ5-8□□ FZ5-8□□-□□ FZ5-11□□	When User confirm the details of each processing items at the create the measurement flow or operate it.	Describes the software functions, settings, and operations for using FH/FH5-series.
Vision System FH/FZ5 Series User's Manual for Communications Settings	Z342	FZ5-11□□-□□ FZ5-12□□ FZ5-12□□-□□	When User confirm the setting of communication functions.	Describes the functions, settings, and communications methods for communicating between FH/FH5 series. The following communication protocol are described. Parallel, PLC Link, EtherNet/IP, EtherCAT, and Non-procedure

Name of Manual	Cat. No.	Model	Purpose	Contents
Vision System FH Series Operation Manual for Sysmac Studio	Z343	FH-1□□□ FH-1□□□-□□ FH-3□□□ FH-3□□□-□□	When User connect to NJ series via EtherCAT communication.	Describes the operating procedures for setting up and operating FH series Vision Sensors from the Sysmac Studio FH Tools.

## Conventions Used in This Manual

### Symbols

The symbols used in this manual have the following meanings.

**IMPORTANT** Indicates relevant operational precautions that must be followed.

**Note** Indicates operation-related suggestions from OMRON.

### Use of Quotation Marks and Brackets

In this manual, menus and other items are indicated as follows.

[ ] Menu Indicates the menu names or processing items shown in the menu bar.

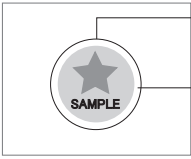
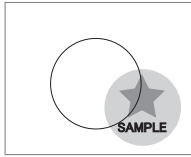
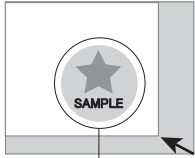
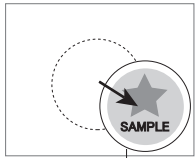
“ ” Item name Indicates the item names displayed on the screen.



## Definitions of Basic Terms

Term	Definition
FH series	All FH series model names as follows: FH-1□□□, FH-1□□□-□□, FH-3□□□, FH-3□□□-□□, FH-L□□□, FH-L□□□-□□
FH-1000 series	All FH-1□□□ series model names as follows: FH-1□□□, FH-1□□□-□□
FH-3000 series	All FH-3□□□ series model names as follows: FH-3□□□, FH-3□□□-□□
FH-L series	All FH-L□□□ series name the following: FH-L□□□, FH-L□□□-□□
FZ5 series	All FZ5 series name shows the following: FZ5-6□□, FZ5-6□□-□□, FZ5-8□□, FZ5-8□□-□□, FZ5-11□□, FZ5-11□□-□□, FZ5-12□□, FZ5-12□□-□□, FZ5-L35□, FZ5-L35□-□□
FZ5-600 series	All FZ5-6□□ series name the following: FZ5-6□□, FZ5-6□□-□□
FZ5-800 series	All FZ5-8□□ series name the following: FZ5-8□□, FZ5-8□□-□□
FZ5-1100 series	All FZ5-11□□ series name the following: FZ5-11□□, FZ5-11□□-□□
FZ5-1200 series	All FZ5-12□□ series name the following: FZ5-12□□, FZ5-12□□-□□
FZ5-L series	All FZ5-L35□ series name the following: FZ5-L35□, FZ5-L35□-□□
measurement flow (abbreviated as “flow”)	A continuous flow of measurement processing. A measurement flow consists of a scene created from a combination of processing items.
measurement processing	Executing processing items for inspections and measurements.
Measurement ID	Information of time when the sensor controller receives the measurement trigger and the line no. Format of measurement ID: YYYY-MM-DD_HH-MM-SS-XXXX YYYY: Year (4 digits) MM: Month DD: Date HH: Hour MM: Minute SS: Second XXXX: Millisecond Example: Measured time: 12/24/2007, 11:10:25.500: Line: 0 Measurement ID: 2007-12-24_11-10-25-5000
processing item	Any of the individual items for vision inspections that are partitioned and packaged so that they can be flexibly combined. These include the Search, Position Compensation, and Fine Matching items. Processing items can be classified for image input ([Input image]), inspection/measurement ([Measurement]), image correction ([Compensate image]), inspection/measurement support ([Support measurement]), process branching ([Branch]), results external output ([Output result]), resulting image display ([Display result]), etc. You can freely classify processing items to handle a wide range of applications. A scene (i.e., a unit for changing the measurement flow) is created by registering the processing items as units.

Term		Definition
scene		<p>A unit for changing the measurement flow that consists of a combination of processing items. "Scene" is used because of the correspondence to the scene (i.e., type of measurement object and inspection contents) where measurements are performed.</p> <p>A scene is created for each measurement or measurement contents.</p> <p>You can easily achieve a changeover simply by changing the scene when the measurement object or inspection content changes.</p> <p>Normally you can set up to 128 scenes. If you need more than 128 scenes, you can separate them into different groups or use the Conversion Scene Group Data Tool to create a scene group that contains over 128 scenes.</p>
processing unit (abbreviated as "unit")		<p>A processing item that is registered in a scene.</p> <p>Numbers are assigned to processing units in order from the top and they are executed in that order.</p> <p>Processing items are registered for the processing units to create a scene (i.e., a unit for changing the measurement flow).</p>
measurement trigger		<p>A trigger for executing measurements.</p> <p>With a parallel interface, the STEP signal or command 00 (Continuous Measurement) is used. With a serial interface, an Execute One Measurement or a Start Continuous Measurement command is used.</p>
test measurement		<p>A measurement that is performed to manually test (check) measurements under the conditions that are set in the currently displayed scene.</p> <p>Test measurements can be executed on an Adjustment Window. Processing is completed inside the Controller and the measurement results are not normally output on an external interface.</p> <p>However, you can select [Output] in [Test measurement] to output the measurement results after executing measurements.</p>
single measurement		A measurement that is executed only once in synchronization with the trigger input.
continuous measurement		Measurements are executed repeatedly and automatically without a trigger input.
operation modes	Double Speed Multi-input	A mode that processes the measurement flow for the first trigger and then processes the measurement flow in parallel for the second trigger to achieve a high-speed trigger input interval. It is used together with the multi-input function.
	Multi-line Random-trigger	<p>A trigger mode that allows you to independently processing multiple measurement flows.</p> <p>With traditional image processing, two or more triggers cannot be acknowledged at the same time.</p> <p>In Multi-line Random-trigger Mode, you can randomly input multiple triggers into one Controller to independently process multiple scenes in parallel.</p>
	Non-stop Adjustment	A mode that allows you to adjust the flow and set parameters while performing measurements. The enables adjustments without stopping the line or stopping inspections.
	Standard	<p>A logging mode that allows complete parallel processing of measurements and logging.</p> <p>Traditionally, logging was not possible while processing measurements. Either measurements or logging had to be given priority and the other one had to wait.</p> <p>With this mode, you can save the measurement images in external memory without affecting the transaction time.</p>
parallel processing (an option for any of the above operation modes)		<p>Parallel processing splits part of the measurement flow into two or more tasks, and processes each task in parallel to shorten the transaction time.</p> <p>Processing items for parallel processing are used so that the user can specify the required parallel processing.</p>
multi-input function		<p>A function that is used to consecutively and quickly input images.</p> <p>It allows the next STEP signal to be acknowledged as soon as the image input processing is completed. There is no need to wait for measurement processing to be completed.</p> <p>You can check whether image input processing has been completed with the status of the READY signal. Even if the READY signal is ON when measurement processing is being executed, the next STEP signal can be acknowledged.</p>

Term	Definition
Position compensation	<p>When the location and direction of measured objects are not fixed, the positional deviation between reference position and current position is calculated and measurement is performed after correcting.</p> <p>Please select processing items that are appropriate to the measurement object from processing items that are related to position compensation.</p> <ul style="list-style-type: none"> <li>●Reference position Measurement area and objects to be measured are correctly aligned.</li> </ul>  <ul style="list-style-type: none"> <li>●When position of object to be measured is deflected Object to be measured overflows Measurement area.</li> </ul>  <p>When position deflection correction is set in advance:</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Measurement will be carried out after moving the image for a corresponding deflection and returning to the reference position.</p>  <p>Measurement will be carried out after measured object enters into Measurement area.</p> </div> <div style="text-align: center;"> <p>Measurement will be carried out after moving the Measurement area for a corresponding deflection.</p>  </div> </div>
Reference position	The point that is always the reference. If the location of the registered model is different from the reference position, the setting should be changed in [Ref. setting].
Model	The image pattern that serves as the inspection target. Characteristics portions are extracted from images of the object and registered as model registration.

Term	Definition
2's complement	<p>Binary numbers are generally used to represent negative numbers.            Negative numbers are expressed by "Inverting all bits of a positive number and adding 1 to the result".            (Example) "-1" is expressed as 2's complement            "-1" can be calculated by "0-1".</p> <p>(In the case of 1, minus 1)</p> $\begin{array}{r} \square 00000000 (= 0) \\ -) 00000001 (= 1) \\ \hline 11111111 (= -1) \end{array} \leftarrow \text{"-1" is expressed with 2's Complement (for 8 bits)}$ <p>There are methods for simple calculation without performing this kind of computation.            For instance, "Negative number = inverting all bits of a positive number and then adding 1 to the result".</p> $\begin{array}{l} 00000001 (= 1) \\ \downarrow \text{Invert all bits} \\ 11111110 \\ \downarrow \text{Plus 1} \\ \boxed{11111111} (= -1) \end{array}$ <p>The first digit is used to judge whether the number is positive or negative.</p> <ul style="list-style-type: none"> <li>• When 0: Positive number (or 0)</li> <li>• When 1: Negative number</li> </ul> <p>The advantage of two's complement numbers is that positive and negative numbers can be used as is in calculations.            (Example) When <math>-1+10=9</math></p> $\begin{array}{r} 11111111 (= -1) \\ +) 00001010 (= 10) \\ \hline 00001001 (= 9) \end{array}$

# Contents

Structure of FH/FZ5 Manuals .....	1
Conventions Used in This Manual .....	2
Definitions of Basic Terms .....	3
Terms and Conditions Agreement .....	13
Safety Precautions .....	15
Precautions for Safe Use .....	18
Precautions for Correct Use .....	21
Regulations and Standards .....	24
<b>1. Before Operation .....</b>	<b>27</b>
Overview .....	28
Basic Mechanism for Measurements .....	28
Support for a Variety of Scenes and Measurement Lines .....	29
Flow of Application .....	31
Windows .....	33
Types of Windows .....	33
Overview of Window Navigation .....	34
Main Window (Layout 0): Adjustment Window (Default) .....	35
Main Window (Layout 1): Run Window (Default) .....	41
Menu List .....	42
Checking the System Configuration .....	44
System Configuration .....	44
Functional Comparison between the FH-series and FZ5-series Controllers .....	45
Saving Settings before Turning OFF the Power and Restarting .....	50
Restarting the Controller: [System Restart] .....	50
Turning OFF the LCD .....	51
Accuracy .....	52
Initializing the Controller .....	53
Initializing the Controller: [System initialization] .....	53
<b>2. Setting Scenes (Measurement Flows) .....</b>	<b>55</b>
What Is a Scene? .....	56
Example of a Scene .....	57
What Is a Scene Group? .....	59
Creating a Scene .....	60
Editing Processing Units in Scenes .....	61
Displaying and Checking Processing Branches in a Scene .....	64
Changing the Scene or Scene Group .....	68
Changing the Scene .....	68
Changing Scene Groups .....	68
Editing Scenes .....	70
Copying Scenes .....	70
Deleting Scenes .....	70
Renaming a Scene and Adding a Description .....	71
Editing Scene Groups .....	72
Copying and Deleting Scene Groups .....	72
Changing the Scene Group Name .....	73

<b>3. Performing Test Measurement/Starting Operation .....</b>	<b>75</b>
Adjustment Windows and Run Windows .....	76
Main Window (Layout 0): Adjustment Window (Default) .....	76
Main Window (Layout 1): Run Window (Default) .....	77
Main Window (Layout 1): Changing to the Run Window .....	77
Main Window (Layout 0): Changing to the Adjustment Window .....	77
Preparing the Controller and Cameras .....	78
Camera Setup .....	78
Preparing a Controller .....	80
Adjusting the Camera .....	80
Executing Test Measurements .....	81
Key Points for Adjustment .....	82
Stabilizing Measurements .....	82
Shortening Processing Time .....	83
Arranging Windows .....	85
Arranging Window Elements (Layout Modification) .....	85
Setting the Behavior of Output Signals for Each Layout (Layout Settings) .....	100
Changing Layout Numbers in the Main Window .....	100
Troubleshooting .....	101
Arranging the Window Display .....	102
Changing the Image Mode and Other Display Contents .....	102
Custom Dialogs .....	105
Flow of Use .....	105
Custom Dialog Tool .....	106
Launching Your Custom Dialog Box .....	117
Useful Functions for Operation .....	118
Remeasuring Saved Images .....	118
Improving Adjustment Efficiency .....	119
Changing Judgement Conditions without Stopping Measurement .....	120
Changing Regions as a Batch [Shift area] .....	121
Monitoring Measurement Value Trends .....	122
Logging Measurement Values and Measurement Images .....	122
Analyzing Logged Data .....	134
Clearing Measurement Results .....	136
Clearing Saved Images .....	136
Capturing Screen Images .....	136
Checking the Memory Consumption and Percentage of Memory Used .....	138
Using the Operation Log .....	139
Operation Log Format .....	141
Saving Data to an External Device .....	142

<b>4. Using Tools .....</b>	<b>145</b>
Limiting user operations (Security settings) .....	146
Setting Accounts (Account List) .....	146
Setting Layout Restrictions .....	148
Setting User Group Operation Restrictions .....	149
Saving/Loading/Deleting the Security Settings .....	151
Changing between user accounts .....	157
Logging in .....	157
Logging Out .....	157
Saving Scene groups in external memory (Scene Group Saving Destination settings) .....	158
Analyzing inspection and measurement results (NG analyzer) .....	160
Layout of NG Analyzer Window .....	161
Using Method of NG Analyzer .....	162
Sharing data within the controller (User data tool) .....	165
Setting Procedure for User Data .....	165
Outputting a List of Scene Data Set Values (Settings download and upload tools) .....	167
Downloading Set Values .....	167
About Downloaded CSV Files .....	167
Uploading Set Values .....	169
Saving Image files to a RAMDisk, or External memory device (Image file save) .....	170
Managing images used for model registration and reference (Registered Image Manager) .....	172
Registering Images .....	172
Loading an Image .....	173
Customizing communication commands (Communication command macro) .....	174
Displaying a measurement flow as a flowchart while editing it (Flow viewer) .....	175
Verifying calibration results (Calibration support tool) .....	176
Updating the referenced position data for a unit in the measurement flow (Update standard position tool)	
177	
Increasing the number of scenes in a group to more than 128 scenes (Conversion scene group data tool)	
179	
Create a customized settings dialog box (Custom dialog tool) .....	182
Extending the functions in a measurement flow, or scene (Scene Control Macro Tool) .....	183
Backing up Sensor Controller setting data (Configuration copy) .....	184
Before backing up .....	184
Backing up Sensor Controller settings .....	186
Restoring settings with saved settings data .....	196
Troubleshooting .....	199
Changing settings for each line in Multi-line Random-trigger mode (Line Maintenance) .....	201
Before use of Line Maintenance .....	201
Line Maintenance tool operations .....	204
Operating with Functional Limitations .....	211
Troubleshooting .....	215
Remotely operating the controller (Remote Operation) .....	216
Overview .....	216
Operation Environment Condition .....	217
How to Start .....	219

<b>5. Saving Data to the FH series/FZ5 series .....</b>	<b>223</b>
Saving Data to the FH series/FZ5 series .....	224
About Saving Areas .....	224
External Drive Names .....	225
Using External Memory Devices (FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series only) ...	226
Shared folder on a computer connected to the network .....	226
Saving Settings Data to the Flash Memory and Restarting .....	227
Saving Settings Data to the Controller RAMDisk or an External Memory Device .....	228
Saving Logged Images in the Controller Memory (RAM) to a RAMDisk or an External Memory Device ....	229
Copying or Moving Files between the Controller RAMDisk and an External Memory Device .....	230
Loading Settings Data from the Controller RAMDisk or an External Memory Device to the Sensor Controller	231
<b>6. Changing the System Environment .....</b>	<b>233</b>
Setting the Camera Conditions .....	234
Checking the Camera Connections: [Camera Connection] .....	234
Setting the Trigger Delay: [Inter-camera setting] .....	234
Setting the SHTOUT Signal: [Output Signal Settings] .....	237
Setting the Conditions That Are Related to Operation during Measurement .....	239
Setting the Operation Mode .....	240
Selection Guide for Operation mode .....	241
Double Speed Multi-input .....	242
Multi-line Random-trigger Mode .....	246
Non-stop Adjustment Mode .....	252
Standard (Operation Mode) .....	254
Parallel Processing .....	255
Parallel Processing Settings (Automatic Parallelization) .....	255
Parallel Processing Settings (Manual Parallelization) .....	255
Specific Example of Parallel Processing .....	257
Restrictions .....	258
Setting Procedures .....	261
Multi-trigger Imaging Processing Function .....	265
Settings for Multi-trigger Imaging .....	266
Restrictions .....	268
Setting Methods .....	269
About Multi-input function (Multi-trigger Imaging) .....	273
Troubleshooting .....	278
Setting the Operating Environment of the System .....	279
Selecting Language [Startup Settings] .....	279
Setting the Status at Startup [Startup Settings] .....	280
Setting Communication [Startup Settings] .....	282
Setting Operation mode [Startup Settings] .....	286
Date-time setting [Other] .....	287
Fan control setting [Other] .....	287
STEP setting [Other] .....	288
Encoder trigger setting [Other] .....	289
Network drive setting [Other] .....	291
Error Setting [Other] .....	293
Checking System Information [System Information] .....	295



<b>7. Appendices</b> .....	<b>299</b>
Alignment .....	300
Overview .....	300
Execution of Calibration .....	303
Troubleshooting .....	310
Alignment .....	311
Alignment Processing Items .....	318
Error Messages and Troubleshooting .....	319
FAQ .....	325
During Start-up .....	325
During Operation .....	326
For Measurement .....	327
About Parallel Interface .....	328
Serial Interface (RS-232C/422 Connection) .....	329
Camera with Lighting Controller .....	329
Measurement Mechanism .....	330
Color Processing Mechanism .....	330
Search Processing Mechanism .....	331
Edge Detection Measurement .....	334
Defect Detection Measurement .....	337
Handling Coordinates .....	338
Basic Knowledge about Operations .....	339
Inputting Values .....	339
Inputting Text .....	339
Selecting Files and Folders .....	340
Available Operations in Select File Window .....	342
Using the Zoom Function .....	343
Setting Figures .....	344
Layout of Figure Setting Area .....	344
Setting Methods .....	345
About OR Setting/NOT Setting .....	351
Image file .....	352
About Number of Logging Images .....	355
About Limits on the Number of Image Input Processing Items Used .....	358
About Max. Number of Loading Images during Multi-input .....	359
Character Code Table .....	360
About Memories Usable with FH series/FZ5 series .....	361
Memory Usage Guidance For Processing Items .....	362
Memory Display Image on PLC I/O .....	367
Operation log input information list .....	369
Manual Revision History .....	382

MEMO

# Terms and Conditions Agreement

## Warranty, Limitations of Liability

### ● Warranties

#### Exclusive Warranty

Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

#### Limitations

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right.

#### Buyer Remedy

Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.

See <http://www.omron.com/global/> or contact your Omron representative for published information.

### ● Limitation on Liability; Etc

OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

## Application Considerations

---

### Suitability of Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

### Programmable Products

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

## Disclaimers

---

### Performance Data

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

### Change in Specifications

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.


### Errors and Omissions


Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

## Safety Precautions

### ● Symbols and the meanings for safety precautions described in this manual.








In order for the product to be used safely, the following indications are used in this book to draw your attention to the cautions. The cautions with the indications describe the important contents for safety.

 <b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.
--	--

 <b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.
--	--

### ● Meanings of Alert Symbols

The following alert symbols are used in this manual.

	The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do.
	<b>General Prohibition</b> Indicates general prohibitions, including warnings, for which there is no specific symbol.
	<b>General Caution</b> Indicates general cautions, including warnings, for which there is no specific symbol.
	<b>Electrical Hazard</b> Indicates the possible danger of electric shock under specific conditions.
	<b>Explosion Hazard</b> Indicates the possible danger of explosion under specific conditions.
	<b>Laser Radiation Hazard</b> Indicates the possible danger of laser radiation or light.
	<b>High Temperature Caution</b> Indicates the possible danger of injury by high temperature under specific conditions.

## ● Alert statements in this Manual

The following alert statements apply to the products in this manual. Each alert statement also appears at the locations needed in this manual to attract your attention.



### Anti-virus protection

Install the latest commercial-quality antivirus software on the computer connected to the control system and maintain to keep the software up-to-date.



### Security measures to prevent unauthorized access

Take the following measures to prevent unauthorized access to our products.

- Install physical controls so that only authorized personnel can access control systems and equipment.
- Reduce connections to control systems and equipment via networks to prevent access from untrusted devices.
- Set strong passwords and change them frequently.
- Scan virus to ensure safety of USB drives or other external storages before connecting them to control systems and equipment.



### Data input and output protection

Validate backups and ranges to cope with unintentional modification of input/output data to control systems and equipment.

- Checking the scope of data
- Checking validity of backups and preparing data for restore in case of falsification and abnormalities
- Safety design, such as emergency shutdown and fail-soft operation in case of data tampering and abnormalities



### Data recovery

Backup data and keep the data up-to-date periodically to prepare for data loss.



When using an intranet environment through a global address, connecting to an unauthorized terminal such as a SCADA, HMI or to an unauthorized server may result in network security issues such as spoofing and tampering.

You must take sufficient measures such as restricting access to the terminal, using a terminal equipped with a secure function, and locking the installation area by yourself.



When constructing an intranet, communication failure may occur due to cable disconnection or the influence of unauthorized network equipment.

Take adequate measures, such as restricting physical access to network devices, by means such as locking the installation area.



When using a device equipped with the USB flash drive or SD Memory Card function, there is a security risk that a third party may acquire, alter, or replace the files and data in the removable media by removing the removable media or unmounting the removable media.

Please take sufficient measures, such as restricting physical access to the Controller or taking appropriate management measures for removable media, by means of locking the installation area, entrance management, etc., by yourself.



This product must be used according to this manual or Instruction sheet.

Failure to observe this may result in impairment of functions and performance of the product.



This product is not designed or rated for ensuring safety of persons. Do not use it for such purposes.



Never connect the AC power supply with this product.

When the AC power supply is connected, it causes the electric shock and a fire.



## WARNING

A lithium battery is built into the Controller and may occasionally combust, explode, or burn if not treated properly. Dispose of the Controller as industrial waste, and never disassemble, apply pressure that would deform, heat to 100°C or higher, or incinerate the Controller.



Since camera that can be connected with this product emits a visible light that may have an adverse effect on the eyes, do not stare directly into the light emitted from the LED. If a specular object is used, take care not to allow reflected light enter your eyes.



Do not touch the terminals while the power supply is ON. Doing so may result in electrical shock.



Please take external safety measures so that the system as a whole should be on the safe side even if a failure of a Sensor Controller or an error due to an external factor occurred. An abnormal operation may result in serious accident.



Please take fail-safe measures on your side in preparation for an abnormal signal due to signal conductor disconnection and/or momentary power interruption. An abnormal operation may result in a serious accident.



## CAUTION

Danger of burns. Do not touch the case while the LED is ON or just after power is turned OFF, since it remains extremely hot.



## Precautions for Safe Use

### ● Condition of the fitness of OMRON products

- Please do not use this product to directly or indirectly use to detect the human body for the purpose of ensuring the safety. In the same application, please use the safety sensor that is published on our sensor catalog.
- Omron products are designed and manufactured as general-purpose products for use in general industrial applications. They are not intended to be used in the following critical applications. If you are using Omron products in the following applications, Omron shall not provide any warranty for such Omron products, unless otherwise specifically agreed or unless the specific applications are intended by Omron.
  - (a) Applications with stringent safety requirements, including but not limited to nuclear power control equipment, combustion equipment, aerospace equipment, railway equipment, elevator/lift equipment, amusement park equipment, medical equipment, safety devices and other applications that could cause danger/harm to people's body and life.
  - (b) Applications that require high reliability, including but not limited to supply systems for gas, water and electricity, etc., 24 hour continuous operating systems, financial settlement systems and other applications that handle rights and property.
  - (c) Applications under severe condition or in severe environment, including but not limited to outdoor equipment, equipment exposed to chemical contamination, equipment exposed to electromagnetic interference and equipment exposed to vibration and shocks
  - (d) Applications under conditions and environment not described in specifications

\*1 In addition to the applications listed from (a) to (d) above, Omron products (see definition) are not intended for use in vehicles designed human transport (including two wheel vehicles). Please do NOT use Omron products for vehicles designed human transport. Please contact the Omron sales staff for information on our automotive line of products.

\*2 The above is part of the Terms and Conditions Agreement. Please use carefully read the contents of the guarantee and disclaimers described in our latest version of the catalog, data sheets and manuals.

### ● Installation Environment

- Do not use the product in areas where flammable or explosive gases are present.
- Install the product so that air can flow freely through its cooling vents.
- Clean the ventilation holes and fan outlet regularly to prevent dust and particles from clogging them. If they are blocked, heat is trapped inside, causing a malfunction.
- Do not install the product close to high-voltage devices and power devices in order to secure the safety of operation and maintenance.
- Make sure to tighten all installation screws securely.
- When mounting the Sensor Controller using the DIN rail mounting bracket, make sure the screw is tightened.
- Make sure to mount the product on DIN-rail securely.



## ● Power Supply and Wiring

- Make sure to use the product with the power supply voltage specified by this manual or Instruction sheet.
- Do not connect AC power source to Sensor Controller. If connects AC power source, it might be a cause of the failure.
- Use the wire of a suitable size (AWG 16 to 12) according to the current consumption.
- Use a DC power supply with safety measures against high-voltage spikes (safety extra low-voltage circuits on the secondary side).
- Do the following confirmations again before turning on the power supply.
  - Is the voltage and polarity of the power supply correct? (24 VDC)
  - Is not the load of the output signal short-circuited?
  - Is the load current of the output signal appropriate?
  - Is not the mistake found in wiring?
  - Is the voltage and polarity of the encoder power (ENC0\_VDD/GND ENC1\_VDD/GND) supply? (5 VDC)

## ● Ground

- Make sure the power supply circuit of the FH Sensor Controller is insulated from the internal circuit. Refer to this manual or Instruction sheet.
- When the connected camera to Sensor Control comes packaged with a base, make sure to mount with the base. Since the enclosure of the camera main body made of metals is short-circuited with the internal circuit, the internal circuit might be short-circuited with FG if no base is used, so that failures or malfunctions may be caused.

Perform Class D grounding (with a grounding resistance of 100  $\Omega$  or less).  
Keep the ground line as short as possible by setting the grounding point as close as possible.  
Ground the FH Sensor Controller independently. If sharing the ground line with other devices or connecting it with a building beam, the Sensor Controller might be adversely effected.
- Check wiring again before turning on the FH Sensor Controller.
- Do not ground the plus (+) terminal when the FH series Sensor Controller is connected to the FH-SC12/ FH-SM12. Doing so may cause a short circuit of the internal circuit, resulting in a malfunction.

The internal circuit is possible to be given damage, it can be cause the failure.

  - FH-1000 series
  - FH-3000 series
  - FH-L series
- Do not ground the plus (+) terminal of the 24VDC power source when the FH series Sensor Controller is connected to the FH-MT12 with a USB cable. Doing so may cause a short circuit of the internal circuit, resulting in a malfunction.
  - FH-1000 series
  - FH-3000 series
  - FH-L series

## ● Other

- Use only the camera and cables designed specifically for the product. Use of other products may result in malfunction or damage of the product.
- Always turn OFF the power of the Sensor Controller and peripheral devices before connecting or disconnecting a camera or cable. Connecting the cable with power supplied may result in damage of the camera or peripheral devices.
- For the cable that is flexed repeatedly, use the robotic cable type (Bend resistant camera cable) to prevent damages.
- Do not apply torsion stress to the cable. It may damage the cable.
- Secure the minimum bending radius of the cable. Otherwise the cable may be damaged.
- Do not attempt to dismantle, repair, or modify the product.
- Should you notice any abnormalities, immediately stop use, turn OFF the power supply, and contact your OMRON representative.
- Illumination is normal immediately after the power supply is turned ON. Do not look directly into the illumination light.
- While the power is ON or immediately after the power is turned OFF, the Sensor Controller and camera case are still hot. Do not touch the case.
- When disposing of the product, treat it as an industrial waste.
- Do not drop the product nor apply excessive vibration or shock to the product. Doing so may cause malfunction or burning.
- This product is heavy. Be careful not to drop it while handling.
- A lithium battery is incorporated, so a severe injury may rarely occur due to ignition or explosion.
- Be sure to take fail-safe measures externally when controlling stages and robots by using the measurement results of the Sensor Controller (axis movement output by calibration and alignment measurement).

## Precautions for Correct Use

### ● Installation and Storage Sites for FH-1000 series/FH-3000 series/FZ5-1100 series/FZ5-1200 series/FZ5-600 series/FZ5-800 series/FZ5-L series

Install and store the product in a location that meets the following conditions:

- Surrounding temperature of 0 to +50°C
- No rapid changes in temperature (place where dew does not form)
- Relative humidity of between 35 to 85%
- No presence of corrosive or flammable gases
- Place free of dust, salts and iron particles
- Place free of vibration and shock
- Place out of direct sunlight
- Place where it will not come into contact with water, oils or chemicals

### ● Installation and Storage Sites for FH-L series

Install and store the product in a location that meets the following conditions:

- Surrounding temperature of 0 to +55°C (-25 to +70°C in storage)
- No rapid changes in temperature (place where dew does not form)
- Relative humidity of between 10 to 90%
- No presence of corrosive or flammable gases
- Place free of dust, salts and iron particles
- Place free of vibration and shock
- Place out of direct sunlight
- Place where it will not come into contact with water, oils or chemicals
- Place not affected by strong electro-magnetic waves
- Place not near to high-voltage, or high-power equipment

### ● Orientation of Product

- For good heat dissipation, install the product only in the position written this manual or Instruction sheet so as not to block the ventilation holes.

### ● Ambient Temperature

- For good heat dissipation, keep the distance written this manual or Instruction sheet.
- Do not install the product immediately above significant heat sources, such as heaters, transformers, or large-capacity resistors.
- Do not let the ambient temperature exceed an operating temperature range.
- Provide a forced-air fan cooling or air conditioning if the ambient temperature is near the upper range of operating temperature range so that the ambient temperature never exceeds the upper range of operating temperature range.

### ● Noise Resistance

- Do not install the product in a cabinet containing high-voltage equipment.
- Do not install the Sensor Controller within 200 mm of power cables.

## ● Component Installation and Handling

- Touching Signal Lines  
To prevent damage from static electricity, use a wrist strap or another device for preventing electrostatic discharges when touching terminals or signal lines in connectors.
- Handling a USB flash drive/SD memory card.  
Refer to *Using External Memory Device* in the *Vision System FH/FZ5 series User's Manual* (Cat. No. W365).
- Do not insert an SD memory card in the reverse orientation, at an angle, or in a twisting manner.  
Before removing a USB flash drive or SD memory card, make sure that data is not being read or written to them.  
For a USB flash drive, the memory device's LED flashes while data is being read or written. Make sure that the LED stops flashing before removing the memory device.  
For an SD memory card, the SD BUSY LED of Sensor Controller flashes while data is being read or written. Make sure that the LED stops flashing before removing the card.
- Turning OFF the Power  
When a message is displayed indicating that a task is in progress, do not turn OFF the power. Doing so causes the data in the memory to be corrupted, resulting in the product not operating properly upon the next start-up.  
When turns OFF, conform the followings proceedings have completed. and then operate again.
  - When saves using Sensor Controller:  
Confirm the save processing is completed and next operation is possible.
  - When saves using communication command:  
Intended command is completed. BUSY signal is turned OFF
- Setting of Power Source  
The power source need to be supplied from DC power source apparatus which is taken a save ultra-low voltage circuit: to protect high voltage.
- When you operate the touch panel monitor, please go at a single point touch operation. If you touch at the same time two or more points, the product will not be able to correctly recognize the touch position.
- Applying excessive force to the touch panel may scratch it, resulting in damage. Do not press the touch panel forcibly nor press it with any sharp object.

## ● Maintenance

- Turn OFF the power and ensure the safety before maintenance.
- Clean the lens with a lens-cleaning cloth or air brush.
- Lightly wipe off dirt with a soft cloth.
- Dirt on the image element must be removed using an air brush.
- Do not use thinners or benzene.
- To ensure safe access for operation and maintenance, separate the Sensor Controller as much as possible from high-voltage equipment and power machinery.

## ● Communication with High-order Device

- After confirming that this product is started up, communicate with the high-order device. When this product has started up, an indefinite signal may be output from the high-order interface. To avoid this problem, clear the receiving buffer of your device at initial operations.

## ● Fail-Safe Measures

- When controlling stages and robots using the measurement results from the Sensor Controller (axis movement output based on calibration and alignment measurement), always take fail-safe measures within the stage and robot systems, such as checking whether the data obtained from the measurement results is within the range of movement of the stages and robots.
- On a FH Sensor Controller side, supplementary use operations and branches of the Sensor Controller to configure a check flow such as “data should not be externally provide if the data is in a range from -XXXXX to XXXXX” based on the stage/robots range of movement.

## ● **Connecting the Sensor Controller and Monitor with a Switcher and Splitter**

- Do not use devices that make the Sensor Controller recognize the monitor again when switching operation is performed. Re-recognition process in switching operation has an effect such as a delay in measurement time.

## Regulations and Standards

### All Series

#### ● Using Product Outside Japan

This regulation applies to FH/FZ5 sensor controller and peripheral devices.

If you export (or provide a non-resident with) this product or a part of this product that falls under the category of goods (or technologies) specified by the Foreign Exchange and Foreign Trade Control Law as those which require permission or approval for export, you must obtain permission or approval or service transaction permission) pursuant to the law.

#### ● U.S. California Notice:

This product contains a lithium battery for which the following notice applies: Perchlorate Material - special handling may apply.

See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate)

#### ● Conformance to KC Standards

This regulation applies to FH/FZ5 sensor controller and peripheral devices.

Observe the following precaution if you use this product in Korea.

사 용 자 안 내 문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서  
가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Guidance for users

This product meets the electromagnetic compatibility requirements for business use. There is a risk of radio interference when this product is used in home.

#### ● WEEE Directive

Dispose of in accordance with WEEE Directive.



## FH-1000/FH-3000 series

---

### ● Conformance to EC/EU Directives

This regulation applies to FH-1000/FH-5000 series Sensor Controller and peripheral devices.

The FH-1000/FH-5000 series Sensor Controller is compliant with the standards below:

- EC Directive 2004/108/EC (Until April 19 2016) / EU Directive 2014/30/EU (After April 20 2016)  
EN61326-1  
Electromagnetic environment: Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
- Also, the following condition is applied to the immunity test of this product.
  - If the level of disturbance of the video is such that characters on the monitor are readable, the test is a pass.
- This product complies with EC/EU Directives. EMC-related performance of the OMRON devices that comply with EC/EU Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed.
- The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.
- If there is a need to respond to the EC / EU directive, please use by an analog RGB output.

### ● Conformance to UL Standards

This regulation applies to FH-1000 and FH-3000 series Sensor Controller and peripheral devices.

This product complies with UL Standards.

- UL508

## FH-L series

---

### ● Conformance to EC/EU Directives

This regulation applies to FH-L series Sensor Controller and peripheral devices.

The FH-L series Sensor Controller is compliant with the standards below:

- EC Directive 2004/108/EC (Until April 19 2016) / EU Directive 2014/30/EU (After April 20 2016)  
EN61326-1  
Electromagnetic environment: Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
- Also, the following condition is applied to the immunity test of this product.
  - If the level of disturbance of the video is such that characters on the monitor are readable, the test is a pass.
- This product complies with EC/EU Directives. EMC-related performance of the OMRON devices that comply with EC/EU Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed.
- The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.
- If there is a need to respond to the EC / EU directive, please use by an analog RGB output.

### ● Conformance to UL Standards

This regulation applies to FH-L series Sensor Controller and peripheral devices.

This product complies with CSA Standards.

- UL 61010-2-201

### ● Conformance to EC/EU Directives

This regulation applies to FZ5/FZ5-L series Sensor Controller and peripheral devices.

The FZ5/FZ5-L series Sensor Controller is compliant with the standards below:

- EC Directive 2004/108/EC (Until April 19 2016) / EU Directive 2014/30/EU (After April 20 2016)  
EN61326-1
- Electromagnetic environment: Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
- Also, the following condition is applied to the immunity test of this product.
  - If the level of disturbance of the video is such that characters on the monitor are readable, the test is a pass.
- This product complies with EC/EU Directives. EMC-related performance of the OMRON devices that comply with EC/EU Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed.
- The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

### ● Conformance to CSA Standards

This regulation applies to FZ5/FZ5-L Sensor Controller and peripheral devices.

This product complies with CSA Standards.

- CSA C22.2 No.61010-1



# Before Operation

---

This section describes the basic flow and preparations that are necessary to start operation.

<b>Overview</b> .....	<b>28</b>
<b>Flow of Application</b> .....	<b>31</b>
<b>Windows</b> .....	<b>33</b>
<b>Checking the System Configuration</b> .....	<b>44</b>
<b>Saving Settings before Turning OFF the Power and Restarting</b> .....	<b>50</b>
<b>Accuracy</b> .....	<b>52</b>
<b>Initializing the Controller</b> .....	<b>53</b>

# Overview

## Basic Mechanism for Measurements

An FH/FZ5-series Sensor Controller uses pre-built packages that contain all the processing tasks (for image input, measurement processing, displays, outputs, etc.) that are required for vision inspections.

You arrange these packaged processes in order of execution of the vision inspection.

An FH/FZ5-series Controller executes vision inspections according to user-created flows.

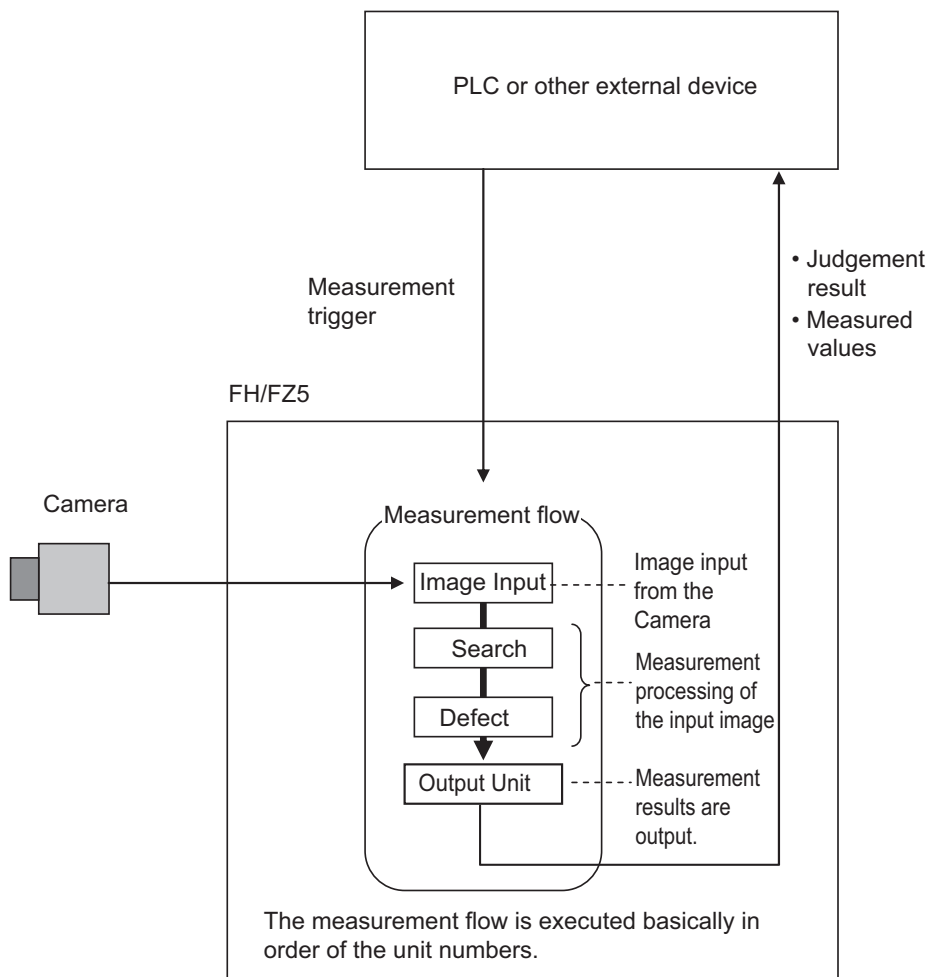
### Note

In the FH/FZ5, a flow that contains packaged processes that are arranged in order of execution of processing items and image processing is called a measurement flow.

Processing items and measurement flows can have more than one setting. You can switch the setting based on the scene to inspect. (Reference: ► Setting Scenes (Measurement Flows) (p.55))

## Concept of Measurement Processing

When the FH/FZ5 receives a measurement trigger from the PLC or other external device, the image input from a Camera, measurement processing, and output of measurement results (e.g., OK/NG judgement results) are executed in the order that those processing items are registered in the measurement flow.

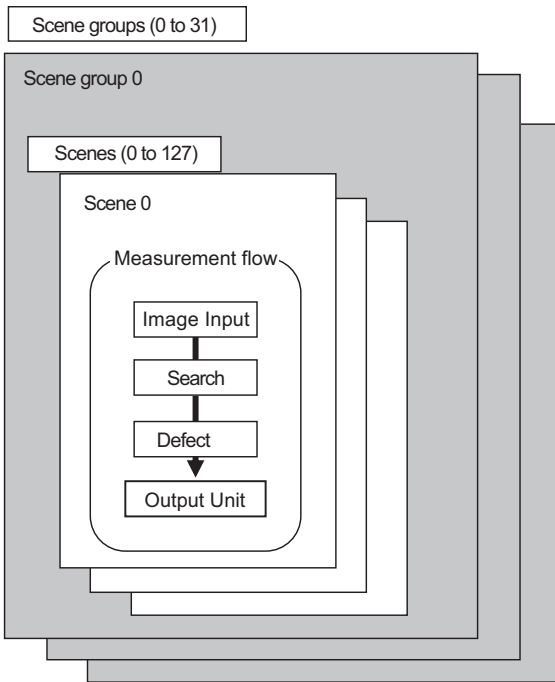


- In the measurement flow, you can change the processing to execute based on the inspection results or input conditions of the vision inspection.
- You can use macro processing to execute pre-packaged processing items and functions in the FH/FZ5 to create original programs. This allows you to create original measurement processes, display processing, input and output processing, and settings dialog boxes that are custom-tailored to your application.

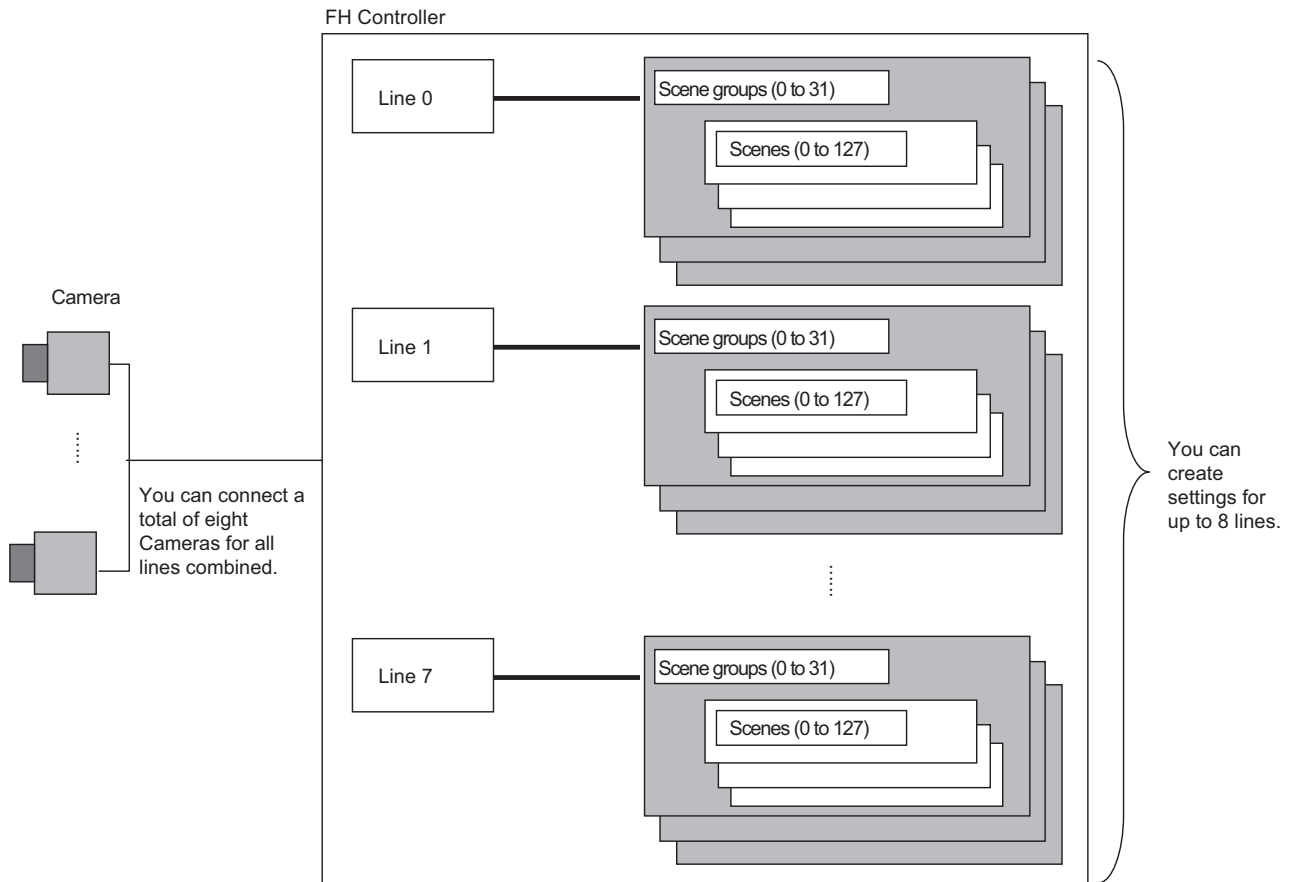
## Support for a Variety of Scenes and Measurement Lines

You can have more than one setting for a measurement flow, depending on the inspections. This is called a scene and you can set up to 128 scenes. (Reference: ▶ What Is a Scene? (p.56))

You can also combine more than one scene into a scene group. Management of scenes by scene groups increases the number of scenes that you can handle. (Reference: ▶ What Is a Scene Group? (p.59))



If you have more than one measurement line, the FH allows you to selectively execute up to eight measurement lines. This allows you to maintain settings for the scenes and scene groups for every line from 0 to 7. You can connect up to eight Cameras to the FH, (four for the FZ5), and selectively control each Camera. (Reference: ▶ Multi-line Random-trigger Mode (p.246))



# Flow of Application

The following table shows the flow for using the FH/FZ5.

Procedure	Description	Reference
Preparations	Installation and Wiring	Vision System FH/FZ5 Series Hardware Setup Manual (Cat. No. Z366) FH Instruction Manual FZ5 Instruction Manual
	↓	
	Turning ON Power	Vision System FH/FZ5 Series Hardware Setup Manual (Cat. No. Z366) FH Instruction Manual FZ5 Instruction Manual
	↓	
	Language Selection in Dialog Box (only when the Sensor Controller is started for the first time)	Reference: ▶ Selecting Language [Startup Settings] (p.279)
	↓	
	Main Window (Layout 0) Display	Reference: ▶ Adjustment Windows and Run Windows (p.76)
	↓	
	Camera Adjustments (Display the settings dialog box for a Camera Image Input processing item.)	Reference: ▶ Preparing the Controller and Cameras (p.78)
	↓	
	Select [Tool] – [System settings], and then under [Startup setting], set the settings for [Basic], [Communication], and [Operation mode].	Reference: ▶ Changing the System Environment (p.233)
	↓	
	Click the [Data save] button, and then select [Function] – [System restart].	Reference: ▶ Saving Settings before Turning OFF the Power and Restarting (p.50) Reference: ▶ Loading Settings Data from the Controller RAMDisk or an External Memory Device to the Sensor Controller (p.231)
	↓	
Select [Tool] – [System settings], and then set the settings for [Camera], [Communication] and [Other].	Reference: ▶ Changing the System Environment (p.233)	
↓		
Click the [Data save] button, and then select [Function] – [System restart].	Reference: ▶ Saving Settings before Turning OFF the Power and Restarting (p.50) Reference: ▶ Loading Settings Data from the Controller RAMDisk or an External Memory Device to the Sensor Controller (p.231)	

Procedure	Description	Reference
	↓	
Scene Editing	In the Main Window (layout 0), edit the measurement flow. <ul style="list-style-type: none"> <li>• Register processing items.</li> <li>• Set the properties for each processing item.</li> </ul>	Reference: ► Setting Scenes (Measurement Flows) (p.55)
	↓	
Scene Editing	Click the [Data save] button.	Reference: ► Saving Settings before Turning OFF the Power and Restarting (p.50) Reference: ► Loading Settings Data from the Controller RAMDisk or an External Memory Device to the Sensor Controller (p.231)
	↓	
Testing	Execute test measurements. (In the Main Window (layout 0), click the [Measure] button.)	Reference: ► Performing Test Measurement/Starting Operation (p.75)
	↓	
	Adjust the parameters for each processing item.	Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat. No. Z341)
	↓	
Testing	Click the [Data save] button.	Reference: ► Saving Settings before Turning OFF the Power and Restarting (p.50) Reference: ► Loading Settings Data from the Controller RAMDisk or an External Memory Device to the Sensor Controller (p.231)
	↓	
Measuring (Operation)	In the Main Window (layout 0), click the [Switch layout] button, and then select [Main Window (Layout 1)].	Reference: ► Performing Test Measurement/Starting Operation (p.75)
	↓	
	In the Main Window (layout 1), check the communications with the PLC.	Vision System FH/FZ5 Series User's Manual for Communications Settings (Cat. No. Z342)
	↓	
Measuring (Operation)	In the Main Window (layout 1), execute commands from the PLC, such as measurement trigger commands.	Vision System FH/FZ5 Series User's Manual for Communications Settings (Cat. No. Z342)
	↓	
Management and Analysis	Save and analyze measurement data and images.	Reference: ► Useful Functions for Operation (p.118) Reference: ► Using Tools (p.145)

## Types of Windows

There are 9 windows (with layout numbers 0 to 8) that you can use to set and operate an FH/FZ5.

Layout	Application
Layout 0	Layout 0 is the adjustment window by default. (Reference: ▶ Main Window (Layout 0): Adjustment Window (Default) (p.76))
Layout 1	Layout 1 is a run window by default. (Reference: ▶ Main Window (Layout 1): Run Window (Default) (p.77))
Layout 2 to layout 8	Layouts 2 to 8 are for user-defined purposes and are created as they are needed. (Reference: ▶ Arranging the Window Display (p.102)) For example, if more than one line is being controlled, you can set and use a separate window for each line. (Reference: ▶ Multi-line Random-trigger Mode (p.246))

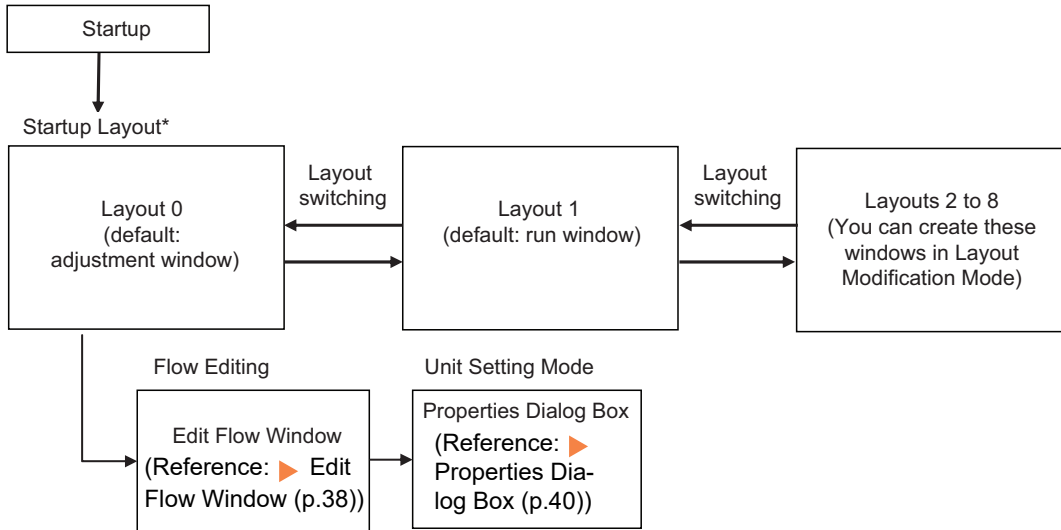
### Note

If necessary, you can change layout 0 and layout 1 from the default adjustment window and run window and use them for other purposes.

### IMPORTANT

If the operation mode is set to Multi-line Random-trigger Mode, you must create a layout for each line. (Reference: ▶ Multi-line Random-trigger Mode (p.246))

## Overview of Window Navigation



\* Select as follows: [System settings] – [Startup setting] – [Basic] tab – [Startup layout].  
Default: [Layout 0] (both local and remote)



## Main Window (Layout 0): Adjustment Window (Default)

You use this window to set up a measurement process and perform test measurements to confirm whether the measurements are processed as intended.

Based on the results of the test measurement, move to the property settings for each processing unit and make adjustments.

When the Main Window (layout 0) is being displayed, measurement results are not output and the RUN signal remains OFF. (Layout modification can be used to change the layout.)

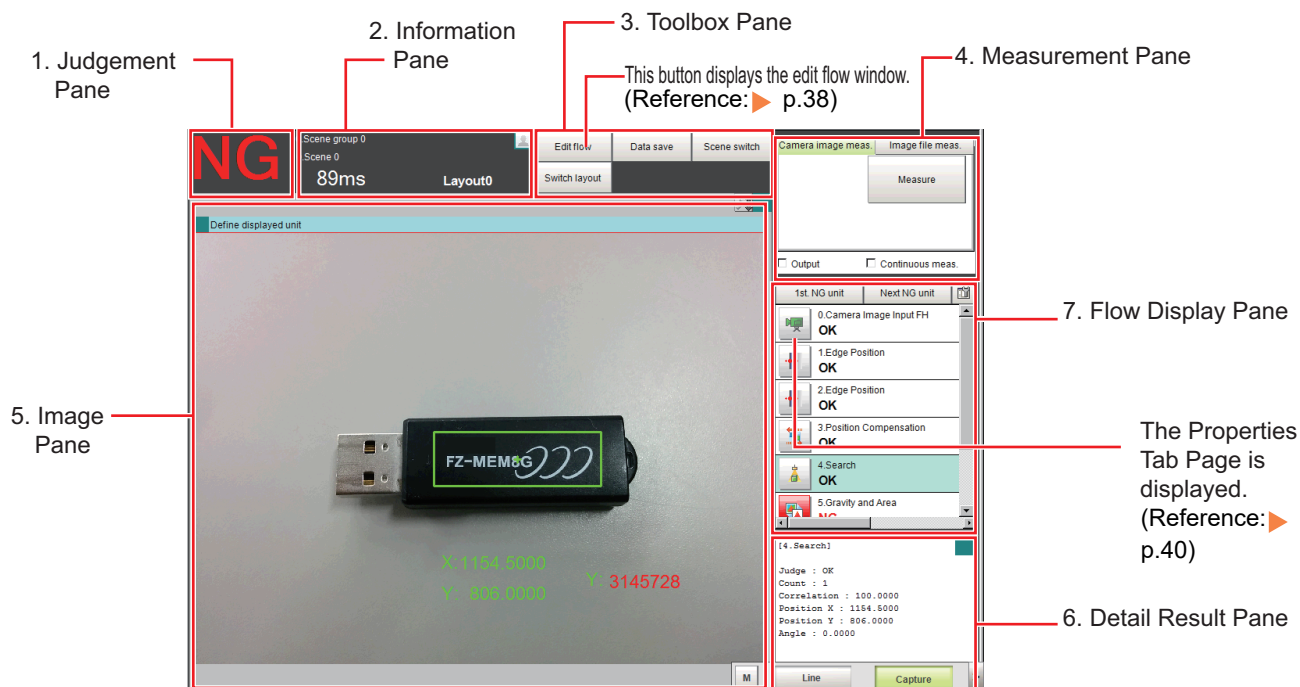
You can manually execute or stop test measurements.

If the measurement results are stable, switch to the Main Window (layout 1) and perform measurements.

### Note

Use the following procedure to change to Main Window (layout 1).  
Select [Switch layout] from the [Function] menu (default layout).

## Names of the Parts of the Main Window (Layout 0): Adjustment Window (Default)



### 1. Judgement Pane

#### • Overall Judgement Result

The overall judgment (OK/NG) for the scene is displayed.

This is the overall judgement result for the entire scene. If any processing unit that is reflected in the overall judgement returns NG, the overall result is NG.

\*1: The judgement results for individual processing units are displayed in the Detail Result Pane.

## 2. Information Pane

- **Layout:**  
The number of the currently display layout is displayed.
- **Processing time:**  
The time required for the measurement process is displayed.
- **Scene group name and scene name:**  
The scene group number and the scene number of the currently displayed scene are displayed.

## 3. Toolbox Pane

- **[Edit flow]:**  
This button starts the edit flow window that is used to edit flows. (Reference: ► Edit Flow Window (p.38))
- **[Data save]:**  
This saves settings data to the flash memory in the Controller. If you make any changes to the settings, make sure to click this button to save the settings.
- **[Switch scene]:**  
This button switches between scene groups and scenes:
- **[Switch layout]:**  
This button switches the layout number.

## 4. Measurement Pane

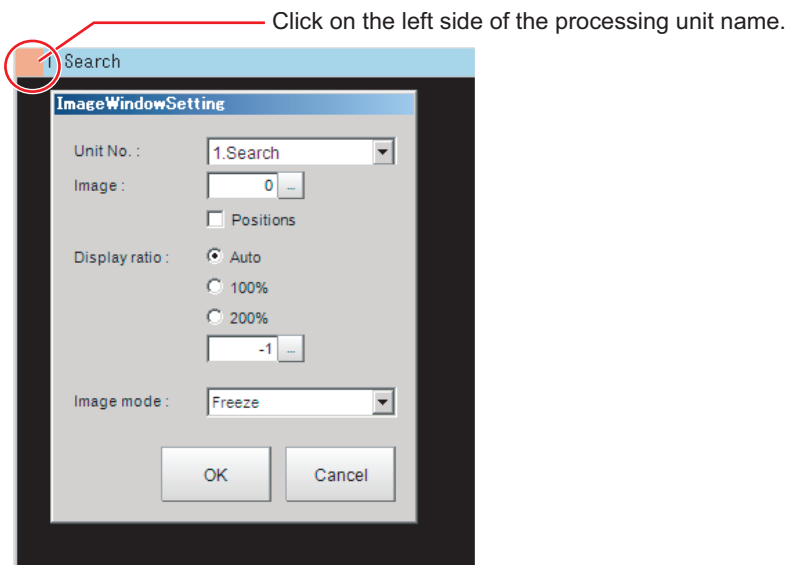
- **Camera image meas.:**  
This button performs a test measurement on the Camera image.
- **Image file meas.:**  
This button re-measures saved images.
- **Output:**  
Select this option to output the measurement results of test measurements that are performed in the Adjustment Window. Do not select this option if you need to perform test measurements on the Sensor Controller but do not need to output the results externally.  
This setting menu is used for temporary setting changes while the Main Window is displayed. When the scene or layout is changed, the "Output" setting in the Layout setup is applied without saving the "Output" setting in the Measurement Pane. Use as appropriate for your application.  
(Reference: ► Setting the Behavior of Output Signals for Each Layout (Layout Settings) (p.100))
- **Continuous meas.:**  
Select this option to continuously perform test measurements in the Adjustment Window.  
Select the [Continuous meas.] option and click [Measure] to repeatedly execute measurements.

## 5. Image Pane

This pane shows the measured image.

It also displays the selected processing unit name or the [Define displayed unit].

- Click on the left side of the processing unit name to display the Properties Dialog Box for the Image Pane.



On this dialog box, you can change the image mode and other contents that are displayed in the Image Display Pane.

(Reference: ▶ Changing the Image Mode and Other Display Contents (p.102))

- Click the upper corner of the Image Display Pane to display the [Add Image Window] button and [Alignment] button. This allows you to display more than one pane side by side.  
(Reference: ▶ Arranging Window Elements (Layout Modification) (p.85))

## 6. Detail Result Pane

This pane displays the results of test measurements.

The floating point number is rounded off to four digits after decimal point.

The floating point numbers that are saved as data will not be rounded off.

## 7. Flow Display Pane

This pane displays the contents of the measurement process (the processing that is set in the measurement flow).

Click the icon of any processing item to display the Properties Dialog Box to set processing item parameters and other settings. (Reference: ▶ Properties Dialog Box (p.40))

You can use the following buttons to move to the next processing unit with an NG judgement result.

[1st NG unit]: Moves to the first processing unit with an NG judgement.

[Next NG unit]: Moves to the next processing unit with an NG judgement.

[] "Property setting" button: Displays the property setting window of selected processing unit.

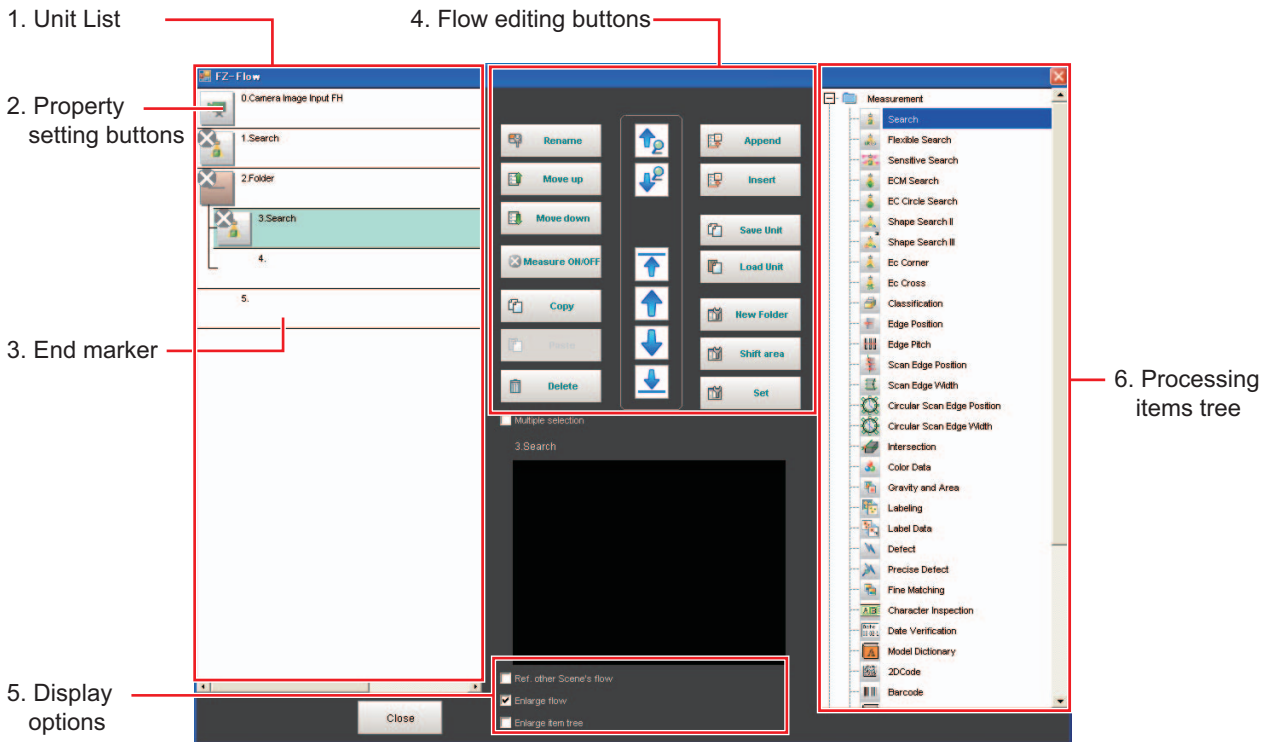
## Edit Flow Window

The edit flow window is used to create measurement flows. You use the edit buttons to arrange processing units in a scene, or to add or delete units.

The right side shows the processing items that can be used as parts in the measurement flow. The left side shows the scene as the measurement flow.

When a measurement trigger is input, processing is executed in sequence starting from the top of the measurement flow.

Click the button for any processing item that is set in the measurement flow, or click the [Set] button to open the Properties Dialog Box.



### 1. Unit List

The processing units included in the flow are displayed in a list.

You can create a flow for a scene by adding processing items to the unit list.

### 2. Property Setting Buttons

The Properties Dialog Box is displayed and allows you to make detailed settings.

### 3. End Marker

This marker indicates the end of the flow.

### 4. Flow Editing Buttons

You can use these buttons to change the order of processing units within the scene or to delete processing units.

(Reference: ► Editing Processing Units in Scenes (p.61))

### 5. Display Options

- **Enlarge flow**

When this option is selected, the Unit list flow (1) is displayed with large icons.

- **Enlarge item tree**

When this option is selected, the processing item tree (6) is displayed with large icons.

- **Ref. other Scene's flow**

When this option is selected, other scene flows within the same scene group can be referred to.

## 6. Processing Items Tree

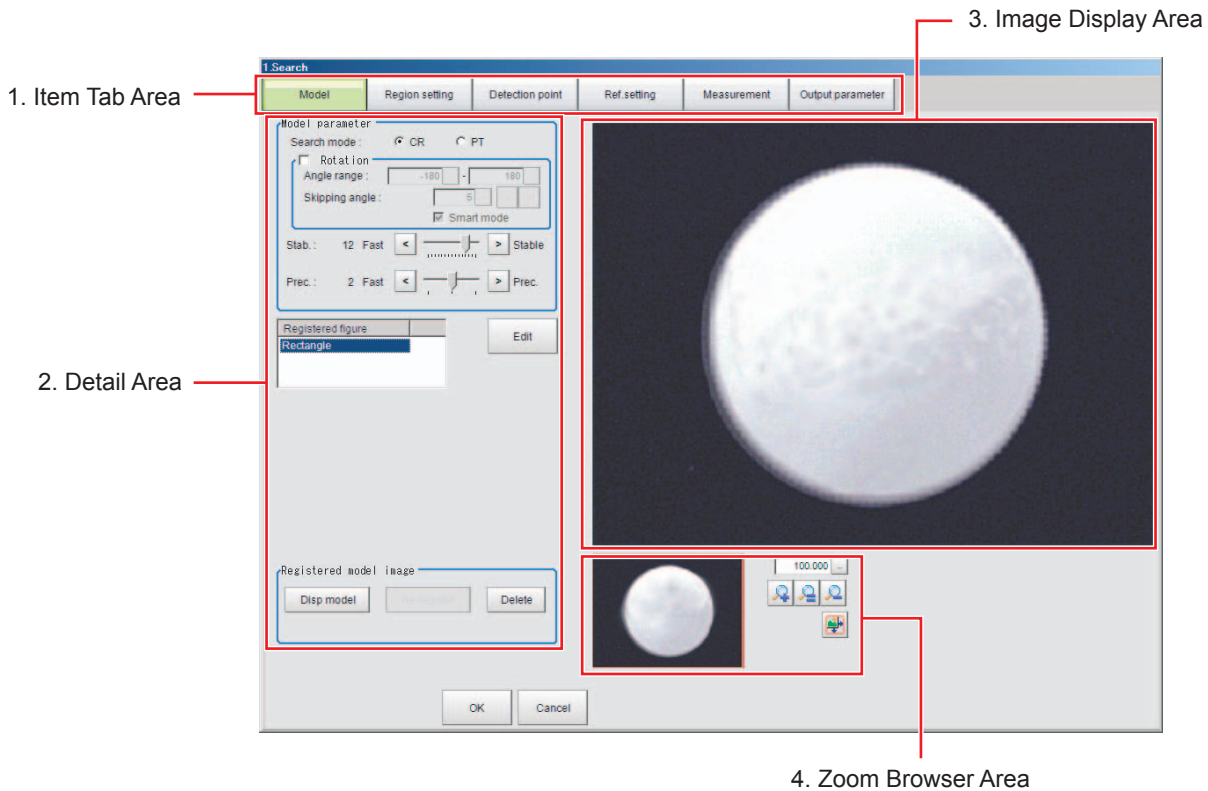
This area allows you to select an item to add to the flow. The items are displayed in tree format that is organized by type.

Click the [+] button for each item to display the lower level items. Click the [-] button for each item to hide the lower level items.

When [Ref.other Scene's flow] is selected, the scene select box and other scene flows are displayed.

## Properties Dialog Box

This dialog box is used to set measurement parameters, judgement conditions, and other conditions for processing items that are registered as processing units in the measurement flow.



### 1. Item Tab Area

The parameters for the processing unit that is currently being set are displayed. Settings are performed starting with the item on the left.

### 2. Detail Area

This area is used to set detail items.

### 3. Image Display Area

This area shows Camera images, figures, positions, and other graphic information.

### 4. Zoom Browser Area

Use this area to zoom in and out from the displayed image.

#### Note

You can use the zoom browser function using your mouse wheel on the image display area where is applied to the property setting window of FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series.

## Main Window (Layout 1): Run Window (Default)

This window is used to perform actual measurements. The measurement results are output through the communications interfaces.

If the Controller is ready to perform measurements, the RUN signal turns ON.

When this window is displayed, the FH/FZ5 is ready to perform measurements.

If a measurement trigger is input from an external device, the FH/FZ5 begins execution of measurement processing according to the contents and sequence that is set in the measurement flow.

### Note

Use the following procedure to change to Main Window (layout 0).  
Select [Switch layout] from the [Function] menu (default layout).

## Names of the Parts of the Main Window (Layout 1): Run Window (Default)

The functions of each display window are the same as for the Main Window (layout 0).

The Toolbox Pane and Measurement Pane that are displayed on the Main Window (layout 0) are not displayed.

(Layout modification can be used to change the layout.)

Judgement Pane (p.91) Information Pane (p.91)



## Menu List

The menu for the Main Window is described below.

Main menu	Command	Description	Reference
File	End	Exits the FH/FZ5 System. After you exit the system, restart the system or turn OFF the power supply.	---
Function	Measure	Executes a test measurement (single or continuous measurement), or a re-measurement.	Reference: ▶ Executing Test Measurements (p.81) Reference: ▶ Remeasuring Saved Images (p.118)
	Scene switch	This button switches between scene groups and scenes:	Reference: ▶ Changing the Scene or Scene Group (p.68)
	Scene maintenance	Used to copy, delete, and rename scenes and scene groups.	Reference: ▶ Editing Scenes (p.70) Reference: ▶ Editing Scene Groups (p.72)
	Edit flow	Used to edit measurement flows.	Reference: ▶ Editing Processing Units in Scenes (p.61)
	Switch layout	Changes the layout number to display.	Reference: ▶ Arranging Window Elements (Layout Modification) (p.85)
	Clear measurement	Clears the measurement data.	Reference: ▶ Clearing Measurement Results (p.136)
	Clear logging image	Clears the images that are logged in the Controller.	Reference: ▶ Clearing Saved Images (p.136)
	Screen capture	Captures the screen that is being displayed.	Reference: ▶ Capturing Screen Images (p.136)
	Saving last logging image	Logs the most recent input images that are being displayed.	Reference: ▶ Logging Measurement Values and Measurement Images (p.122)
	Data save	Saves settings data to the flash memory in the FH/FZ5.	Reference: ▶ Saving Settings before Turning OFF the Power and Restarting (p.50) Reference: ▶ Saving Data to the FH series/FZ5 series (p.223)
	Save to file	Saves the settings data, logged images, and logged data to a file. It also copies files between memory devices.	Reference: ▶ Saving Data to the FH series/FZ5 series (p.223)
	Load from file	Loads a settings file.	
	System initialization	Restores the Controller to the default settings.	Reference: ▶ Initializing the Controller (p.53)
	System restart	Restarts the Controller.	Reference: ▶ Saving Settings before Turning OFF the Power and Restarting (p.50) Reference: ▶ Saving Data to the FH series/FZ5 series (p.223)
Function	Transfer data	Transfers (copies) the settings for line 0 to line 1, and then changes to the Non-stop Adjustment Mode.	Reference: ▶ Non-stop Adjustment Mode (p.252)
	Non-stop data transfer	Transfers (copies) the settings for line 1 to line 0 in Non-stop Adjustment Mode without affecting measurements.	
	Operation log	Saves the operation log of the Controller to a special file.	Reference: ▶ Using the Operation Log (p.139)
	System information	Displays the Controller's model and software version.	Reference: ▶ Checking System Information [System Information] (p.295)



Main menu	Command	Description	Reference
Tool	NG analyzer	Used to analyze NG causes based on image data.	Reference: ► Analyzing inspection and measurement results (NG analyzer) (p.160)
	System settings	Sets settings that are related to the system environment of the Controller. Includes settings such as the startup settings, Camera settings, and communications settings.	Reference: ► Changing the System Environment (p.233)
	Security settings	Used to set accounts and limit access to the Controller.	Reference: ► Limiting user operations (Security settings) (p.146)
	User data tool	Sets the initial value for user data that can be shared across scenes and across scene groups.	Reference: ► Sharing data within the controller (User data tool) (p.165)
	Settings download and upload tools	Used to download and upload a list of set values for scene data as a CSV file.	Reference: ► Outputting a List of Scene Data Set Values (Settings download and upload tools) (p.167)
	Image file save	Saves logged images and image files that are saved in the Controller.	Reference: ► Saving Image files to a RAMDisk, or External memory device (Image file save) (p.170)
	Registered image Manager	Used to register the most recent input image, a logged image that is saved in the Controller, or an image file and load it as a measurement image.	Reference: ► Managing images used for model registration and reference (Registered Image Manager) (p.172)
	Customize I/O command	Creates a user-defined communications unit (i.e., a custom communications command) for the FH/FZ5 to execute in response to an input from the PLC or other external device.	Reference: ► Customizing communication commands (Communication command macro) (p.174)
	Flow Viewer	Shows the flow of processing for the measurement flow that is currently being edited.	Reference: ► Displaying a measurement flow as a flowchart while editing it (Flow viewer) (p.175)
	Calibration support tool	Graphically displays the relationship of the positions of the Camera coordinates and the actual coordinates.	Reference: ► Verifying calibration results (Calibration support tool) (p.176)
	Update standard position tool	Used to set or change the reference position for more than one processing unit that you specify in the measurement flow.	Reference: ► Updating the referenced position data for a unit in the measurement flow (Update standard position tool) (p.177)
	Conversion scene group data tool	Creates a scene group that has more than 129 scenes.	Reference: ► Increasing the number of scenes in a group to more than 128 scenes (Conversion scene group data tool) (p.179)
	Custom dialog tool	Used to create customized dialog boxes for setting processing items.	Reference: ► Custom Dialogs (p.105)
	Custom dialog	Displays a dialog box that is created with the custom dialog tool.	
	Tool	Scene Group Saving Destination Settings	Changes the location for saving scene group data to the sensor controller's memory or external storage.
Configuration copy		Saves and loads all the various settings data files saved in the Sensor Controller.	Reference: ► Backing up Sensor Controller setting data (Configuration copy) (p.184)
Line Maintenance		This tool can be used when using Multi-line random-trigger mode to copy settings data from one line to another line.	Reference: ► Changing settings for each line in Multi-line Random-trigger mode (Line Maintenance) (p.201)
Window	Layout modification	Used to change any layout from layout 0 to layout 8.	Reference: ► Arranging the Window Display (p.102)
	Layout setup	Sets whether to use the RUN signal output and external outputs for layouts 0 to 8.	

# Checking the System Configuration

## System Configuration

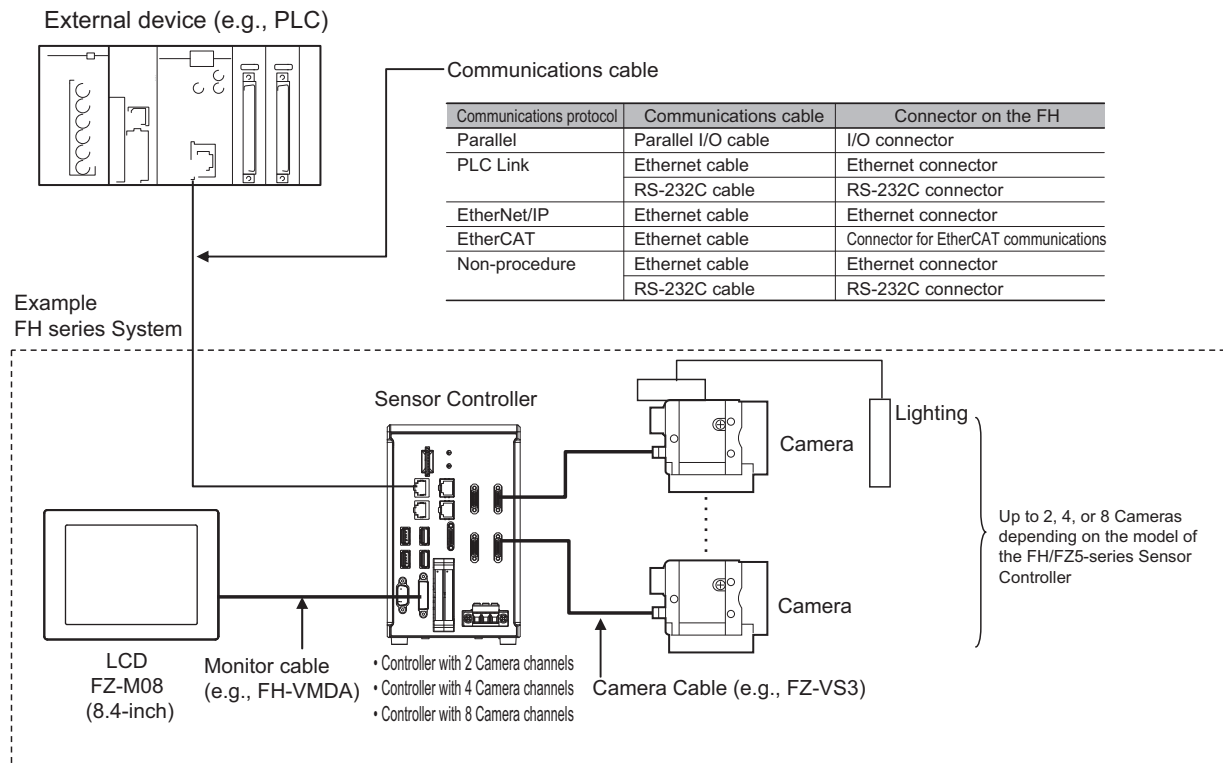
The FH/FZ5 is a Vision Sensor that uses a controller to process measurements of objects that are imaged with a Camera.

You connect an LCD for operations and monitoring, and various Cameras to the FH/FZ5-series Sensor Controller.

You connect external devices, such as a PLC or a computer, through a parallel, Ethernet, or RS-232C cable.

You can connect up to eight Cameras, depending on the model of the Controller.

To measure more than one line with a single Sensor Controller, you assign the Camera for the measurements to each line beforehand, and switch between Cameras during the measurement flow.



\*1. FZ-MEM2G or FZ-MEM8G USB flash drive is sold separately.

For details of the system configuration each series or basic configuration, refer to ► the *Vision System FH/FZ5 series Hardware Setup Manual* (Cat. No. Z366).

## Functional Comparison between the FH-series and FZ5-series Controllers

The following table shows the differences between the FH series and FZ5 series.

The fastest measurement speed is FH-3000 series.

The next speed is the following:

FH-3000 series > FH-1000 series > FZ5-1200 series > FZ5-800 series > FZ5-1100 series > FZ5-600 series > FH-L series > FZ5-L series.

Select the appropriate Sensor Controller series according to the application as below table.

### Principal Difference

Controller model Function	FH Series				
	FH-□050-20	FH-□050-10	FH-□050	FH-L□□□-10	FH-L□□□
Number of Camera connections	8 <sup>*2</sup>	4	2	4	2
Operation mode <sup>*1</sup>					
Single-line High-speed Mode	Yes			Yes	
High-speed Logging Mode	Yes			Yes	
Non-stop Adjustment Mode	Yes			Yes	
Multi-line Random-trigger Mode	Yes (Maximum 8 lines)			No	
Number of scenes (number of line process changes)	128 <sup>*3</sup>			128 <sup>*3</sup>	
Input interface					
EtherCAT	OK			---	
External memory					
USB flash drive	OK			OK	
SD memory card	OK			OK	
Sysmac Studio support	OK			---	
Menu languages	Japanese, English, Simplified Chinese, Traditional Chinese, Korean, German, French, Spanish, and Italian				
Monitor Interface	<ul style="list-style-type: none"> <li>• DVI connection (Recognize the recommended resolution automatically)</li> <li>• RGB connection (Resolution XGA 1024×768 dot)</li> </ul>				

\*1: Select the Operation mode for your application purpose.

For Operation mode, refer to the following:

Reference: ▶ Setting the Operation Mode (p.240)

\*2: When using the FH-SC12/FH-SM12, you can connect up to four cameras. Do not connect more than five cameras when using only the FH-SC12/FH-SM12. When connecting the FH-SC12/FH-SM12 for use with another camera model, you can connect up to four FH-SC12/FH-SM12 cameras and also connect up to four cameras of the other camera model, for a total of eight connected cameras.

\*3: The Conversion Scene Group Data Tool allows you to create a scene group of more than 129 scenes.

\*4: Nine languages are selectable in the [Language setting] dialog box under [System Settings], however, only Japanese, English, Simplified Chinese, and Traditional Chinese can be used. If a language other than these four languages is selected, the menus will appear in English. The menus will also appear in English if system data with set languages other than these four languages is loaded.

\*5: Output to an external monitor is disabled in the default settings.

If output to an external monitor is needed, contact your OMRON representative.

Controller model	FZ5 Series							
	FZ5-L35□-10 FZ5-6□□-10	FZ5-L35□ FZ5-6□□	FZ5-8 □□-10	FZ5-8 □□	FZ5-11 □□-10	FZ5-11 □□	FZ5-12 □□-10	FZ5-12 □□-10
Number of Camera connections	4	2	4	2	4	2	4	2
Operation mode *1								
Single-line High-speed Mode	Yes							
High-speed Logging Mode	Yes							
Non-stop Adjustment Mode	Yes							
Multi-line Random-trigger Mode	No	Yes (Maximum 2 lines)						
Number of scenes (number of line process changes)	128*2							
Input interface								
EtherCAT	---							
External memory								
USB flash drive	OK							
SD memory card	---							
Sysmac Studio support	---							
Menu languages	Japanese, English, Simplified Chinese, Traditional Chinese*3		Japanese, English, Simplified Chinese, Traditional Chinese, Korean, German, French, Spanish, Italian					
Monitor Interface	<ul style="list-style-type: none"> <li>FZ5-L35□/ FZ5-L35□-10: RGB (Resolution XGA 1024×768 dot)</li> <li>FZ5-6□□/ FZ5-6□□-10: LCD-Model Sensor controller*4</li> </ul>		LCD-Model Sensor controller	LCD-Model Sensor controller*4	LCD-Model Sensor controller			

\*1: The operation mode can be selected according to the intended use. For detailed information on Operation modes, refer to:  
▶ Setting the Operation Mode (p.240).

\*2: Using the Conversion Scene Group Data Tool, you can create scene group data with more than 129 scenes.

\*3: You can select 9 languages on the Language setting screen of the system setting, but only 4 languages can actually switch to the selected language. Menus for other languages are displayed in English. Also, when reading system data with languages other than these 4 languages set in the language setting, the menu will be displayed in English.

\*4: Use of external monitor output is not supported. [Factory Default]  
For customers requiring external monitor output, please contact our branch office.

## System Settings

Menu	Sub Menu	Tab	Group	Parameter	Sensor Controller's Model					
					FH series		FZ5 series			
					FH-1000 series FH-3000 series	FH-L series	FZ5-800 series FZ5-1100 series FZ5-1200 series	FZ-600 series	FZ5-L series	
Startup	Startup setting	Language Setting		Language	Yes	Yes	Yes	*1	*1	
		Basic	Relocate memories	Relocate memories	No*2	No*2	No*2	Yes	Yes	
		Communication	Communication module select	FieldBus	Yes	*3	*3	*3	*3	
		Operation mode	Operation mode setting	Operation mode	Yes	*4	Yes	No*5	No*5	
				Parallel Execute	Yes	Yes	Yes	No*6	No*6	
Camera	Camera connection			Camera 0 to 7	*7	*7	*7	*7	*7	
	Inter-camera setting			STEP-cameraDelay7	*7	*7	*7	*7	*7	
				Transmission speed 0 to 7	*7	*7	No*2	No*2	No*2	
	Output signal setting		Common setting		Output signal:	*7	*7	No*2	No*2	No*2
					Line setting	SHTOUT delay	*7	*7	No*2	No*2
			SHTOUT width	*7		*7	No*2	No*2	No*2	
			SHTOUT polarity	*7		*7	No*2	No*2	No*2	

Menu	Sub Menu	Tab	Group	Parameter	Sensor Controller's Model				
					FH series		FZ5 series		
					FH-1000 series FH-3000 series	FH-L series	FZ5-800 series FZ5-1100 series FZ5-1200 series	FZ-600 series	FZ5-L series
Commu- nication	Parallel	Confirmation	Input state	STEP0-7	Yes	*9	*8	*8	*9
				DSA0-7	Yes	*11	*10	*10	*11
				DI LINE0-2	Yes	No <sup>*2</sup>	No <sup>*2</sup>	No <sup>*2</sup>	No <sup>*2</sup>
				ACK	Yes	Yes	No <sup>*2</sup>	No <sup>*2</sup>	No <sup>*2</sup>
	RS-232C/ 422 (Normal)	Setting		Interface:	No <sup>*12</sup>	No <sup>*12</sup>	Yes	Yes	Yes
	Ethernet (Normal (UDP))	Setting	Address setting	Obtain an IP address automatically	*13	No <sup>*2</sup>	Yes	Yes	Yes
				IP address:	*13	No <sup>*2</sup>	Yes	Yes	Yes
				Subnet mask:	*13	No <sup>*2</sup>	Yes	Yes	Yes
				Default gateway:	*13	No <sup>*2</sup>	Yes	Yes	Yes
				DNS server:	*13	No <sup>*2</sup>	Yes	Yes	Yes
				Preferred WINS server:	*13	No <sup>*2</sup>	Yes	Yes	Yes
				Alternate WINS server:	*13	No <sup>*2</sup>	Yes	Yes	Yes
			Address setting 2	Obtain an IP address automatically	Yes	Yes	No <sup>*2</sup>	No <sup>*2</sup>	No <sup>*2</sup>
				IP address:	Yes	Yes	No <sup>*2</sup>	No <sup>*2</sup>	No <sup>*2</sup>
				Subnet mask:	Yes	Yes	No <sup>*2</sup>	No <sup>*2</sup>	No <sup>*2</sup>
				Default gateway:	Yes	Yes	No <sup>*2</sup>	No <sup>*2</sup>	No <sup>*2</sup>
				DNS server:	Yes	Yes	No <sup>*2</sup>	No <sup>*2</sup>	No <sup>*2</sup>
				Preferred WINS server:	Yes	Yes	No <sup>*2</sup>	No <sup>*2</sup>	No <sup>*2</sup>
		Input/Output setting	Output IP address	Yes	Yes	Yes	Yes	Yes	
			Input port No	Yes	Yes	Yes	Yes	Yes	
			Output port No	Yes	Yes	Yes	Yes	Yes	

Menu	Sub Menu	Tab	Group	Parameter	Sensor Controller's Model							
					FH series		FZ5 series					
					FH-1000 series FH-3000 series	FH-L series	FZ5-800 series FZ5-1100 series FZ5-1200 series	FZ-600 series	FZ5-L series			
Other	Fan control setting			Low rotation/ High rotation	No <sup>*2</sup>	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>			
	Encoder trigger setting			Use the encoder trigger	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>			
				Encoder input type	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>			
				Resolution	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>			
				Count rotations with pulse Z	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>			
				Trigger setting	Trigger signal:	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>		
					Enable timing:	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>		
					Pulse reset timing:	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>		
					Pulse A 0 to 5:	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>		
					Support backlashing	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>		
					Trigger in backlashing	Yes	No <sup>*2</sup>	Yes	Yes	No <sup>*2</sup>		
				Network drive setting			S-Z	Yes	Yes	Yes	*14	*14

\*1: Only 4 languages are available. If loads the unsettable data, perform in English.

\*2: Setting is disable.

\*3: EtherCAT setting is disable.

\*4: Multi-line Random-trigger Mode setting is disable. If set Multi-line Random-trigger mode, perform in Standard mode.

\*5: Operation mode tab is not displayed.

\*6: Parallel processing tub is not displayed.

\*7: Depending on the number of camera port of Sensor Controller.

\*8: Enable only STEP 0 to 1.

\*9: Enable only STEP 0.

\*10: Enable only DSA 0 to 1.

\*11: Enable only DSA 0.

\*12: Disable to set. RS-422 is not supported.

\*13: Supported only the Sensor Controller has 2 port: FH-□□□□-10, FH-□□□□-20

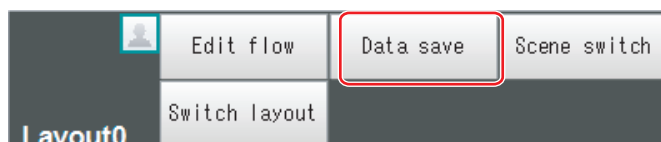
\*14: Enable to set only 1 Sensor Controller under network.

# Saving Settings before Turning OFF the Power and Restarting

Before you turn OFF the power supply to the Controller, save the data that you have set to the flash memory in the Controller.

The settings data in the flash memory of the Controller are loaded everytime the Controller is restarted, so make sure to use the [Data save] command to save the settings data to the flash memory in the Controller. Then, always restart the Controller. The settings data will not take effect unless you restart the Controller. If you do not save the data to the flash memory in the Controller, changes to the settings will be lost when you turn OFF the power supply.

- 1 In the Main Window (layout 0), click the [Data save] button in the Toolbox Pane to save the settings data.**



- 2 Turn OFF the power supply to the Controller and exit the system.**

## Note

- Data That Is Saved  
Scene data and system data are saved in the Controller. Logged images and data that are saved in the RAM disk are not saved. Perform any of the following procedures to keep this data.
  - Copying Data Saved in the RAM disk to External Memory  
Reference: ▶ Saving Settings Data to the Controller RAMDisk or an External Memory Device (p.228)
  - Changing the Save Destination for Logged Data to External Memory  
Reference: ▶ Logging Measurement Values and Measurement Images (p.122)
- Using the Scene Group Function  
The scene data that is set for scene group 0 is saved in the Controller for models FZ5-L series and FZ5-600 series. The scene data from scene groups 1 to 31 is saved to the external memory and overwrites any previously saved data. (For the FH series, FZ5-800 series, FZ5-1100 series and FZ5-1200 series, all data is saved in the Controller by default.)

## Restarting the Controller: [System Restart]

You can restart the Controller. Before restarting, back up any required data, such as scene data and system data.

Reference: ▶ Saving Settings Data to the Flash Memory and Restarting (p.227)

- 1 Select [System restart] from the [Function] menu.**

The [System restart] dialog box is displayed.

- 2 Click [OK].**

The Controller is restarted.

The settings data that was saved in flash memory is enabled.

## IMPORTANT

- Immediately after starting up the FH series/FZ5 series Sensor Controller and immediately after changing scenes, there will be no input image. No input image is processed as the same color image as in the factory default state.
- If you open the Properties Dialog Box before inputting an image, click the Cancel button to close the dialog box. Pressing the OK button in the dialog box will change the setting to the same color camera setting as the factory default setting.

(Reference: ▶ The measurement NG (image mismatch) error will result when connecting a monochrome camera (p.327))

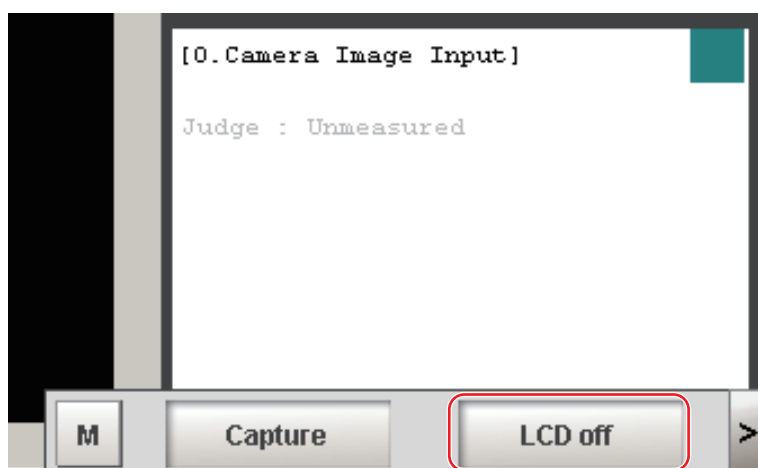


## Turning OFF the LCD

(This function is supported only by the FZ5-600/800/1100/1200-series LCD-integrated Controllers.)  
You can turn OFF the LCD without turning OFF the Controller.

- 1 Click the [LCD off] button that is located on the Measurement Manager Bar in the lower right corner of the window.

A confirmation message is displayed.



- 2 Click [OK].

Power to the LCD is turned OFF.

## Restoring Power to the LCD

(This function is supported only by the FZ5-600/800/1100/1200-series LCD-integrated Controllers.)  
Click the bottom edge of the LCD.  
After a while, the LCD power will turn ON.

# Accuracy

Integer: Held as an INT or LONG-type data (4 byte integer).  
Floating-point number: Held as DOUBLE-type data (9 byte floating point number).

Each value may be rounded to the minimum or maximum value of the data depending on the restriction of the display.

## Example

Image number (INT): 0 or larger number

Angle (DOUBLE): from  $-180^{\circ}$  to  $180^{\circ}$ , from  $0^{\circ}$  to  $360^{\circ}$ , from  $-90^{\circ}$  to  $90^{\circ}$

# Initializing the Controller

You can restore all settings of the Controller to default settings. However, the security settings will not be affected.

## Initializing the Controller: [System initialization]

Before you initialize the Controller, back up any required data, such as scene data and system data.

Reference: ► Saving Data to the FH series/FZ5 series (p.223)

**1** Select [System initialization] from the [Function] menu.

The [System initialization] dialog box is displayed.

**2** Click [Execute].

A confirmation dialog box is displayed.

**3** Click [Yes].

The Controller is initialized and restarted.



# Setting Scenes (Measurement Flows)

A measurement flow consist of a series of combined processing items and is called a scene. This section explains how to create and edit scenes.

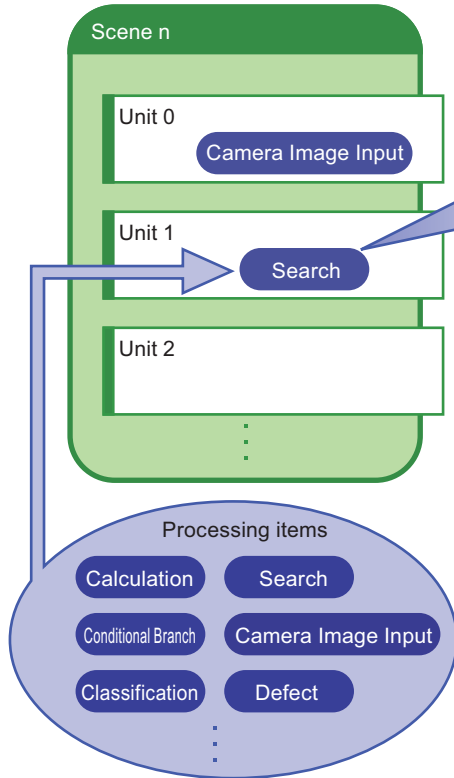
<b>What Is a Scene? .....</b>	<b>56</b>
<b>What Is a Scene Group? .....</b>	<b>59</b>
<b>Creating a Scene .....</b>	<b>60</b>
<b>Editing Processing Units in Scenes .....</b>	<b>61</b>
<b>Displaying and Checking Processing Branches in a Scene.....</b>	<b>64</b>
<b>Changing the Scene or Scene Group .....</b>	<b>68</b>
<b>Editing Scenes.....</b>	<b>70</b>
<b>Editing Scene Groups .....</b>	<b>72</b>

# What Is a Scene?

Processing items for use with various measurement objects and measurement objectives are provided in the Sensor Controller. By combining and executing these processing items, measurement adapted to the purpose can be implemented. A combination of processing items is called a scene. Scenes can be easily created by combining processing items that are suited to the measurement purpose from the list of processing items that are provided.

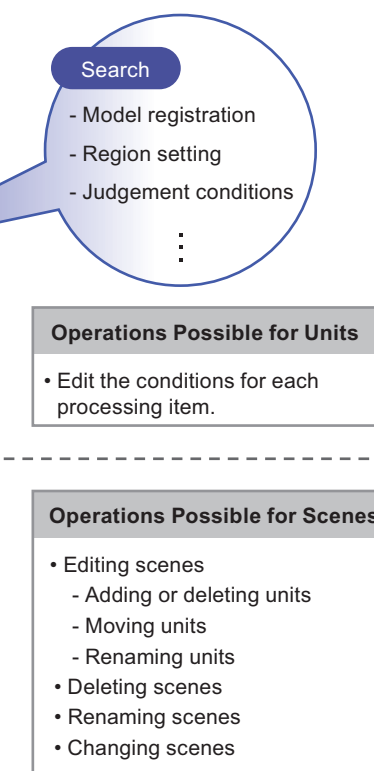
## Editing Scenes

Set a processing item for each unit in the flow.



## Editing Units

Set the conditions for each unit that forms the flow.



## Changing Processes Using Scenes

You can create more than one scene. For example, if you create scenes for each measurement object, such as scene 0 to inspect label ABC and scene 1 to inspect label XYZ, you can change the process smoothly just by changing the scene whenever the measurement object or measurement objective has changed.

Reference: ► Changing the Scene or Scene Group (p.68)

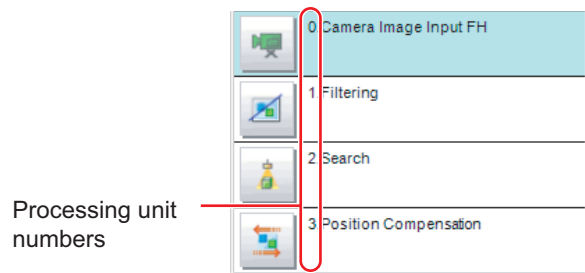
Normally you can set up to 128 scenes. If you require more than 128 scenes, you can create scene groups to easily manage them.

Operating Procedure for the Conversion Scene Group Data Tool (p.179) allows you to create a scene group that has more than 129 scenes.

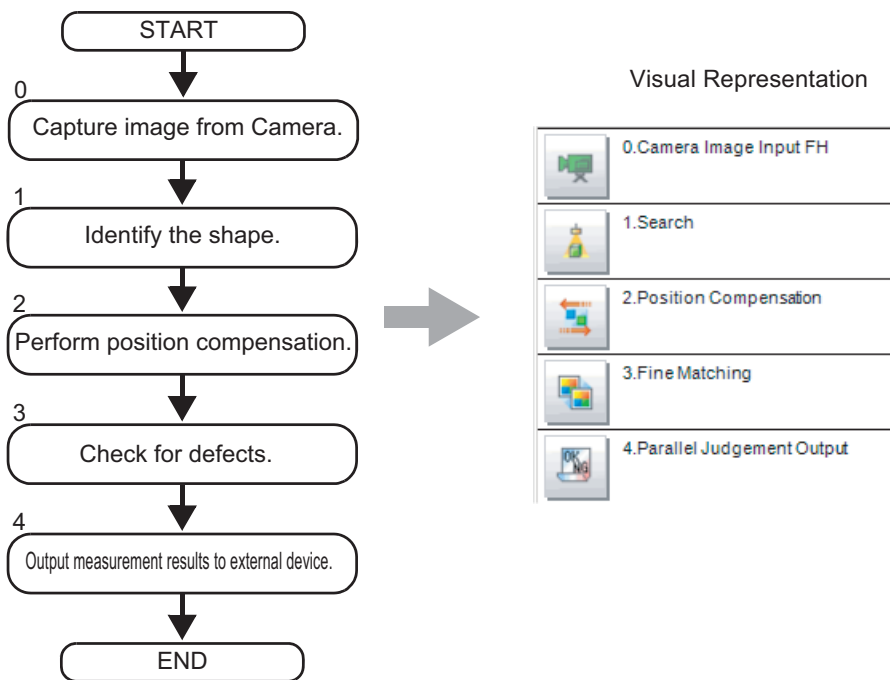
Reference: ► What Is a Scene Group? (p.59)

## Example of a Scene

The processing items registered to a scene are called processing units. In the edit flow window where you create scenes, select the processing items required for measurement and add them to the flow. The number at the top of the processing unit is called the unit number. When the measurement trigger is input, processing is executed in the order of the processing unit numbers.



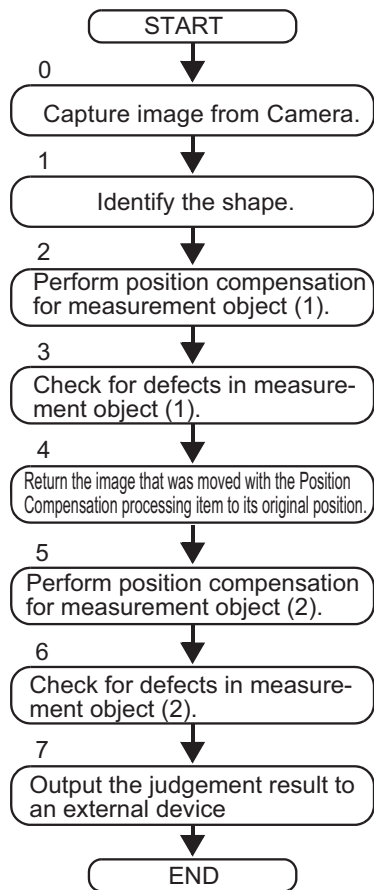
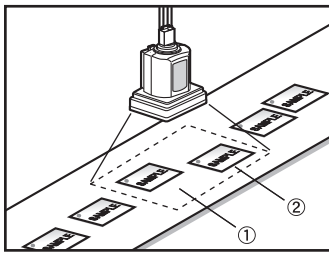
Example: Normal Measurement



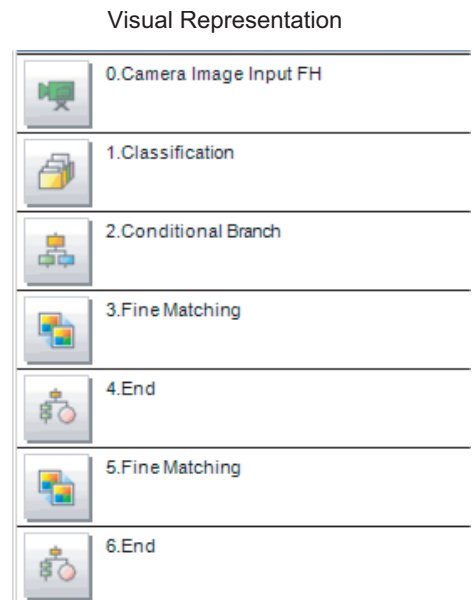
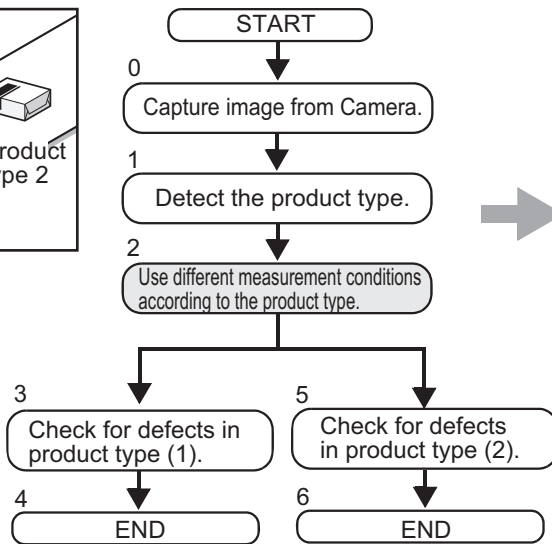
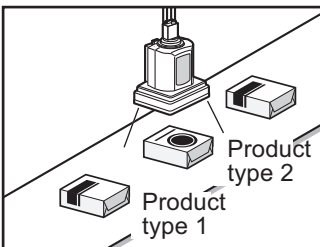
**Note**

By default, a [Camera Image Input] or [Camera Image Input FH] processing item is set for unit 0.

Example: Adding Position Compensation for Two Measurement Objects in the Same Field of View



Example: Determining the Product Type from the Image and Branching Later Inspection Conditions According to the Product Type (Branch Processing)

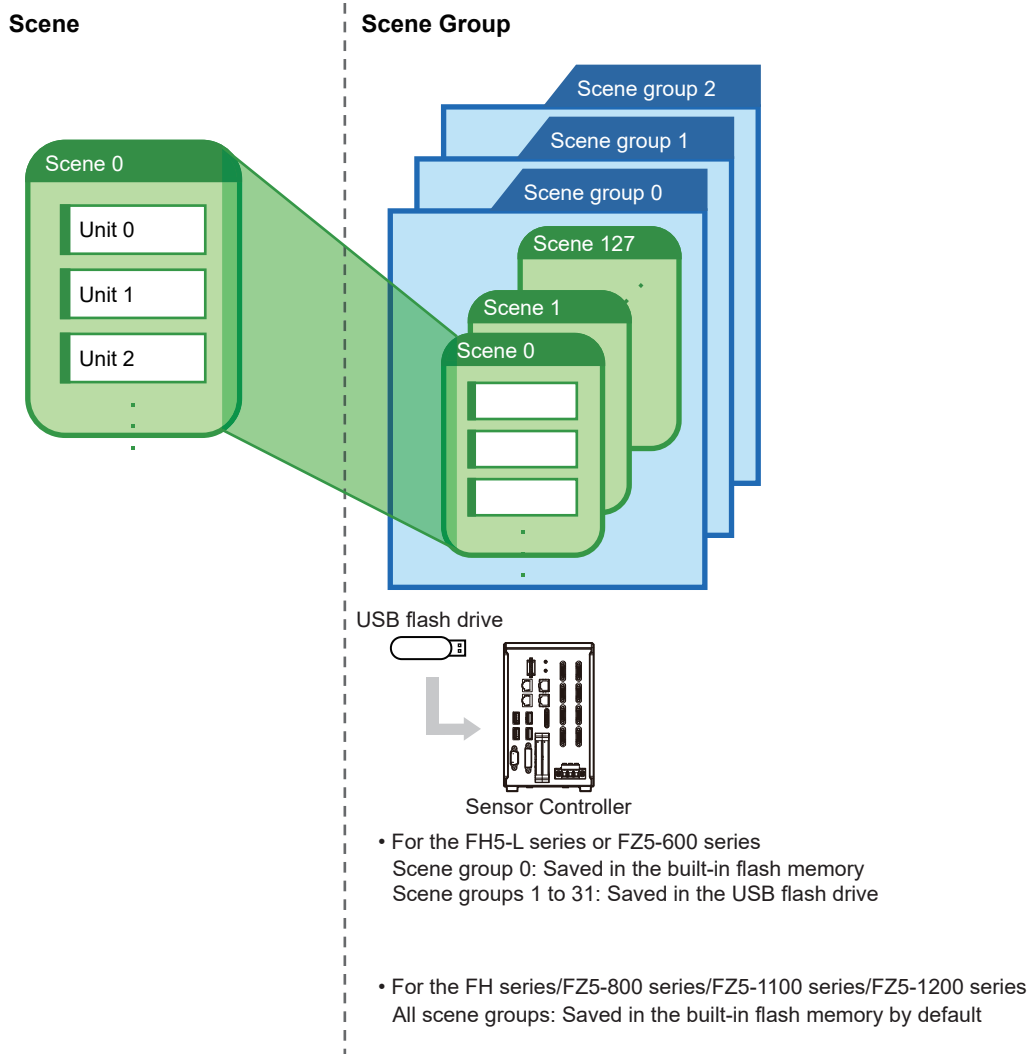




# What Is a Scene Group?

A scene group is a collection of up to 128 separate scenes. Creating scene groups is convenient to increase the number of scenes and to manage scenes according to categories.

For the FH5-L series or FZ5-600 series, a USB flash drive is required to create scene groups. Scene group 0 is saved in the Controller, while scene groups 1 to 31 are saved in USB flash drive. (For the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series, all data is saved in the Controller.)



**Note**

- Up to 128 scenes can be handled as one scene group, and up to 32 scene groups can be set. You can therefore use 128 scenes × 32 scene groups, or 4,096 scenes.
- For the FZ5-L series/FZ5-600 series, the drive name of the USB flash drive must be named “USBDisk” for it to be used as the destination for scene groups 1 to 31. The names “USBDisk2” to “USBDisk4” cannot be used for saving. When other USB flash drives are already inserted for the USB disk, perform operations only after removing all USB flash drives other than the one in which the scene group data is stored.
- If the external memory capacity is insufficient for the data size, 4,096 scenes cannot be set. The scene data size depends on the settings.
- Check the amount of memory used and free data memory from the menu of Memory Consumption Monitor on the Measurement Management Bar or the System Information.  
Reference: ► Checking the Memory Consumption and Percentage of Memory Used (p.138) and Checking System Information [System Information] (p.295).

# Creating a Scene

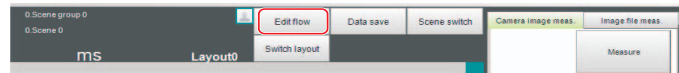
This section explains how to add processing units to a scene.

## 1 In the Main Window (layout 0), display the scene to edit.

Reference: ▶ Changing the Scene or Scene Group (p.68)

## 2 Click the [Edit flow] button.

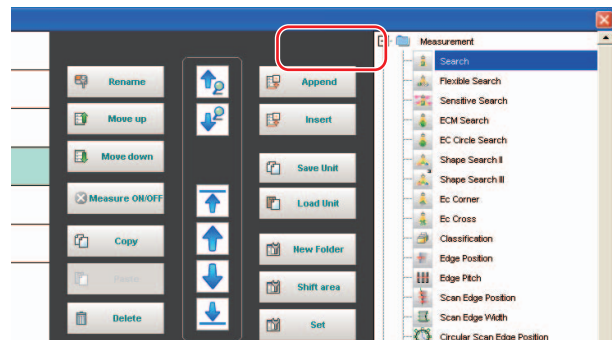
The edit flow window is displayed.



## 3 Select the processing item to add from the processing item tree.

## 4 Click the [Append] button.

The selected processing item is added at the bottom of the unit list (flow).



## 5 Add another processing unit if necessary. Repeat the steps after 3.

### Note

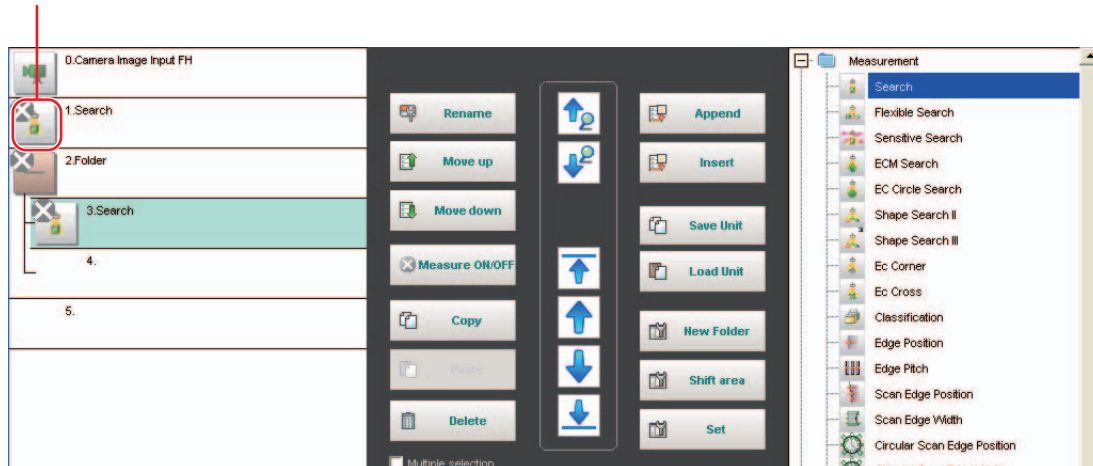
- Limitations on Settings

The number of image input processing items that can be used is limited.

Reference: ▶ About Limits on the Number of Image Input Processing Items Used (p.358)

## 6 Either click the icon of the processing unit to be set or click the [Set] button.

Property setting buttons



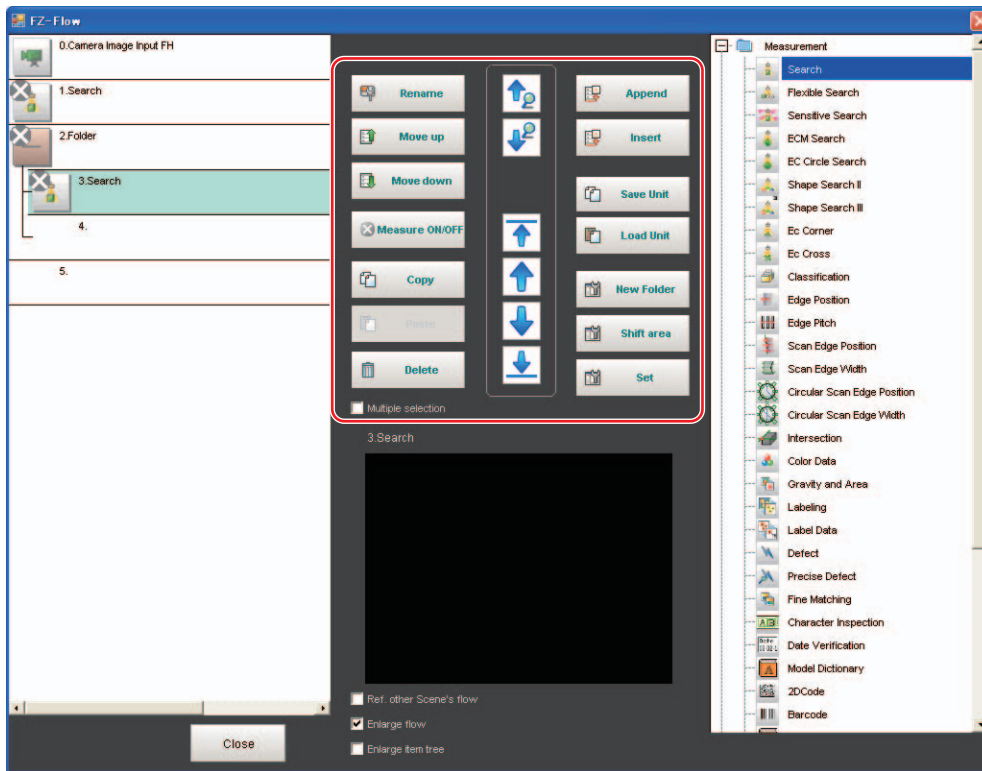
The Properties Tab Page is displayed. Set detailed conditions. The displayed contents depend on the processing item.

## 7 Set the conditions.

The displayed contents depend on the processing item.

# Editing Processing Units in Scenes

You use the edit buttons in the edit flow window to arrange processing units in a scene, or to delete processing units.




- Searching for a Processing Unit** ( ) ( )  
 Searches the measurement flow for the processing item that is selected in the processing item tree.
- Selecting a Processing Unit** ( ) ( ) ( ) ( )  
 Automatically selects the processing unit at the very top or bottom of the unit list, or a processing unit at any position in between.
- Adding a Processing Units at a Specified Position** ( ) ( )  
 Adds or inserts a processing unit at the bottom position of the scene or another specified position.
- Moving a Processing Unit** ( ) ( )  
 Moves a processing unit within a scene to change the processing order.
- Copying and Pasting Processing Units** ( ) ( )  
 Copies and pastes a processing unit while maintaining the same settings.
- Saving Processing Unit Data to a File** ( )  
 Saves the data for a selected processing unit to a file.
- Loading Processing Unit Data** ( )  
 Loads the data for a processing unit from a file.
- Deleting a Processing Unit** ( )  
 Deletes a processing unit from the scene.

- **Renaming Processing Units** (  **Rename** )

Renames a processing unit in the scene. Unit names must begin with a character other than ° (semi-voiced sound symbol) and 〃 (voiced sound symbol). Also, unit names cannot consist of only a single-byte number, only a "+", or only a ".".

- **Setting the Details of a Processing Unit** (  **Set** )

Sets the properties of a processing unit in the scene.

- **Shift Area** (  **Shift area** )

Changes the related figure data in one batch.

- **New Folder** (  **New Folder** )

Used when multiple processing units are managed as a group.

- **Handling Multiple Processing Units** (  **Multiple selection** )

Used when processing units are copied or deleted together. Click the [Multiple selection] button to display the check boxes for the processing items. The selected processing units can be manipulated as a group.



- **Referring to Other Scene Flows** (  **Ref. other Scene's flow** )

Units in other scenes can be referred to and added to the current scene flow.

- **Selecting a scene to refer to displays the flow for that scene.**



- **Switching processing unit measurement execution ON/OFF** (  **Measure ON/OFF** )

You can switch off the processing unit within a scene so that measurement is not executed for individual processing units. The processing unit that has been switched off cannot execute measurement until switched on. Pressing the button toggles the measurement execution setting between ON and OFF.



## IMPORTANT

---

Make sure to enable Measure for the image input processing unit for unit 0 before use.

---

- If a processing unit is inserted, the numbers for the subsequent processing units increase by one. With processing items related to results output or branch control, the numbers for processing units set as references also automatically increase by one.
- If a button other than [Paste] is clicked after pasting a processing unit, continued pasting of the processing item cannot be performed.
- If a processing unit is deleted, the numbers for the subsequent processing units decrease by one. With processing items related to results output or branch control, the numbers for processing units set as references also automatically decrease by one.
- To hide a specific processing unit in the flow on an adjustment window or run window, insert a "\*" (single byte) at the beginning of the processing unit name.
- With the FZ-L series and FZ-600 series, the number of units that can be set in a flow depends on the available data memory.

In the case of the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series, the number of processing items is not limited and can be registered as long as there is sufficient free memory.

If the amount of used memory increases and the amount of free memory becomes insufficient, it may cause errors in operation mode switching or in adding Processing Units into the measurement flow. Please check the memory consumption when you create scenes.

Reference: ► Checking the Memory Consumption and Percentage of Memory Used (p.138) and Checking System Information [System Information] (p.295).

- When copying and pasting a conditional branch processing unit or other processing unit that refers to another processing units, the branch destination of the pasted processing unit is initialized to [End processing]. When pasting whole processing units within a folder, a parallelization processing unit, or a parallelized task processing unit, references from inside the pasted block to outside the block are initialized to [End processing].  
When copying and pasting a calculation processing unit or other processing unit that refers to another processing unit, the content of the expression of the pasted processing unit becomes #ERR. When pasting whole processing units within a folder, a parallelization processing unit, or a parallelized task processing unit, references from inside the pasted block to outside the block become #ERR.
- Turning measurement execution ON/OFF for a folder, a parallelization processing unit or a parallelized task processing unit turns measurement execution ON/OFF for all processing units within the folder, the parallelization processing unit or the parallelized task processing unit.
- When [ON] is set for [Parallel Execute] in [Operation mode setting] in the system settings, turning the measurement execution setting ON/OFF for a processing unit may greatly change the processing time. In this case, use parallelization processing items to parallelize the measurement flow instead of using automatic parallel processing.
- When measurement execution has been set to OFF for a processing unit that is a conditional branch destination, processing is executed starting with the first processing unit set to ON after the branch destination processing unit.
- When you set \*(half-width asterisk) to the front of processing unit name, its processing unit is not displayed on the Flow window.
- Overall judgement result of the processing units that are set in the folder is displayed in the folder unit. However, if a Conditional branch is set to branch outside the folder, the folder unit will display as OK.

# Displaying and Checking Processing Branches in a Scene

To see how a branch affects the processing flow after you edit a scene in the edit flow window, start the Flow Viewer.

Select [Flow Viewer] from the [Tool] menu.

## Overview

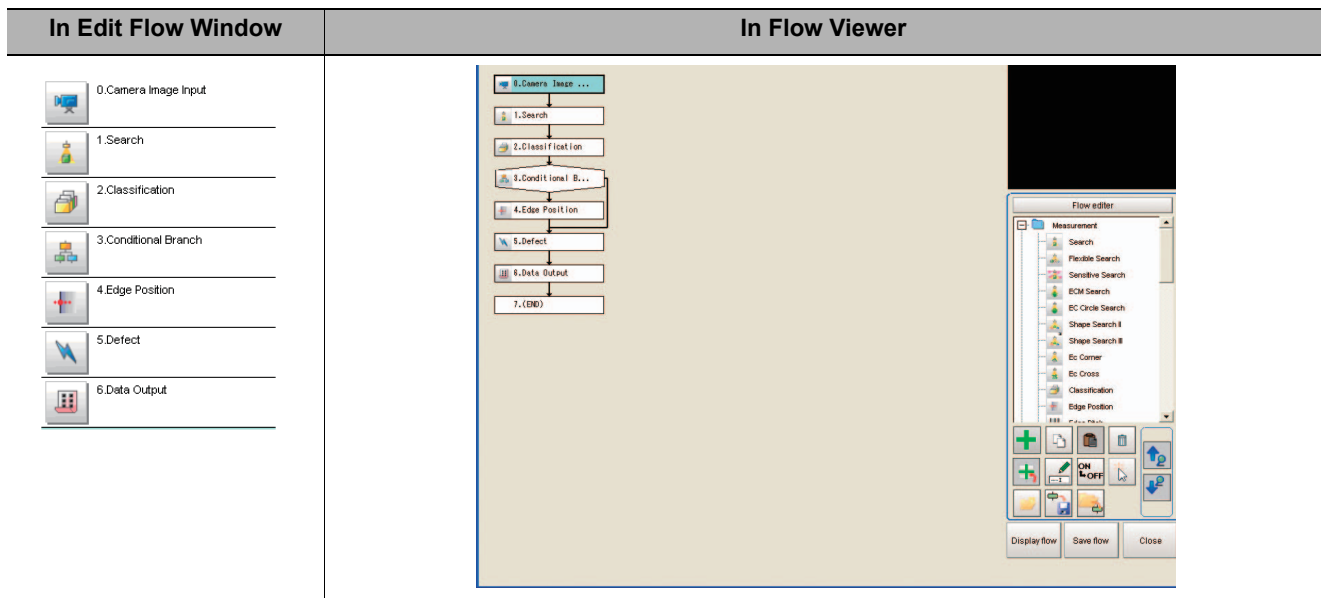
The Flow Viewer shows the flow of processing for the measurement flow that is currently being edited.

This makes it easy to understand the relationship of branches and folders in the measurement flow.

The Flow Viewer allows you to edit the measurement flow, and also allows you to edit, rename, and save processing units in the same way as with the edit flow window.

You can save the flow of processing for the currently displayed measurement flow as an image file.

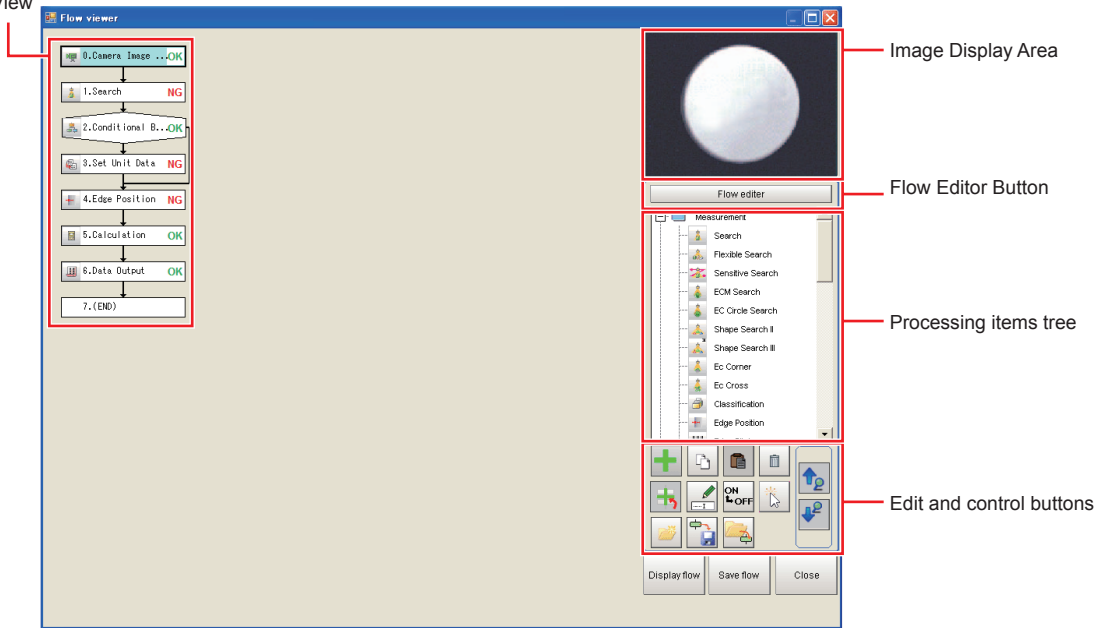
- You can also edit the measurement flow.
- You can edit the unit properties in the same way as with the edit flow window.
- You can save the flow of processing for the currently displayed measurement flow as an image in JPEG format.
- You can also rename and save processing units.



## Window Configuration

The window configuration for the Flow Viewer is shown below.

Flow Builder View



### Image Display Area

This area shows Camera images, figures, positions, and other graphic information. The measurement image is updated each time a unit is selected.

### Flow Editor Button

This button starts the edit flow window.

### Tree of Processing Items

This area allows you to select an item to add to the flow. The items are displayed in tree format that is organized by type.

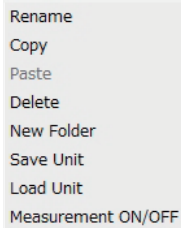
## Flow Editing Functions

### Repositioning a Unit within a Flow

On the Flow Builder, drag the unit to the desired position.  
To insert a unit before another unit, drag it onto the desired unit.

### Right-click Menu

The following popup menu is displayed when you right-click on a unit in the flow.



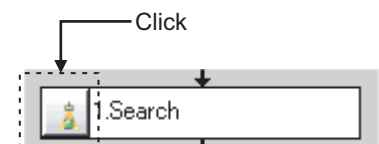
The menu commands perform the same operations as the Edit and Control Buttons.

### Edit and Control Buttons

Icon button	Function	Description	Icon button	Function	Description
	Add to End of Flow	Adds the selected item in the item tree to the end of the flow as a new unit.		Load Unit	Loads the settings for a processing unit from a file (extension .unit) and places it directly before the selected unit in the flow.
	Add before Current Unit	Adds the selected item in the item tree to the position directly before the selected unit in the flow as a new unit.		Measurement ON/OFF	Used to turn off measurement execution for individual in-scene processing units so that measurement is not executed.
	New Folder	Creates a folder directly before the selected unit in the flow. Drag units to edit the contents of the folder.		Movement mode	Enables the flow display position to be moved by drag operations instead of by using the scroll bar.
	Copy	Copies the selected unit in the flow.		Search Up	Searches for the selected item in the item tree upward from the selected position in the flow.
	Paste	Pastes the copied unit to the position directly before the selected unit in the flow.		Search Down	Searches for the selected item on the item tree in the downward direction from the selected position in the flow.
	Delete	Deletes the selected unit from the flow.		Display Entire Flow	Displays the entire flow in the center of the view. The [Save] button outputs the same image as the [Save flow] button.
	Rename	Renames the selected unit in the flow.		Save Flow Image	Outputs the entire flow as an image file (extension .jpg).
	Save Unit	Saves the settings for the selected unit in the flow to a file (with the extension .unt).		Exit Flow Viewer	Closes the Flow Viewer.

### Changing the Properties of Units in a Flow

On the Flow Builder, click the icon to the left of the unit for which to change the properties. The property dialog box for the unit is displayed.



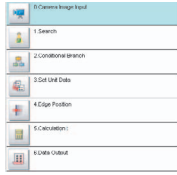


## Examples of Branch and Folder Views

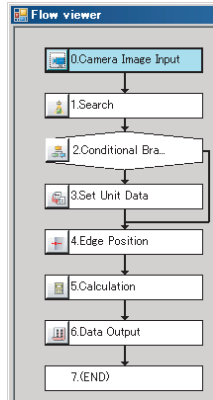
Examples:

### Edit Flow Window

Conditional Branch View



### Flow Viewer

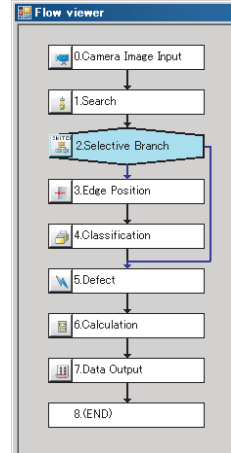


### Edit Flow Window

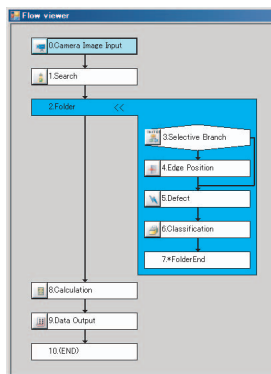
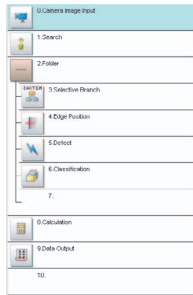
Selective Branch



### Flow Viewer



Folder View



# Changing the Scene or Scene Group

You can change the scene to perform a process change. The default display is scene 0 when the power supply is turned ON. You can create many scenes (scenes 0 to 127).

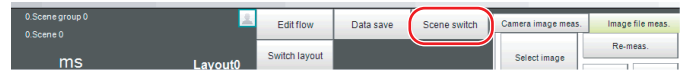
Also, if you use scene groups, you can set up to 4,096 scenes.

You can also send commands from an external device to change the scene group or scene.

Reference: ► *Vision System FH/FZ5 Series User's Manual for Communications Settings (Cat No. Z342).*

## Changing the Scene

- 1 In the Main Window (layout 0), click the [Scene switch] button in the Toolbox Pane.**



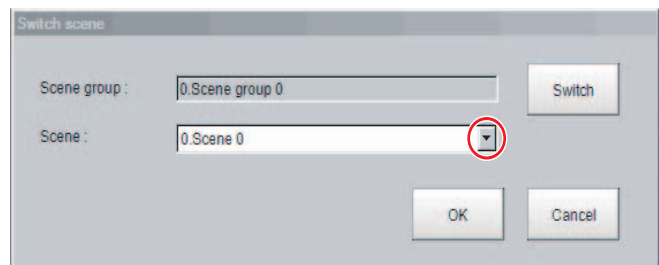
The [Scene switch] dialog box is displayed.

### Note

- An alternative operation is to select [Switch scene] from the [Function] menu.

- 2 Click [▼] to select the scene to change to.**

To change the scene group, click [Switch], and then click [▼] in the displayed dialog box to select the scene group to change to.



- 3 Click [OK].**

The scene changes.

## Changing Scene Groups

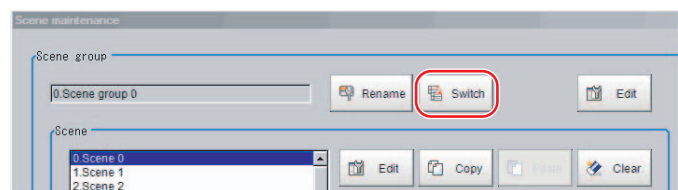
Use the following procedure to change to the scene group in which the scene to be edited is stored.

- 1 In the Main Window (layout 0), select [Scene maintenance] from the [Function] menu.**

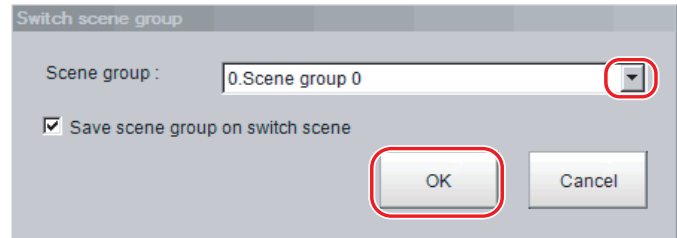
The [Scene maintenance] dialog box is displayed.

- 2 Click the [Switch] button in the Scene Group Area.**

The [Scene group switch] dialog box is displayed.



### 3 Change to the scene group to edit.



- 1 Click the [▼] button to select the scene group to edit.
- 2 Select whether the scene group should be saved when changing to another scene group.

Parameter	Set value [Factory default]	Description
Save scene group on switch scene	[Selected]	When the scene group is changed, the data of the scene group before changing is saved.
	Not selected	The scene group data is not saved when you change to another scene group. Therefore, you can change the scene group faster.

#### Note

- The setting for whether to save a scene group when changing is linked to the settings of the [Measure setting] dialog box.  
Reference: ► Setting the Conditions That Are Related to Operation during Measurement (p.239)

### 3 Click [OK].

The scene group is changed and the [Scene maintenance] dialog box is displayed again.

#### IMPORTANT

- If you select [Save scene group on switch scene], data may be lost if the power supply is turned OFF while changing the scene group. Make sure that the power supply is not turned OFF while the scene group is being changed.
- If the available external memory is not sufficient to save data when changing the scene group, the data will be initialized if the power supply is turned OFF because the scene group data in the external memory is temporarily cleared during the saving process. To avoid this problem, increase the available external memory without turning OFF the power supply or reduce the scene group data size, and save the data to the external memory again.
- Immediately after starting up the FH series/FZ5 series Sensor Controller and immediately after changing scenes, there will be no input image. No input image is processed as the same color image as in the factory default state.
- If you open the Properties Dialog Box before inputting an image, click the Cancel button to close the dialog box. Pressing the OK button in the dialog box will change the setting to the same color camera setting as the factory default setting.

(Reference: ► The measurement NG (image mismatch) error will result when connecting a monochrome camera (p.327))

# Editing Scenes

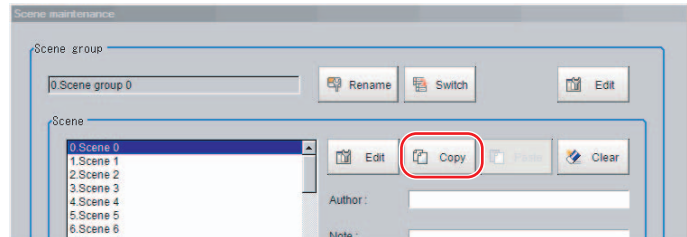
## Copying Scenes

Use the following procedure to copy and paste a scene within a scene group. This is convenient for reusing a scene and changing only the required parts.

- 1 In the Main Window (layout 0), select [Scene maintenance] from the [Function] menu.**

The [Scene maintenance] dialog box is displayed.

- 2 In the scene list, click the scene to copy, and then click [Copy].**



- 3 In the scene list, click the scene where the copy is to be made, and then click [Paste].**

An overwrite confirmation dialog box is displayed.

- 4 Click [Yes].**

The scene selected as the destination is overwritten with the copied scene data.

- 5 Click the [Close] button.**

## Deleting Scenes

Use the following procedure to delete the settings and return to the default values. Use the following procedure to initialize the measurement contents for a scene.

- 1 In the Main Window (layout 0), select [Scene maintenance] from the [Function] menu.**

The [Scene maintenance] dialog box is displayed.

- 2 Click the scene to be deleted from the scene list.**

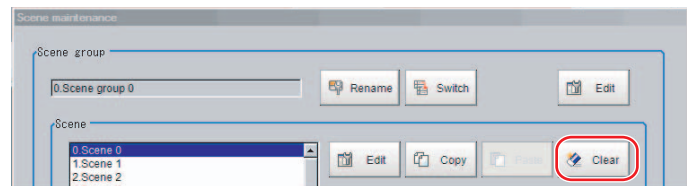
- 3 Click the [Clear] button.**

A confirmation message is displayed.

- 4 Click [Yes].**

The scene data is deleted.

- 5 Click the [Close] button.**



## Renaming a Scene and Adding a Description

A user description can be added to each scene. This is convenient for making settings more easily understandable when managing many scenes.

- 1** In the Main Window (layout 0), select [Scene maintenance] from the [Function] menu.

The [Scene maintenance] dialog box is displayed.

- 2** Click the scene to be renamed from the scene list.

- 3** Click the [Edit] button.

- 4** Set the [Scene name], [Author], and [Note].

- 1** Click the [· · ·] button for each item.

The on-screen keyboard is displayed.

- 2** Set the names and a note.

The [Scene name] and [Author] cannot be longer than 15 characters, and the [Note] cannot be longer than 255 characters.

You cannot use ° (semi-voiced sound symbol) and ̀ (voiced sound symbol) in the [Scene name].

### Note

- When entering the [Note], enter a line-break after 32 single-byte characters or 17 double-byte characters. Without line breaks, the display of character strings will be truncated.

- 5** Click [OK].

- 6** Click the [Close] button.

# Editing Scene Groups

Copying or deleting can be done by scene group and scene groups can be renamed.

## Note

For the FZ5-L series or FZ5-600 series, make sure to check that a USB flash drive has been inserted before performing this operation.

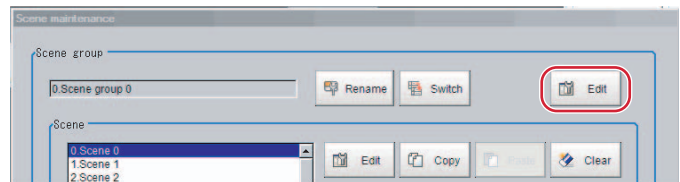
## Copying and Deleting Scene Groups

**1** In the Main Window (layout 0), select [Scene maintenance] from the [Function] menu.

The [Scene maintenance] dialog box is displayed.

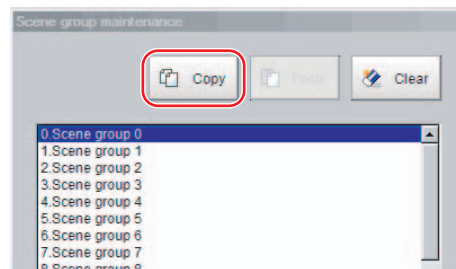
**2** Click the [Edit] button.

The [Scene group maintenance] dialog box is displayed.



## Copying

**3** Select the scene group to copy, and then click the [Copy] button.



**4** Select the copy destination scene group and click [Paste].

An overwrite confirmation dialog box is displayed.

**5** Click [Yes].

The scene group selected as the destination is overwritten with the copied scene group data.

**6** Click the [Close] button.

## Deleting

The following data is deleted.

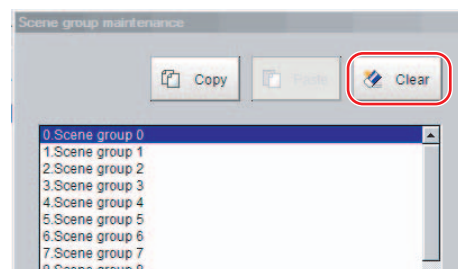
- Name set for the scene group
- All scene data within the scene group

**7** Select the scene group to delete, and then click the [Clear] button.

A confirmation message is displayed.

**8** Click [Yes].

The scene group data is deleted.



**9** Click the [Close] button.

## Changing the Scene Group Name

Scene groups can be named with any desired text. This is convenient to make scene groups easier to identify when there are many scene groups to manage.

**1** In the Main Window (layout 0), select [Scene maintenance] from the [Function] menu.

The [Scene maintenance] dialog box is displayed.

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

The [Scene group maintenance] dialog box is displayed.

**3** Click [...] next to [Scene group name].

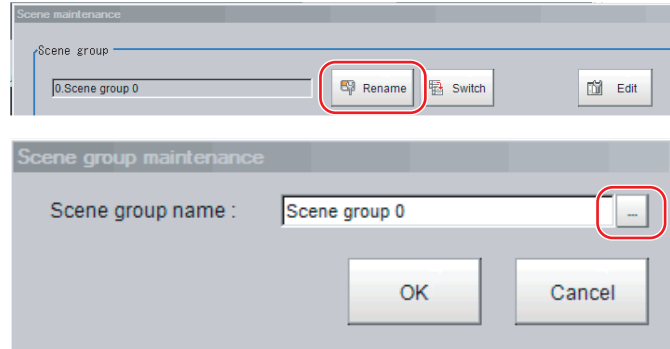
The on-screen keyboard is displayed.

**4** Set the name.

Enter 15 characters or less.

**5** Click [OK].

**6** Click the [Close] button.



MEMO



# Performing Test Measurement/Starting Operation

This section describes test methods for checking whether correct measurement can be performed at the set conditions and describes useful functions for operation.

<b>Adjustment Windows and Run Windows .....</b>	<b>76</b>
<b>Preparing the Controller and Cameras.....</b>	<b>78</b>
<b>Executing Test Measurements .....</b>	<b>81</b>
<b>Key Points for Adjustment.....</b>	<b>82</b>
<b>Arranging Windows.....</b>	<b>85</b>
<b>Arranging the Window Display.....</b>	<b>102</b>
<b>Custom Dialogs .....</b>	<b>105</b>
<b>Useful Functions for Operation.....</b>	<b>118</b>

# Adjustment Windows and Run Windows

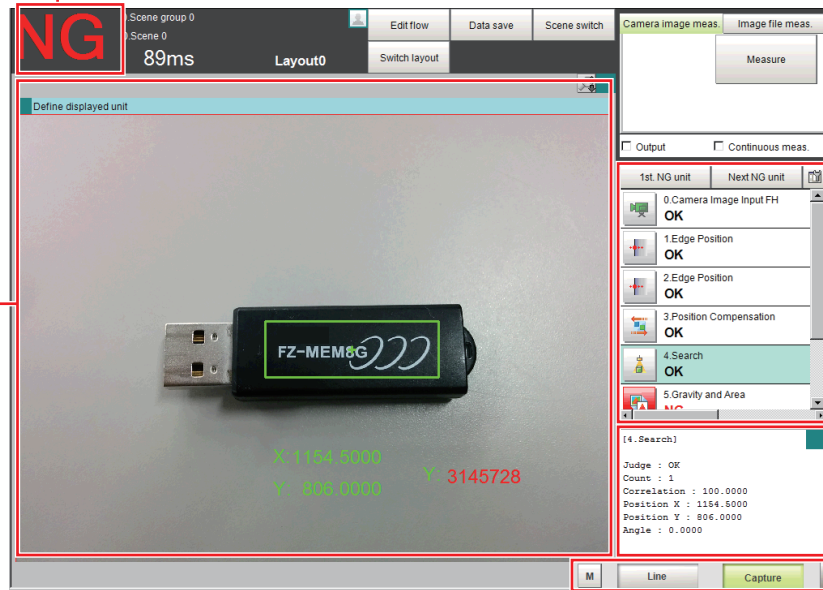
After test measurement and remeasurement are performed on the Main Window (layout 0), check the measurement results. If there are problems, adjust the processing item setting values of the processing units. When the measurement results are stable, change to the Main Window (layout 1) and perform measurements. This section describes the adjustment windows and run windows.

## Main Window (Layout 0): Adjustment Window (Default)

Layout 0 is set as an adjustment window by default. (This can be changed in Layout Modification Mode.)

The judgement result and measurement time for the entire scene are displayed.

You can overlay the measurement results on the Camera image.



Units with NG results are displayed in red.

Measurement results are displayed in text format.

### Measurement Manager Bar

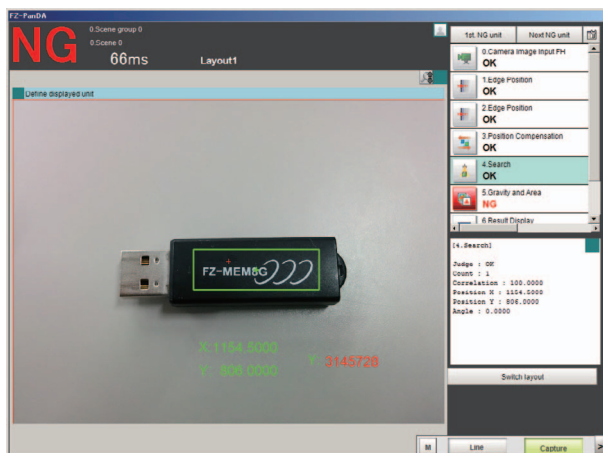
This is displayed regardless of the layer that is displayed.

- [Capture]: Saves the contents that is displayed on the monitor as an image.  
Reference: ▶ Capturing Screen Images (p.136)
- [LCD Off] (Displayed only with LCD-integrated Controllers.)  
Turns OFF power to the LCD monitor.  
Reference: ▶ Turning OFF the LCD (p.51)
- [Line] (This is displayed only when the operation mode is set to Multi-line Random-trigger Mode.)  
This changes the line.  
Reference: ▶ Multi-line Random-trigger Mode (p.246)
- [Switch Screen] (This is displayed only when the operation mode is set to Non-stop Adjustment Mode.)  
This changes to the Non-stop Adjustment Mode Window.  
Reference: ▶ Non-stop Adjustment Mode (p.252)
- [Memory state button] This button opens the window to show the amount of memory and percentage of memory used.  
Reference: ▶ Checking the Memory Consumption and Percentage of Memory Used (p.138)

## Main Window (Layout 1): Run Window (Default)

Layout 1 is set as a run window by default. (This can be changed in Layout Modification Mode.)

The flow, detailed results, and tool box are displayed in the Control Area.



When processing takes a long time, it is necessary to check the processing items and setting values. The time required for measurement is also displayed with the measurement results, so use this for reference.

## Main Window (Layout 1): Changing to the Run Window

- 1 In the Main Window (layout 0), click the [Switch layout] button.



- 2 In the [Switch layout] dialog box, select the layout number (layout 1 by default).  
The display changes to the Main Window (layout 1).

### Note

- You can make settings so that the run window is displayed whenever the power supply to the Controller is turned ON.  
Reference: ▶ Setting the Status at Startup [Startup Settings] (p.280)
- The lighting gradually gets darker if it is used for a long time, so adjust judgement conditions periodically.
- Without stopping the measurement, you can change judgement conditions for a processing unit set for a scene.  
Reference: ▶ Changing Judgement Conditions without Stopping Measurement (p.120)

## Main Window (Layout 0): Changing to the Adjustment Window

- 1 In the Main Window (layout 1), click the [Switch layout] button in the Toolbox Pane.
- 2 In the [Switch layout] dialog box, select the layout number (layout 0 by default).



The display changes to the Main Window (layout 0).

# Preparing the Controller and Cameras

## Camera Setup

FH series/FZ5 series Sensor Controllers use the CameraLink standard for camera connection. At normal camera connection, a single camera cable is used for a single camera, and each camera is connected to the Sensor Controller in the CameraLink base configuration. Starting from camera connector 0 on the Sensor Controller, connect cameras to the camera connectors you want to use in ascending order of camera connector number.

### IMPORTANT

- Immediately after starting up the FH series/FZ5 series Sensor Controller and immediately after changing scenes, there will be no input image. No input image is processed as the same color image as in the factory default state.
- If you open the Properties Dialog Box before inputting an image, click the Cancel button to close the dialog box. Pressing the OK button in the dialog box will change the setting to the same color camera setting as the factory default setting. (Reference: ▶ The measurement NG (image mismatch) error will result when connecting a monochrome camera (p.327))

## Using Two Cables for High-frame-rate Camera Use (FH series only)

FH-1000 series/FH-3000 series/FH-L series Sensor Controllers support the CameraLink standard's Base Configuration and Medium Configuration.

The Medium Configuration enables use at a higher frame rate than the Base Configuration, reducing image input time. The configuration that can be connected will depend on the connected cameras.

See the instruction sheet of the cameras you are using.

To connect a camera in the Medium Configuration, you will need to use two camera cables of the same type and length to connect the camera and Sensor Controller (two-cable connection).

Sensor Controller camera connectors should be connected as a pair with ascending consecutive even and odd numbered connectors.

The table below shows the camera connector and camera number assignments when connecting the Sensor Controller and camera cable with a two-cable connection.

### Camera numbers for operation modes other than multi-line random trigger mode

The table below shows the camera connector and camera number assignments when the operation mode is a mode other than the multi-line random trigger mode.

A number corresponding to a Sensor Controller camera connector number is assigned for the camera number. When using two-cable connection, the even number in the pair of ascending consecutive camera connector numbers is assigned as the camera number.

Sensor Controller camera connector number	Camera number in application software		
	Example when all cameras use one-cable connection	Example when all cameras use two-cable connection	Example when combining one- and two-cable connection
0	0	0	0
1	1		1
2	2	2	2
3	3		3
4	4	4	Not connected
5	5		5
6	6	6	6
7	7		7

## Camera numbers for multiple-line random trigger mode

The table below shows the camera connector and camera number assignments when the operation mode is the multi-line random trigger mode. This table is an example showing the camera number assignments when the number of lines is two.

Camera numbers are assigned for each line in ascending order starting from 0. For two-cable connection, camera numbers are assigned in ascending order regardless of camera connector number pairs.

Sensor Controller camera connector number	Camera number in application software					
	Example when all cameras use one-cable connection		Example when all cameras use two-cable connection		Example when combining one- and two-cable connection	
	Line 0	Line 1	Line 0	Line 1	Line 0	Line 1
0	0	---	0	---	0	---
1	1	---			1	
2	2	---	2	---	2	---
3	3	---			2	
4	---	0	---	0	---	Not connected
5	---	1			---	0
6	---	2	---	2	---	1
7	---	3			---	

### IMPORTANT

- When connecting cameras with two-cable connection, use a pair of ascending consecutive even and odd numbered Sensor Controller camera connector numbers for each camera. You will not be able to get the image acquisitions correctly if you use camera connectors with non-consecutive connector numbers, or if an odd numbered connector has a lower number than the even numbered connector it is paired with.
- CameraLink medium configuration is only supported by FH-1000/FH-3000/FH-L series Sensor Controller. FZ5-series models, FZ4-series models and other non-FH-1000/FH-3000/FH-L series only support the CameraLink base configuration.
- When [Operation mode setting] has been set to the multi-line random trigger mode, changing the camera connections or [Multi-line Random-trigger mode] in the system settings may change camera number assignments in line with the change made. After changing the camera connections or [Multi-line Random-trigger mode], before using the Sensor Controller, check the camera numbers in the property setting screen for the [Camera Image Input] processing items or [Camera Image Input FH] processing items.
- STGOUT signals (STGOUT0 to STGOUT7) signals are tied to the camera connector numbers, not the camera numbers. When using CameraLink Medium Configuration or Multi-line Random-trigger mode, check the camera connector number of a Sensor Controller that corresponds to the camera number.
- SHTOUT signal (SHTOUT0 to SHTOUT7) are tied to the Line number, not camera number. When use Multi-line random-trigger mode, confirm the Line number and use SHTOUT signal.

#### Note

When connecting cameras with two-cable connection, the camera connection screen in the system settings displays the camera model for one member of the pair of camera connector numbers, and displays [Disconnect] for the other.

## One-cable Camera Connection

FH series/FZ5 series Sensor Controllers support the CameraLink standard's Base Configuration. In the base configuration, one camera cable is used to connect one camera. Starting from camera connector 0 on the Sensor Controller, connect cameras to the camera connectors you want to use in ascending order of camera connector number.

## Preparing a Controller

No special preparations are required with this Controller because processing items are pre-installed.

Please check that the Controller is turned On and that the Main Window is displayed.

For details, refer to ► the *Vision System FH/FZ5 series Hardware Setup Manual* (Cat. No. Z366).

The first time the program is started, the Language Setting Dialog Box is displayed. Select the language.

Reference: ► Selecting Language [Startup Settings] (p.279)

## Adjusting the Camera

Check the images that are being taken.

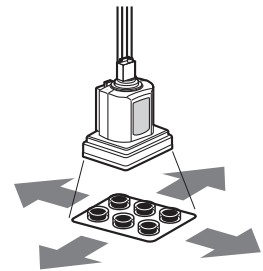
Adjust the position of measurement objects and the focus of the lens.

### 1 Click the upper left corner of the Image Pane, and then select [Image mode] – [▼] – [Through].

The through image from the Camera is displayed in the Image Pane.

Reference: ► Arranging the Window Display (p.102)

### 2 Adjust the position of measurement objects so that they display at the center of the monitor.



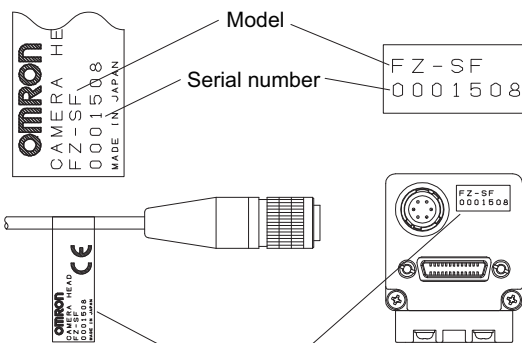
Adjusting the Position of the Measurement Target

### 3 Adjust the focal distance of the lens.

#### Note

- If a Camera is used together with a lens, turn the focus ring on the lens to adjust the focus.  
Refer to ► *Screen adjust* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

## IMPORTANT



Check the model and serial number.

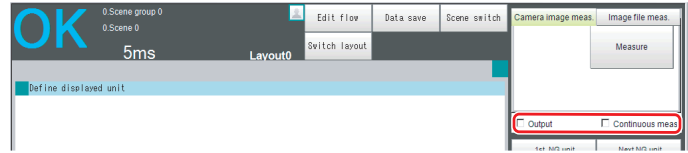
When using a Compact Digital Camera, check that the model and serial number of the Camera Head and Camera Amplifier match. When a Camera Head and Camera Amplifier with different models and serial numbers are connected, they may not operate correctly.

# Executing Test Measurements

Test whether the intended measurement processing can be performed with the current setting contents. Look at test results and adjust the property settings of each processing unit.

Perform measurement according to the conditions set for the displayed scene.

- 1 In the Main Window (layout 0), click the [Camera image meas.] button in the Measurement Pane.
- 2 Set the following items as test conditions.



Parameter	Description
Output	Select this check box when the measurement results on the adjustment window are also to be output. Clear the checkmark when test measurement for the device is to be performed without results being output.
Continuous meas.	Select this check box when continuous measurement is to be performed. Click the [Measure] button to start continuous measurements.

- 3 Click the [Measure] button in the Measurement Pane.

The measurement is performed.

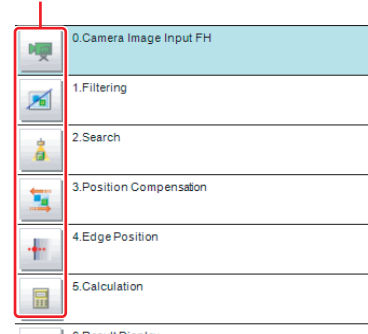
**Note**

- If continuous measurements are in progress, the [Stop continuous meas.] button will be displayed. To stop continuous measurements, click the [Stop continuous meas.] button.

- 4 Check the measurement results.
- 5 If necessary, adjust the setting values for each processing unit again.

You can move to the property dialog box directly by clicking the button of any processing unit in the flow.

Property setting buttons



**Note**

Test images can be saved. This function is called logging. After setting conditions, the saved test images can be used in performing test measurements again.

Reference: ▶ Logging Measurement Values and Measurement Images (p.122)

**IMPORTANT**

The processing time displayed in the Information Pane during continuous measurements executed via the test measurement settings includes the update time of the display, while that for continuous measurements executed by external commands does not, since measurement is higher prioritized in that case. Therefore, the processing time for continuous measurement executed via test measurement menu may be longer than that for continuous measurement executed by external commands. Measurement intervals and display update intervals should be evaluated in the actual configuration.

# Key Points for Adjustment

This section describes key points for adjustment to improve measurement precision and shorten measurement time.

## Stabilizing Measurements

This section describes key points for adjustment when measurements are not stable. There are two methods for improving measurement precision: Performing processing of images loaded from the Camera (filtering) or adjusting settings and parameters.

### Adjusting Parameters of Each Processing Item

Adjustment to improve precision and stability depends on the processing item.

Refer to ► *Key Points for Adjustment* for individual processing items in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

### Processing Images (Filtering)

There are cases in which high-precision measurement is impossible, such as when using images loaded from the Camera that have noise, irregularities, or low contrast or when the background has patterns during defect measurement.

Refer to ► *Filtering* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

#### When measurement images have irregularities (searching and location positioning are not stable)

The Smoothing (Strong and Weak) and Median filter items are both effective.

- **Smoothing (Strong and Weak)**

This processing changes the shade of images so that irregularities are not as easily seen.

- **Weak Smoothing**

Before Processing



After Processing



- **Median**

In comparison with smoothing, the Median filter item allows for irregularities to be hidden without having to shade the edges of images.

#### Measurement Images That Contain Noise

The Dilate and Erosion filtering items are both effective.

- **Dilate**

When there is dark noise in an image, bright areas are enlarged to eliminate dark noise.

- **Erosion**

When there is bright noise in an image, bright areas are contracted to eliminate bright noise.

#### Erosion

Before Processing



After Processing





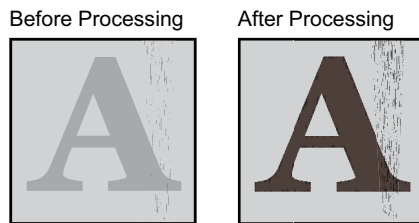
### Measurement Images with Low Contrast (Defect Inspection Is Unstable)

The Extract Vertical Edges, Extract Horizontal Edges, and Extract Edges filtering items are effective.

- **Extract Vertical Edges**

This extracts the vertical edges of an image.

#### Extract Vertical Edges



- **Extract Horizontal Edges**

This extracts the horizontal edges of an image.

- **Edge Extraction**

This extracts all edges of an image.

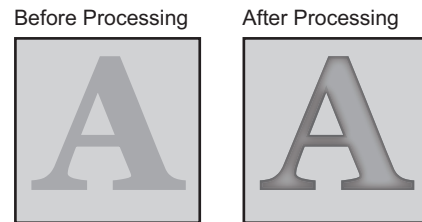
### When Unidentifiable Shapes Are Present

The Edge Extraction filtering item is effective.

- **Edge Extraction**

This is used to make the profile clearer and the shape more identifiable.

#### Edge Extraction

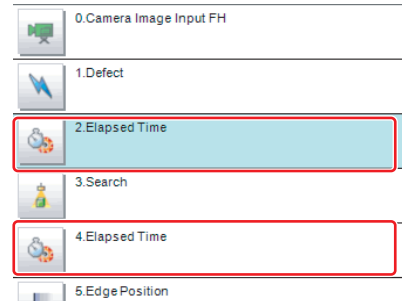


## Shortening Processing Time

### Checking Processing Times for Each Processing Unit

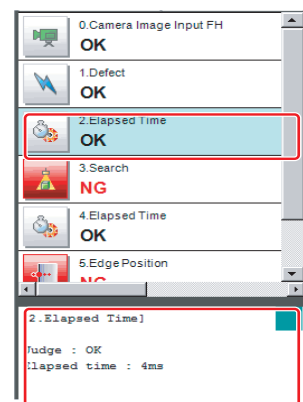
Find out which processing units are taking the most time and adjust the parameters of those processing items.

- 1 **Insert the Elapsed Time processing item after the processing unit for which time is to be measured.**



- 2 **Execute the measurement.**
- 3 **Click the Detail Result Area, and then click the Elapsed Time processing unit where time is to be checked.**

The elapsed time from the top of the flow to the relevant processing unit is displayed.



- 4 **Adjust the parameters of the processing units that are taking time.**

Refer to ► *Points for Adjustment* for individual processing items in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for details on adjustment parameters.

## Shortening the Processing Time for the Overall Measurement Flow

---

You can use parallel processing to shorten the processing time.

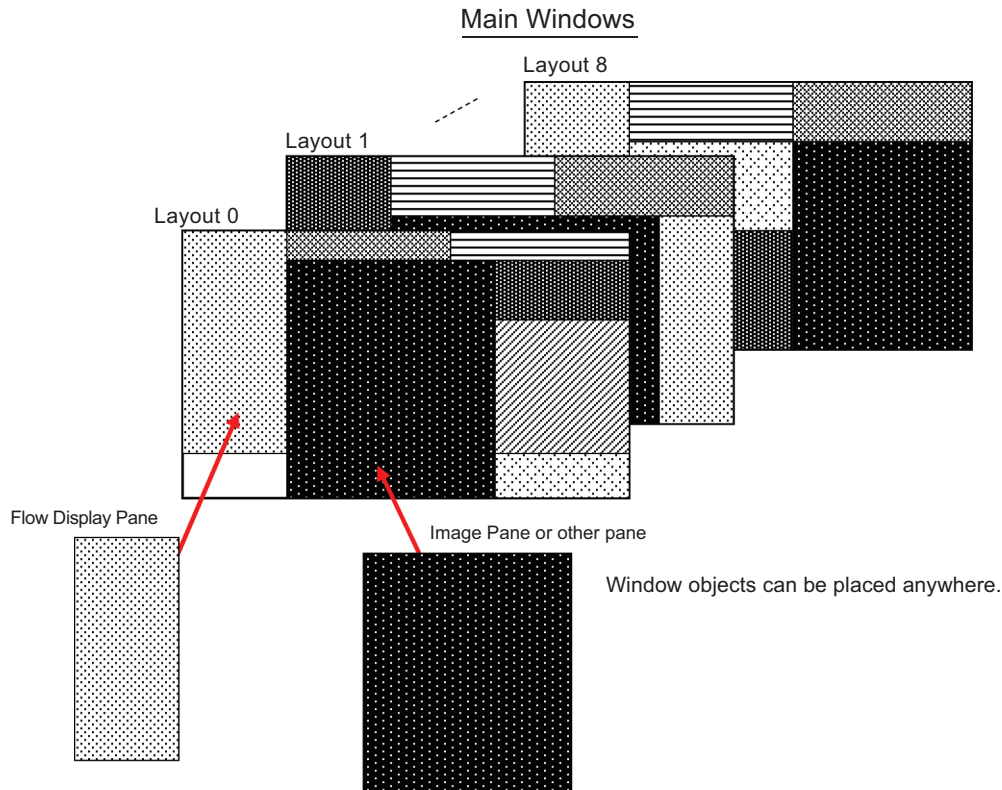
Parallel processing reduces the processing time of the overall measurement flow. It uses a multi-core CPU to process different parts of the measurement flow in parallel at the same time.

Reference: ▶ Parallel Processing (p.255)

# Arranging Windows

## Arranging Window Elements (Layout Modification)

Configuration elements for the Main Windows (called *window objects*) can be laid out and displayed anywhere. You can create a maximum of 9 Main Windows from layout 0 to layout 8.



Each Layout Window is set as follows by default:

Layout	Default setting	Behavior of output signals	
		RUN signal output	Signal output of results
Layout 0	Layout 0 is set as an adjustment window.	OFF	OFF
Layout 1	Layout 1 is set as a run window.	ON	ON
LAYOUTS 2 TO 7	LAYOUTS 2 TO 7 ARE FOR USER-DEFINED PURPOSES AND ARE CREATED AS THEY ARE NEEDED. BY DEFAULT, THESE LAYOUTS HAVE THE SAME SETTINGS AS LAYOUT 0.	OFF	OFF
Layout 8	LAYOUT 8 IS SET AS A REMOTE OPERATION WINDOW. WHEN AN ERROR OCCURS IN LAYOUT 8, ERROR DIALOG APPEARS AS A TEXT STRING IN THE ERROR PANE INSTEAD OF IN AN ERROR DIALOG BOX.	OFF	OFF

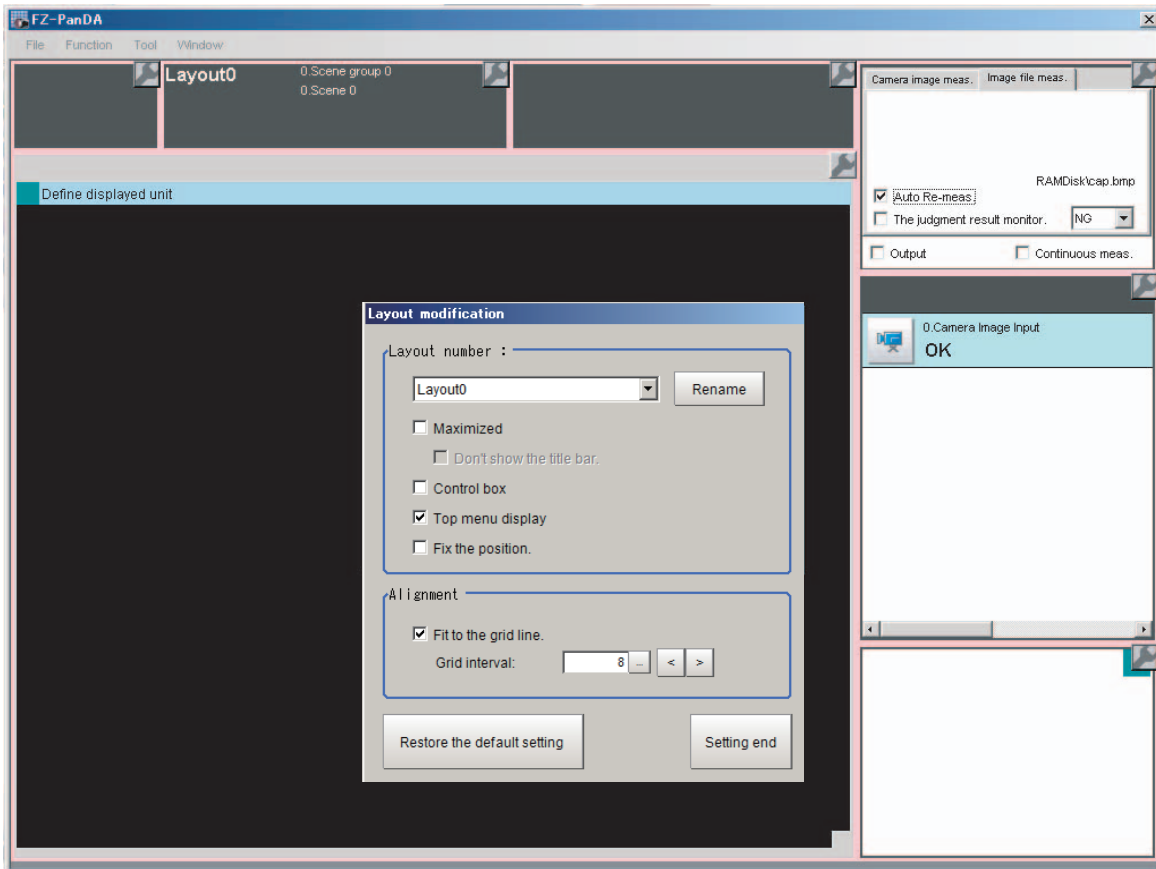
- You can use these layouts to create Main Windows that show only the information that the operator needs, such as a window that shows only the image and the OK or NG status for operation in the field.
- You can change the position and size of the image display, or the processing unit to be displayed for each product type, inspection, or measurement.


### IMPORTANT

If the operation mode is set to Multi-line Random-trigger Mode, create a layout for each line.

## Modifying Layouts

- 1 Select [Layout modification] from the [Window] menu in the Main Window for layout 0.
- 2 The display changes to Layout Modification Mode, and the [Layout modification] dialog box is displayed as shown below.



A  icon will appear on the upper right corner of each object. This indicates that the Layout Modification Mode is active.



In this state, you can display and arrange the layout of objects in the Main Window.

\*1: Normal menu and window operations are not available in Layout Modification Mode.

- 1 Select a layout from [Layout 0] to [Layout 8] in the [Layout number] list.

The Main Window that is behind the [Layout modification] dialog box will change.

You can perform the following operations.

- Click the  icon in the upper right corner of each window object to display the settings dialog box for that object.
- Drag any window object to change its display position.
- Drag the border of any window object to change its size.
  - With the FZ5, you can drag the  icon in the lower right corner of a window object to size it.
- The grid line is displayed when you set Alignment.
  - Each window object can have its size and position adjusted using the grid.

The [Layout modification] dialog box displays the following elements.

Item	Description [Factory default]
Layout number	Select the number of the layout to edit. Layout 0 to layout 8
Rename	Edit the Layout name. Double-byte character or single-byte character can be input up to 255 characters.
Maximized	This function is exclusively for an FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller. Specify whether to always display the Main Window at its maximized state. <ul style="list-style-type: none"> <li>Selected: The Main Window will be displayed in its maximized state on the current display. This window cannot be moved.</li> <li>[Not selected]: The Main Window will be set to the size and position that was in effect immediately before it was maximized.</li> </ul>
Don't show the title bar	<ul style="list-style-type: none"> <li>This function can be set when Maximized is ON.</li> <li>Selected: The title bar will be hidden.</li> <li>[Not selected]: The title bar will be displayed.</li> </ul>
Control box	This function is exclusively for an FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller. Specify whether to display a Minimize Button and a Close Button in the Main Window. <ul style="list-style-type: none"> <li>Selected: A Close Button and Minimize Button will be displayed in the upper right corner of the Main Window.</li> <li>[Not selected]: The Close Button and Minimize Button in the upper right corner of the Main Window will be hidden.</li> </ul>
Top menu display	Specify whether to display the main menu at the top of the Main Window. <ul style="list-style-type: none"> <li>[Selected]: A menu will be displayed at the top of the window.</li> <li>Not selected: The menu at the top of the window will be hidden, and changes to the layout will no longer be allowed.</li> </ul>
Alignment	Set this function to adjust layout position.
Fit to the grid line	Set whether the grid lines are displayed on the Main Window by a pixel unit when the Layout modification is set. <ul style="list-style-type: none"> <li>Selected: The grid lines will be displayed on the Main Window. The window object can be changed its position and size per grid.</li> <li>[Not selected]: The grid lines will be hidden.</li> </ul>
Grid interval	This function is applied when [Fit to the grid line] is ON. Set the grid size. The unit is in pixel. 2 to 200 [8]
Restore the default setting	The layout for the selected layout number is restored to the default settings.
Setting end	This ends Layout Modification Mode.

**Note**

If you change to a layout number (default setting: layout 1) where the menu at the top of the Main Window is hidden and you exit the Settings Mode, the main menu at the top of the Main Window will disappear.


To display the menu at the top of the Main Window for that layout number, use the following procedure.

- 1** Click the [Switch layout] button that appears in the lower right corner, and change to a layout number where the [Top menu display] option is selected.
- 2** Select [Layout modification] from the [Window] menu.
- 3** Change to the Layout number whose menu at the top of the Main Window is hidden.
- 4** Select the [Top menu display] option.

## IMPORTANT

- The setting of [Maximized] applies only to the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller.  
With the FZ5-600 series/FZ5-L series Sensor Controller, the Main Window is always displayed at the maximum size regardless of the setting of [Maximized].
- The setting of [Control box] applies only to the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller.  
With the FZ5-600 series/FZ5-L series Sensor Controller, the Minimize Button and Close Button are always hidden in the Main Window regardless of the setting of [Control box].

### ● Common Operations for Window Objects

- Click inside a window object and drag it to change its position.
- Click the outer edge of a window object and drag it to change the size of the object.
- Click the  icon that appears on the upper right corner of any window object to open the settings dialog box for that object.
- The grid line is displayed when you set Alignment.  
Each window object can have its size and position adjusted using the grid.

### ● Adding Window Objects

- 1 Right-click somewhere in the gray area outside the window objects and select the name of the object to add.

### ● Deleting Window Objects

FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series

- 1 Right-click the window object and click [Delete the window].

FZ5-L series/FZ5-600 series

- 1 Click  in the upper right corner of the window object.



### ● Restoring a Layout to its Default Settings

- 1 Select the layout number for the layout to restore to its default settings, and click [Restore the default setting]. The layout for the selected number is restored to its default settings.

### ● To Exit Layout Modification Mode

- 1 Click [Finish] on the layout modification Window to end layout modification.

### ● Changing the Layout Number from a Layout with a Hidden Top Menu

If you click [Finish] on a layout where the top menu display is hidden, the [Switch layout] button will automatically appear in the lower right corner. Click the [Switch layout] button and switch to a layout number where the [Top menu display] option is selected.

## Saving the Layout in the Controller or a File

---

### ● Saving the Layout in the Controller

After you end Layout Modification Mode, click the [Data save] button.

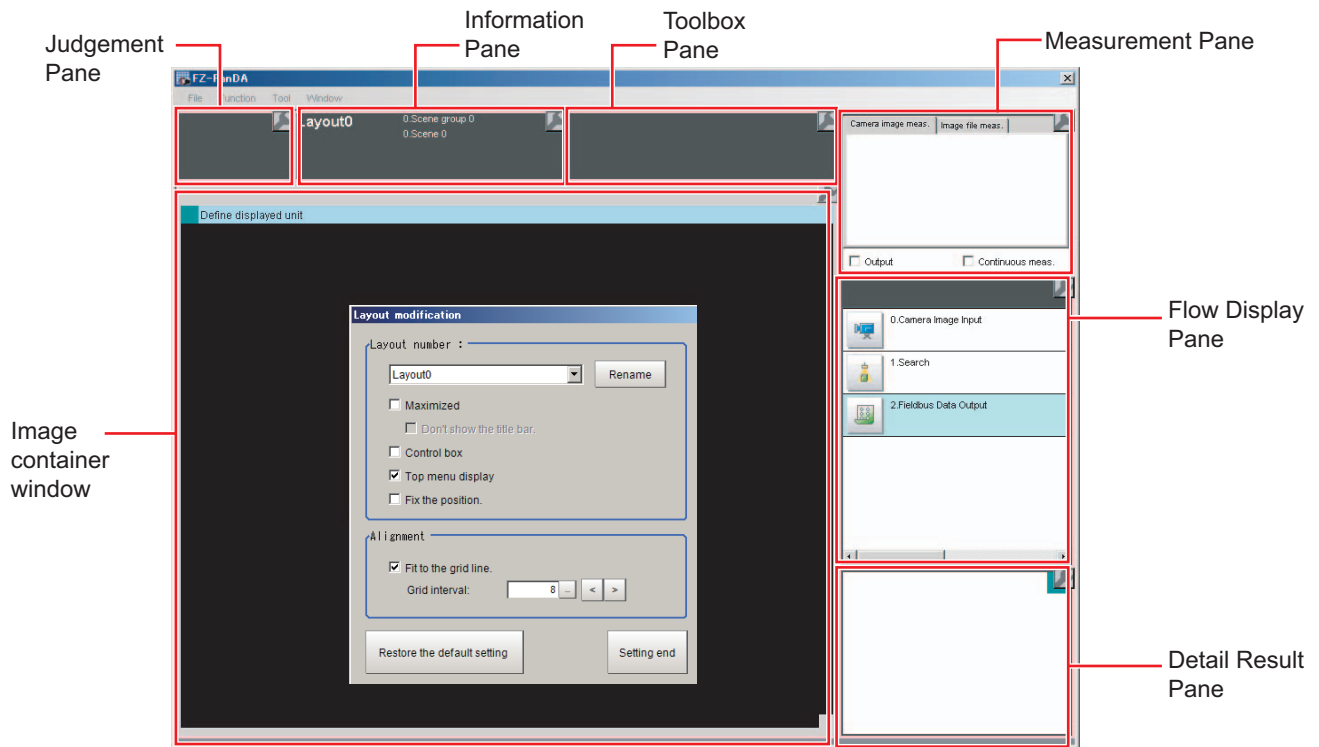
Restart the Sensor Controller to reflect the layout modifications that were saved.

### ● Saving a File

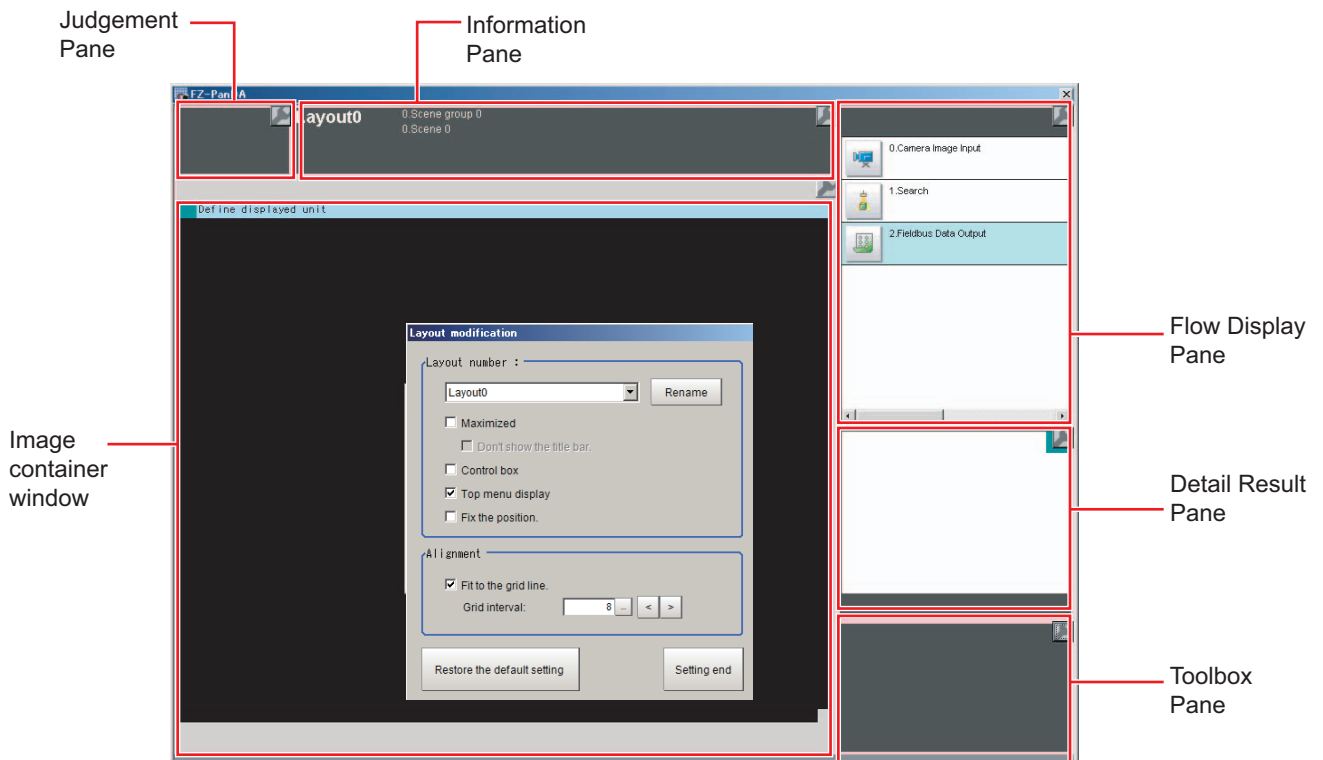
Select [Save to File] from the [Function] menu. Under [Settings data], set the [Data to be saved] to [System data] or [System + Scene group 0], specify the destination, and then click the [OK] button.

## Window Objects That Can Be Laid Out or Changed

### Layout 0 (in Default State) and Layouts 2 to 8



### Layout 1 (in Default State)





You can place the following panes anywhere on a single layout.  
You cannot have more than one pane of the same type.

Pane	Name displayed when a pane is added in Pane Customization Mode
Error Pane	FZ_PanDA.ErrorWindow
Flow Display Pane	FZ_PanDA.FlowWindow
Image container window	FZ_PanDA.ImageContainerWindow
Information Pane	FZ_PanDA.InformationWindow
Judgement Pane	FZ_PanDA.JudgeWindow
Measurement Pane	FZ_PanDA.MeasureWindow
Detail Result Pane	FZ_PanDA.TextWindow
Toolbox Pane	FZ_PanDA.ToolWindow
Image display Pane	FZ_PanDA.PicutureWindow
Label Pane	FZ_PanDA.LabelWindow

### Judgement Pane

This pane shows the overall judgement result. There are no parameters that can be set.

### Information Pane

This pane shows various information about the measurement and scene.

The following elements are displayed.

- Processing Time
- Layout Number
- Scene Group Number: Scene Group Name
- Scene No.: Scene Name
- Logging Errors
- PLC Link Errors

Editable items	Description [Factory default]
View	Layout Number, Processing Time, Scene Group Number + Scene Group Name, Scene No. + Scene Name, Logging Error, PLC Link Error [All visible]
Layout	Click the display item to change its size. The position can be changed by dragging. Setting the Alignment, the grid lines will be displayed.
Size	1 to 64 (the default size depends on the item)
Load default	Restores the default status.
Alignment	Set this function to adjust layout position.
Fit to the grid line	Set whether the grid lines are displayed on the Main Window by a pixel unit when the Layout modification is set. <ul style="list-style-type: none"> <li>• Selected: The grid lines will be displayed on the Main Window. The window object can be changed its position and size per grid.</li> <li>• [Not selected]: The grid lines will be hidden.</li> </ul>
Grid interval	Set the grid size. The unit is in pixel. 2 to 200 [8]

### Toolbox Pane

This pane shows the tool buttons.

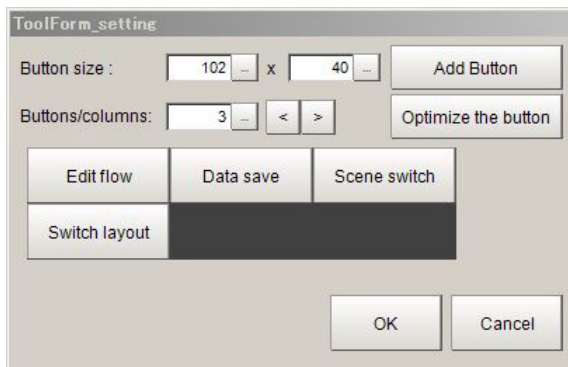
The following elements are displayed.

- [Edit flow] button
- [Data save] button
- [Switch scene] button
- [Switch layout] button

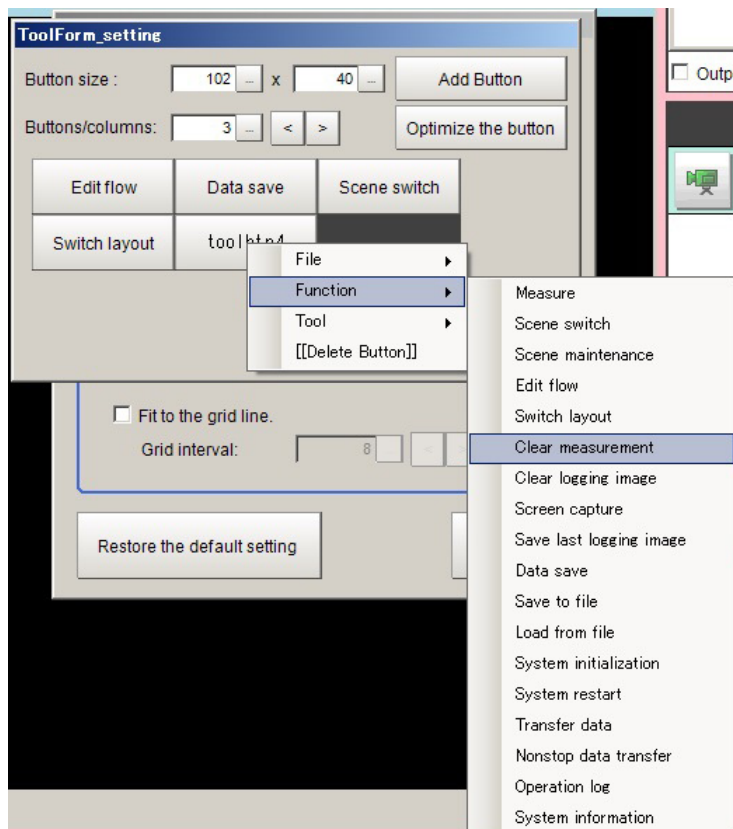
Editable items	Description [Factory default]
Add Button	Each click adds one button. You can assign the File, Function, and Tool of sub menus.
Button size	Sets the size of each button in pixels. 16 × 999, [102 × 40]
Buttons/columns	Sets the number of buttons to display per row. 1 to 32, [3]
Optimize the button	Sets the height and width of buttons based on the window size divided by the number of buttons. One-click adjusts the size of all buttons.
Delete the ImageButton	Click the ImageButton to delete, and then select [Delete] in sub menu. Add [Clear measurement] in Menu.

Add [Clear measurement] in Menu.

- 1** In Layout Modification Mode, click the icon in the upper right corner of the Flow Display Pane.
- 2** The following settings dialog box is displayed.



- 3** Select [Function] - [Clear Measurement] in sub menu.



## Measurement Pane


This pane is for measuring and re-measuring. The following elements are displayed. There are no editable elements.

- [Camera image meas.] tab page: [Measure] button
- [Image file meas.] tab page: [Selection image] button, [Re-meas.] button, [Auto Re-meas.] check box, and the [Judgement result monitor] check box
- [Output] check box
- [Continuous meas.] check box

## Flow Display Pane

This pane shows the measurement flow.

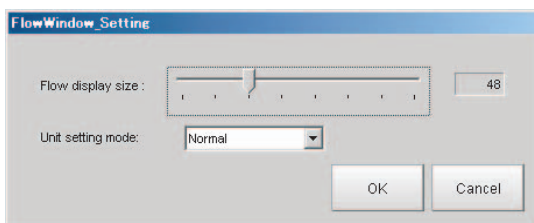
The following elements are displayed.

- [1st. NG unit] button
- [Next NG unit] button
- [] "Property setting" button
- Measurement flow list

### • To Change the Size of the Flow Display Pane

Use the following procedure if the type of settings dialog box to display when you click a processing unit icon is set to the Simplified Non-stop Adjustment Mode:

- 1** In Layout Modification Mode, click the  icon in the upper right corner of the Flow Display Pane.
- 2** The following settings dialog box is displayed. Set the following settings.



Editable items	Description [Factory default]
Flow display size	Sets the size of the Flow Display Pane. The unit is in pixels. 16 to 128, [48]
Unit setting mode	Specifies the type of item settings dialog box to display when you click on a processing unit icon. <ul style="list-style-type: none"> <li>• [Normal]: Displays a normal settings dialog box.</li> <li>• Simplified non-stop: Displays the Simplified Non-stop Adjustment Mode.</li> <li>• Nothing: No settings dialog box is displayed.</li> </ul>

## Detail Result Pane

This pane gives detailed measurement results in text format for the selected processing unit in the measurement flow.

The following elements are displayed.

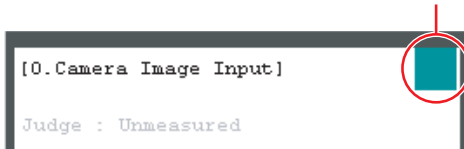
- Processing unit number, Item name
- Judgement

There are no parameters that can be set.

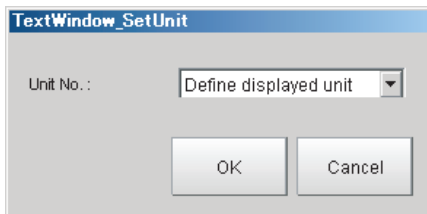
### • To Specify the Unit Number in the Detail Result Pane

- 1 Click the upper right corner of the Detail Result Pane.

Click the upper right corner.



- 2 The following dialog box is displayed. Use this to specify the display mode for the Detail Result Pane.




Editable items	Description [Factory default]
Unit No.	[Define displayed unit] or Each unit number If the [Define displayed unit] option is selected, the detail result for the selected unit for the flow display is displayed. If the unit selected for the flow display is changed, detail result shown also changes according to the setting. If Flow Display Pane is selected as hidden in Layout modification settings, the current settings for the Flow Display Pane are maintained. If you select [Unit No.], the detail result of the selected unit is displayed regardless of the unit selected for the Flow Display Pane. If Flow Display Pane is selected as hidden in Layout modification settings, the current settings for the Flow Display Pane are maintained.

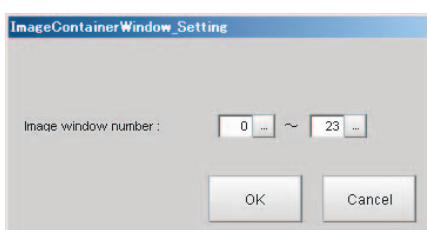
## ImageContainerWindow

You can add image windows and change the layout of them in ImageContainerWindow.

### • To limit the number of image windows

When adjusting the number of image windows to use, a number is assigned to each image window. The number goes up as more image window is added. You can limit the count of image windows by specifying a range of the assigning numbers.

- 1 In Layout Modification Mode, click the  icon shown on the upper right corner of the ImageContainerWindow.
- 2 A window to specify the range of the number of image windows appears. Set up as follows.



Editable items	Description
Image window number	Up to 24 image windows can be added in the ImageContainerWindow Factory default: 0 to 23

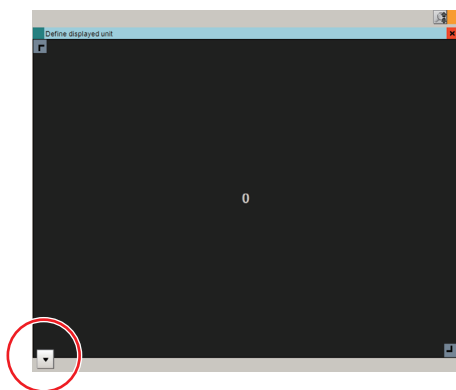
- **To add image windows**

Complete the layout modification, and then click the upper right corner of the ImageContainerWindow.

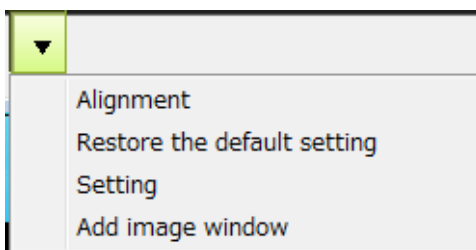
Click the upper right corner.



A button to adjust the display settings of the ImageContainerWindow appears on the lower left corner of the image window.



**3 Click the button.**




Menus will be displayed where you can adjust the following settings.

Editable items	Description [Factory default]
Alignment	Aligns image windows at even intervals.
Restore the default setting	Restores default settings for the position, grid, and aspect ratio of the image window.
Setting	Adjust the layout of the image window. <ul style="list-style-type: none"> <li>• Alignment to the grid</li> <li>• Aspect ratio (fix the aspect ratio)</li> </ul>
Add image window	Add an image window. An image window and an image window number will be added per click.

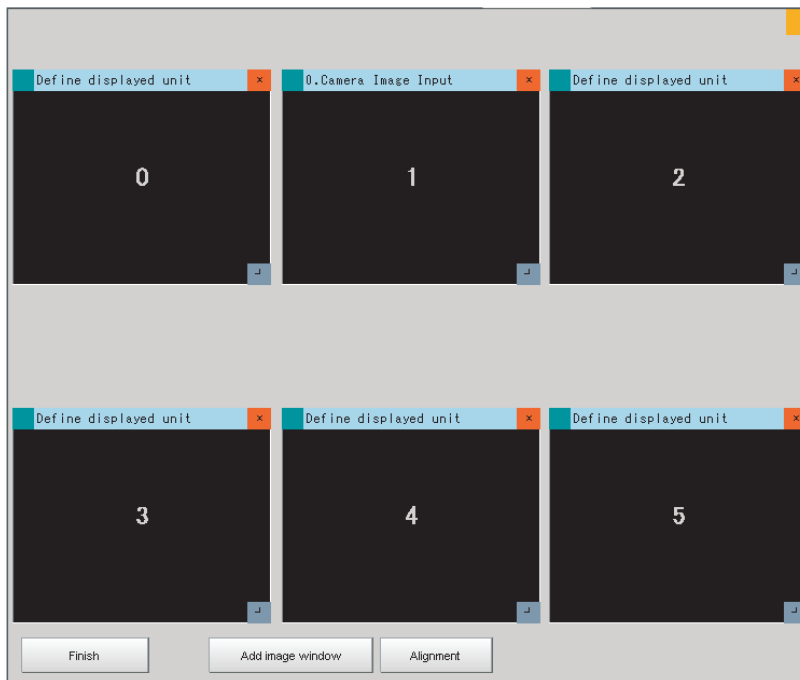
**4 Click [Add image window]. An image will be added in the ImageContainerWindow.**

**5 The size and position of the image windows can be adjusted by dragging them.**

To adjust an image window, click the  button at the upper right corner of the image window.

- **To display multiple images aligned at even interval.**

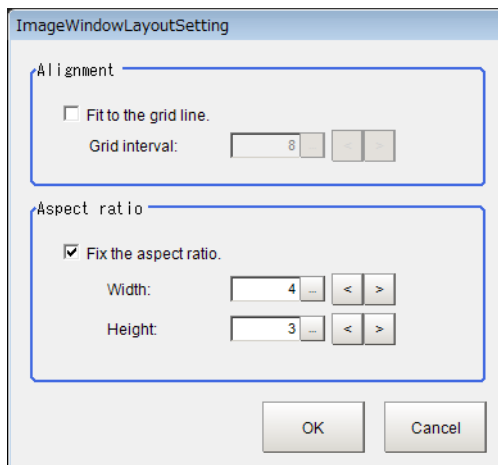
Click [Alignment]. Then, image windows will be displayed in the order of the image window number.  
 Example: When aligning image window 0 to 5



- **To show grid and to fix the aspect ratio of the image window**

Image windows can be moved and scaled up/down by fitting to the grid. The aspect ratio of the image window can be fixed.


**1** Click [Setting] to adjust settings shown in the following image.

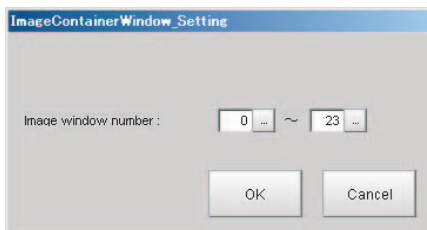


Editable item	Description
Alignment	
Fit to the grid line	Selects whether or not to show the grid in the ImageContainerWindow. <ul style="list-style-type: none"> <li>• Selected: The grid will be shown. The size and position of the window parts will be adjusted according to the grid.</li> <li>• [Cleared]: The grid will be hidden.</li> </ul>
Grid interval	Sets the grid size in pixels. 2 to 200 [8]
Aspect ratio	
Fit the aspect ratio	Sets whether or not to fix the aspect ratio of image window. The aspect ratio can be adjusted according to that of connected camera. <ul style="list-style-type: none"> <li>• Selected: The size will be changed with fixed aspect ratio.                Width: 1 to 9999 [4]                Height: 1 to 9999 [3]</li> <li>• [Cleared] The size will be changed without fixing the aspect ratio.</li> </ul>

• **To Limit the Number of Image Panes Assignable to Each Layout**

You can use Layout modification to limit the range of Image Pane numbers that can be used on each layout.

- 1** When the Layout modification Pane is active, click the  icon in the upper right corner of the Image Display Pane.
- 2** A settings dialog box for the Image Pane number range is displayed. Set following settings.



Editable items	Description
Image window number	<ul style="list-style-type: none"> <li>• Layout 0 to 7: You can add up to 24 Image Panes within the Image Display Pane. 0 to 23</li> <li>• Layout 8: You can add up to 8 Image Panes within the Image Display Pane. 24 to 31</li> </ul>

**IMPORTANT**

- Part of image windows can exceed the ImageContainerWindow horizontally. They cannot entirely be positioned outside the ImageContainerWindow. The upper left part of the image window will always stay inside the ImageContainerWindow. No portion of image windows can be positioned outside the ImageContainerWindow vertically.
- Available Image Pane numbers differ for the layouts 0 to 7 and for the layout 8. Therefore, change of Image Panes for the layout 0 to 7 does not apply to the layout 8.

## Error Pane

This pane shows errors, such as Camera connection errors.

If you add an Error Pane to a layout and an error occurs that normally causes an error dialog box to appear, an error string will appear in the Error Pane.

This is useful for remote operation or situations where an error dialog box would be difficult to close.

The latest error string (error message) is displayed on the top line of the error pane.

Also the error pane can display the error messages of up to 100.

The Error Pane is assigned to layout 8 by default.

### Note

The Error Pane displays error messages for the following errors.

- System errors
- Fan or voltage errors
- Camera connection errors
- Changes made to the connected Camera
- Camera overcurrent detected
- Image logging disk write errors
- Output control timeout errors (parallel I/O, PLC Link, or EtherNet/IP)
- PLC Link communications errors
- Parallel I/O overcurrent detected
- Settings data load errors
- Settings data transfer errors
- Output timeouts (EtherCAT)
- Output buffer errors (EtherCAT)

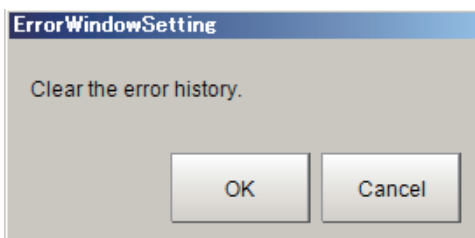
### • Clearing the Error Display

- 1** In the state where you have exited layout modifications, click the upper left corner of the Error Pane.

Click the upper left corner.



- 2** The following dialog box is displayed. Click the [Clear] button.



- 3** Click the [Close] button on the settings dialog box to close the dialog.



## Image File Display Window

The image file display is automatically adjusted to the size of the Image file display window and cannot be changed.


### Note

- Image will be fit to the upper left corner of the Image File Display Window. The size and position of the image cannot be changed.
- Image is loaded and displayed when launching the FH Sensor Controller, or when registering the Image File Display Window.
- Image is displayed as stretched to the width of the window. For more information about this, refer to FH-AP1.

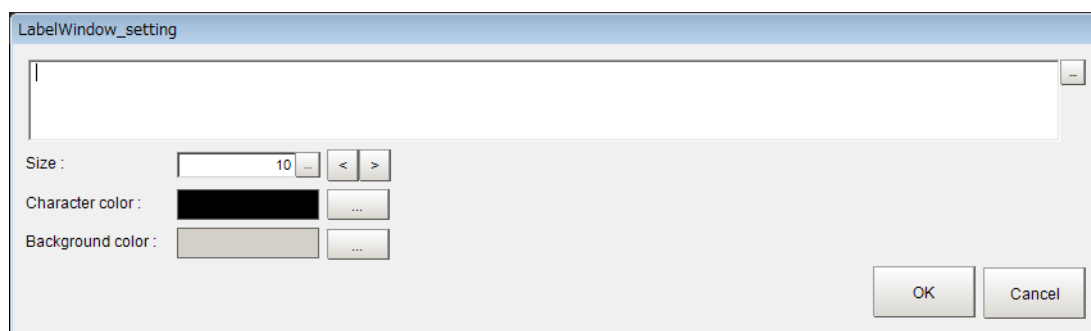
## Label Window

The window for displaying the title and other text.

By default it is not displayed.

- 1** Select and move to the desired window from the Layout modification screen.
- 2** Right-click in an area outside the window and then click "FZ\_PanDA.LabelWindow."
- 3** Click the  icon in the upper right corner.
- 4** The settings screen below will be displayed. Make the following settings.

The Label Window is a window to display letters such as titles.



Editable items	Setting [Factory default]	Description
Word to display	---	You can type a word consisting of 0 to 255 characters.
Size	5 to 50 point [10]	Select the font size of the displaying word.
Character color	6,770,000 colors [Black]	The color of characters can be specified from 16,770,000 full colors by RGB specification.
Background color	6,770,000 colors [Gray]	The color of characters can be specified from 16,770,000 full colors by RGB specification.

### IMPORTANT

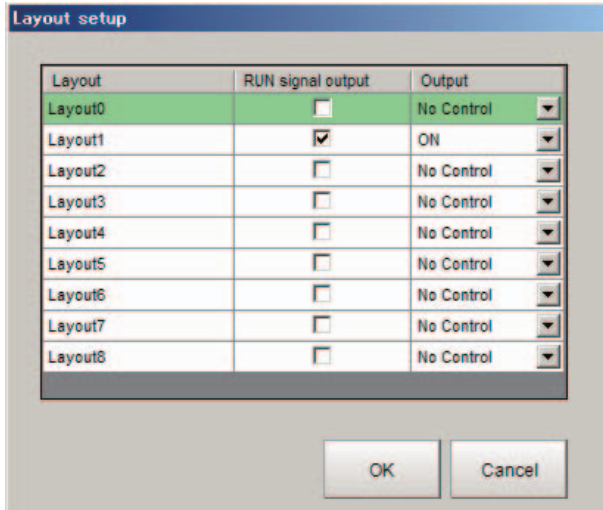
In the Label Window, only characters in the language selected under the System Settings are available.

## Setting the Behavior of Output Signals for Each Layout (Layout Settings)

For each layout, you can set the behavior of output signals after the layout is changed.

- 1 Select [Layout setup] from the [Window] Menu for the main window for layout 0.
- 2 The following [Layout setup] dialog box is displayed.

Set the name for layouts 0 to 8, and whether to use the RUN signal output and external output signals.



Item	Description
Layout	Layout name (up to 32 characters)
RUN signal output	The RUN signal for the layout is output if the check box is selected. Select or clear the check boxes.
Output	Set whether to output the execution results of Results Output processing units. <ul style="list-style-type: none"> <li>• ON: Data is output when a Results Output processing unit is executed in the measurement flow during execution of a measurement.</li> <li>• OFF: Data is not output even when a results output processing unit is executed in the measurement flow for a measurement.</li> <li>• No Control: The state of the outputs that were in effect before the layout was changed are retained. If [Output] is selected immediately before the layout is changed, the outputs stay ON, and if [Output] is not selected, the outputs stay OFF.</li> </ul>

## Changing Layout Numbers in the Main Window

You can change the layout in the Main Window to the layout number that was set in Layout Modification Mode. Use this when you need to work with more than one layout.

- 1 Select [Switch layout] on the [Function] menu or from the tool buttons.
- 2 Select the layout number to change to and click the [OK] button to close the [Switch layout] dialog box.

Item	Description
Layout number	Layout number (layout 0 to layout 8)

### Note

It is also possible to switch the Layout number with a communication command.

## Troubleshooting

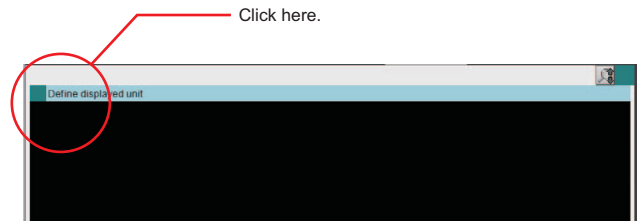
Symptom	Setting	Correction
The RUN signal is not output.	Layout setup	Select [Layout setup] from the [Window] menu and select the [RUN signal output] check box for the layout to be used.
The layout of the Image container window cannot be changed.	---	Click the button in the upper right corner of the Image container window when the Layout modification Pane is not displayed in the Main Window.
Cannot create a backup of the layout settings.	---	The layout data is included in the system data and saved in the Sensor Controller when you click [Data save]. To save or load the settings to or from a file, click [Save to file] or [Load from file] to save or load the system data and scene group 0 data or the system settings data. After loading the system settings, change to a layout number different from the one being edited, then switch back to the layout number being edited. the updated contents will be displayed.
An image of a window object remains in the Main Window when modifying the layout.	Layout modification	When you finish modifying the layout, the display will be updated and window objects will be displayed correctly.
Unable to output the measurement result to an external device after Switch layout is executed.	Layout setup	If "Output" is set to OFF in the Layout setup of the layout to be used, the measurement result can not be externally output immediately after launching the system, or after Switch layout. Even if you check "Output" in the measurement window of the main screen, the setting selection for "Output" in the Layout setup menu will be used when switching layouts. Before executing measurement, set "Output" to ON in the Layout setup menu of the layout to be used.
Editing contents are not reflected when you confirm the Sensor Controller after edit a layout by remote control.	Layout modification	Change to a layout number different from the one was edited, then switch back to the edited layout number. The updated contents will be displayed.

# Arranging the Window Display

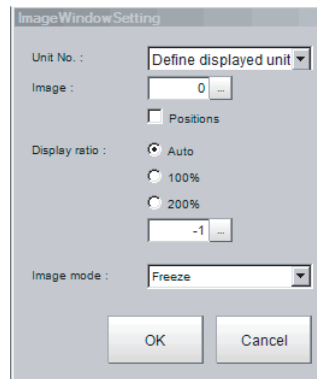
## Changing the Image Mode and Other Display Contents

The display contents of the Image Pane can be changed in order to make the measurement status easier to understand.

- 1 Click the upper left corner of the Image Pane that for which to change to display the settings dialog box for the Image Pane.



- 2 The settings dialog box for the Image Pane is displayed. Set the items.



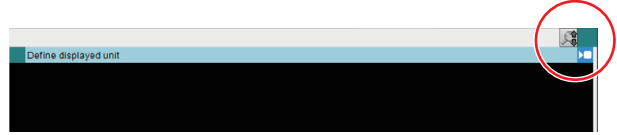
Editable item	Description [Factory default]
Unit No.	<p>[Define displayed unit] or Unit No.</p> <p>If the [Define displayed unit] option is selected, the measurement image for the selected unit in the flow display is displayed. If you select another unit in the flow display, the measurement image that is displayed will also change according to the selected unit. If the flow display is hidden, current settings for the flow display will be maintained.</p> <p>If you specify a unit number, the measurement image will continue to display the image for that unit number, regardless of the selected unit in the flow display.</p>
Image	<p>Specify a sub image number for the measurement image to display.</p> <p>The sub image number that can be displayed depends on the processing item.</p> <p>The menu is disabled if the [Position] check box is selected.</p> <p>[0] to 100</p>
Position	<p>Specify whether to display the position list.</p> <p>Check box selected or [cleared].</p>
Display ratio	<p>Specify the magnification at which to display the Image Pane.</p> <p>The range for this parameter is from -1 to 1,600.</p> <p>[Auto], 100%, 200%, or numerical value</p>
Image mode	<p>Specify the image mode to use to display the image in the Image Pane.</p> <p>Through, [Freeze], or Last NG</p>

## Changing the Display Ratio

When you use the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series, you can change the display magnification as follows:

- Change the display magnification on the Image Pane.
- Change the display magnification using the zoom icon of Image container window.

**1** Click the zoom icon in the upper right corner of the Image container window.



**2** The zoom icon color is changed, and then the Display Ratio can be changed by using mouse wheel.



The Display Ratio can be changed by using mouse wheel.



The Display Ratio can not be changed by using mouse wheel.

### Note

- If there is a display magnification via mouse wheel capability, the following operation is usable.
  - Double-clicking:  
Change the doubled display magnification to fit the image widow size.
  - Triple-clicking:  
Displays the part of the window except the partially loaded margin.  
Change the display magnification of the captured image except the margin according to the window size.

## Image Mode List



You can change the following items on the Main Window (layout 0).

Item	Description
Through	The latest image is always loaded from the Camera and displayed. When a through image is selected, saved images cannot be called up for measurement.
Freeze (default)	The image that was scanned in the immediately preceding measurement is displayed. Images are updated when measurements are performed.
Last NG	The latest NG error image resulting from an overall judgement is displayed. The latest measurement results are always shown in the overall judgement and measurement time. In this case, the overall judgement result and measurement time may conflict with the Camera image. Also, during continuous measurements, the last NG image cannot be displayed.

### IMPORTANT

- In the following cases, saved images cannot be called up for measurement.
  - When a through image mode is selected in unused Image pane.
- When you select [Through], the measurement start or display switch may be delayed.

#### Note

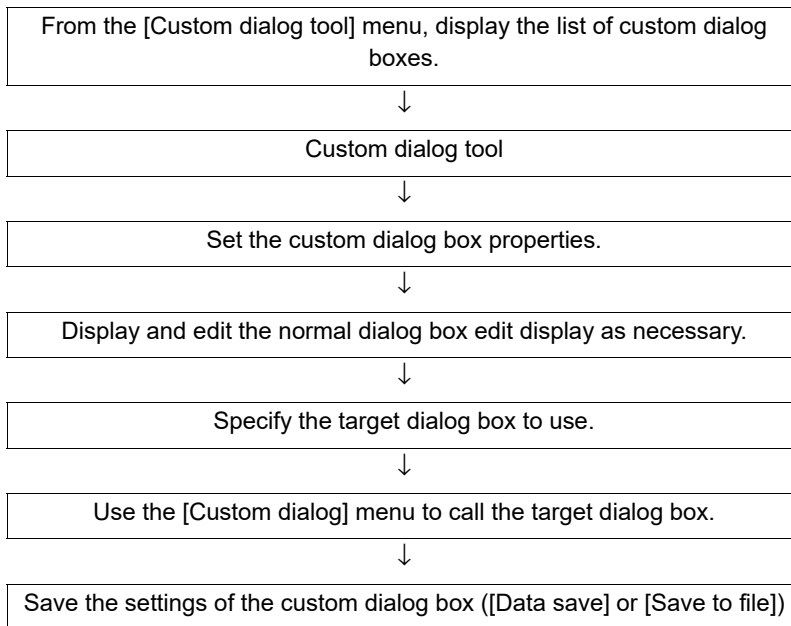
- If a measurement trigger is input while using the multi-input function or immediately after BUSY is turned OFF (such as while the display is being updated), the last NG image cannot be displayed.
- [Display Last NG Image] serves a similar function as a processing item for which error images can be saved. If this processing item is used, the last NG image can be acquired without operation having any effect on operation.
- The icon in upper right of the Image Pane shows current state of the image.  
The  icon shows "Through" of image mode.  
The  icon shows "Last NG" of image mode.

# Custom Dialogs

You can create a customized settings dialog box on the Sensor Controller and display it instead of the normal settings dialog boxes for each processing item.

This allows you to hide parameter settings that must not be changed during normal operation, and show only the parameters that are necessary. You can also create a settings dialog box that allows the operator to change the settings for more than one processing unit.

## Flow of Use

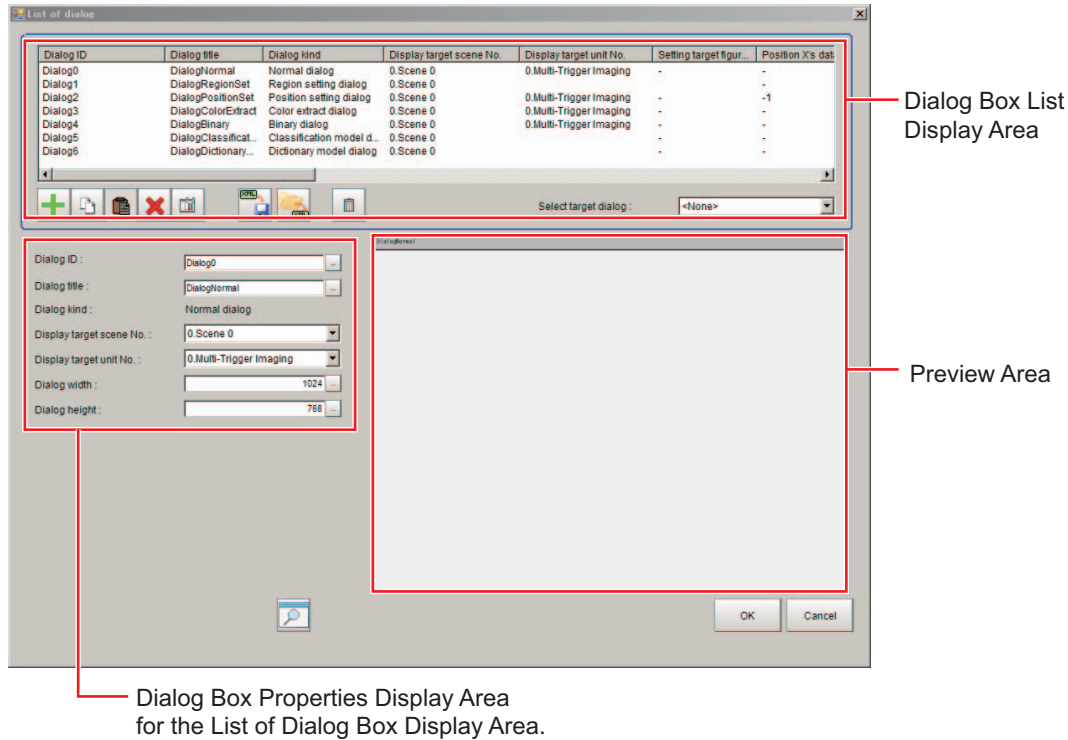


## Custom Dialog Tool







Use the following procedure to create a custom dialog box.

### 1 In the Main Window, select [Custom dialog tool] from the [Tool] menu.




The [List of dialog] display area is displayed. The Custom Dialog Tool has the following display areas: Dialog Box List Display Area, Dialog Box Properties Display Area, and Preview Area.



### Edit and Control Buttons for the List of Dialog Box Display Area.

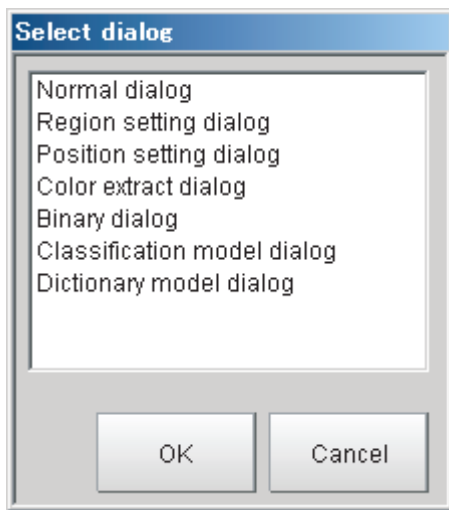
Icon button	Function	Description
	Add dialog	Adds a dialog box. The [Select dialog] list is displayed.
	Copy dialog	Copies the selected dialog box.
	Paste dialog	Pastes the copied dialog box to the end of the list.
	Delete dialog	Deletes the selected dialog box.
	Edit normal dialog	If the selected dialog box is a normal dialog box, this button allows you to edit the contents that are displayed in the Edit Dialog Box Area. The [Edit Dialog] area is displayed.
	Save to dialog setting file	Saves the selected dialog box to a dialog box settings file (extension .xml).



Icon button	Function	Description
	Load from dialog setting file	Loads the dialog box from the specified dialog box settings file (extension .xml) into the list of dialog boxes.
	Reset tool settings	Reset all dialogs.
	Preview	Displays a working preview of the selected dialog box for testing.

**2** In the list of dialog boxes, click the [Add dialog] button (+).

The [Select dialog] list is displayed.



The types of dialog boxes that you can create are listed below.

Dialog kind	Description
Normal dialog	This is a custom dialog box that you create with numeric input boxes, buttons, and other items.
Region setting dialog	This dialog box sets the measurement region for a processing item, such as the region setting for Search and Defect.
Position setting dialog	This dialog box sets the reference of a processing item, such as the reference position for Search and Edge Position.
Color extract dialog	This dialog box sets the color of a processing item, such as the color setting in Edge Position.
Binary dialog	This dialog box sets the binary setting of a processing item, such as the binary filter in Labeling.
Classification model dialog	You can register multiple models for this dialog box, such as for the model registration of the Classification processing item.
Dictionary model dialog	You can register multiple models for this dialog box, such as for the model registration of the Model Dictionary processing item.

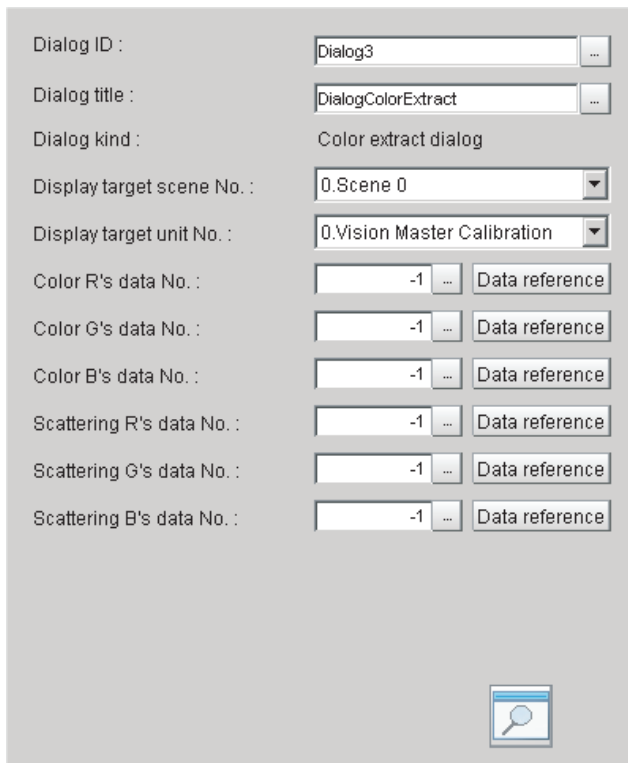
**3** Select the kind of dialog box to add, and then click the [OK] button.

The selected dialog box is added to the Dialog Box List Display Area.

Select the added dialog box from the dialog box list. The settings for the selected dialog box are displayed in the Edit Dialog Box Area while an image of the dialog box is displayed in the Preview Area.


**4 Edit the settings for the dialog box. Some settings are common for all dialog boxes, and some are specific to individual dialog boxes.**

**Example: Dialog Box Properties Display Area for Color Extract Processing Item**



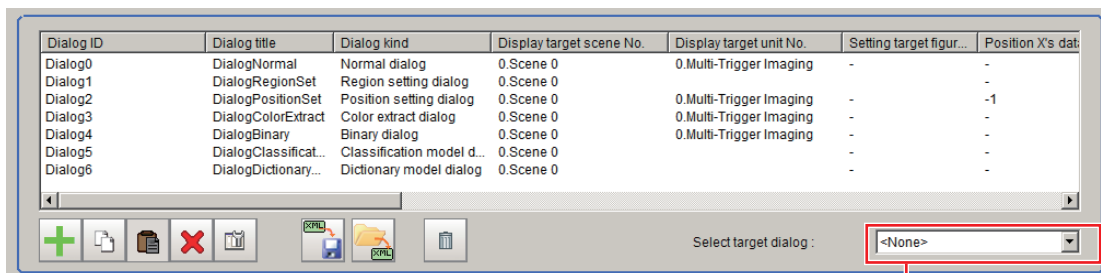
Refer to ► Settings in the Dialog Box Properties Display Area (p.109) for details on individual settings.

**Note**

If [Dialog kind] is set to [Normal dialog], click the [Edit normal dialog] button (  ) to edit the dialog box.  
Reference: ► Editing a Normal Dialog Box (p.111)

**5 Edit the settings, and click the [Preview] button (  ) as necessary to confirm the edited dialog box.**

**6 Use the [Select target dialog] list to specify the ID of the dialog box to open.**





Select the target dialog box.

To open the dialog box that you specified in the [Select target dialog], select [Custom dialog] from the [Tool] menu.

**7 When you have finished editing, click the [OK] button to exit the List of Dialog Box Display Area.**

**8 Click [Data save] on the Main Window to save the settings.**

Note

To save the settings individually, click the [Save to dialog settings file] button  to save the settings to a file. The saved file can be loaded with the [Load dialog settings file] button .

## Settings in the Dialog Box Properties Display Area

### Common Settings Area

Parameter	Set value [Factory default]	Description
Dialog ID	The dialog box ID is set to a character string that is not assigned to any other dialog box.	The ID for the dialog box. To change the ID, click the [...] button and enter the desired characters.
Dialog title	A title that is based on the dialog box type is assigned.	The title for the dialog box. This appears in the title bar when the custom dialog box is displayed. To change the title, click the [...] button and enter the desired characters.
Dialog kind	---	The dialog box type is displayed.
Display target scene No.	[Scene 0]	This specifies the number of the scene for which to display the dialog box.
Display target unit No.	This is set to the unit that can be selected from the display target scene.	This specifies the number of the unit for which the dialog box is to be displayed instead of the default settings dialog box. The unit that can be specified depends on the type of the dialog box. Immediately after the dialog box is added, the unit with the lowest unit number out of the display target units in the display target scene is selected. If there is no display target unit, unit 0 is selected.

#### IMPORTANT

If you change the measurement flow after you create a custom dialog box, change the target unit number to match the edited measurement flow.

### Individual Setting Region

#### • Normal Dialog Box Setting Region

Parameter	Set value [Factory default]	Description
Dialog width	100 to 1920 [1024]	Sets the width of the dialog box.
Dialog height	100 to 1080 [768]	Sets the height of the dialog box.

#### • Region Setting Dialog Box Setting Region

Parameter	Set value [Factory default]	Description
Setting target figure No.	[0]	Specifies the figure number for the unit to use for region setting. The number that you can select depends on the unit that is specified.

• **Position Setting Dialog Box Setting Region**

Parameter	Set value [Factory default]	Description
Position X's data No.	-1 to 999999999 [-1]	Specifies the data number on the X axis for the unit to use for position setting.
Position Y's data No.	-1 to 999999999 [-1]	Specifies the data number on the Y axis for the unit to use for position setting.
[Data reference] button	---	You can select the data number directly to enter it, or you can enter it with the [Data reference] button. Click the [Data reference] button to select the target data in the [Data reference] dialog box.

• **Color Extract Dialog Box Setting Region**

Parameter	Set value [Factory default]	Description
Color R's data No.	-1 to 999999999 [-1]	Specifies the R's data number for the color to specify for the unit to use for color extraction.
Color G's data No.	-1 to 999999999 [-1]	Specifies the G's data number for the color to specify for the unit to use for color extraction.
Color B's data No.	-1 to 999999999 [-1]	Specifies the B's data number for the color to specify for the unit to use for color extraction.
Scattering R's data No.	-1 to 999999999 [-1]	Specifies the R's data number for the difference in the unit to use for color extraction.
Scattering G's data No.	-1 to 999999999 [-1]	Specifies the G's data number for the difference in the unit to use for color extraction.
Scattering B's data No.	-1 to 999999999 [-1]	Specifies the B's data number for the difference in the unit to use for color extraction.
[Data reference] button	---	You can select the data number directly to enter it, or you can enter it with the [Data reference] button. Click the [Data reference] button to select the target data in the [Data reference] dialog box.

• **Binary Dialog Box Setting Region**

Parameter	Set value [Factory default]	Description
Binary upper's data No.	-1 to 999999999 [-1]	Specifies the upper data number for the unit to use for binary filtering.
Binary lower's data No.	-1 to 999999999 [-1]	Specifies the lower data number for the unit to use for binary filtering.
Binary reverse's data No.	-1 to 999999999 [-1]	Specifies the reverse data number for the unit to use for binary filtering.
[Data reference] button	---	You can select the data number directly to enter it, or you can enter it with the [Data reference] button. Click the [Data reference] button to select the target data in the [Data reference] dialog box.

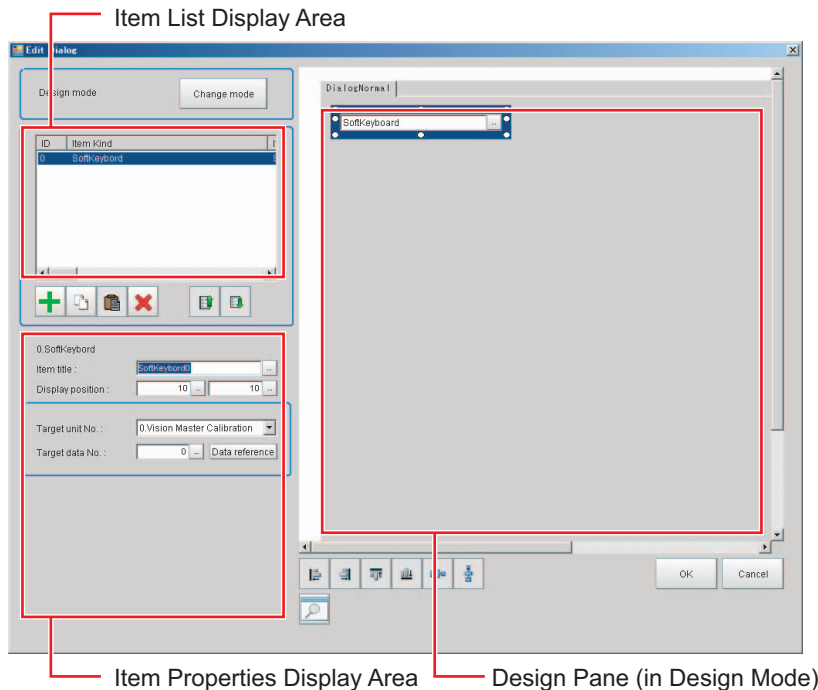
## Editing a Normal Dialog Box

If [Dialog kind] is [Normal dialog], you can freely place objects, such as numeric entry boxes and buttons, anywhere in the Edit Dialog Box Area.








**1** In the Dialog Box List Display Area, select a dialog box that is of the normal dialog box type.

**2** Click the [Edit normal dialog] button (  ).

The [Edit Dialog] area is displayed.

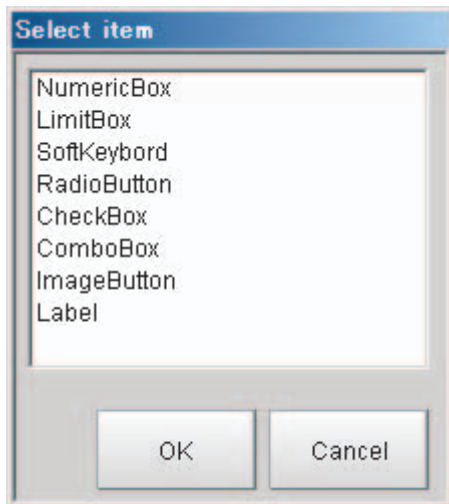


### Edit and Control Buttons for the Edit Normal Dialog Box Window.

Icon button	Function	Description
	Change mode	Changes between the Design Pane and the List Pane.
	Add item	Adds an item. The [Select item] dialog box is displayed. Click the [OK] button to add the selected item to the end of the list.
	Copy item	Copies the item that is selected in the list.
	Paste item	Adds the copied item to the end of the list of items.
	Delete item	Deletes the item that is selected in the list.
	Move item up	Moves the selected item up one position in the list.
	Move item down	Moves the selected item down one position in the list.

### 3 In the list of dialog boxes, click the [Add item] button ( ).

The following [Select item] list is displayed.




The types of items that you can place on a normal dialog box are listed below.

Item kind	Description
Numeric Box	This setting object is used to enter numeric values. From the processing items, select the numeric data to use as the target for the entered numeric value.
Limit Box	This setting object is used to enter upper and lower limits. From the processing items, select the upper/lower limit to use as the target for the entered numeric value.
Soft Keyboard	This setting object is used to enter characters. From the processing items, select the character string data to use as the target for the entered a character string.
Radio Button	This setting object is used to enter button options. From the processing items, select the data to use as the target for the entered selection result.
Check Box	This setting object is used to enter check box options. From the processing items, select the data to use as the target for the check box selection result.
Combo Box	This setting object is used to enter from a combo box. From the processing items, select the data to use as the target for the entered selection result. You can also set the items to display in the combo box.
Image button	This setting object is used to accept inputs from a button. Buttons can be placed in any desired position and are used to execute predetermined events when the button is clicked.
Label	This setting object is used to display characters. You can display any character string in any desired position.

### 4 Select the kind of item to add, and then click the [OK] button.








The item is added to the Item List Display Area. At the same time, the added item is also displayed in the Design Pane.

## 5 To move the position where an added item is displayed in the Design Pane, drag the item to the desired position.

Drag the  part of the border of the added item to change its display size.

Every item can be clicked, dragged, or selected as a group of items. Selected items are shown with a blue border.

The Design Pane of the Edit Normal Dialog Box Window has the following edit and control buttons.

Icon button	Function	Description
	Left	Aligns the left edges of the selected items to the left side of the first item that is selected.
	Right	Aligns the right edges of the selected items to the right side of the first item that is selected.
	Top	Aligns the top edges of the selected items to the top of the first item that is selected.
	Bottom	Aligns the bottom edges of the selected items to the bottom edge of the first item that is selected.
	Evenly space horizontally	Evenly adjusts the space on the left and right sides of the selected items.
	Evenly space vertically	Evenly adjusts the space on the tops and bottoms of the selected items.
	Preview	Displays a preview of the dialog box that is being created.

### Note

To view a list of the properties of an item in the Item List Display Area in Design Mode, click the [Change mode] button. The Item List Display Area changes to a list display.

Click the [Change mode] button in Edit Mode to return to the Design Mode.

## 6 Every time you click an item in the list, that item changes between selected (inverted display) and not selected.

If only one item is selected (inverted display), the settings for that item type are displayed in the Edit Item Area.

## 7 Edit the settings for the item. Some settings are common for all items, and some are specific to individual items.

### Example: Item Properties Display Area for a Numeric Box

Refer to ► Settings in the Item Properties Display Area (p.114) that is described later in this section for details on all settings.

## 8 When you have finished editing, click the [OK] button to exit the Edit Dialog Box Window.

### Settings in the Item Properties Display Area

#### • Common Settings Area

Parameter	Set value [Factory default]	Description
Item title	This is set to a character string that is not assigned to any other item in the list when the item is added.	To change the title of the dialog box item, click the [...] button and enter the desired characters.
Display position	X: 0 to 1920, [-] Y: 0 to 1080, [-]	These are the coordinates of the upper left corner of the dialog box item. The upper left corner of the dialog box is 0, 0. The display position is also updated when you drag an item to a new position in the Design Pane.

#### • Individual Setting Region

##### Numeric Box Setting Region

Parameter	Set value [Factory default]	Description
Target unit No.	0 to Number of units in the display target scene - 1 [0]	Specify the unit to be the target for the numeric setting. The units that are registered for the scene that is the target of the normal dialog box will appear in the combo box. Select the processing unit to set.
Target data No.	0 to 9999999 [0]	Specify the data to be the target for the numeric setting. Enter the data number for the unit that is specified by the target unit number.
[Data reference] button	---	You can select the data number directly to enter it, or you can enter it with the [Data reference] button. Click the [Data reference] button to select the target data in the [Data reference] dialog box.
Decimal digits	0 to 4 [4]	Enter the number of digits after the decimal place that can be entered by the numeric setting.
Max value	-999999.9999 to 999999.9999 [999999.9999]	Enter the maximum value that can be entered with the numeric setting.



Parameter	Set value [Factory default]	Description
Min value	-999999.9999 to 999999.9999 [-999999.9999]	Enter the minimum value that can be entered with the numeric setting.

## Limit Box Setting Region

Parameter	Set value [Factory default]	Description
Target lower unit No.	0 to Number of units in the display target scene - 1 [0]	Specify the unit to be the target for the upper/lower limit setting. The units that are registered for the scene that is the target of the normal dialog box will appear in the combo box. Select the processing unit to set. Set the same unit number as the upper target unit number.
Target upper unit No.	Target upper unit No. [0]	Specify the unit to be the target for the upper/lower limit setting. The units that are registered for the scene that is the target of the normal dialog box will appear in the combo box. Select the processing unit that you wish to set. Set the same unit number as the lower target unit number.
Target data No.	0 to 9999999 [0]	Specify the data to be the target for the upper/lower limit setting. Enter the data number for the unit that is specified by the target unit number.
[Data reference] button	---	You can select the data number directly to enter it, or you can enter it with the [Data reference] button. Click the [Data reference] button to select the target data in the [Data reference] dialog box.
Decimal digits	0 to 4 [4]	Enter the number of digits after the decimal place that can be entered by the upper/lower limit setting.
Max value	-999999.9999 to 999999.9999 [999999.9999]	Enter the maximum value that can be entered with the upper/lower limit setting.
Min value	-999999.9999 to 999999.9999 [-999999.9999]	Enter the minimum value that can be entered with the upper/lower limit setting.

## Soft Keyboard Setting Region

Parameter	Set value [Factory default]	Description
Target unit No.	0 to Number of units in the display target scene - 1 [0]	Specify the unit to be the target for the character string setting. The units that are registered for the scene that is the target of the normal dialog box will appear in the combo box. Select the processing unit to set.
Target data No.	0 to 9999999, [0]	Specify the data to be the target for the character string setting. Enter the data number for the unit that is specified by the target unit number.
[Data reference] button	---	You can select the data number directly to enter it, or you can enter it with the [Data reference] button. Click the [Data reference] button to select the target data in the [Data reference] dialog box.

### Radio Button Setting Region

Parameter	Set value [Factory default]	Description
Target unit No.	0 to Number of units in the display target scene - 1 [0]	Specify the unit to be the target for the radio button setting. The units that are registered for the scene that is the target of the normal dialog box will appear in the combo box. Select the processing unit to set.
Target data No.	0 to 9999999 [0]	Specify the data to be the target for the radio button setting. Enter the data number for the unit that is specified by the target unit number.
[Data reference] button	---	You can select the data number directly to enter it, or you can enter it with the [Data reference] button. Click the [Data reference] button to select the target data in the [Data reference] dialog box.
Set value	0 to 9999999 [0]	Enter the numeric value to set in the target data when the radio button is selected. The numeric value that is set here is the set value for that selected radio button that is applied to the data for the target data number when the operator changes the radio button selection on the actual user dialog box.

### Check Box Setting Region

Parameter	Set value [Factory default]	Description
Target unit No.	0 to Number of units in the display target scene - 1 [0]	Specify the unit to be the target for the check box setting. The units that are registered for the scene that is the target of the normal dialog box will appear in the combo box. Select the processing unit to set.
Target data No.	0 to 9999999 [0]	Specify the data to be the target for the check box setting. Enter the data number for the unit that is specified by the target unit number.
[Data reference] button	---	You can select the data number directly to enter it, or you can enter it with the [Data reference] button. Click the [Data reference] button to select the target data in the [Data reference] dialog box.

### Combo Box Setting Region

Parameter	Set value [Factory default]	Description
Target unit No.	0 to Number of units in the display target scene - 1 [0]	Specify the unit to be the target for the combo box setting. The units that are registered for the scene that is the target of the normal dialog box will appear in the combo box. Select the processing unit to set.
Target data No.	0 to 9999999 [0]	Specify the data to be the target for the combo box setting. Enter the data number for the unit that is specified by the target unit number.
[Data reference] button	---	You can select the data number directly to enter it, or you can enter it with the [Data reference] button. Click the [Data reference] button to select the target data in the [Data reference] dialog box.

Parameter	Set value [Factory default]	Description
[Item setting] button	---	Set the item name and the data that corresponds to the item name to display in the combo box. Make sure the number of items and the number of data match. <ul style="list-style-type: none"> <li>• Items: Enter the name of the items to display in the combo box.</li> <li>• Data No.: Enter the target data numbers that correspond to each item in the combo box.</li> </ul>

#### Image Button Setting Region

Parameter	Set value [Factory default]	Description
Event	<ul style="list-style-type: none"> <li>• [OK]</li> <li>• Cancel</li> <li>• Launch dialog</li> </ul>	Set the event to execute when the button is clicked. <ul style="list-style-type: none"> <li>• OK: Overwrites the data setting and closes the dialog box.</li> <li>• Cancel: Cancels the data setting and closes the dialog box.</li> <li>• Launch dialog: Launches the specified custom dialog box.</li> </ul>
Target dialog ID	The dialog box ID at the beginning of the list of dialog boxes (except the current dialog box)	This setting is displayed if you select [Launch dialog] for the event. When the button is clicked, select the ID for the dialog box to launch.

#### IMPORTANT

If you change the measurement flow after you create a custom dialog box, change the target unit number to match the edited measurement flow.

## Launching Your Custom Dialog Box

- 1 In the Main Window, select [Custom dialog] from the [Tool] menu.**  
The custom dialog box that is set for [Select target dialog] is displayed.
- 2 Change the setting for the processing unit in the custom dialog box that is displayed.**

# Useful Functions for Operation

## Remeasuring Saved Images

Images from when measurements are performed, including test measurements, can be saved. Remeasurement can be performed with saved images after conditions are adjusted in order to check whether the adjustment is appropriate.

The logging function is used to save images.

Reference: ▶ Logging Measurement Values and Measurement Images (p.122)

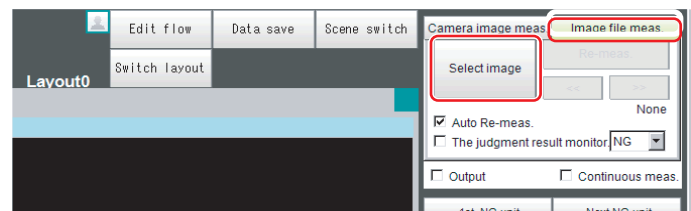
Images that can be remeasured include images saved in the Controller and images saved in external memory.

**1** Click the upper left corner of the Image Display Pane, set the [Image mode] to [Freeze], and then click the [OK] button.

**2** In the Main Window (layout 0), click the [Image file meas.] button in the Measurement Pane.

**3** Click the [Select image] button.

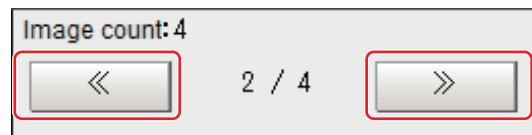
The [FileExplorer] dialog box is displayed.



**4** Select the file to display from the [FileExplorer] dialog box.

**5** The selected image is displayed at the lower left of the [FileExplorer] dialog box.

When there are multiple camera images in a file, as for a logging image when multiple cameras are connected, use the [<<] and [>>] buttons to switch images.



**6** Click [OK].

The path and file name of the image are displayed under [Select image].

**7** In the Main Window (layout 0), click the [Re-meas.] button under [Image file meas.] .

Measurement of the selected image is performed.

Note

### About Automatic Remeasurement

Displayed images can be automatically remeasured by selecting [Auto Re-meas.].

### IMPORTANT

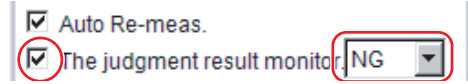
When remeasuring an image with the Controller, it is necessary to have a Camera connected that is appropriate to the image size. For example, if the image file for remeasurement contains 2-megapixel images and a 0.3-megapixel Camera is connected to the Controller or if a Camera is not connected, measurement will not be performed correctly due to a memory deficiency. Perform remeasurement after connecting a Camera appropriate to the image size.

## Improving Adjustment Efficiency

You can make adjustments more efficiently when you need to measure a large amount of image samples and classify or perform adjustments with each judgement.

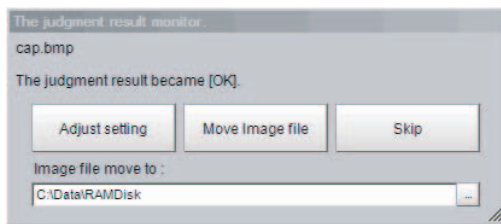
Files in which there are both NG error files and OK files can be continuously remeasured automatically, with the system stopping at images with a specified condition (OK/NG) and moving those files.

- 1** In the Main Window (layout 0), click the [Image file meas.] button in the Measurement Pane.
- 2** Select [The judgment result monitor] and set the judgement conditions for identification.

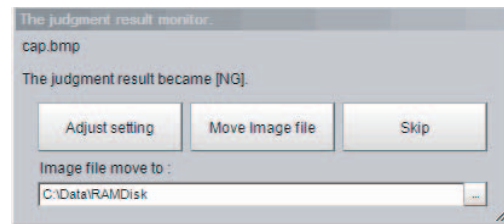


If the specified judgement condition is achieved when continuous measurement is performed, measurement stops and the following message is displayed.

### If OK Is Selected



### If NG Is Selected



- 3** Select the processing for the measured image.

#### Adjusting Flow Settings

Click the [Adjust setting] button.

#### Moving Images to Specified Folder

Specify the folder to move the image file to.

Click the [Move Image file] button.

Click the [Skip] button to skip processing and remeasure the next image.

## Changing Judgement Conditions without Stopping Measurement

Using the simplified Non-stop Adjustment function makes it possible to change the judgement conditions of processing units for the currently displayed scene without stopping the measurement processing.

### Using the Simplified Non-stop Adjustment Mode

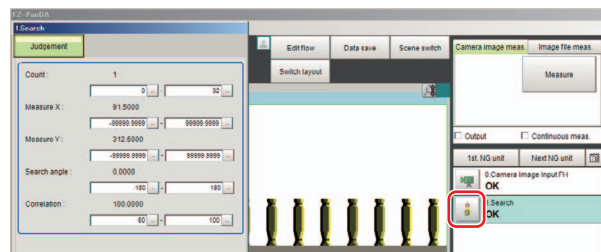
- 1 Select [Layout modification] from the [Window] menu.
- 2 In the Layout Modification Mode, select the layout number to use the Simplified Non-stop Adjustment Mode.
- 3 Click the upper right corner of the Flow Display Pane.
- 4 Change the [Unit setting mode] under [Flow Windows\_Setting] to [Simplified non-stop], and then click the [OK] button.
- 5 Click [Setting end] on the Layout Modification Pane.

Simplified Non-stop Adjustment Mode is enabled for the modified layout window.

- 6 Click the icon of the processing unit with the judgement condition to be adjusted.

The [Judgement] dialog box for the selected processing unit is displayed.

If you click the icon of the processing unit that does not have a [Judgement] setting item, the Judgement Pane is not displayed.



- 7 Modify the judgement conditions for the processing units.
- 8 Click [OK].

The Judgement Pane closes, and the display returns to the Main Window.

The changed contents are shown in the displayed scene.

If you need to modify the judgement conditions for more than one processing unit, repeat steps 6 to 8.

### Disabling the Simplified Non-stop Adjustment Mode

If the Simplified Non-stop Adjustment Mode is enabled, you cannot make detailed parameter settings for processing units.

To make detailed parameters for processing units, stop the measurement process and disable the Simplified Non-stop Adjustment Mode.

- 1 Select [Layout modification] from the [Window] menu.
- 2 In the [Layout number] on the Layout Modification Pane, select the layout number for which to disable the Simplified Non-stop Adjustment Mode.
- 3 Click the upper right corner of the Flow Display Pane.
- 4 Change the [Unit setting mode] under [Flow Windows\_Setting] to [Normal], and then click the [OK] button.
- 5 Click [Setting end] on the Layout Modification Pane.

Simplified Non-stop Adjustment Mode is disabled for the modified Layout Window.

### IMPORTANT

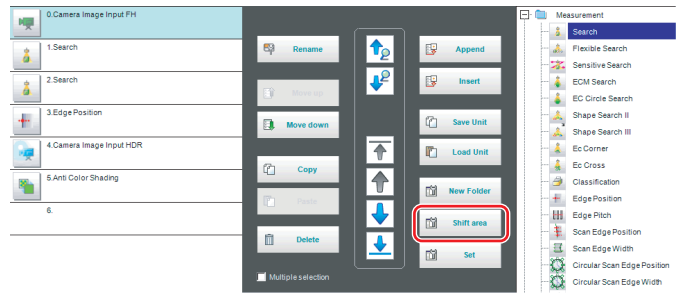
- While Simplified Non-stop Adjustment Mode is being executed, do not change the scenes or execute scene group switching.
- Simple Non-stop Adjustment Mode can be applied to judgment conditions; for processing items that do not have judgment conditions, Simple Non-stop Adjustment Mode can not be used.

## Changing Regions as a Batch [Shift area]

Figure data for multiple processing items can be changed as a batch.

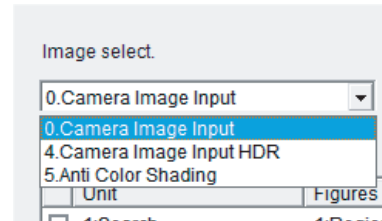
- 1 In the edit flow window, click the [Shift area] button.**

The [Shift area] dialog box is displayed.

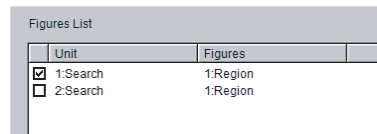


- 2 Select the processing item in which to change the region.**

Only image setting processing items included in [Input image] and [Compensate image] are displayed.

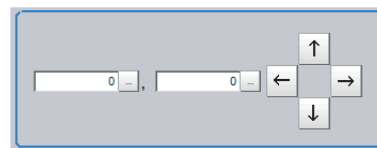


- 3 Select the registration region to change.**



- 4 Click [Move] and input the value or click the arrows to move the image.**

Images can also be directly dragged to move them.



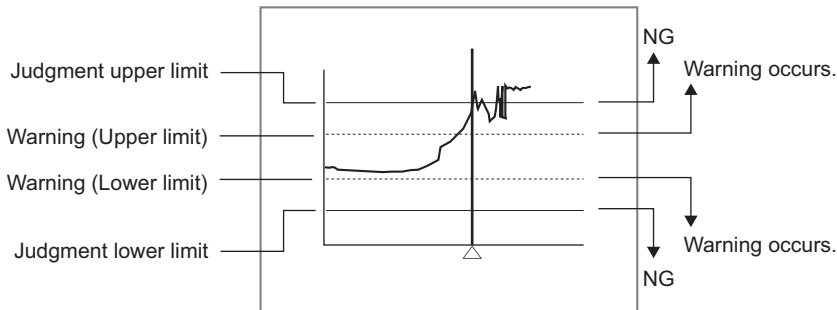
- 5 Click [OK].**

The change is registered.

## Monitoring Measurement Value Trends

By monitoring the trends in measurement values, the occurrence of defects can be prevented in advance and this information can also be helpful in NG error occurrence cause analysis. Use the [Trend Monitor] processing item to monitor the measurement values.

Refer to ► *Trend Monitor* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).



### Note

- If the measurement value is within the alarm range, the [Warning] message is displayed.
- If a result output-related processing item is used, this allows for output to external devices when a warning occurs.
- Through trend monitor judgement, trends can be managed and NG error images can be saved.  
To save only NG error images identified by trend monitor judgement, create settings so that overall judgements from processing units other than [Trend Monitor] are not included in the judgement.

## Logging Measurement Values and Measurement Images

### What Is Logging?

Logging is used to save Camera input images or measurement results when executing measurements. Depending on what is being saved, there is image logging (camera input images) and data logging (measurement results)

File type and save method can be set in the Logging setting menu of System settings.

There are two logging functions, system logging and logging that is performed by the processing item.

### Image Logging

#### • System Logging

To enable system logging, set the logging setting in the system settings.

The image logging process is executed after processing of the measurement flow is completed.

#### • Processing Item Logging

For those processing items that include logging function, Image Logging and Image Conversion Logging are two available logging functions.

To enable processing item logging, register the processing items in the measurement flow.

This logging function allows you to more flexibly set the logging conditions than system logging. If there is more than one Image Logging Unit in the measurement flow, image logging is performed based on the logging conditions for the most recently executed Image Logging Unit.

Reference: ► *Specifying Logging Conditions for Images* (p.133)



## Data Logging

### • System Logging

Data logging does not have a system logging function. Use a Data Logging processing item.

### • Processing Item Logging

For those Processing items that include logging function, Data Logging is available.

To enable processing item logging, register the processing items in the measurement flow.

If there is more than one data logging unit in the measurement flow, data logging is performed based on the logging conditions for the most recently executed data logging unit.

## IMPORTANT

- If you use logging, the measurement processing time will take longer for the time required for the logging process. If you need to continuously execute measurements that include image logging, allow enough time between measurement triggers after the first trigger to allow time for image processing.  
Reference: ► *Calculating the Measuring Interval ([Logging])* (p.132) for information on measuring the time for image logging processing.
- Processing item image logging and system image logging cannot be used at the same time.  
If you prefer to use the Image Logging processing item, click [System Settings] – [Other] – [Logging setting] – [Image logging], and then select [None].
- If you prefer to use the Data Logging processing item, click [System settings] - [Other] - [Logging setting] - [Data Logging] and configure the logging conditions.

This section describes system logging in detail.

Refer to the ► *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for information on processing item logging

The processing items that can be logged are described below.

### Image Conversion Logging

This logging saves Camera images.

Image conversion logging allows you to draw a rectangle around a portion of the image to save. You can also specify the format of the saved image (BMP or JPG).

### Data Logging

Measurement data is saved.

## System Logging

There are 2 different logging methods.

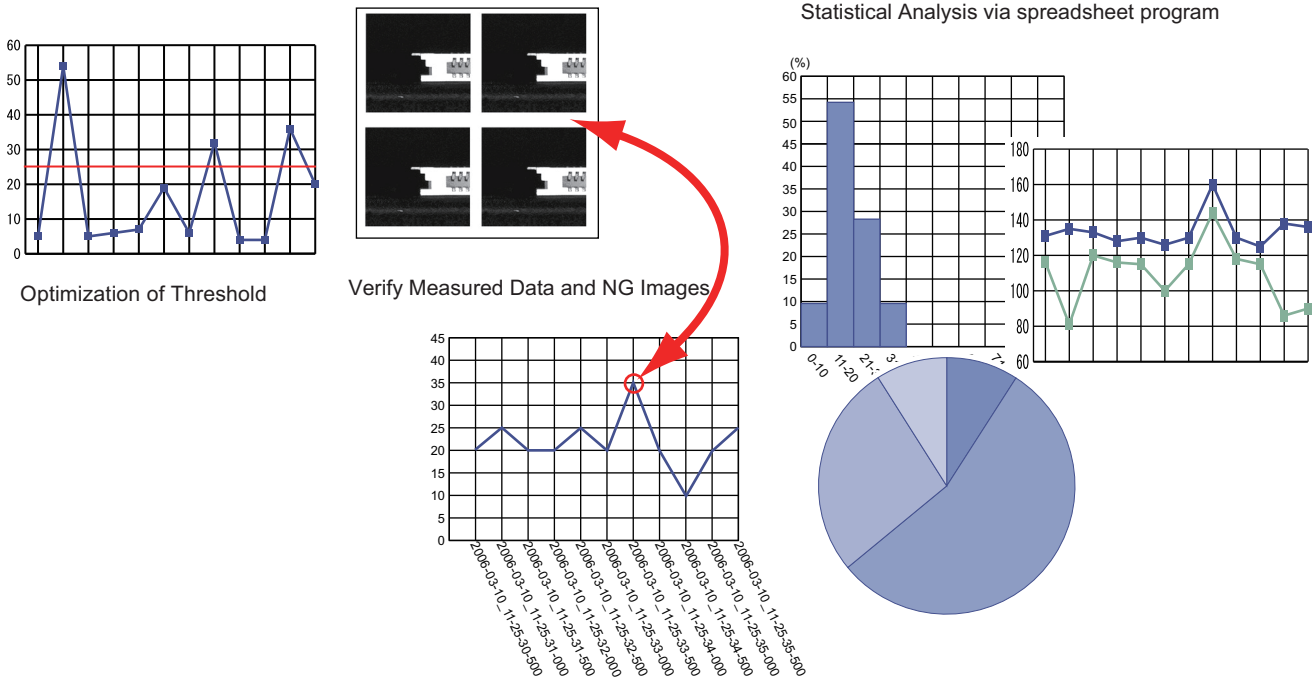
### Logging Images That Are Currently Displayed

Reference: ▶ Logging Current Image [Save Last Logging Image] (p.124)

### Automatically Logging Images During Measurements

Reference: ▶ Setting Logging Conditions [Logging Setting] (p.125)

Images and measurement data can be saved in external memory, which makes them useful for the following kinds of adjustment.



### Logging Current Image [Save Last Logging Image]

You can setup logging timing, save destination, save file format and logging method.

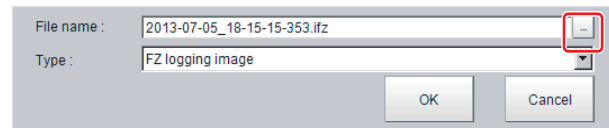
**1** In the Main Window, select [Save last logging image] from the [Function] menu.

The File Explorer is displayed.

**2** Set the logged image save destination.

Specify the image file save destination (RAM disk or external memory).

**3** Edit the file name as required.



**4** Click [OK].

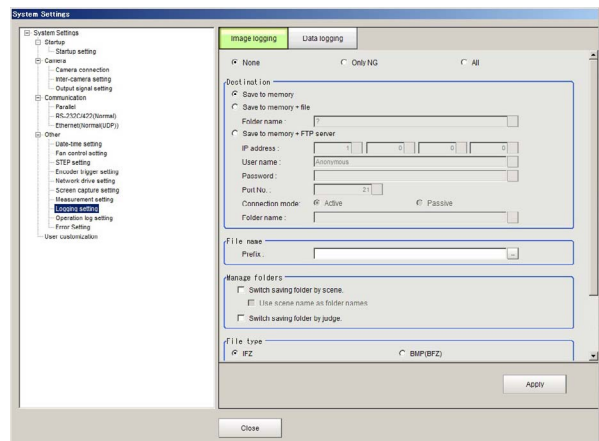
After the logging operation is complete, the Save Last Logging Image Dialog Box closes.

## Setting Logging Conditions [Logging Setting]

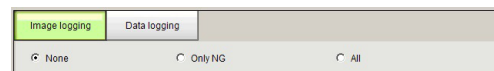
Set the logging time, save destination, file type and logging method.

- 1 In the Main Window, select [Tool] – [System settings] – [Other] – [Logging setting] menu.

The [Logging settings] dialog box is displayed.

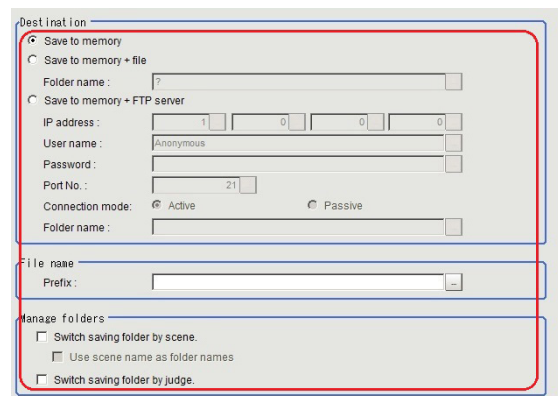


- 2 Click the [Image logging] tab.
- 3 Set the image logging conditions.



Parameter	Set value [Factory default]	Description
Image logging	[None]	No images are saved. When logging images with the processing item [Image Logging], select [None].
	Only NG	Only images with an overall judgement of NG are saved.
	All	All measured images are saved. Some images may not be saved if [Measurement] is set in [Logging priority] in step 4.

- 4 Set the logged image save destination.



Parameter	Set value [Factory default]	Description
Destination	[Save to memory]	Saves data to the Controller memory (RAM).
	Save to memory + file	Images that are saved to the Controller memory (RAM) are saved as files to a external memory or to the RAM disk in the Controller.
	[Save to memory + FTP Server]	Images that are saved to the Controller memory (RAM) are saved as files to the FTP server.

**IMPORTANT**

- Logging images saved in the Controller memory are overwritten starting with the oldest image if the upper limit for the number of save images is exceeded. (Reference: ► About Number of Logging Images (p.355))
- The data saved in the Controller memory or RAM disk is deleted when the Controller is restarted.
- If an external storage is specified as the save destination, the processing time may be longer or may fluctuate. Be sure to check functionality thoroughly before starting operation.
- If images and data are logged to a network drive, the use of the multi-input function and other heavy measurement loads on the Controller may slow down communications and cause logging errors.  
In this case, set the measurement Takt time so that there is some leeway.
- [Save to memory + FTP Server] can be used with FH/FZ5-800/FZ5-1100/FZ5-1200 series only. It can not be used with FZ5-600/FZ5-L series.
- There are below limitations for [Save to memory + FTP Server] function.
  - : Connection via a proxy server cannot be made.
  - : Some servers will not generate logging errors even if save memory capacity is insufficient.

**Note**

In order to perform logging quickly, image files are first saved in the Controller memory (RAM). The Controller memory (RAM) for saving images is a ring memory.

Reference: ► About Number of Logging Images (p.355)

If power of the Controller is turned OFF or it is restarted, the data saved in the Controller memory or RAM Disk will be cleared.

Select [Save to memory + file] or [Save to memory + FTP Server] to save them in external storage.

When [Save to memory + file] in [Destination] is selected, set the destination and file names.

Parameter	Set value [Factory default]	Description
Folder name	<ul style="list-style-type: none"> <li>• [RAM Disk]</li> <li>• Drive name of external memory device</li> </ul>	Specify the image file save destination (RAM disk or external memory). Logged images are saved in the specified save destination folder. (Maximum number of characters: 128 single-byte characters)

If you select [Save to memory + FTP Server] as a [Destination], configure the setting items below.

Setting item	Set value [Factory default]	Description
IP address	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [1.0.0.0]	Specify the IP address of the destination FTP server. Connection via a proxy server cannot be made.
User name	[Anonymous]	Specify the user name which is used for a connection with the destination FTP server. Use only single-byte alphanumeric characters and numbers.
Password	---	Enter the password for a connection with the destination FTP server.
Port number	[21]	Enter the port number for a connection with the destination FTP server.
Connection method	<ul style="list-style-type: none"> <li>• [Active]</li> <li>• Passive</li> </ul>	Select the FTP connection method.
Folder name	---	Specify the destination directory of the FTP server. Use the relative pathname of the destination directory. Use only single-byte alphanumeric characters and numbers.

## 5 Specify the prefix of the image logging file.

Setting item	Set value [Factory default]	Description
Prefix	---	Set the prefix for the saved file name. (Maximum number of characters: 32 single-byte characters) The set character string is added at the beginning of the name of the save file. Use only single-byte alphanumeric characters and numbers. If a prefix contains a non-supported character, a logging error is generated when logging is executed.

## 6 When you use the function to switch the saving folder, set the switching conditions.

Setting item	Set value [Factory default]	Description
Switch saving folder by scene	<ul style="list-style-type: none"> <li>• Selected</li> <li>• [Not selected]</li> </ul>	If this check box is selected, folders that correspond to scene numbers are automatically created and image files are divided by scene and saved.
Use scene comments as folder names	<ul style="list-style-type: none"> <li>• Selected</li> <li>• [Not selected]</li> </ul>	If this check box is selected, folders to which image files are allocated are named using the scene names and scene group names at the time of measurement execution. If a scene name contains a character not supported for folder names, a logging error is generated when logging is executed.
Switch saving folder by judge	<ul style="list-style-type: none"> <li>• Selected</li> <li>• [Not selected]</li> </ul>	If this check box is selected, OK/NG folders are automatically created and image files are divided by the overall judgment and saved.

### [Save to Memory + File] Setting Example and Save Destination

Setting example	Destination
<ul style="list-style-type: none"> <li>• Folder name: USB disk</li> <li>• Prefix: image_</li> <li>• [Switch saving folder by scene]: Selected</li> <li>• [Switch saving folder by judge.]: Selected</li> </ul>	<p>The settings in the example on the left are applied as shown below.</p> <ul style="list-style-type: none"> <li>• OK image save destination: \USBDisk\S000-000\OK\image_(Measurement ID).IFZ</li> <li>• NG image save destination:\USBDisk\S000-000\NG\image_(Measurement ID).IFZ</li> </ul>

### [Save to Memory + FTP Server] Setting Example and Save Destination

Setting example	Destination
<ul style="list-style-type: none"> <li>• IP address: 10.5.6.100</li> <li>• User name: OMRON</li> <li>• Password: abc</li> <li>• Port number.: 21</li> <li>• Connection method: Active</li> <li>• Folder name: Logging</li> <li>• Prefix: image_</li> <li>• [Switch saving folder by scene]: Selected</li> <li>• [Switch saving folder by judge]: Not selected</li> </ul>	<p>With left sample settings, the file will be saved as below.</p> <ul style="list-style-type: none"> <li>• When the current directory which FTP server specifies is "C:\Data\RAMDisk". C:\Data\RamDisk\Logging\S000-000\image_(Measurement ID).IFZ</li> </ul>

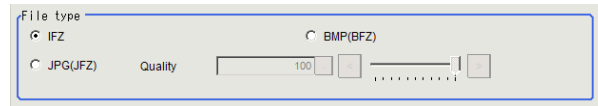
Note

- If logging errors occur, please check the following .
  - : Is the LAN cable connected properly?
  - : Are the destination server settings in system settings correctly set?
  - : Did you use any character other than single-byte alphanumeric characters for the file names or folder names?
- Measurement ID : measurement time YYYY-MM-DD\_HH-MM-SS-XXXX  
 (YYYY: Calendar, MM: Month, DD: Day, HH: Hour, MM: Minute, SS: Second, XXXX: Millisecond and Line number)  
 Example  
 Measurement time: 11:10:25.500 AM, December 24, 2007 and Line 0, the measurement ID is "2007-12-24\_11-10-25-5000".  
 Since the file name of the logging image also includes the same measurement ID, confirmation of the measurement data and image data can be performed with the measurement ID.

## 7 Select the file type.

Set the file type to save image files.

Reference: ▶ Image file (p.352)



Setting item	Set value [Factory default]	Description
File type	<ul style="list-style-type: none"> <li>• [IFZ]</li> <li>• BMP(BFZ)</li> <li>• JPG(JFZ)</li> </ul>	Select the file type to save images for Logging. IFZ: Save as an OMRON image logging file format for use with FH/FZ series, or FQ series. BMP (BFZ): Save as a container format image logging file that includes BMP format image files. JPG (JFZ): Jpeg format image files are organized in folders when saved as a logging image file format.
Quality	<ul style="list-style-type: none"> <li>• 0 to 100</li> <li>• [100]</li> </ul>	Image quality settings for saving as JPG (JFZ).

### IMPORTANT

- If you save as BMP(BFZ)format /JPG(JFZ) format, the handling for the area outside the image differs from the IFZ file format and emphasizes ease of display. If you want to perfectly reproduce the measurement processing, including error processing on the outside part of the image, save it as IFZ file format.
- Do not change the name of any BMP/Jpeg included in the BMP(BFZ) file type. Measurement may fail on this file type when loaded.
- If there are camera image input numbers for the BMP format files included in the BMP(BFZ)/JPG(JFZ) file type that are out of sequence, measurement will not be done on images after the first out of sequence number.
- JPG(JFZ) format can be read and measured with sensor controller software version 5.71 or later. Since it is an irreversible compression image format, the measurement result differs from IFZ format, or BMP(BFZ) format.

Note

Differences among IFZ, BMP (BFZ) and JPG(JFZ) are as follows. Select the type depending on the intended use.

#### 1. File type

- IFZ is an OMRON proprietary image file type. In order to confirm images in this file type, a Sensor Controller, or custom tools are necessary.
- BMP(BFZ)/JPG(JFZ) is a standard bitmap/Jpeg format image file type. Images in this file type can be confirmed with standard PC desktop image tools and without the need for any custom tools.

#### 2. File size

- BMP(BFZ) is triple in size than IFZ file type when you save color images.
- JPG(JFZ) format file size varies depending on image quality.
- Conversion time differs when converts IFZ to BMP(BFZ)/JPG(JFZ) during loading/writing the BMP(BFZ)/JPG(JFZ) files or due to savable images depending on differ of file size.

#### 3. Compatibility

- Loading or measuring IFZ file type is applied to Sensor Controller's software version 5.30 or less and cognition of multiple camera is also enable.
- Loading or measuring BMP(BFZ) file type is applied to Sensor Controller's software version 5.30 or less, however processes same as one BMP image due to no multiple camera information.

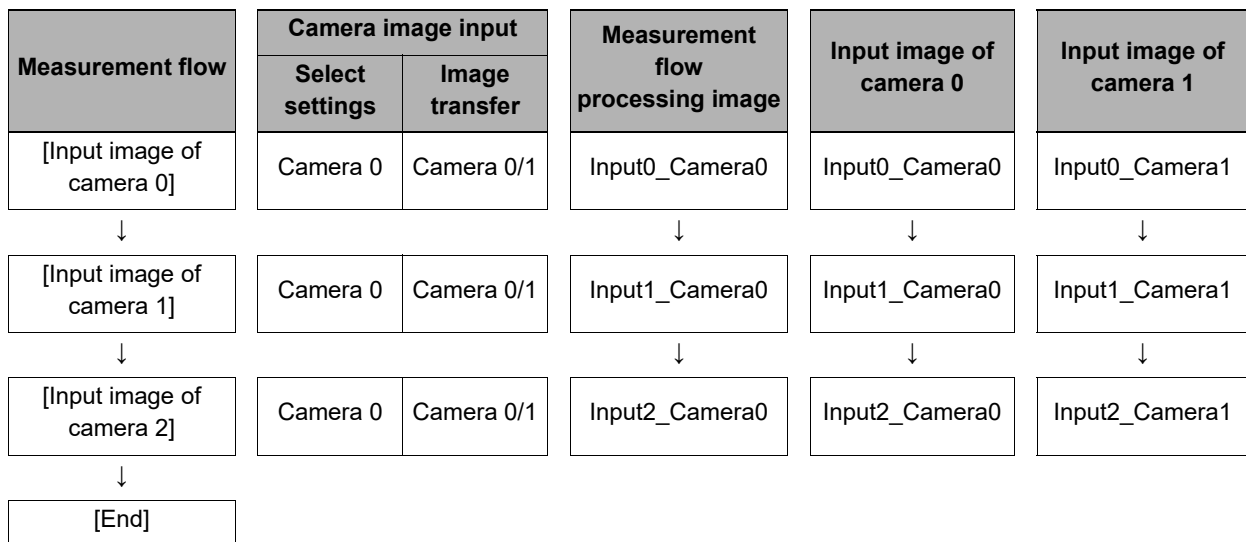
## 8 Select the save method for Multiple image logging.



Select the save method when you use multiple camera image inputs in the measuring flow.

Setting item	Set value [Factory default]	Description
Multiple image logging	<ul style="list-style-type: none"> <li>• [OFF]</li> <li>• ON</li> </ul>	Select the save method when you use multiple camera image inputs in the measuring flow. OFF: Save only latest image of camera image input in measurement flow. ON: Save transported input images of all camera image input in the measurement flow.

Describe the example when two cameras connected and Camera image input function is executed three times.



### ● Multiple image logging is [OFF]

- Saves the latest input image of camera. Specifically, two images, Input2\_Camera0 and Input2\_Camera1, are saved.

### ● Multiple image logging is [ON]

- Saves all of the transferred input images at the camera input. Specifically, six images,
- Saves the latest input image of camera. Specifically, two images, Input2\_Camera0 and Input2\_Camera1, are saved.

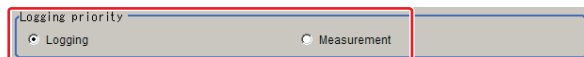
### IMPORTANT

Multiple image logging is [ON]

- Processing time will be long when parallel is [OFF] because all of the transferred images are saved.
- Some latest images exceeds the memory size will be deleted because all of the transferred images are temporarily saved to the Sensor Controller.

## 9 Set the image logging priority conditions.

When the measurement takt time is short, a time lag may occur in writing from the Controller memory (RAM) to the RAM disk in the Controller and a temporary lack of available space in the Controller memory may occur. Select whether logging or measurement has priority at these times.



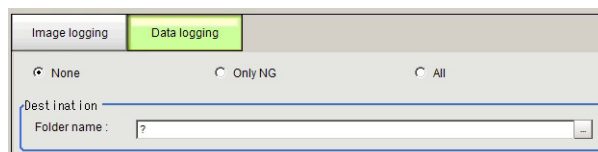
Parameter	Set value [Factory default]	Description
Logging priority	[Logging]	Image logging is prioritized over the following measurement. If overwriting of measurement images as logging images in the Controller memory (RAM) is not available, measurement is continued until it becomes available. When overwriting becomes available, the next measurement trigger can be accepted.
	Measurement	Starting measurement is prioritized over image logging. If overwriting of measurement images as logging images in the Controller memory (RAM) is not available, the measurement image is discarded, and the next measurement trigger is accepted.

### Note

To save all images that are logged, set the operation mode of the Sensor Controller to [Standard] (Operation Mode) and the Logging setting (logging condition) to [Logging]. At the same time, select [Tool] – [System Settings] – [Startup], and turn OFF [Parallel execute] under the operation mode In the startup settings.

## 10 Click [Data Logging].

The data format is set with the Data Logging processing item.



Parameter	Set value [Factory default]	Description
Data logging	[None]	Measurement data is not saved.
	Only NG	Measurement data is saved when an NG error occurs in a unit before a [Data Logging] unit. If an NG error occurs after the [Data Logging] processing unit, data logging is not performed.
	All	All measurement data is saved.

## 11 Set the logged data save destination.

Parameter	Set value [Factory default]	Description
Folder name	<ul style="list-style-type: none"> <li>[RAM Disk]</li> <li>USBDisk</li> </ul>	The data is saved in the specified destination folder (RAM disk or USB disk). Set the file name with the [Data Logging] processing unit. (Maximum number of characters: 128 single-byte characters)

## 12 Click [Apply].



## IMPORTANT

- The data saved in the Controller memory or RAM disk is deleted when the Controller is restarted.
- If external storage is specified as the save destination, the processing time may be longer or may fluctuate. Be sure to check functionality thoroughly before starting operation.
- If images and data are logged to a network drive, the use of the multi-input function and other heavy measurement loads on the Controller may slow down communications and cause logging errors. In this case, set the measurement takt time so that there is some leeway.

### Note

#### Image Logging

- When the number of files in the save destination folder increases, the time needed to save images increases.
- If you specify Disable in [Camera Image Input], its camera image will not be saved.

#### Number of Images That Can Be Saved

- This will depend on the size and resolution of the images and the number of Cameras connected.
- The number of images that can be saved on the RAM disk in the Controller or a external storage depends on available space.
  - If the RAM disk is selected, the memory available in the RAM disk
  - If external storage is selected, it depends on the external storage capacity.
- When you use the external memory device, some limitations may be required due to the combination of file format and Sensor Controller model.

Sensor Controller Model	File Format		
	FAT16	FAT32	NTFS
FZ5-L series FZ5-600 seires	<ul style="list-style-type: none"><li>• When you save the Image file to the immediately below root file, the number of the Image files can be saved is around 126.</li><li>• When you save the Image file to one folder, the number of the Image files can be saved is 999.*<sup>1</sup></li><li>• The maximum number of folders which can be created is 999.</li></ul>	<ul style="list-style-type: none"><li>• When you save the Image file to one folder, the number of image files can be saved is 999.</li><li>• The maximum number of folders which can be created is 999.*<sup>1</sup></li></ul>	1NTFS is not supported in FZ5-L/FZ5-600 series Sensor Controller.
FH series FZ5-800 series FZ5-1100 series FZ5-1200 series	<ul style="list-style-type: none"><li>• When you save the Image file to the immediately below root file, the number of the Image files can be saved is around 126.</li><li>• When you save the Image file to one folder, the number of the Image files can be saved is 16000.</li></ul>	The total number of the Image file can be saved to the immediately below root file or to one folder is around 16000.	No limitation of file format.

#### Loading Data to a Computer

- Default settings are set so that logging data is saved in the RAM disk in the Controller. When logging data is loaded to a computer, set [external storage] as the save destination. Logging data is first saved to the RAM disk in the Controller. It can then be copied from the RAM disk and saved to the [external storage] using [Copy files] in [Save to file].

## Calculating the Measuring Interval ([Logging])

If the [Logging priority] is set to [Logging] (default), all target images that are measured are logged. This may extend the processing time by the time that is required to generate the image files.

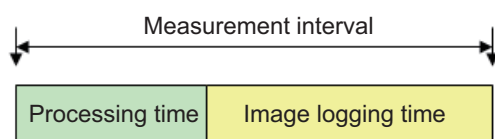
The method that is used to calculate the measurement interval that allows logging without affecting the processing time is described below.

### Measurement Interval Conditions

The measurement interval must satisfy the following condition.

$$\text{Processing time} + \text{Image logging time} < \text{Measurement interval}$$

- Processing time: The time that is displayed in the upper left corner.
- Image logging time: The time that is required to generate and save a single image file.



### Example:

If the processing time is 100 ms and the image logging time is 150 ms, set the measurement interval to at least 250 ms.

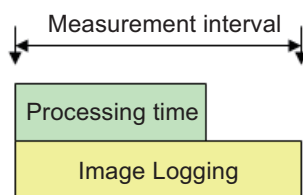
### IMPORTANT

#### [Standard] is selected for Operation Mode.

In Standard (Operation) mode, images can be logged while measurement is in progress.

The measurement interval must satisfy the following condition.

$$\text{Image logging time} < \text{Measurement interval}$$



#### • Example:

If the processing time is 100 ms and the image logging time is 150 ms, set the measurement interval to at least 150 ms.

## Specifying Logging Conditions for Images

If you need to specify conditions for logging images, you should use the processing item logging function. For example, the system logging function logs all images if the overall judgement is NG or OK. Processing item logging (image logging), logs images only when a condition is met. The following examples illustrate how processing item logging can be used.

### Possible Saving Conditions

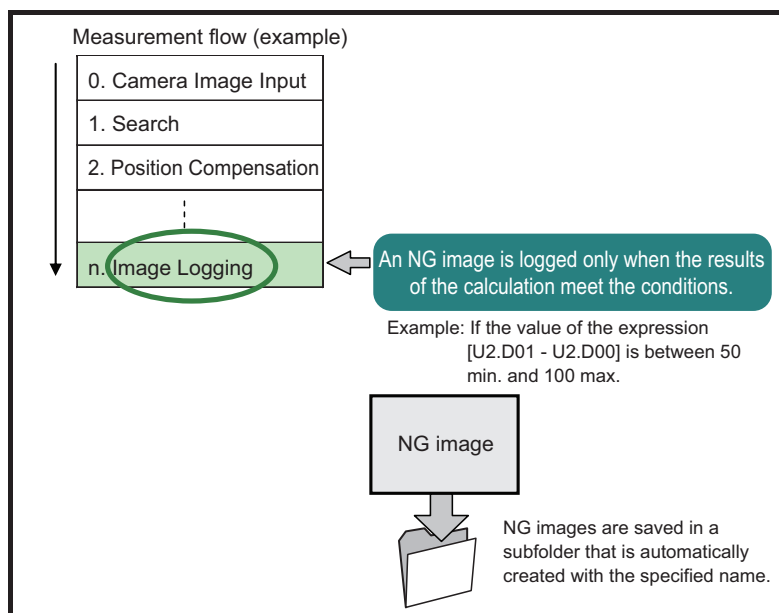
Images can be logged when measurement data or result data of a calculation falls within a specified range.

Example 1: Image logging is performed if the individual judgements of three measurement units U1, U3, and U5 are NG.

Example 2: Image logging is performed if the edge width for a measurement unit is below a set value.

### Destination of Images

This diagram shows the destination for saving if [Save to memory + file] is selected in the system image logging settings.



### IMPORTANT

If [Logging setting] is set to [Image logging], select [None] (default).

### Note

If you set more than one Image Logging processing unit in the measurement flow, the most recently executed image logging is enabled.

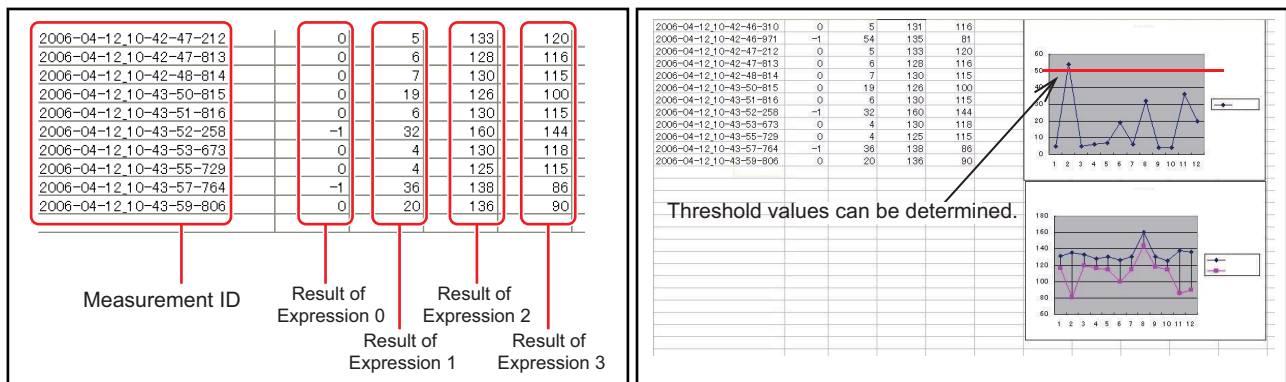
## Analyzing Logged Data

Acquired data is referred to and processed, and settings are analyzed.

### Checking Logged Data with a Computer

This section uses the example of saving logging data in USB flash drive.

- 1** Copy the logged data in the external memory to the computer.
- 2** Open the copied data in the folder using an application associated with the extension (.csv).  
This procedure describes an example for data displayed in spreadsheet program.
- 3** Process and analyze the data with a spreadsheet program.  
For example, the optimum threshold value can be calculated.



## Comparing Logged Data and Logged Images

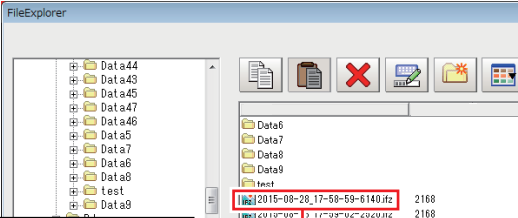
Compare image and measurement data to confirm correctness and to make analyzing trends for when NG occurs easier.

The measurement data and image data stored with the logging functions are associated through measurement IDs based on the measurement date and time. One image data file contains the Camera image data of all the connected units.

In this way, measurement data can be made to always correspond with image data.

Verify data with the measurement ID.

Logging image folder



Logging data

2015-08-28_17-58-59-6140	1	4	805.7223	738.7936
2015-08-28_17-59-02-2520	1	2	1118.341	462.854
2015-08-28_17-59-03-6520	1	3	913.5338	432.4308
2015-08-28_17-59-04-8040	1	4	1504.367	416.0796
2015-08-28_17-59-06-0830	1	3	452.3409	328.5425
2015-08-28_17-59-08-0270	1	3	456.3119	930.3248
2015-08-28_17-59-08-8200	1	1	1433.82	353.8236
2015-08-28_17-59-09-4110	1	2	638.4595	200.7353
2015-08-28_17-59-09-9300	1	2	641.0529	801.0375
2015-08-28_17-59-10-6170	-1	0	0	0

Images are correlated with measured data via measurement ID.

### Note

#### Measurement ID

YYYY-MM-DD\_HH-MM-SS-XXXX.

YYYY: Year (4 digits)

MM: Month

DD: Date

HH: Hour

MM: Minute

SS: Second

XXXX: Millisecond

Example:

Measured time: 12/24/2007, 11:10:25.500:

Line: 0

Measurement ID: 2007-12-24\_11-10-25-5000

## Clearing Measurement Results

Use the following procedure to clear all of the currently displayed scenes.

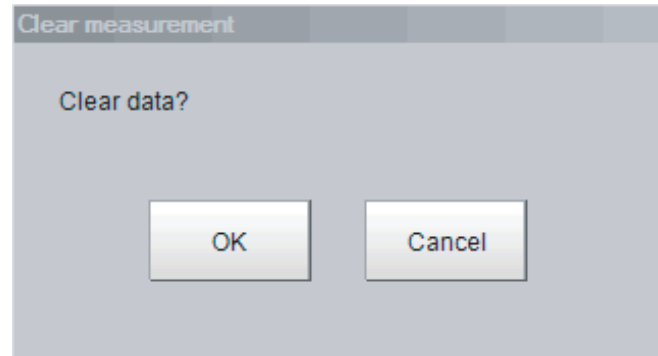
This function sets the expression which calculates the measurement count, and is convenient when that count is to be reset.

- 1 In the adjustment window (layout 0), select [Clear measurement] from the [Function] menu.**

A confirmation dialog box is displayed.

- 2 Click [OK].**

The measurement results are deleted.



## Clearing Saved Images

Use the following procedure to clear all of the images that are currently logged in the Controller.

- 1 In the Main Window (layout 0), select [Clear logging image] from the [Function] menu.**

A confirmation dialog box is displayed.

- 2 Click [OK].**

### Note

If you want to keep the logged images as files, save the logged images to the external memory by clicking [Function] – [Save to file] – [Logging image] before clearing them.

Reference: ► Saving Logged Images in the Controller Memory (RAM) to a RAMDisk or an External Memory Device (p.229)

## Capturing Screen Images

The contents displayed in the run window can be captured. Saved images can be loaded into the computer and pasted into documents.

### Set the destination for captured images.

Use the following procedure to set the save destination for the image captured with the screen capture function.

- 1 In the Main Window, select [System settings] – [Other] – [Screen capture setting] from the [Tool] menu.**

The [Screen capture] settings dialog box is displayed.

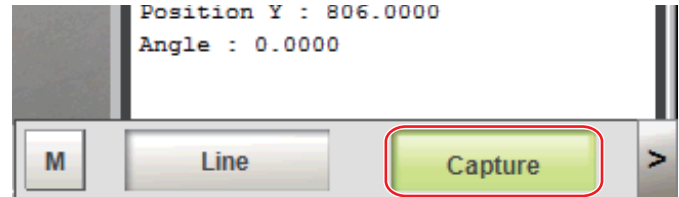
- 2 Specify the save destination for captured images.**



- 3 Click [Apply].**

## Saving Captured Images

- 1 Click the [Capture] button that is displayed on the Measurement Manager Bar that is located in the bottom right corner.



### IMPORTANT

The capture takes a few seconds and measurement cannot be performed at this time.

#### Note

- An alternative operation is to select [Screen capture] from the [Function] menu.
- If you use the [Capture] button that is located in the bottom right corner to capture the screen image in Multi-line Random-trigger Mode, the image is always saved to the destination that is set for line 0.

## Captured Image Files

This section explains the format and file names for captured images.

Item	Description
File format	The file format is BMP.
File name	The file name is the date and time at which the capture was performed. YYYY-MM-DD_HH-MM-SS-MS.BMP Year (4 digits) -Month- Date_ Hour- Minute- Second- Millisecond Example: The file name for a capture date and time of 3/10/2007, 11:25:30.500: 2007-03-10_11-25-30-500.BMP

#### Note

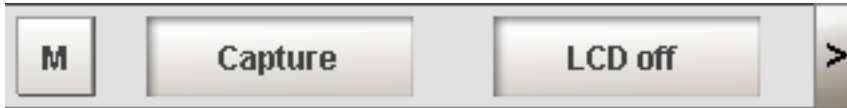
The following cannot be captured.

- The dialog box to select a file or a folder
- Confirmation message when LCD is turned OFF

## Checking the Memory Consumption and Percentage of Memory Used

The Memory state window that shows the memory used in the sensor controller can be opened from the Measurement Manager Bar.

- 1 Click the [M] button on the Measurement Manager Bar of the Main Window.



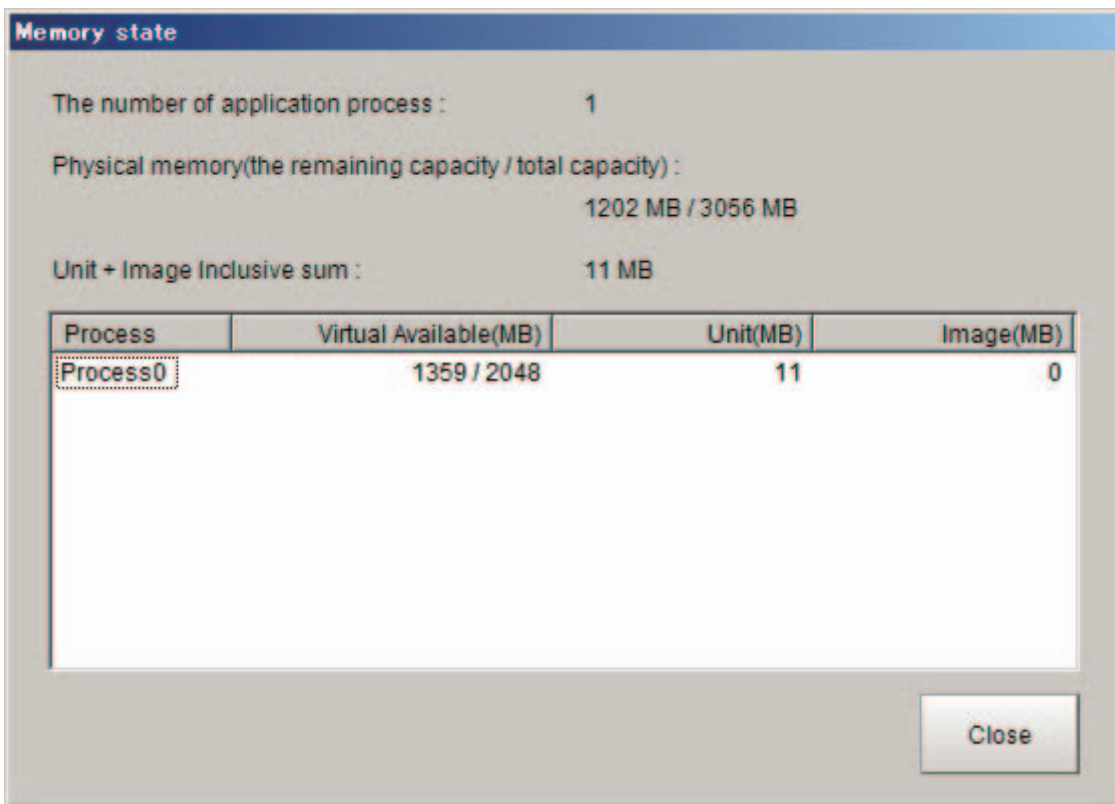
Memory state button

- 2 The Memory state window is displayed. You can check the amount of memory used.

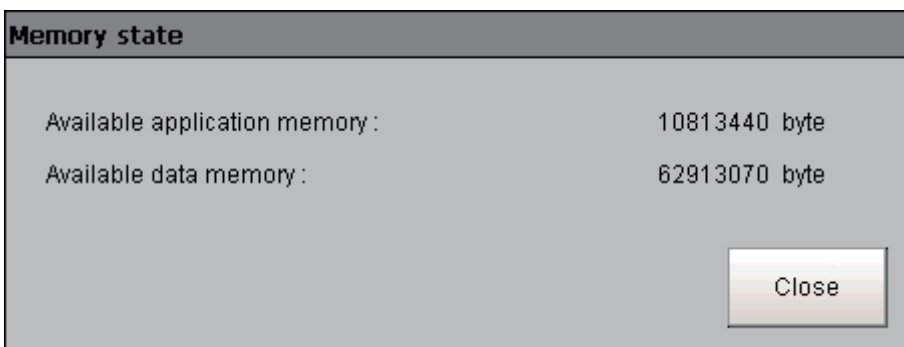
For details of the Memory state window, refer to the following.

Reference: ▶ Checking System Information [System Information] (p.295)

### FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series



### FZ5-L series/FZ5-600 series





Note

- If the amount of used memory increases and the amount of free memory becomes insufficient, it may cause errors in operation mode switching or in adding Processing Units into the measurement flow. Please check the memory consumption when you create scenes.

Reference: ▶ Checking System Information [System Information] (p.295)

## Using the Operation Log

The operation log automatically saves the contents of Controller operations and setting changes in a unique file delimited with semicolons (;). Setting content changes are recorded as a time series, which makes change management possible.

### Setting the Operation Log

Set the destination to save the operation log. Also set whether to start recording the operation log during startup.

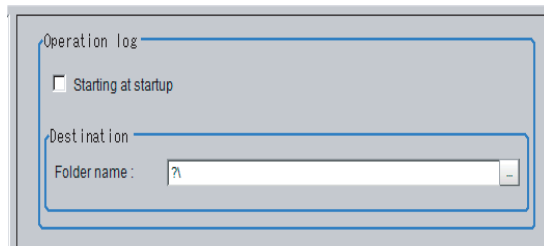
Sample output of an operation log: This log records the date, time, user name, and the operation that was performed.

```
2012/09/10 13:08:41;Administrator;SetSystemData,"OperationLog","enabled","1";0
2012/09/10 13:08:41;Administrator;MeasureStart;0
2012/09/10 13:08:41;Administrator;GetSceneGroupNo;0
...
```

- 1 In the Main Window, select [System settings] – [Other] – [Operation log setting] from the [Tool] menu.**

The [Operation log settings] dialog box is displayed.

- 2 Set the parameters for the operation log.**



Parameter	Description
Starting at startup	Select this check box to record the operation log from startup The setting will be reflected from the next time that the system starts up.
Folder name	Specify the destination folder name. The operation log file name is the date and time at which the operation log was started plus the .log extension. Example: 2012-09-29_12-39-04.log <ul style="list-style-type: none"> <li>• In Multi-line Random Trigger Mode, set a save destination for each line. The file name is the date and time at which the operation log was started + the line number + the "log" extension. Example: 2012-09-29_12-39-04_Line0.log</li> <li>• This setting only takes effect after you save the data and restart the system.</li> <li>• In non-stop adjustment mode, the non-stop adjustment log is saved with the file name (date and time at which the operation log was started)_Nonstop.log.</li> </ul>

- 3 Click [Apply].**

### IMPORTANT

If the save destination of operation log does not exist or an insufficient memory is available, the logging operation will fail. In this case, an logging error appears, Refer to Error Messages and Troubleshooting (p.319).

## Checking and Changing the Operation Log Status

Use the following procedure to check the current operation log function status

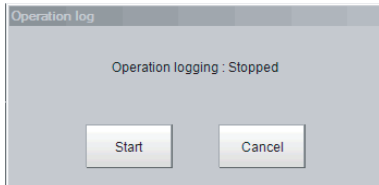
**1** In the Main Window, select [Operation log] from the [Function] menu.

The current operation log status is displayed.

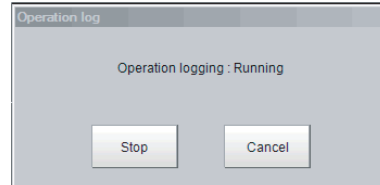
To change the current operation log status, click either [Start] or [Stop].

To close the dialog box without changing the current operation log status, click the [Cancel] button.

Dialog Box When Operation Log Is Stopped



Dialog Box While Operation Log Is Being Recorded



## Loading an Operation Log File

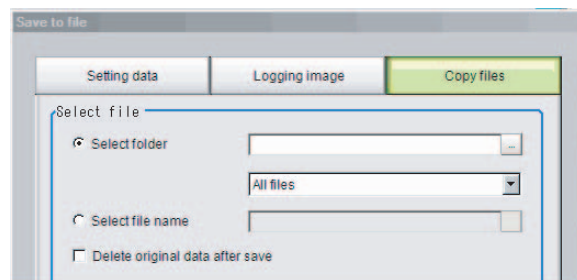
When the log file is set to be saved to the Controller, use the following procedure to load the file.

**1** Insert an external memory device into the Controller.

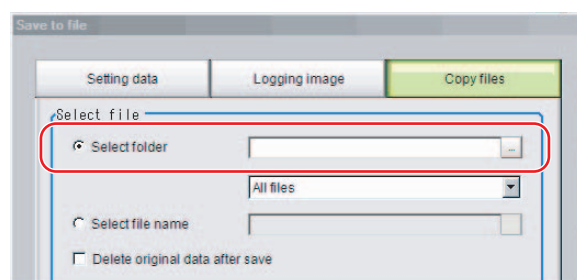
**2** In the Main Window, select [Save to file] from the [Function] menu.

The [Save to file] dialog box is displayed.

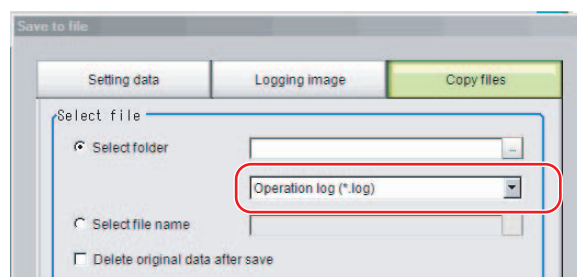
**3** Click the [Copy files] tab.



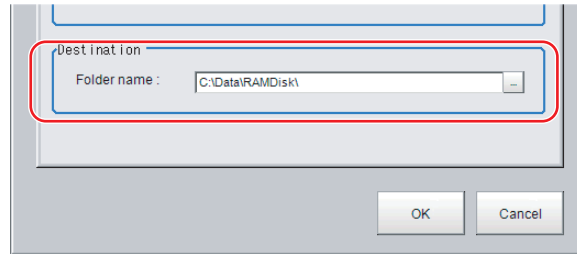
**4** Select [Select folder], click [...], and specify the folder.



**5** Select the operation log (\*.log).



## 6 Specify the destination.



## 7 Click [OK].

For details on operation logs, refer to ► Operation Log Format (p.141)

### IMPORTANT

- The contents of operation log files cannot be checked on the Controller. On a computer, open the file with a text editor or change the delimiter characters to semicolons (;) with spreadsheet software.

## Operation Log Format

- The operation log is stored in a file indicating the date and time as follows in the directory specified as the save destination.

YYYY-MM-DD\_HH-MM-SS.log (example: 2012-08-20\_12-00-00.log)

- The date and time shown in the file name is the date and time at which the log file was created.
- The maximum size for a log file is about 100 KB. If a log file is larger than 100 KB, the log is written into a new file from the first record over 100 KB.
- When the log is stopped, then started again, a new log file is created.
- Also during operation log execution, if the save destination directory setting is changed, at that point in time, a new log file is created in the new save destination.
- Use spreadsheet program or other spreadsheet software to open the log file. If the characters are corrupted, set the character code to UTF-8 with the BOM.
- Basically, information is saved when the API (application program interface) is executed. The information for one piece of API information is written into the log file as one record.

The format for each record that is written to the log file is as follows: The four data items, the execution date and time, user name, input information, and output information, are delimited with semicolons. At the end of the record, a line feed (CR+LF) is entered.

*(Execution date and time); (user name); (input information); (output information) [LF+CR]*

Examples:

2012/08/20 12:00:00;user0;SetSystemData,"XX","YY","ZZ";0

2012/08/20 12:00:01;user0;GetSystemData,"XX","YY";0,"ZZ"

Execution date and time	The date and time at which this API was executed.
Username	The name of user that is currently logged in. If no one is logged in, the character string "no login" is entered.
Input information	The API name is followed by supplemental information (mostly API arguments), delimited with commas.
Output information	The API return value is followed by supplemental information (mostly information gotten by the API), delimited with commas.

For the operation log input information written in the operation log file, refer to ► Operation log input information list (p.369).

## Saving Data to an External Device

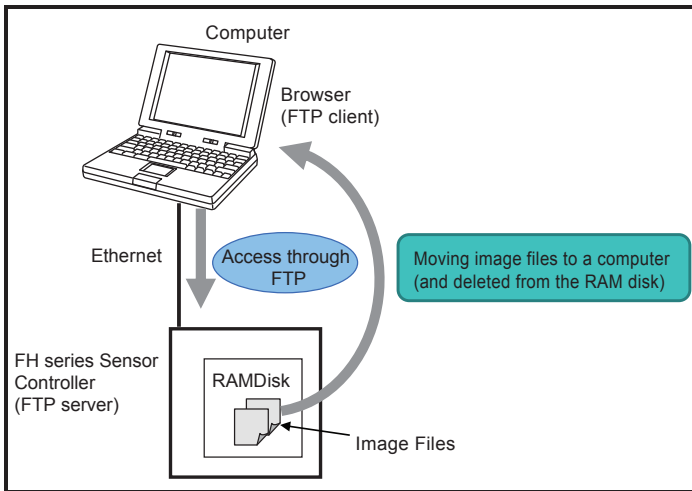
### To Save Logged Image Files to a Computer (FTP)

The FTP is useful when you need to save logged image files to a computer.

Example

When you want to move the logged image to your personal computer before FH Sensor Controller's RAMDisk or external memory is full:

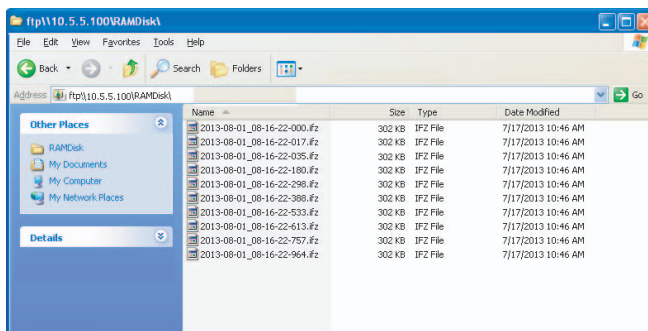
Accessing to the FH Sensor Controller with FTP function, you can directly specify the file of RAMDisk or external memory from a browser and can move the file.



### Operating Procedure

Use the following procedure to access the RAM disk in the FH series Sensor Controller.

- 1 Set up the computer and Controller for communications through Ethernet.**
- 2 Start the Explorer on the computer.**
- 3 In the address bar, type the IP address and destination and press the Enter Key.**  
Example: [ftp://10.5.5.100/RAMDisk]
- 4 The contents of the RAM disk is displayed as shown below.**



- 5 Drag files as you would with normal file operations.**

## IMPORTANT

Use only single-byte alphanumeric characters for the file names of files to send and receive with the FTP.

- If account, or password is needed for FTP connection, set them as follows  
Account: anonymous  
Password: Blank or half-width characters
- When you access to the external memory device except RAMDisk, refer to the following:
  - M:\ (SD memory card): SDDisk
  - E:\ (USB flash drive): USBDisk
  - F:\ (USB flash drive): USBDisk2
- Cannot access to the external memory device, i.e. G drive, from FTP.

### Note

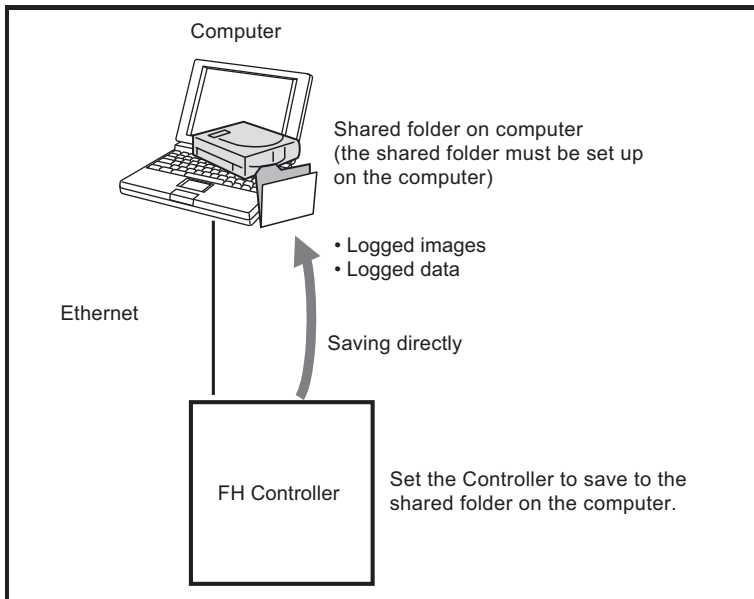
- There are no limitations on when you can perform FTP file transfers.
- Processing of FTP file transfers does not affect the transaction time. However, It does affect the load on the network.

## Saving Logged Data Directly to a Shared Folder on a Computer ([Network Drive Function])

The network drive function is useful when you need to log image data or measurement data directly to a computer that is connected by Ethernet.

You can specify the shared folder on a computer that is connected by Ethernet as the destination for logged images or logged data.

Direct reading and writing with the computer eliminates the need for reading and writing through external memory devices. At the same time, it also eliminates the need to stop measurements to insert or remove the external memory device.



### Setting Up the Network Drive

Register the shared folder on a network drive with a shared name.

- 1** Select [Tool] menu – [System settings] – [Other] – [Network drive setting].
- 2** Select the shared name to be registered, and click [Edit].
- 3** Enter the information to be allocated to the network drive (shared name), such as the shared folder, user name, and password.
- 4** The shared folder on the connected computer will appear in the [Select file/folder] dialog box.

## Specifying a Network Drive as a Logging Destination

To import logging data to a computer, you specify a shared folder on the computer as the logged data destination.

### Note

---

The data saving time depends on the conditions of the network and the destination drive.  
Be sure to check the operation thoroughly with the actual devices that will be used.

---

# Using Tools

This section describes adjustments during startup and convenient tools for operation.

Limiting user operations (Security settings) .....	146
Changing between user accounts .....	157
Saving Scene groups in external memory (Scene Group Saving Destination settings) .....	158
Analyzing inspection and measurement results (NG analyzer).....	160
Sharing data within the controller (User data tool) .....	165
Outputting a List of Scene Data Set Values (Settings download and upload tools).....	167
Saving Image files to a RAMDisk, or External memory device (Image file save).....	170
Managing images used for model registration and reference (Registered Image Manager).....	172
Customizing communication commands (Communication command macro).....	174
Displaying a measurement flow as a flowchart while editing it (Flow viewer) .....	175
Verifying calibration results (Calibration support tool).....	176
Updating the referenced position data for a unit in the measurement flow (Update standard position tool) ....	177
Increasing the number of scenes in a group to more than 128 scenes (Conversion scene group data tool) .....	179
Create a customized settings dialog box (Custom dialog tool) .....	182
Extending the functions in a measurement flow, or scene (Scene Control Macro Tool).....	183
Backing up Sensor Controller setting data (Configuration copy).....	184
Changing settings for each line in Multi-line Random-trigger mode (Line Maintenance).....	201
Remotely operating the controller (Remote Operation) .....	216

# Limiting user operations (Security settings)

You can restrict access to the Sensor Controller for specific users and user groups. Because you can set a password for each user and can enable or disable operations for each user group, you can flexibly manage users to match the way they use the system, for example system administrators, onsite managers, and system operators.

It is also possible to link to the operation log and get operation records for the currently logged-in user.

## Setting Accounts (Account List)

This section explains how to add, edit, and delete user accounts.

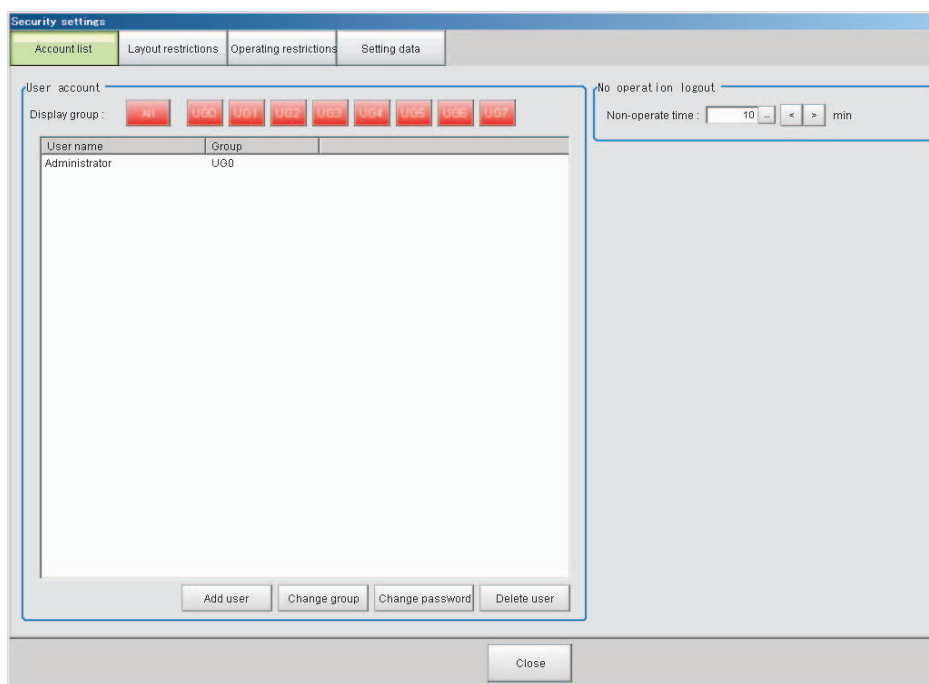
### IMPORTANT

In order to add, edit, or delete a user account, you must be logged in with a user account belonging to group UG0. The default user name and password are both "Administrator".

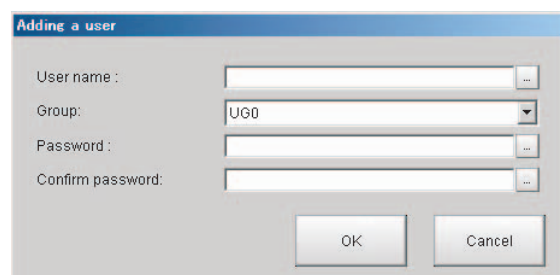
## Adding Accounts

Use the following procedure to add a user account.

- 1** In the Main Window, select [Security settings] from the [Tool] menu.  
The [Security settings] dialog box is displayed.
- 2** Click [Account list] in the Item Tab Area.



- 3** Click the [Add user] button.
- 4** Set the user information.





Parameter	Description
User name	Enter a user name of 1 to 20 single-byte alphanumeric characters. The names are case sensitive.
User group ID	Select the user group (UG0 to UG7) to which the user being added will belong. If you select [UG0], the user can use all functions. Reference: ► Setting User Group Operation Restrictions (p.149)
Password	Enter the login password for the user being added. The password for the new user must have one or more characters. The password for a transferred user may also be 0 characters.
Confirm password	Enter the login password again.

## 5 Click [OK].

The user account is added and displayed in the user account list.

## Editing an Account

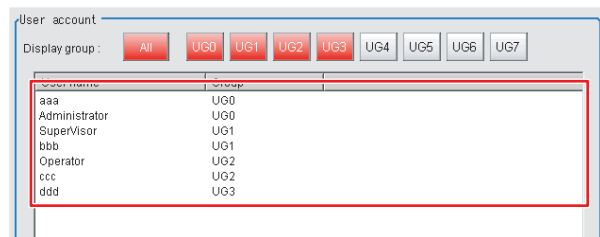
Use the following procedure to change the user group or password for the user account.

### 1 In the Main Window, select [Security settings] from the [Tool] menu.

The [Security settings] dialog box is displayed.

### 2 Click [Account list] in the Item Tab Area.

### 3 Click the user to change the user group or password for.



### 4 Click the [Change group] button or the [Change password] button.

### 5 Change the user group or password.

### 6 Click [OK].

The user information is changed.

## Deleting an Account

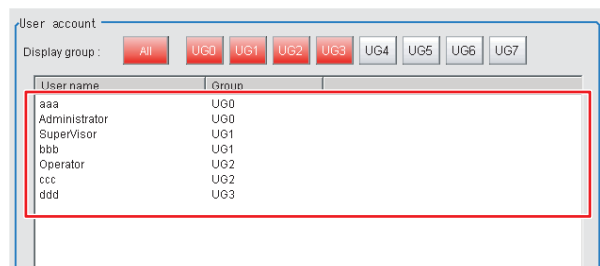
Use the following procedure to add a user account.

### 1 In the Main Window, select [Security settings] from the [Tool] menu.

The [Security settings] dialog box is displayed.

### 2 Click [Account list] in the Item Tab Area.

### 3 Click the user to delete.



### 4 Click the [Delete user] button.

A confirmation message is displayed.

### 5 Click [Yes].

The user account is deleted.

## Setting Automatic Logout

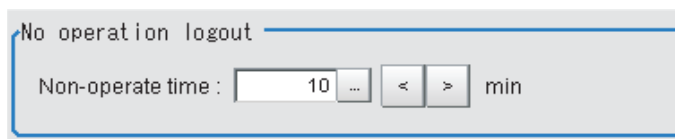
Use the following procedure to set the length of time before an account is automatically logged out when no operation is performed.

- 1 In the Main Window, select [Security settings] from the [Tool] menu.**

The [Security settings] dialog box is displayed.

- 2 Click [Account list] in the Item Tab Area.**

- 3 In the [No operation logout] area, set the non-operation time.**



No operation logout

Non-operate time :  min

Parameter	Set value [Factory default]	Description
Non-operate time	1 to 999 [10]	Set the length of time before an account is automatically logged out when no operation is performed. Set the time in minutes.

## Setting Layout Restrictions

Set the right to change the layout for each user group.

You can restrict the functions that can be used by each user group.

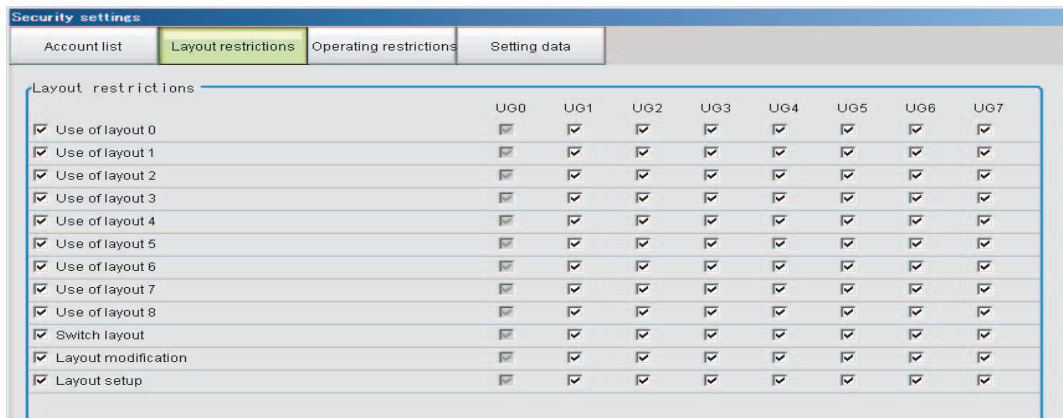
The layouts that can be restricted are as follows:

Security setting items
Use of layout 0
Use of layout 1
Use of layout 2
Use of layout 3
Use of layout 4
Use of layout 5
Use of layout 6
Use of layout 7
Use of layout 8
Switch layout
Layout modification
Layout setup

- 1 In the Main Window, select [Security settings] from the [Tool] menu.**

The [Security settings] dialog box is displayed.

## 2 Click the [Layout restrictions] tab in the Item Tab Area.



## 3 The layout restriction settings are changed.

## 4 Click the [Close] button.

### Setting User Group Operation Restrictions

You can restrict the functions that can be used by each user group.  
You can set restrictions for the following items.

Security setting item
End
Measure
Scene switch
Scene maintenance
Edit flow
Clear measurement
Clear logging image
Screen capture
Save last logging image
Data save
Save to file
Load from file
System initialization
System restart
Transfer data
Nonstop data transfer
Start/stop of operation log
System information
NG analyzer
System settings
Registered image management
Customize I/O command
Unit setting mode starting
Nonstop adjustment mode starting
Image window layout setting
Information window setting

## Security setting item

Tool button setting

Image container window setting

Flow window setting

Image window setting

Text window setting

Error window setting

Output

Continuous meas.

Select image

Auto Re-meas.

The Judgement result monitor

Re-meas.

LCD off

User data tool

Setting download and upload tools

Image file save

Flow Viewer

Calibration support tool

Update Standard position tool

Conversion scene group data tool

Custom dialog tool

Custom dialog

Scene Group Saving Destination Settings

Scene Control Macro Tool

Master scene update

Master scene edit

Configuration copy

Line Maintenance

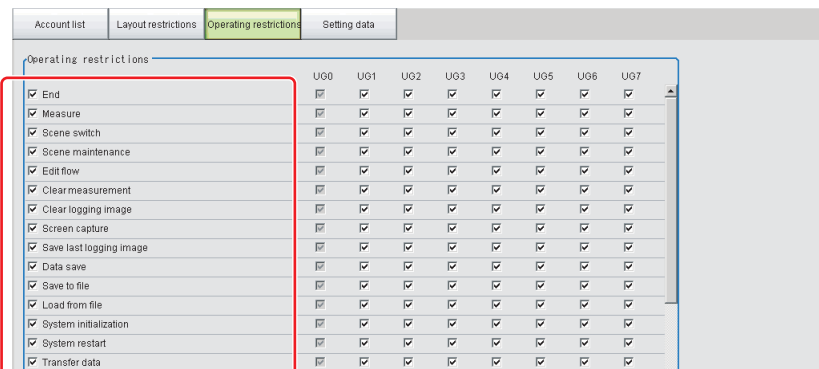
# 1 In the Main Window, select [Security settings] from the [Tool] menu.

The [Security settings] dialog box is displayed.

# 2 Click the [Operating restrictions] tab in the Item Tab Area.

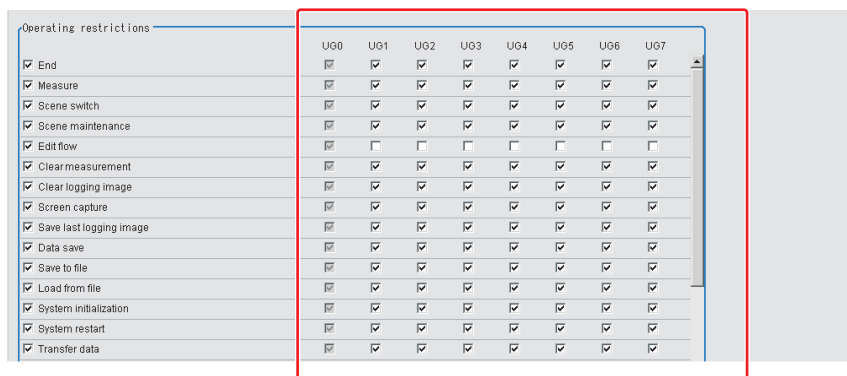
# 3 Select the operations to restrict.

Operations that are not selected are not restricted.



# 4 Select the operations to be permitted by user groups (UG1 to UG7) on the right side

Operations that are not selected cannot be used by users belonging to that group.



# 5 Click the [Close] button.

Operation restrictions are set for the user groups.

## Saving/Loading/Deleting the Security Settings

You can save user account and user group settings (security settings). You can load or delete saved settings. Account setting data is not included in BKD files.

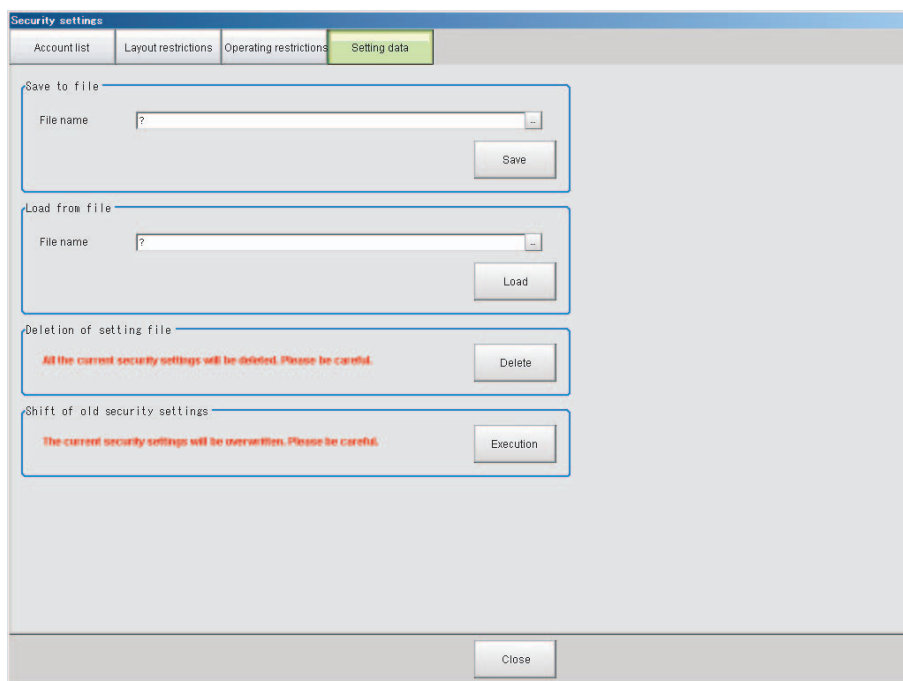
### Saving Security Settings

You can save user account and user group settings to a RAM disk or an external memory device.

#### IMPORTANT

- During data transfer to external memory, do not remove the external memory device until the transfer is completed. Data and the external memory may be corrupted.
- Timing for Saving Data in the Controller  
Data is saved to the Controller only when the [Security setting] dialog box is closed with the [Close] button. When the login window is ended by selecting [Cancel], data is not saved to the Controller. The set contents or loaded contents are cleared by when the Controller is restarted.
- Remote Operation Security  
The security settings are synchronized, but for users who are logged in, the security settings are managed separately on the local side and remote side. Therefore, even if users are logged in on the local side, they must log in again on the remote side.

- 1** When saving data to external memory, insert an external memory device into the Sensor Controller.
- 2** In the Main Window, select [Security settings] from the [Tool] menu.  
The [Security settings] dialog box is displayed.
- 3** Click the [Setting data] tab in the Item Tab Area.



- 4** Specify the destination folder and file name in the [Save to file] area.
- 5** Click the [Save] button.

## Loading Security Settings

Use the following procedure to load a saved user account and user group settings into the Sensor Controller.

### IMPORTANT

Note that some setting cannot be keep when you load the security setting saved as the older version than the current software version.

Reference: ► Loading security settings from an older software version (p.153)

- 1** If the settings were stored in external memory, insert the external memory device containing the security settings to load into the Sensor Controller.
- 2** In the Main Window, select [Security settings] from the [Tool] menu.  
The [Security settings] dialog box is displayed.
- 3** Click the [Setting data] tab in the Item Tab Area.
- 4** Select the file to load from the [Load from file] area.
- 5** Click the [Load] button.

## ● Loading security settings from an older software version

When loading security settings from a previous Sensor Controller software version, the settings that can be transferred will differ depending on the that previous software version. Refer to the following table. Confirm each setting item and reset as needed.

### (1) Loading the security settings in software version 4.12, or earlier.

Setting item	Keep	Discard
Password	OK	
Switch to ADJUST mode		OK
Non-stop adjustment mode		OK
RUN Control area		OK
RUN Tool box		OK

#### Note

For the password setting set in FZ4 Ver4.12, or earlier, refer to Transferring Old Security Settings (p.156).

### (2) Loading the security settings in version from 4.20 to 4.24.

Setting item	Keep	Discard
Layout restrictions		
Switch to ADJUST mode		OK
Switch to RUN mode		OK
ADJUST Control area		OK
ADJUST Test measurement		OK
ADJUST flow		OK
ADJUST Detail result		OK
ADJUST Image display		OK
RUN Control area		OK
RUN flow		OK
RUN Detail result		OK
RUN Image display		OK
RUN Tool box		OK

Setting item	Keep	Discard
Operation restrictions on User group		
Edit flow	OK	
Scene switch		OK
Scene group switch		OK
Scene maintenance		OK
Unit setting	OK	
Measurement flow display size change	OK	
Non-stop adjustment mode		OK
Measurement flow display size change		OK
Positions		OK
Image layout		OK
Image mode		OK
Image selection		OK
Zoom images		OK
Measure setting		OK
Logging setting		OK
Operation logging setting		OK
Start operation logging		OK
Clear measurement	OK	
Logging image clear		OK
Save last logging image	OK	
Data save	OK	
Save to file		OK
Load from file		OK
Camera connection		OK
Camera settings		OK
Standard parallel I/O		OK
Ethernet: Normal (TCP)		OK
Ethernet: Normal (TCP Client)		OK
Ethernet: Normal (UDP)		OK
Ethernet: PLC Link (SYSMAC CS/CJ/CP/One)		OK
Ethernet: PLC Link (MELSEC QnU/Q/QnAS)		OK
Ethernet: PLC Link (JEPMC MP)		OK
RS-232C/422: Normal		OK
RS-232C/422: PLC Link (SYSMAC CS/CJ/CP/One)		OK
RS-232C/422: PLC Link (MELSEC QnU/Q/QnAS)		OK
EtherNet/IP		OK
EtherCAT		OK
Date-time setting		OK
Language setting		OK
Fan control setting		OK
Startup setting		OK



Setting item	Keep	Discard
Operation restrictions on User group		
RUN window selection		OK
RUN window display selection		OK
Short cut function setting at run mode		OK
STEP signal filter setting		OK
Encoder trigger setting		OK
Network drive setting		OK
System initialization		OK
System restart		OK
Screen capture	OK	
LCD Off	OK	
Screen capture setting		OK
NG analyzer	OK	
User Data Tool	OK	
Settings download and upload tools	OK	
Image file save	OK	
Registered Image Manager	OK	
I/O command customize tool (Communication Command Macro)	OK	
System information		OK
Data transfer (Non-stop data transfer)	OK	
Return to RUN mode		OK
Output		OK
Continuous meas.		OK
Select RUN mode		OK
Measure using selected img (Re-meas.)	OK	
Auto Re-meas.	OK	
The Judgement result monitor		OK
Clear Error signal		OK
Clear Parallel OR+DO		OK

**(3) Loading the security settings in version 5.00, or later.**

Keeps all of the security setting items including the software version of saved in the Sensor Controller.

## Deleting Security Settings

Use the following procedure to delete saved user accounts and user groups settings.

### IMPORTANT

The current security settings are all deleted.

**1 In the Main Window, select [Security settings] from the [Tool] menu.**

The [Security settings] dialog box is displayed.

**2 Click the [Setting] tab in the Item Tab Area.**

**3 Click the [Delete] button in the [Deletion of setting file] area.**

The security settings are deleted and the following message is displayed.  
"User info logging in was changed now. Please log in again."

**4 Click [OK].**

The [Login] dialog box is displayed.

Enter the default user and password "Administrator".

If the login dialog box is canceled, the [Security setting] dialog box is closed.

## Transferring Old Security Settings

Password settings that were made in FZ4 version 4.12 or earlier can be inherited.

### IMPORTANT

This procedure will overwrite the current security settings.

**1 In the Main Window, select [Security settings] from the [Tool] menu.**

The [Security settings] dialog box is displayed.

**2 Click the [Setting] tab in the Item Tab Area.**

**3 Click the [Execution] button in the [Shift of old security settings] area.**

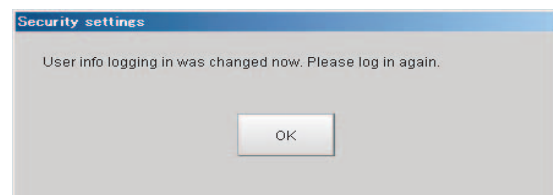
The confirmation message, "The settings will be transferred and saved in the Controller. OK?" is displayed.

**4 Click [Yes].**

The security settings are changed.

**5 Click [OK].**

Enter the user name and password to log in again.



# Changing between user accounts

After a user account is set up, you can log in and log out with the registered user account. If you try to execute an operation you do not have the right to use, the login dialog box is displayed even though you are already logged in. In that case, log in with a user account that has the right to execute that operation.

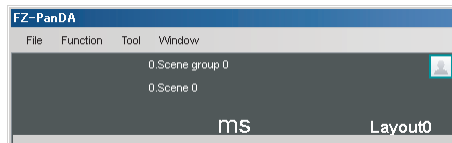
## Logging in

When you log in, you can execute those operations that the user account you logged in with has the right to execute.



- 1 Click the [Login] icon in the Measurement Information Display Area.

The [Login] dialog box is displayed.



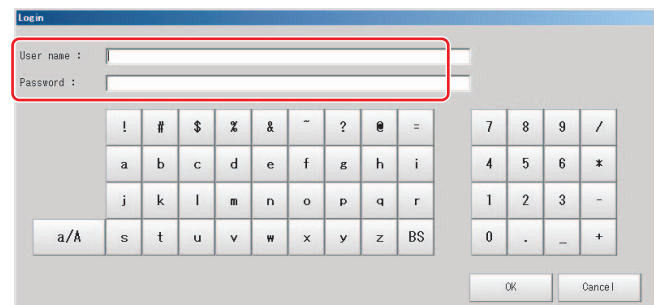
- 2 Enter the user account and password.

If the login fails, "The user name or the password is wrong" is displayed.

Enter the correct user name and password.

- 3 Click [OK].

The login icon switches to the logged-in state.



## Logging Out

### Note

- If an automatic logout time is set, you will be automatically logged out if you do not perform any operations at all for the set time period.
- If you do not perform any operation, such as changing the display, after an automatic logout, the [Login] icon will still appear in the logged in state.  
The icon display will be updated if you change from the Main Window to a settings dialog box or an operating dialog box, or if you change to another layout.

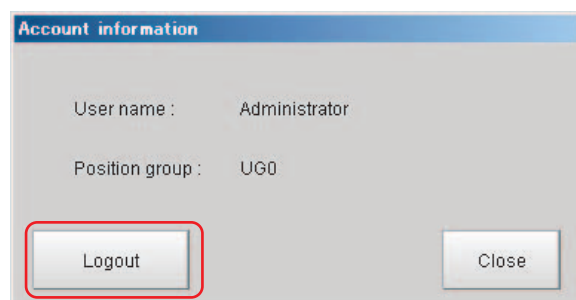
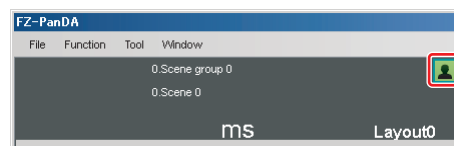
- 1 Click the [Login] in the Measurement Information Display Area.

The [Login] dialog box is displayed.

- 2 Click the [Logout] button.

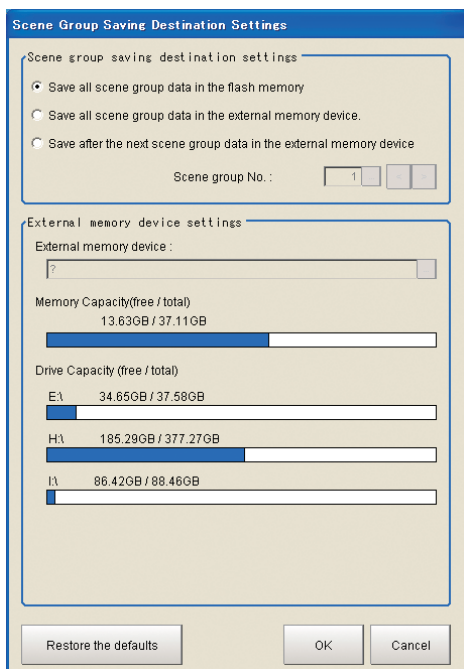
- 3 Click [OK].

The login icon changes to the logged-out state.



# Saving Scene groups in external memory (Scene Group Saving Destination settings)

The scene group storage location specification function lets you specify a location other than the Sensor Controller's flash memory for saving scene group data. After specifying the desired storage location with this function, menus and buttons such as "Data save" save set data in the specified external memory instead of in the Sensor Controller's flash memory. This function is handy as it enables use of external memory when the volume of scene group data is too large to save all of it in the Sensor Controller's flash memory.



- 1** Select [Scene Group Saving Destination Setting] from the [Tool] menu in the main screen.  
A screen for specifying the scene group storage location appears.
- 2** Set each item in the [Scene group saving destination on settings] area.

Variable name	Set value [Factory default]	Content
Scene Group Saving Destination Setting	<ul style="list-style-type: none"> <li>• [Save all scene group data in the flash memory]</li> <li>• Save all scene group data in the external memory device</li> <li>• Save after the next scene group data in the external memory device</li> </ul>	Sets the storage location for scene group data. <ul style="list-style-type: none"> <li>• Store all in Sensor Controller memory</li> <li>• Store all in external storage device</li> <li>• Store scene groups after scene group below in external storage device</li> </ul>
Scene group No.	0 to 9999[1]	This setting is valid when [Save after the next scene group data in the external memory device] is selected for [Scene Group Saving Destination Setting]. Used to set the number of the first scene group to store in external memory. For the FH/FZ5 series, if 32 or above is specified for the scene group number, all scene group data will be saved to the Sensor memory.

### 3 Set each item in the [External memory device settings] area.

Variable name	Set value [Factory default]	Content
External memory device settings	---	This setting is valid when [Save all scene group data in the external memory device] or [Save after the next scene group data in the external memory device] is selected for [Scene Group Saving Destination Setting]. Used to set the storage location folder.

### 4 Click [OK].

The scene group storage location is changed, and the current scene group data is transferred from the current storage location to the new storage location. An error message is displayed if the transfer fails.

#### IMPORTANT

- An error message is displayed if scene group data storage or reading fails. See "Error Messages and Troubleshooting" in the Appendices for descriptions of error messages.  
Reference: ► Error Messages and Troubleshooting (p.319)
- When the scene group data storage location setting is changed, a file with the [\*.scg] file extension is created at the new storage location. Do not change the file name or file extension of this scg file. If you change, the setting will not be saved or read correctly.
- When you change the Scene group save destination, the original data in the save destination will be deleted. The data in the original save destination will be deleted. Make sure to back up data for use in case of malfunction, or corrupted data.

#### Note

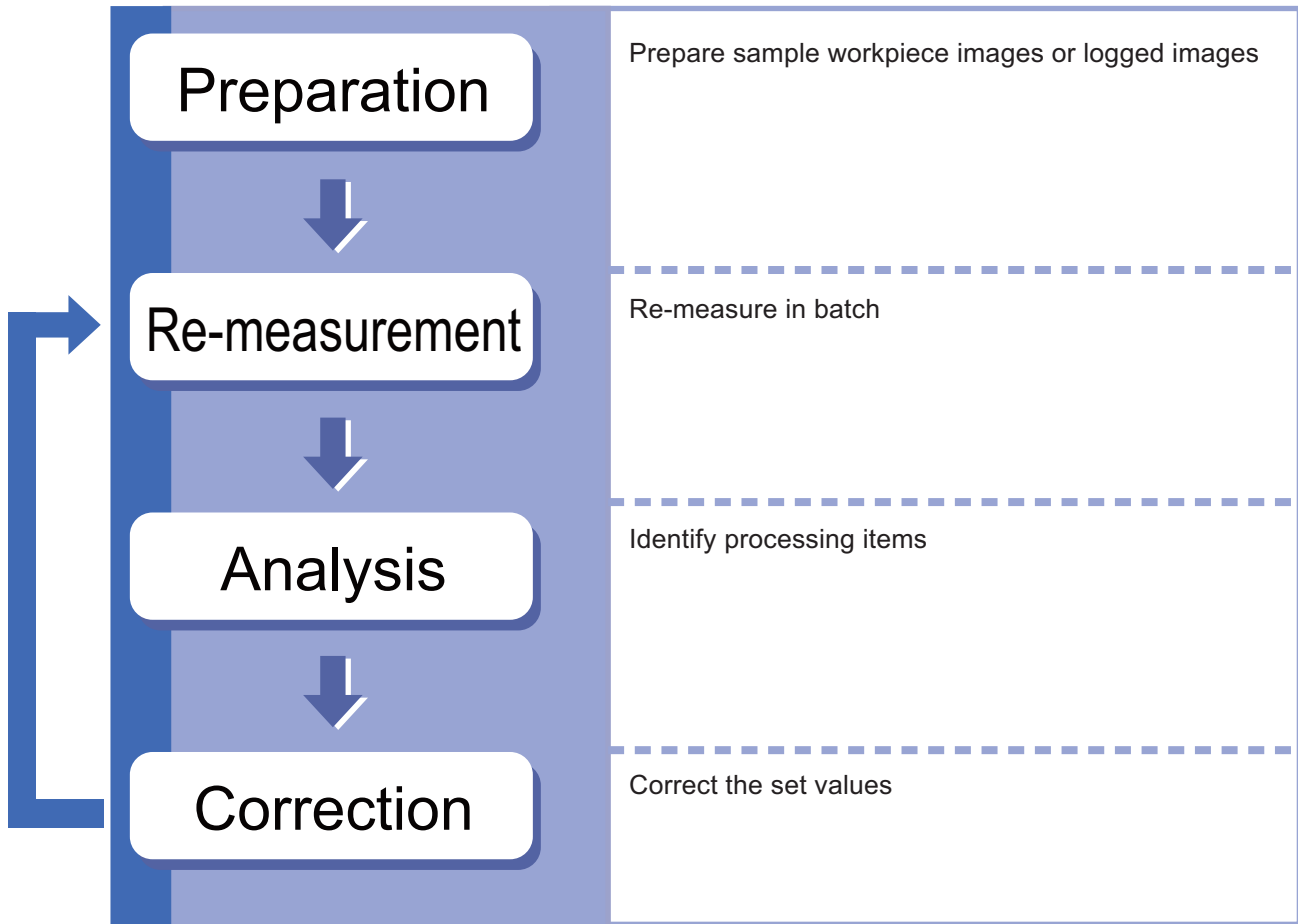
- You can check the available capacity of external memory in the setting screen. We recommend that you check whether your external memory has enough available capacity before changing the storage location.
- Clicking [Restore the defaults] restores the settings to their factory default values.  
Factory default settings differ as follows:
  - FZ5-L series/FZ5-600 series:  
Scene group 0 is stored in the Sensor Controller's flash memory.  
Scene groups 1 and after are stored in external memory.
  - FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series:  
Scene group 0, Scene group 1, and after are stored in the Sensor Controller's flash memory.

# Analyzing inspection and measurement results (NG analyzer)

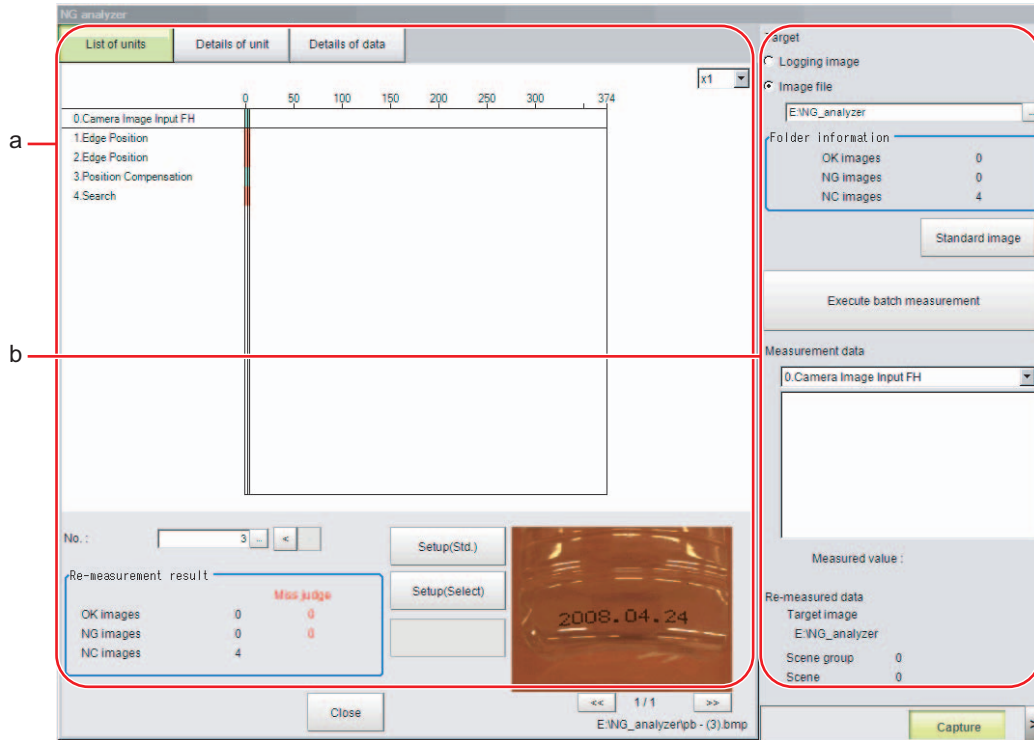
Start the NG analyzer by selecting [Tool] - [NG analyzer] from the Controller menu.  
This tool, which analyzes setting flows, is used mainly in 2 ways.

- **Adjustment of measurement set values during start-up**  
Use sample workpiece images to analyze optimal set values for the processing flow.
- **Analysis of NG causes during operation**  
Use logged images to analyze NG causes.

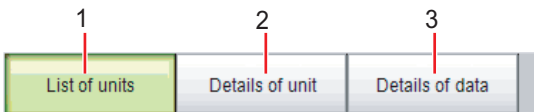
The operation flow is as follows.



# Layout of NG Analyzer Window



## a. Analysis result display area



### 1. List of units

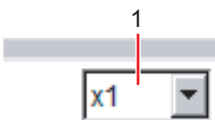
A list of units currently set is shown together with analysis results.

### 2. Details of unit

Detailed analysis results of each unit are shown.

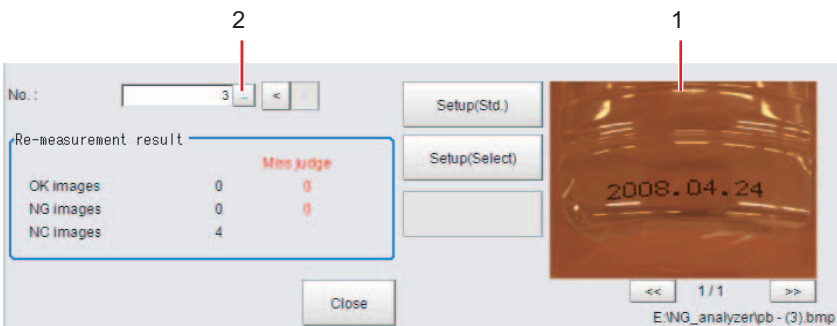
### 3. Details of data

Detailed results of analysis data are shown.



### 1. Display ratio

Sets magnification to display.



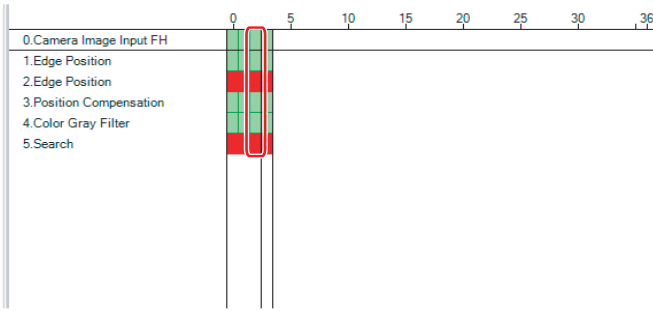
### 1. Image display area

Displays selected images.

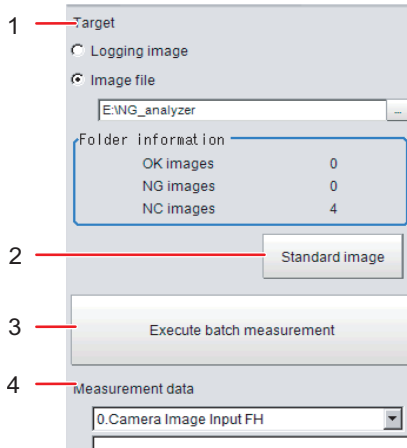
### 2. Image selection

Selects the image number to be displayed in the image display area.

Images can be displayed by directly clicking the analysis result window.



## b. Control area



### 1. Target

Sets images to be measured.

### 2. Standard image

Standard image

### 3. Execute batch measurement

All of the specified target images are measured continuously.

### 4. Measurement data

Display the desired unit in the list of units and select the unit based on details of unit and details of data.

## Using Method of NG Analyzer

### IMPORTANT

- Classify sample images beforehand into the OK folder containing images you want to judge OK or NG folder containing images you want to judge NG. (The applicable file types are "\*.IFZ", "\*.BYR", "\*.BMP" and "\*.BFZ".)
- Do not input external commands or STEP signals while the NG analyzer is running (excluding during non-stop adjustment).

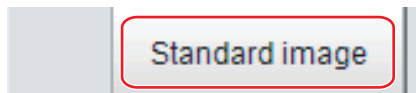
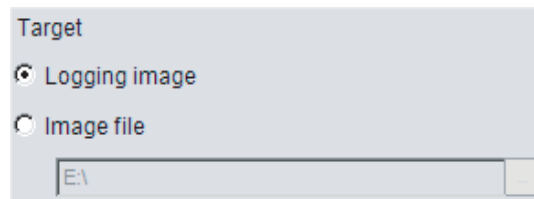
### 1 On the Main Window, select [Tool] menu - [NG analyzer].

The analyzer window is displayed.

### 2 Specify the image file.

Specify the upper rank folder containing the OK and NG folders.  
Although logged images of the Controller can be set as the target, all logged images of the Controller, if selected, are treated as "Not yet judged."

You can also set a reference image to perform adjustment.



### 3 Click files in the folder are displayed.

### 4 Click [Execute batch measurement].

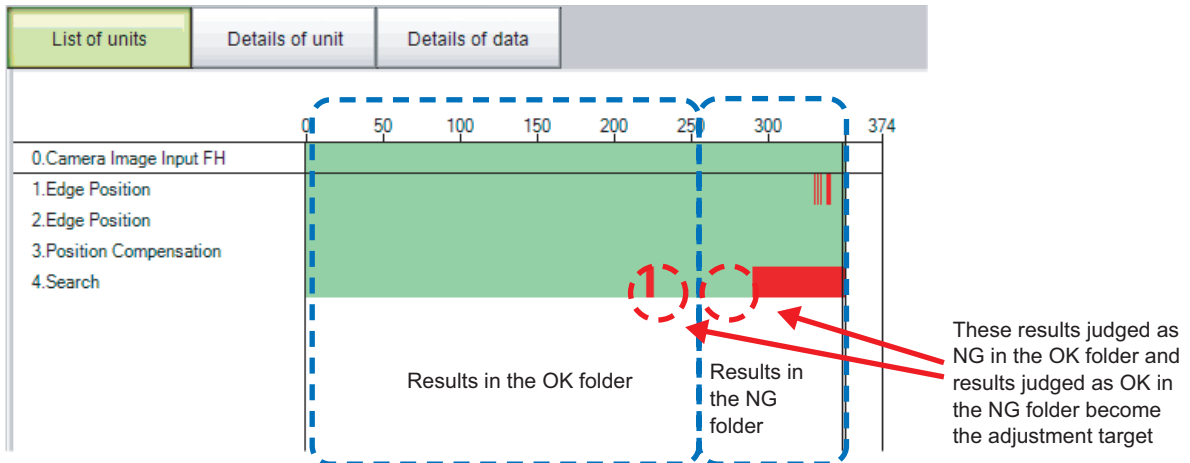
All images in the folder are measured in batch.

Re-measurement result		
		Miss judge
OK images	0	0
NG images	0	0
NC images	0	



## 5 Measurement results are displayed.

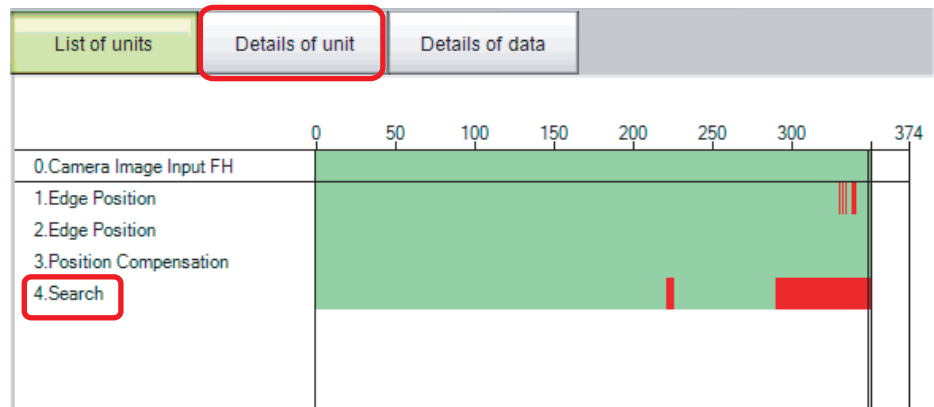
The results in the OK folder are shown first, followed by the results in the NG folder. Green indicates OK, while red indicates NG.



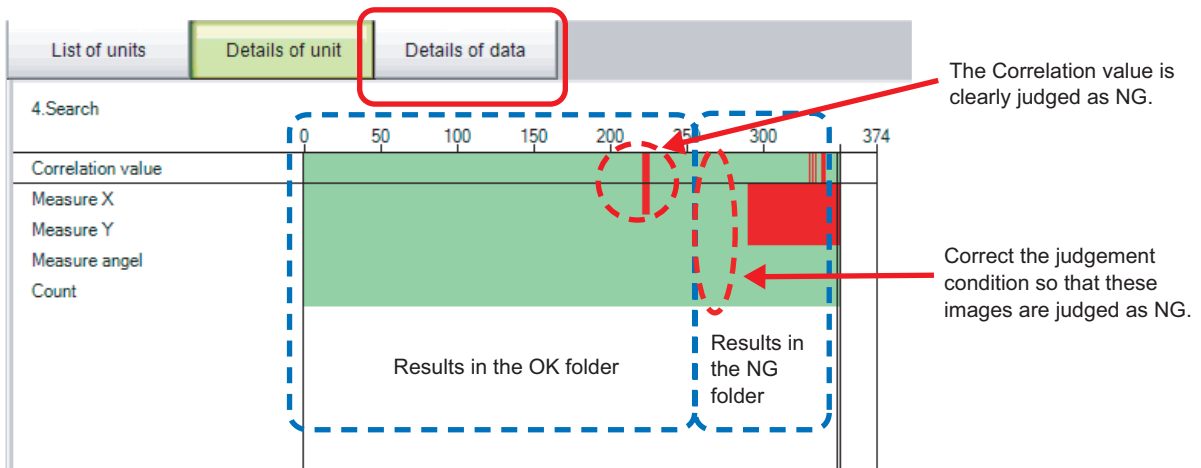
Adjust the set values of each unit until no images are incorrectly judged.

## 6 Select the processing item to be adjusted, and click [Details of unit].

In the above example, [Search] becomes the adjustment target.



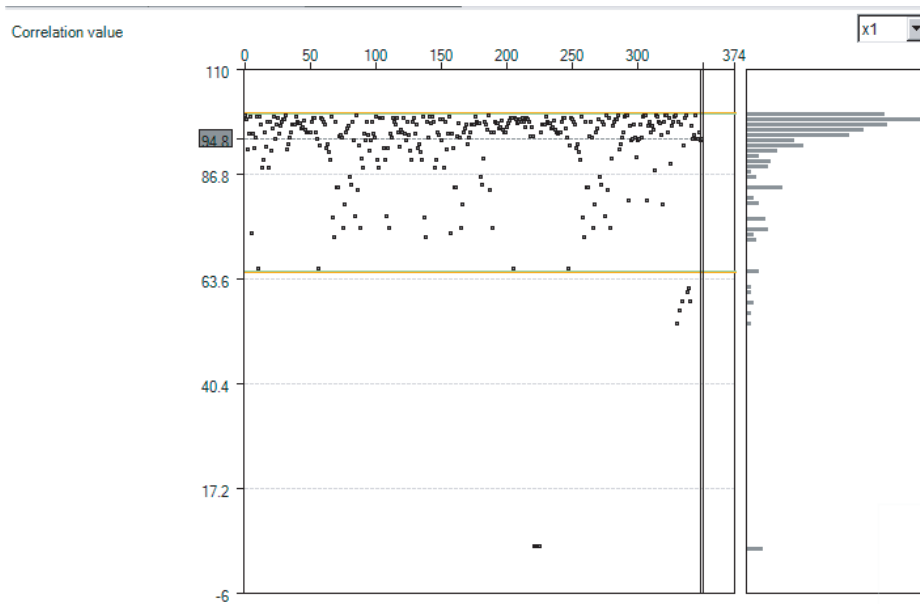
## 7 The cause of NG is displayed. To check the details of values further, click [Details of data].



## 8 Adjust the processing item by referring to the displayed content.

In the following example, Correlation values are clearly lower on some images.

Based on the revealed cause of incorrect judgement, use the [Set up(Std.)] and [Set up(Select)] buttons to change the set values of the processing unit.



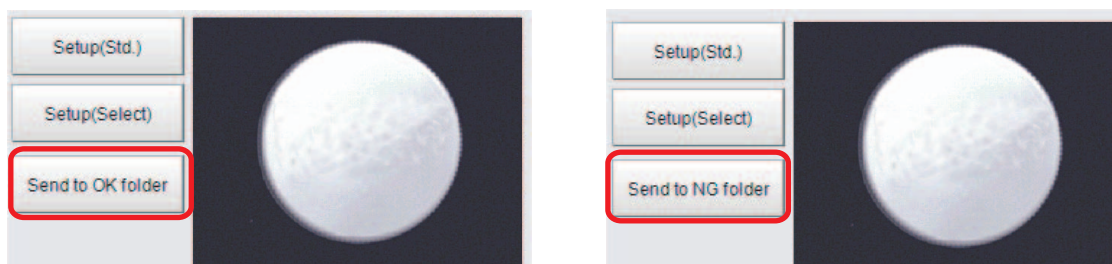
## 9 Repeat steps 5 to 8 to correct the set values corresponding to all causes of incorrect judgement.

## 10 Select [Execute batch measurement] to confirm that no images are incorrectly judged.

If there are still incorrectly judged images, repeat the same procedure until a re-measurement finds no incorrectly judged images.

### Note

- OK/NG judgements can be changed by using [Send to OK folder] and [Send to NG folder] buttons. In this case, the changes will not be reflected until re-measurement is performed.



# Sharing data within the controller (User data tool)

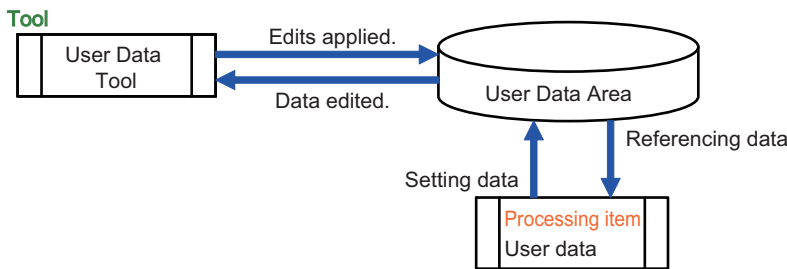
This tool is used to share data within the Controller.

The data set as user data is shared between scenes or scene groups. Data sharing across lines is not allowed in Multi-line Random Trigger Mode. The data variables that are created are stored in the user data region on the Controller.

Use the User Data Tool to edit data, specify initial values, and enter data comments.

Use the User Data processing item to set or reference the values in the data that you set with the User Data Tool.

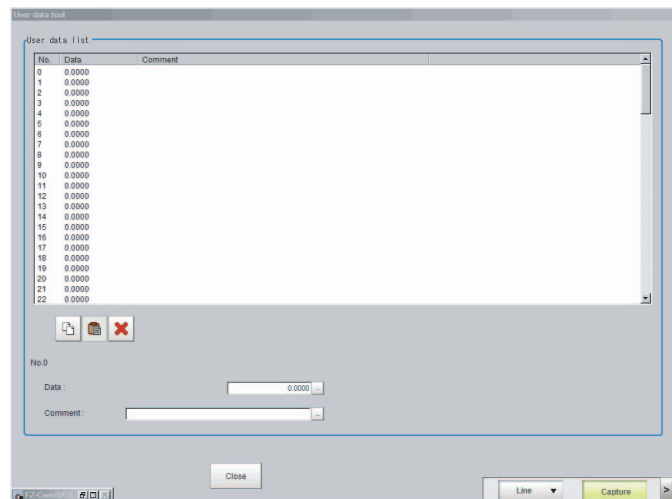
Refer to ► *User Data* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).



## Setting Procedure for User Data

- 1 To set user data, select [User data tool] from the [Tool] menu in the Main Window.**

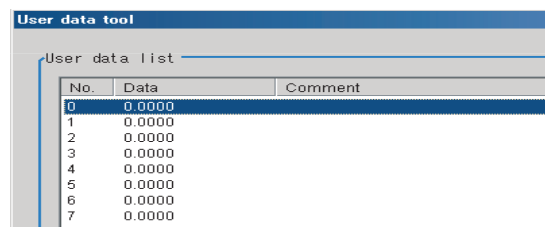
The [User data tool] dialog box is displayed.



- 2 Click the data to set.**

0.0000 (Not selected) means that user data is not created. To use the user data, set values without mistake.

To set 0 as an initial value, enter "0".

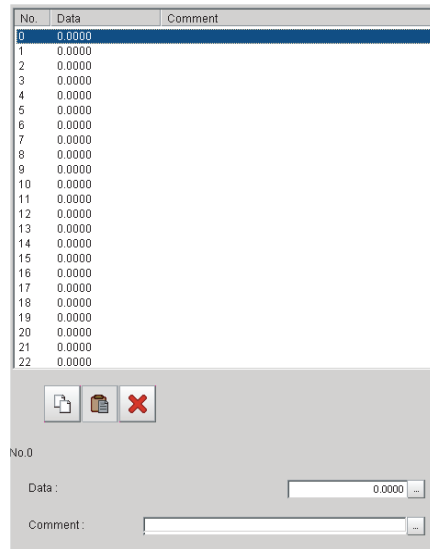


- 3 Set the default value for the data.**

Item	Set value [Factory default]	Description
Data	-999999999.9999 to 999999999.9999 [0.0000]	Set the specified user data value.

**4 Enter the comment for the data.**

The entered comment will be displayed in the [Comment] column of the User Data processing item.



Item	Set value [Factory default]	Description
Comment	64 characters max. [Space]	Set the comment for the specified user data.

**5 Repeat steps 2 to 4 to set the user data.**

**6 To stop the User Data Tool, click [Close].**

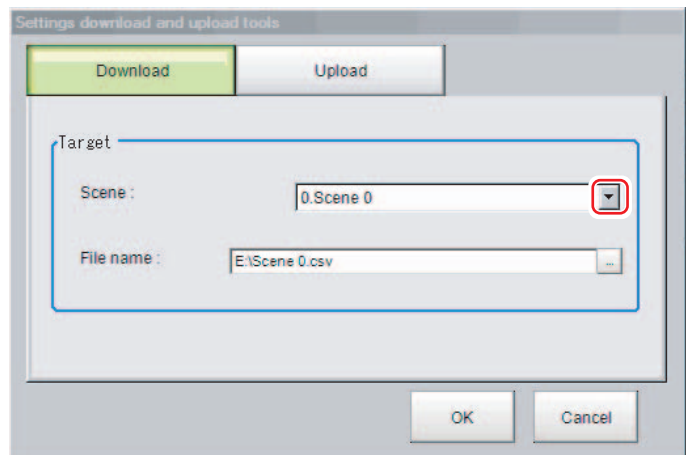
**7 Click [Data save] to save the specified user data to the Controller.**

# Outputting a List of Scene Data Set Values (Settings download and upload tools)

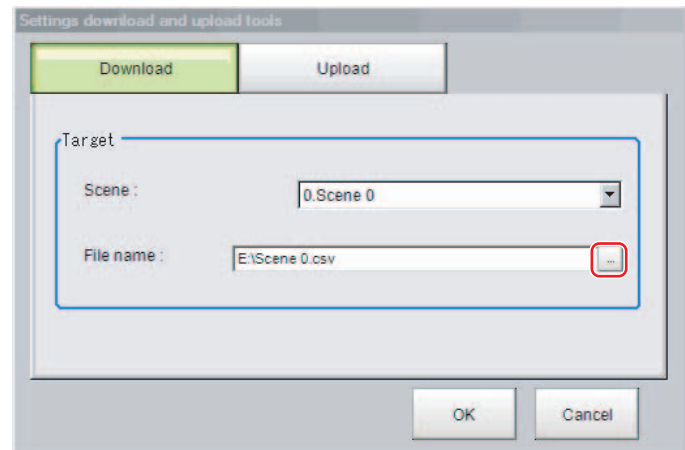
To create a list of the set values for scene data, use the Settings Download and Upload Tools. With the set value download function, the specified scene data set values can be output to a CSV file. Different set values in multiple scene data can be easily checked by opening the CSV files in an editor. (Only data that can be read and written can be downloaded.) The Setting Values Upload Tool allows you to upload a CSV file with confirmed set values.

## Downloading Set Values

- 1 Change to the scene group that contains the scene with the set values to download.
- 2 When saving data to external memory, insert an external memory device into the Sensor Controller.
- 3 In the adjustment window (layout 0), select [Settings download and upload tools] from the [Tool] menu.
- 4 Click [Download] and select the scene with the set values to download.



- 5 Specify the save destination folder and file name, and click [OK].
- 6 Click [OK].  
The data will be saved to the save destination.



## About Downloaded CSV Files

The character code of the downloaded CSV file is Unicode (UTF-8). You can open this file with the Notepad in Windows. When using another editor to open the file, set the character code to Unicode (UTF-8).

The CSV file format is as follows:

---

SceneTitle,Scene title name,Author,Note  
#Processing item number in the flow,Processing item identifier,Processing unit title identifier,data title,data

---

Double-byte characters are enclosed in the double quotation marks ("").

Refer to the individual processing items and the external reference tables in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for the parameters for all data. Only data that can be read and written can be downloaded.

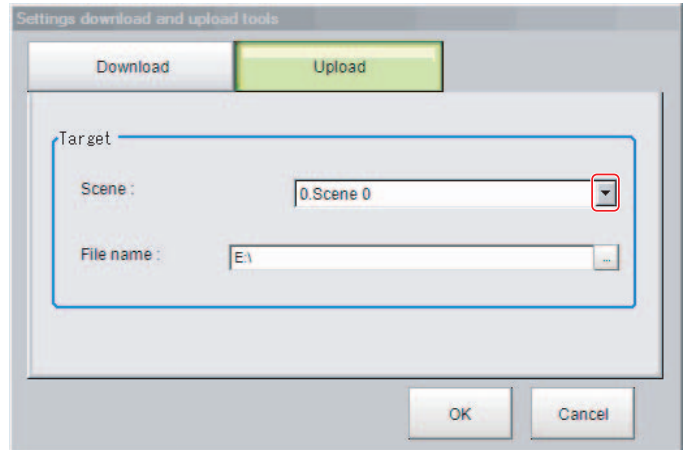
Output Example of CSV File:

SceneTitle	Scene 0	
#0	Camera image	Camera Image Input
#1	Search	Search
outputCoordinate	Output coordinates	0
calibration	Calibration	0
overallJudge	Reflect to overall judgement	0
searchMode	Search mode	0
rotation	With/without rotation	0
endAngle	Upper limit of the rotation angle	180
startAngle	Lower limit of the rotation angle	-180
angleSkip	Skipping angle	5
smartMode	Smart mode	1
stability	Stab.(CR)	12
accuracy	Prec.	2
searchSpeed	Stab.(PT)	3
referencePosX	Reference X	0
referencePosY	Reference Y	0
detectionPosX	Detection point X	0
detectionPosY	Detection point Y	0
subPixel	Sub-pixel	0
candidateLevel	Candidate Point Level	70
upperX	Upper limit of measure X	99999.9999
lowerX	Lower limit of measure X	-99999.9999
upperY	Upper limit of measure Y	99999.9999
lowerY	Lower limit of measure Y	-99999.9999
upperAngle	Upper limit of the angle	180
lowerAngle	Lower limit of the angle	-180
upperCorrelation	Upper limit of corr.	100
lowerCorrelation	Lower limit of corr.	60
savemdlimg	Save registered model	0
thersDetail	Candidate Point Level	75
sort	Sort condition	1
searchNo	Search No.	0
upperCount	Upper limit of count judgement	32
lowerCount	Lower limit of count judgement	0
isMulti	Multiple output	0

## Uploading Set Values

Use the following procedure to upload the CSV file to which you downloaded the set values.

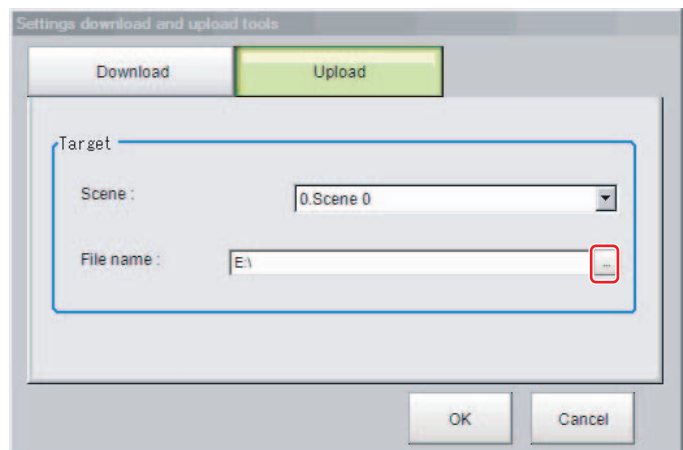
- 1** Change to the scene group that contains the scene with the set values to be uploaded.
- 2** When reading from external memory, insert an external memory device into the Sensor Controller.
- 3** In the Main Window, select [Settings download and upload tools] from the [Tool] menu.
- 4** Click [Upload] and select the scene with the set values to be uploaded.



### IMPORTANT

To upload the file, set the character code to Unicode (UTF-8) with the Windows Notepad or another application, and save the file in CSV format.

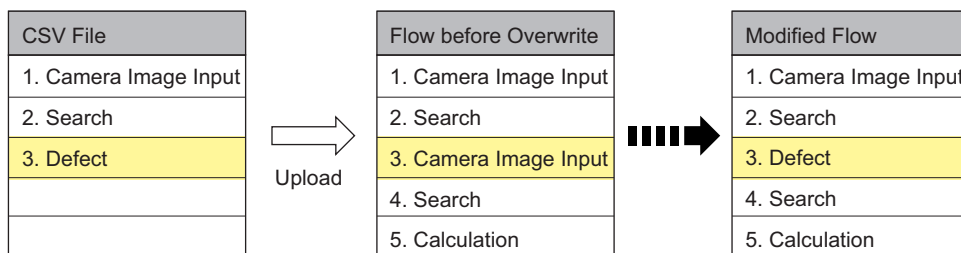
- 5** Specify the folder and the name of the file to be loaded, and click [OK].
- 6** Click [OK].  
The data is uploaded.



### IMPORTANT

- If data with fewer units than the scene data to be loaded is uploaded, the parts that do not exist in the CSV file will not change.

Example:



In this example, the processing item for unit 3 will be changed from Camera Image Input to Defects. The parts that do not exist in the CSV file (4. Search processing item and 5. Calculation processing item in the flow) will not change.

# Saving Image files to a RAMDisk, or External memory device (Image file save)

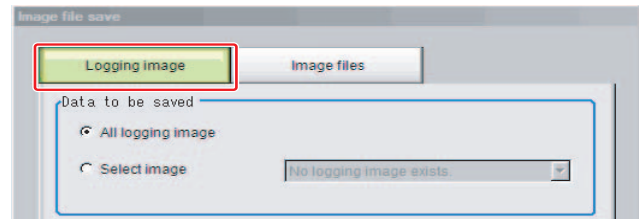
This section describes how to save logged images and image files that are saved in the Controller to a RAM disk or external memory device in the Controller. The storage format (bitmap or Jpeg) can be specified when the images are saved.

## IMPORTANT

During saving, do not restart, turn OFF the power supply, or remove the external memory device. The data may be corrupted.

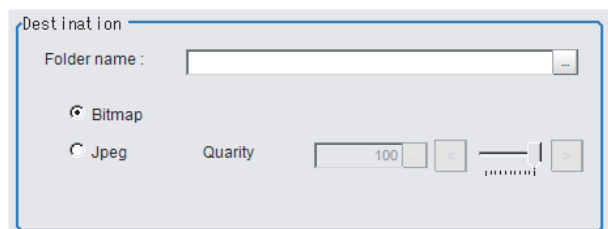
### Saving Logging Images

- 1** When saving data to external memory, insert an external memory device into the Sensor Controller.
- 2** In the Main Window, select [Image file save] from the [Tool] menu.  
The [Image file save] dialog box is displayed.
- 3** Click [Logging image] and select the logged image to save.



Parameter	Set value [Factory default]	Description
Data to be saved	[All logging image]	All logged images are saved.
	Select image	The selected logged images are saved. Click [▼] to select the image to save. When [Latest measurement] - [logging image] is selected, the save file name will be LoggingImage000.ifz.

- 4** Specify the destination folder name and file type.



Parameter	Set value [Factory default]	Description
Folder name	---	Specify the destination folder name.
Format	<ul style="list-style-type: none"> <li>• [Bitmap]</li> <li>• Jpeg</li> </ul>	Select the image format in which to save the image.
Quality	0 to 100 [100]	Specify the quality of the Jpeg image to save

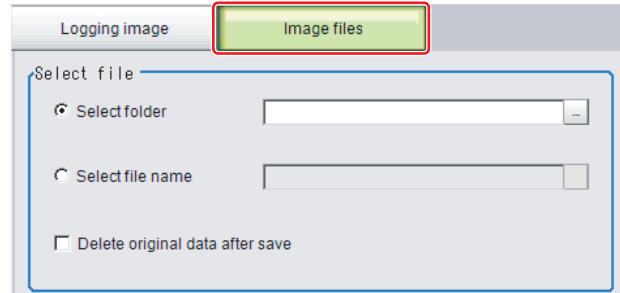
- 5** Click [OK].

The image is logged in the selected destination. If a file with the same name already exists in the destination folder, the newly saved file overwrites the old one.



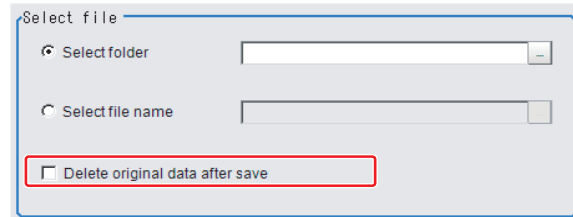
## Saving Image Files

- 1** When saving data to external memory, insert an external memory device into the Sensor Controller.
- 2** In the Main Window, select [Image file save] from the [Tool] menu.  
The [Image file save] dialog box is displayed.
- 3** Click the [Image files] tab to select the image files to save.

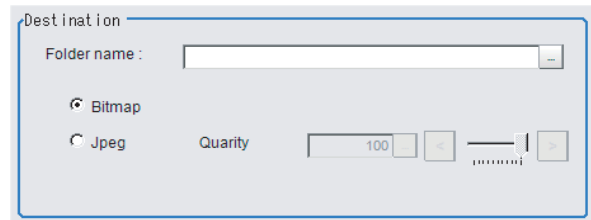


Parameter	Set value [Factory default]	Description
Select file	[Select folder]	Saves multiple files in a folder. Click the [...] button and specify the source folder to copy or move.
	Select file name	Saves the selected image file Click the [...] button and specify the file name.

- 4** To delete the source file after saving a copy to external memory, select [Delete original data after save].



- 5** Specify the destination folder name and file type.



Parameter	Set value [Factory default]	Description
Folder name	---	Specify the destination folder name.
Format	<ul style="list-style-type: none"> <li>• [Bitmap]</li> <li>• Jpeg</li> </ul>	Select the image format in which to save the image.
Quality	0 to 100 [100]	Specify the quality of the Jpeg image to save

- 6** Click [OK].  
The image is logged in the selected destination. If a file with the same name already exists in the destination folder, the newly saved file overwrites the old one.

### Note

The save file name is the original file name and the extension.

# Managing images used for model registration and reference (Registered Image Manager)

You can save images used for model registration and reference registration as registration images and can reference them later and use them for re-registration and adjustment of reference positions. You can register the [Latest logging image], [Logging image], and [Image file].

## IMPORTANT

- External storage which has connectivity with External USB device, such as USB flash drive, or USB HDD.
- The registered image is saved in the external memory device.
- Do not change the configuration of files in the external memory device. Changing it would make it impossible to read the files.
- Image files in the JPG (JFZ) format can not be registered / loaded.

## Registering Images

This section describes how to register, load, or delete an image.

### Registering Images

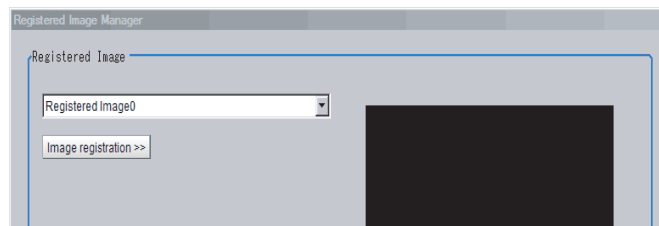
Use the following procedure to register images. You can register up to 1,000 images.

- 1 Insert a USB flash drive into the Sensor Controller.**
- 2 In the Main Window, select [Registered Image Manager] from the [Tool] menu.**

The [Registered Image Manager] dialog box is displayed.

- 3 Select an index number for the image to register.**

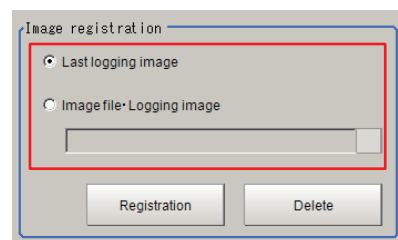
The number can be selected from 0 to 999.



#### Note

- If an image already exists, it will be displayed.
- If a number that has been assigned to an existing image is selected for the image to register, the existing image will be replaced by the new image.

- 4 Click the [Image registration>>] button.**
- 5 Select the image to register.**



Parameter	Set value	Description
Image registration	Last logging image	Registers the most recent image used for measurements.
	Image file · Logging image	Registers a logged image that was saved in the main memory. Image files saved in USB flash drive, or other external memory storage.

- 6 Click the [Registration] button.**

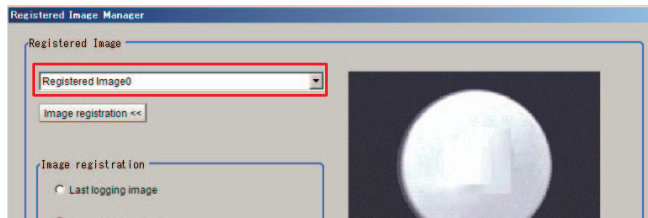
In step 3, if you select a registered image number that is already registered, an overwrite confirmation dialog box is displayed. If you want to replace the existing image with a new image, click [Yes].

- 7 Click the [Image registration<<] button.**

## Deleting Images

Use the following procedure to delete registered images.

- 1** In the Main Window, select **[Registered Image Manager]** from the **[Tool]** menu.  
The **[Registered Image Manager]** dialog box is displayed.
- 2** Click the **[Image registration>>]** button.
- 3** Select the registered image number of the image to delete.



### Note

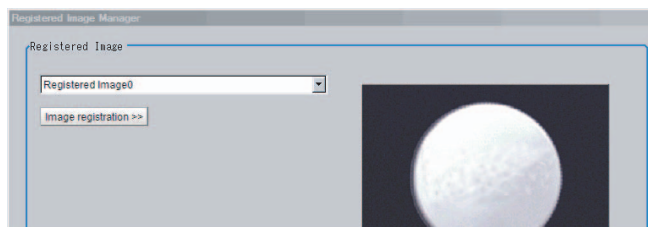
When more than one image is included in the registration images, click the **[<<]** or **[>>]** buttons under the Preview Area as necessary to move forward or back to the desired image.

- 4** Click the **[Delete]** button.  
A deletion confirmation dialog box is displayed.
- 5** Click **[Yes]**.  
The selected image is deleted.
- 6** Click the **[Image registration<<]** button.

## Loading an Image

A registered image can be loaded as a measurement image.

- 1** In the Main Window, select **[Registered Image Manager]** from the **[Tool]** menu.  
The **[Registered Image Manager]** dialog box is displayed.
- 2** Select the registered image number of the image to load.



### Note

When more than one image is included in the registration images, click the **[<<]** or **[>>]** buttons under the Preview Area as necessary to move forward or back to the desired image.

- 3** Click the **[Read]** button.  
The selected image is loaded as a measurement image.  
The **[Registered Image Manager]** window is closed and the display returns to the Main Window.

# Customizing communication commands (Communication command macro)

You can define your own communications commands for the Sensor Controller.

You use this to create functionality that is not available in the standard communications commands, or to perform more than one process with a single communications command.

Example: To tell the Controller to change scenes and then execute a measurement from an external device.

Without using communication command macro	Using communication command macro
You must send two standard communications commands: the Switch Scene command (scene) and the Measurement command (measure).	Create a measurement command (mymeasure) that is set to execute scene switching followed by measurement processing. One execution of the mymeasure command actually executes two commands, the scene command and measure command, which simplifies the control logic from the PLC or other external device.

User-defined communications commands are registered as a character string of the command name for the non-procedure communications protocol, or as a command number from 0 to 255. These commands are stored in the main memory of the Sensor Controller.

The maximum number of characters that can be used for the Communication Command Macro is 1024 characters.

If you send a registered communications command from the external device to the Sensor Controller, the Sensor Controller recognizes it and performs the specified processing.

Refer to ► Components of the Setting Screen of the Communication Command Macro Tool and How to Configure Settings in the *Vision System FH/FZ5 Series Macro Customize Functions Programming Manual* (Cat. No. Z367)

## Displaying a measurement flow as a flowchart while editing it (Flow viewer)

The Flow Viewer shows the flow of processing for the measurement flow that is currently being edited. When you edit a flow, the Flow Viewer is useful when you need to check the relationship of branches and folders.

Refer to the following reference for information on the Flow Viewer.

Reference: ► [Displaying and Checking Processing Branches in a Scene \(p.64\)](#)

# Verifying calibration results (Calibration support tool)

The Calibration Support Tool provides a graphic display of the calibration setting results (relationship of the positions of the Camera coordinates and the actual coordinates) when you set the alignment function.

This allows you to check for major errors in the calibration results.

Refer to the following reference for information on the Calibration Support Tool.

Reference: ▶ Other Alignment Functions (p.314)

# Updating the referenced position data for a unit in the measurement flow (Update standard position tool)

This section describes the use of a table to set or change the reference position for more than one processing unit that you specify in the measurement flow.

To open the Update Standard Position Tool, select [Update standard position tool] from the [Tool] menu.

## Items That Can Be Updated with the Update Standard Position Tool

You can specify the following processing items.

- Search
- Sensitive Search
- Shape Search II
- Shape Search III
- EC Circle Search
- ECM Search
- Ec Corner
- Ec Cross
- Edge Position
- Scan Edge Position
- Circular Scan Edge Position
- Intersection
- Gravity and Area
- Labeling

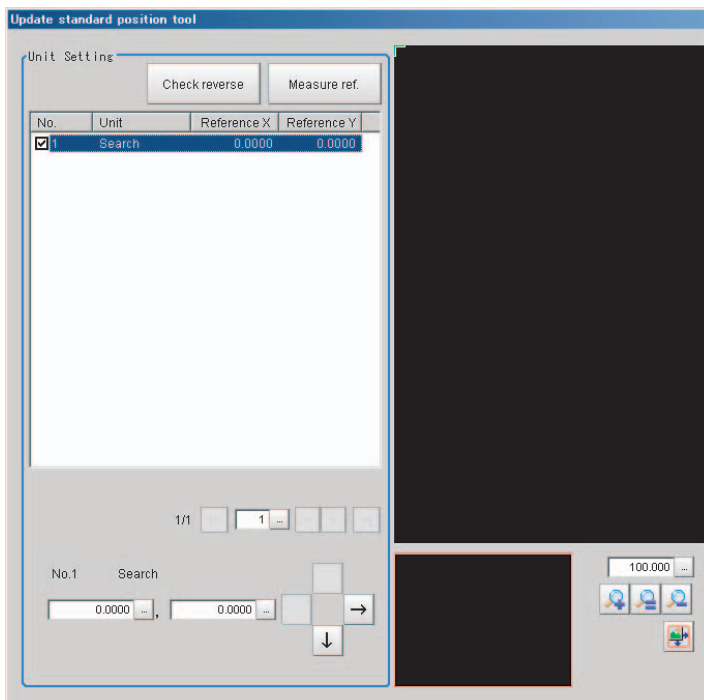
## Operating Procedure for the Update Standard Position Tool

You can update the reference position for measurement items in the flow without the need to open the settings dialog box for each item.

For example, you can easily update the reference position that is updated frequently in an alignment application. To update the reference position, display the image to use as the reference in advance.

When you click the [Measure ref.] button, the Controller measures the reference for all units that are selected in the [Unit Setting] list and updates the reference position.

If you click the reference position in the window, or enter the coordinates as a numeric value, the reference positions for the selected units in the [Unit Setting] list are updated with this value.



## To Cancel Updating

Click the [Cancel] button. You can return the reference positions to the values that were in effect before you opened this tool.

### Note

---

Most of the measurement items automatically update their reference positions when the model or measurement area is changed. If you need to change the reference position after it is updated, place the workpiece in the desired position, and then update the reference positions for all measurement units that you wish to change in the measurement flow.

---



# Increasing the number of scenes in a group to more than 128 scenes (Conversion scene group data tool)

You can increase the number of scenes in a scene group to more than 128 scenes.  
To start the Conversion Scene Group Data Tool, select [Conversion scene group data tool] from the [Tool] menu.

## Overview

Normally, there are 128 scenes in a scene group.  
For example, if you need to create scenes for each model and there are more than 128 models, you would normally create more than one scene group to manage the scenes.  
However, you can use the Conversion Scene Group Data Tool to increase the number of scenes in a scene group to up to 1,024 scenes. A scene group data file (extension \*.sgp) is used as the target data.  
The ability to manage all of the scenes in one scene group even if there are more than 128 scenes simplifies the PLC control programming and data management. USB flash drive is required to use this function.

## IMPORTANT

If you increase the data size of a scene group, you may not be able to save the data in the Controller or load the data from a file, depending on the number of scenes and the settings.  
If that occurs, change the measurement flow, separate the scene group, or otherwise reduce the data size of the scene group.

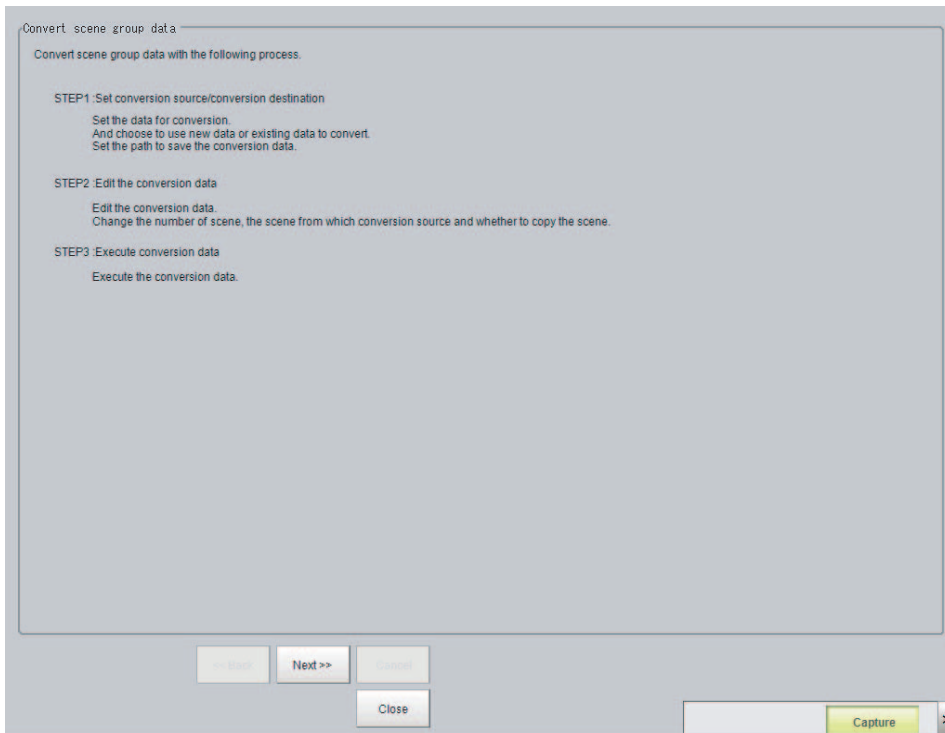
## Note

For best results, organize the scenes in the scene groups before you use the Conversion Scene Group Data Tool. For example, arrange the scenes in the proper order, delete unnecessary scenes, and assign scene names.  
Reference: ► Editing Scenes (p.70)

## Operating Procedure for the Conversion Scene Group Data Tool

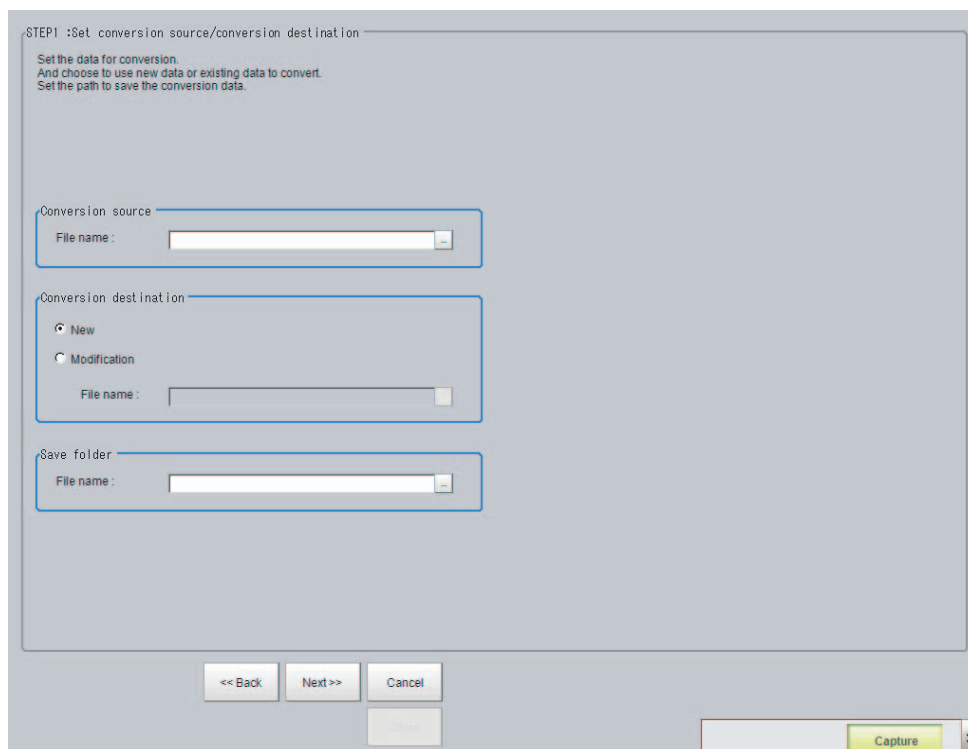
When you start the Conversion Scene Group Data Tool, the following dialog boxes are displayed in order.  
You complete the following three dialog boxes as a progressive process that sets, edits, and converts the scene group data.

- Step 1: Set the target data to convert.
- Step 2: Edit the data.
- Step 3: Execute the conversion process.

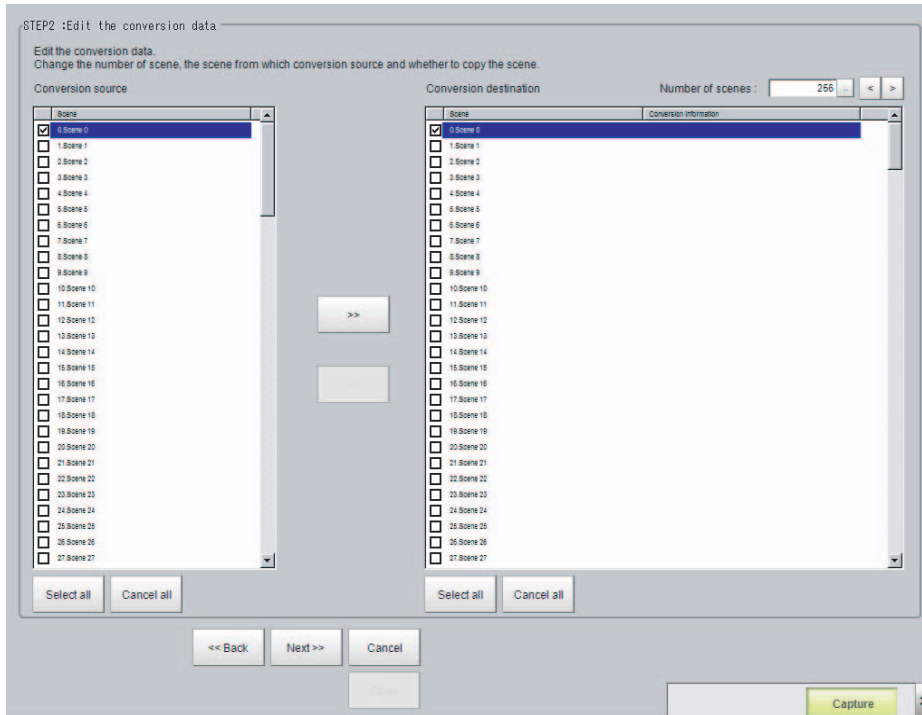


Use the following procedure and the guidance in the dialog boxes to perform the conversion process.

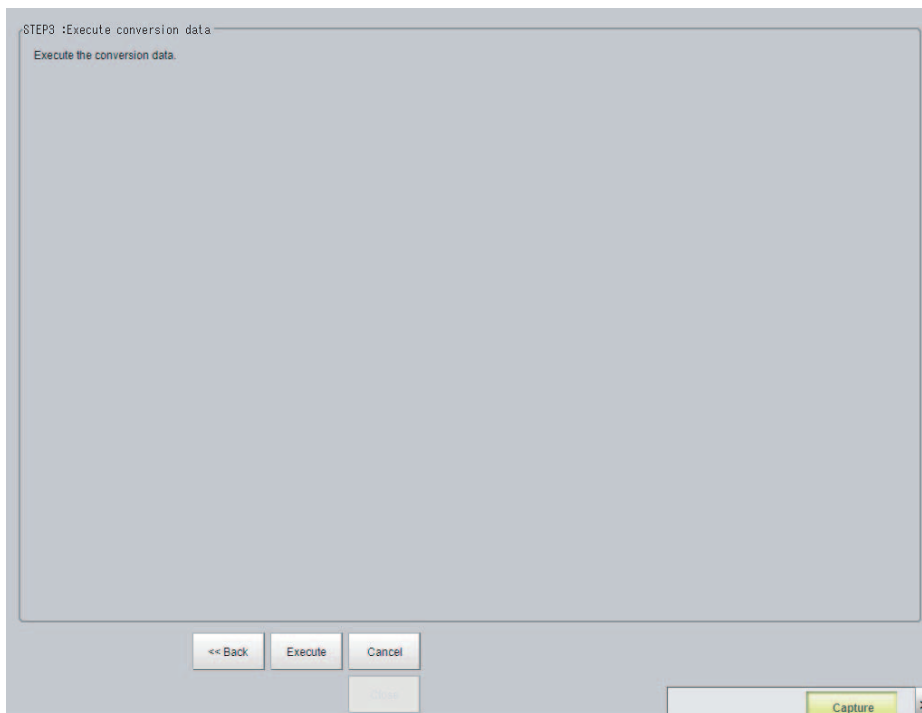
- 1** Select [Conversion scene group data tool] from the [Tool] menu.  
The Conversion Scene Group Data Tool is started.
- 2** Click the [Load] button. The [STEP 1] dialog box is displayed.



- 3** Specify the target data file to convert, the destination data file, and the destination. Then click the [Next >>] button. The [STEP 2] dialog box is displayed.



- 4** Edit the scene in the converted scene group. Click the [>>] button to copy the conversion source to the conversion destination. Click the [<<] button to copy the conversion destination to the conversion source. When you are done editing, click the [>>] button. The [STEP 3] dialog box is displayed.



- 5** Specify the destination for the converted file, and then click the [Execute] button. A progress bar is displayed and the conversion is executed.

## Create a customized settings dialog box (Custom dialog tool)

You can create a customized settings dialog box and display it instead of the normal settings dialog box that is provided for each processing item.

This allows you to create settings dialog boxes that match your application.

Refer to the following reference for information on custom dialog boxes.

Reference: ▶ Custom Dialog Tool (p.106)

## Extending the functions in a measurement flow, or scene (Scene Control Macro Tool)

Using this tool, can complement or extent the operation of measurement flow or Scene.

This tool is useful when the following cases:

- When add the processing unit and measurement flow.
- When the manage data common in the multiple processing units.

For details, refer to ► *Description of the Setting Screen of the Scene Control Macro Tool and How to Configure Settings* in the *Vision System FH/FZ5 Series Macro Customize Functions Programming Manual* (Cat. No. Z367).

# Backing up Sensor Controller setting data (Configuration copy)

This function will back up the setting data of the Sensor Controller.

The capability to save/load a copy of the Sensor Controller settings as Sensor Controller project data facilitates copying desired settings to other Sensor Controllers.

## IMPORTANT

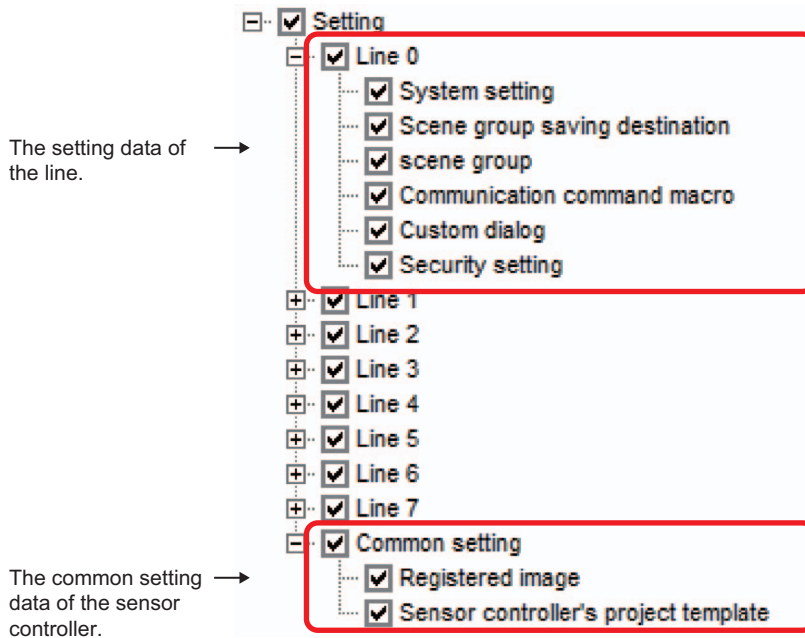
- When running the remote operation tool, Configuration Copy is disabled.
- In the Non-stop Adjustment mode, Configuration Copy can be used only for line 0.
- In the Multi-line Random-trigger mode, Configuration Copy can be used only to line 0.
- Do not turn off the power supply and do not remove external storage devices while sensor controller project data is being saved or loaded. Doing so could damage the external storage device and corrupt the sensor controller project data.

## Before backing up

There are two types of settings data that can be backed up.

One is the setting data for the line, the other is the common setting data for the Sensor Controller.

The line for which setting data can be saved varies depending on the Operation mode. The common setting data for the Sensor Controller that can be saved does not depend on the Operation Mode.



Operation Mode	Description
Standard	Line 0 settings and Common settings can be stored.
Double speed Multi-input	Settings for Line 1 to 7 cannot be stored.
Non-stop Adjustment	The data that are selected in the line 1 to 7 can not be stored.
Multi-line Random-trigger	The settings for any selected (checked) line plus Common settings can be stored.

## Setting data which can be backed up

The following is the detailed list of the setting data.

Type	Name	Description
Setting data of the line	System setting	System setting includes the following configuration. <ul style="list-style-type: none"> <li>The data of [System Settings] dialog box Reference: ▶ Changing the System Environment (p.233)</li> <li>The layout information of the layout 0 to 8 Reference: ▶ Arranging Windows (p.85) <sup>(*1)</sup></li> <li>The User Data Reference: ▶ Sharing data within the controller (User data tool) (p.165)</li> </ul>
	Scene group saving destination	Setting contents of the Scene group saving destination are the setting object. Reference: ▶ Saving Scene groups in external memory (Scene Group Saving Destination settings) (p.158)
	Scene group	Scene group saved to Sensor Controller or external memory <sup>(*2)</sup> are the setting object. All of the following settings include to Scene group <ul style="list-style-type: none"> <li>Flow Settings of all scenes.</li> <li>Macro code of Scene Control Macro for all Scene.</li> <li>Scene Control Macro data of all Scenes. Reference: ▶ <i>Components of the Setting Screen of the Communication Command Macro Tool and How to Configure Settings</i> in the <i>Vision System FH/FZ5 Series Macro Customize Functions Programming Manual</i> (Cat. No. Z367)</li> <li>Image Container Window Settings of all scenes Reference: ▶ Arranging Windows (p.85)</li> <li>Image Window Settings of all scenes. Reference: ▶ Arranging the Window Display (p.102)</li> </ul>
	Communication command macro	The target data is the Communication Command Macro data. Reference: ▶ <i>Components of the Setting Screen of the Communication Command Macro Tool and How to Configure Settings</i> in the <i>Vision System FH/FZ5 Series Macro Customize Functions Programming Manual</i> (Cat. No. Z367)
	Custom dialog	The target data is all setting of the Custom dialog. Reference: ▶ Custom Dialog Tool (p.106)
	Security setting	Security settings include the following configuration. <ul style="list-style-type: none"> <li>Account list</li> <li>Layout restrictions</li> <li>Operating restrictions</li> </ul> Reference: ▶ Saving/Loading/Deleting the Security Settings (p.151)
The common setting data for the Sensor Controller	Registered image	The target image data is the image data that is stored in the Registered Image Manager. <sup>(*3)</sup> Reference: ▶ Managing images used for model registration and reference (Registered Image Manager) (p.172)
	Sensor controller project template <sup>(*4)</sup>	The target template is the template that is stored by Configuration Copy. Reference: ▶ Editing a template (p.192)

\*1: The layout information does not include the setting data of Image Container Windows. The setting data of Image Container Windows is included the scene data.

\*2: FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series:  
The target data is available when External memory device is indicated in External memory device settings.  
FH5-L series/FZ5-600 series:  
The target data is the scene group 1 or later in the USBDisk folder.

\*3: FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series:  
The destination folder of the Registered image is "E:\RegisteredImage".

FH5-L series/FZ5-600 series:

The destination folder is “ USBDisk:\RegisteredImage”.

\*4: In Configuration Copy, you can register the selection status of configuration data as a Sensor controller’s project template.

#### Note

- When saving the system settings or scene group data individually, please refer to following.  
Reference: ▶ Saving Settings Data to the Controller RAMDisk or an External Memory Device (p.228)
- When loading the system settings or scene group data individually, please refer to following.  
Reference: ▶ Loading Settings Data from the Controller RAMDisk or an External Memory Device to the Sensor Controller (p.231)

## Backing up Sensor Controller settings

It’s necessary to select the setting data of Sensor Controller and save the data to the External Memory Device to back up the data.

This chapter explains the procedures for launching the Configuration Copy function, selecting the settings data to save and selecting an External Memory Device for the save destination.

### IMPORTANT

- Before starting up Configuration Copy, click the [Data save] button. Only the data saved to the Controller can be backed up.
- For Multi-line random trigger mode, first, click [Data save] button at each lines. For each line, start up Configuration Copy.
- After loading a BKD file (System setting + Scene group 0 data), do not save the data. Launch the Configuration copy function after restarting Sensor Controller without saving.
- After loading the change of system setting or INI file (system set data), save to the Sensor Controller. restart the Sensor Controller, and then launch the Configuration copy function.  
(Reference: ▶ Saving Image files to a RAMDisk, or External memory device (Image file save) (p.170))

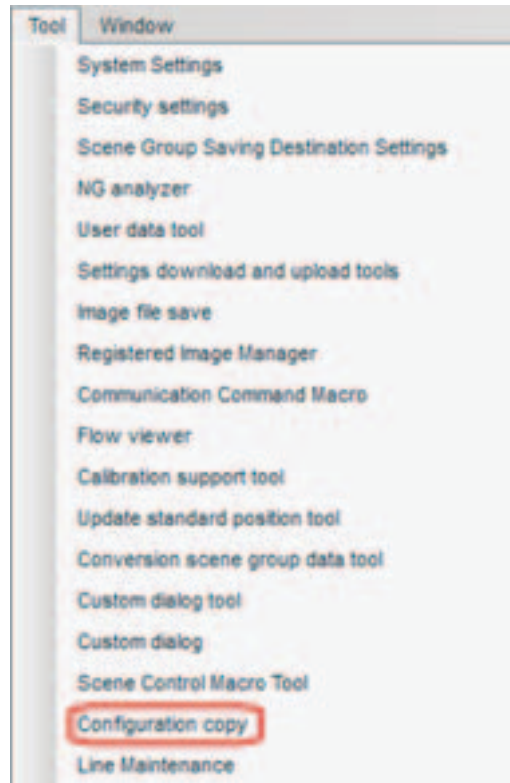
## Launching Configuration Copy

Necessary steps prior to launching Configuration Copy are explained here.

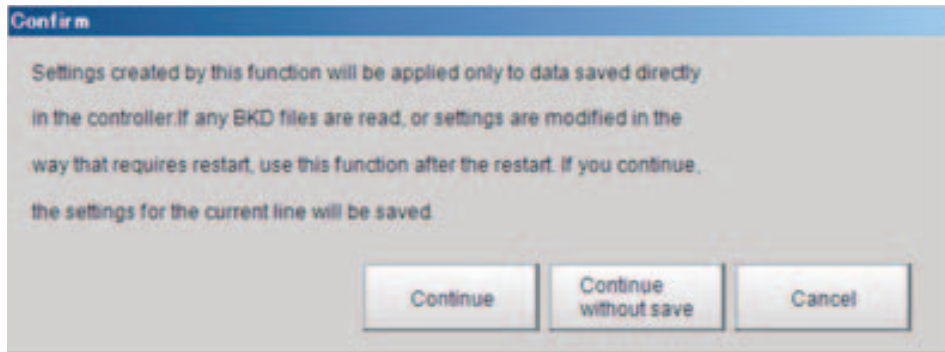
### **1** Connect the external memory device to the Sensor Controller.



**2** From the [Tool] menu in the main window, select [Configuration Copy].



### 3 [Confirm] dialog box is displayed.



Click [Continue] button.

The Setting data for the line 0 and Common setting will be saved and the Configuration Copy function will be launched.

- In the case of multi-line random trigger mode,  
When not be saved the data of the line 0 to 7 for back up, please click [Cancel] button. If you click [Continue] button, the setting data of the line 0 to 7 can not be saved. Launch the Configuration Copy function after [Data Save] for all lines.

#### Note

---

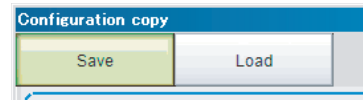
If settings have been modified and you do not want to include the modifications in the sensor controller project, click the [Continue without save] button and the pre-edited settings will be saved to the project.

---

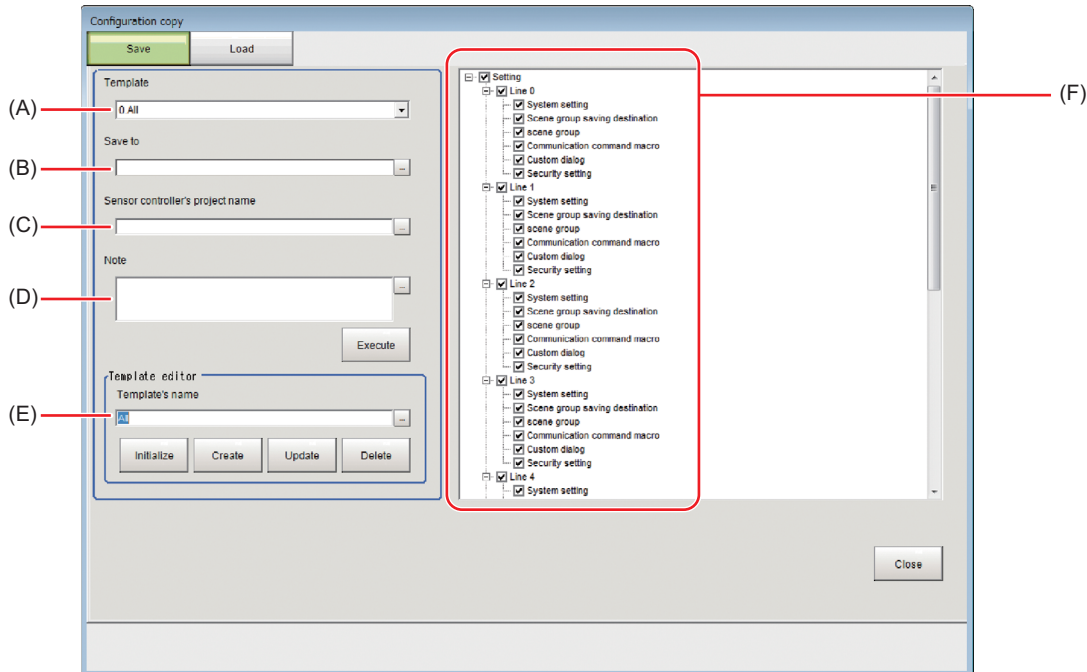
## Selecting the settings to back up

This section explains the procedures for selecting the settings to backup

**1** Click [Save] tab.



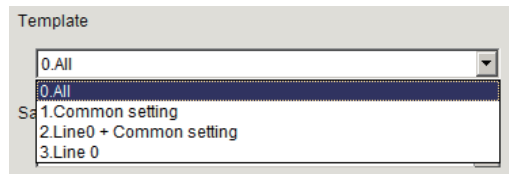
**2** Save screen is displayed.



Symbol	Name	Set value [Factory default]	Description
(A)	Template	<ul style="list-style-type: none"> <li>• [0.All]</li> <li>• 1.Common setting</li> <li>• 2.Line0 + Common setting</li> <li>• 3.Line0</li> </ul>	<p>You can save the current settings in the data tree.</p> <p>By loading the template, you can easily check the setting data to be saved.</p> <p>In the Configuration copy function, there are four templates (All / Common setting / Line 0 + Common setting / Line 0) are the selections.</p>
(B)	Save to	[Blank]	<p>Specify the save destination folder.</p> <p>Please specify the folder of External memory device.</p>
(C)	Sensor controller's project name	[Blank]	<p>You can save this Setting data and its folder structure as a sensor controller project.</p> <p>Enter a Sensor controller project name with 1 to 256 characters. If a name is not entered here, the project is not saved.</p> <p>The allowable number of characters is the same for double-byte and single-byte characters.</p> <p>However, the following symbols can not be used in the name of Sensor controller's project.</p> <p>¥ / : ; * ? " &lt; &gt;  </p>
(D)	Note	[Blank]	<p>Notes for such things as the content of Sensor controller's project and creation date can be entered here. [Note], You can use up to 256 characters. The allowable number of characters is the same for double-byte and single-byte characters. Newline character count as three characters.</p>
(E)	Template editor	---	<p>Edit the content of the template.</p> <p>Reference: ▶ Editing a template (p.192)</p>
(F)	Tree structure area	---	<p>A list of settings is displayed.</p> <p>Check the settings data to back up.</p>

### 3 Select a template.

By selecting a template, it is possible to choose combination of the data for back up. Templates are as follows.



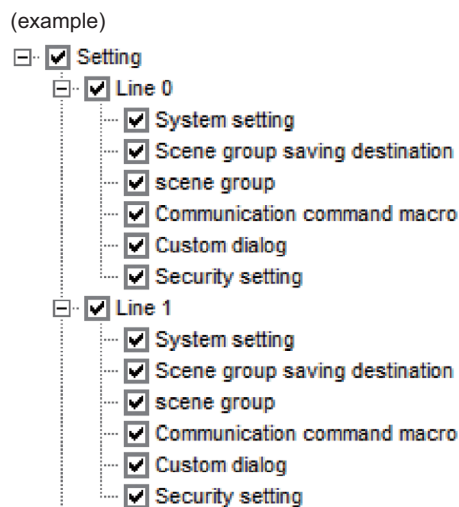
Template name	Description
All	Use in multi-line random trigger mode. All settings can be backed up in Configuration Copy. All setting data for the line 0 to 7 and all common setting data for the Sensor Controller will have their check box selected.
Common setting	All common setting data of the Sensor Controller will have their check box selected.
Line0 + Common setting	Use in Standard (operation mode), Double speed Multi-input mode and Non-stop Adjustment mode. All setting data for the line 0 and all common setting data of the Sensor Controller will have their check box selected.
Line0	Use in Standard (operation mode), Double speed Multi-input mode and Non-stop Adjustment mode. All setting data for line 0 will have their check box selected.

**Note**

- It is possible to change the setting of a template.  
Reference: ▶ Editing a template (p.192)
- Please refer to below for details of setting data.  
Reference: ▶ Setting data which can be backed up (p.185)

### 4 Select the check box of the settings data to save.

Clear the check box for any settings you do not want to have saved.



## Saving to an External Memory Device

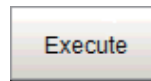
This section explains the procedures for saving settings data to the External Memory Device.

### 1 Set [Save to], [Sensor controller's project name] and [Note].

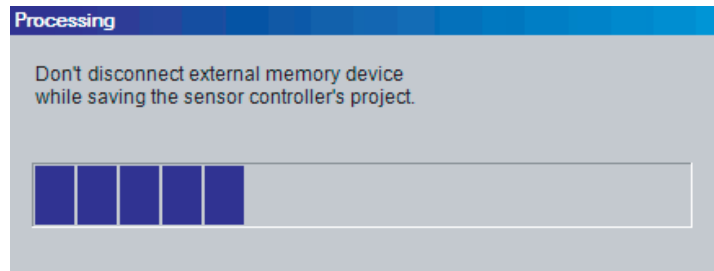
Creates the sensor controller project as the file in save destination.

Saves the selected setting data to the folder of the sensor controller project.

### 2 Click [Execute] button.



### 3 While saving the sensor controller's project, [Processing] dialog box is displayed.



4

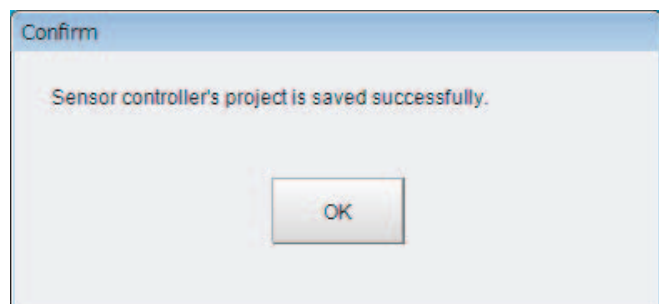
Using Tools

#### IMPORTANT

While saving the sensor controller's project, do not turn off the power supply of the Sensor Controller, or disconnect the external memory device. Doing so could corrupt the external memory device, or corrupt the sensor controller project data.

### 4 After saving the sensor controller's project, [Confirm] dialog box is displayed.

After successfully saving in saving the Sensor Controller project, folder with project name specified when setting the save destination to the external memory device. Saves the selected setting data to the folder of the sensor controller project.



#### IMPORTANT

Do not edit the file or folders which saved to sensor controller project.  
Doing so could cause the sensor controller to not start up normally when loading the project file.

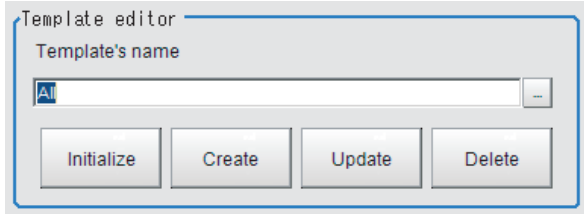
## Editing a template

You can save the current settings in the data tree. By loading the template, you can easily check the setting data to be saved.

In the Configuration copy function, there are four templates (All / Common setting / Line 0 + Common setting / Line 0) are the selections.

### Template editor screen

The settings for [Template editor] are explained here.



Item	Set value [Factory default]	Description
Template's name	<ul style="list-style-type: none"> <li>• [All]</li> <li>• Common setting</li> <li>• Line 0 + Common setting</li> <li>• Line 0</li> </ul>	<p>A selected template is reflected by [Template's name].</p> <p>When creating a new template, you can specify the template's name using up to 256 characters.</p> <p>The allowable number of characters is the same for double-byte and single-byte characters.</p>

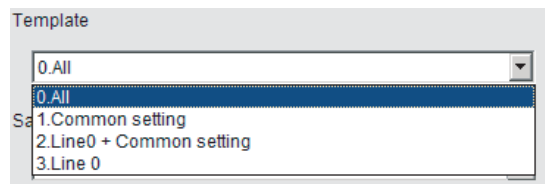
Button	Description
Initialize	<p>When initializing the setting of a template, click [Initialize] button.</p> <p>Available templates are [All], [Common setting], [Line 0 + Common setting] and [Line 0].</p> <p>The data edited the template is initialized and can not be returned to the edited data.</p> <p>Reference: ► Initialize a template (p.195)</p>
Create	<p>Create a new template. (*1)</p> <p>Input a template's name and select the setting data, and then click [Create] button.</p> <p>Reference: ► Create a template (p.192)</p>
Update	<p>Without changing the template's name, the selection of setting data is changed.</p> <p>Select the template and select the setting data, and then click [Update] button.</p> <p>Reference: ► Updating a template (p.194)</p>
Delete	<p>Delete an unnecessary template.</p> <p>Select the template and then click [Delete] button.</p> <p>Deleted template can not be returned to the original.</p> <p>Reference: ► Deleting a template (p.195)</p>

\*1: The number of template that can be registered is 1 to 256.

### Create a template

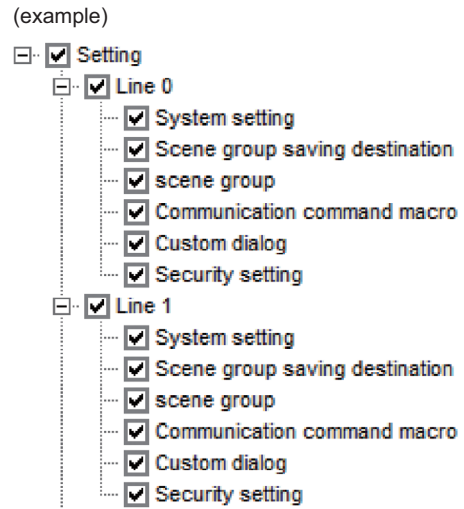
Describes the steps for creating a new template.

#### 1 Select a template.

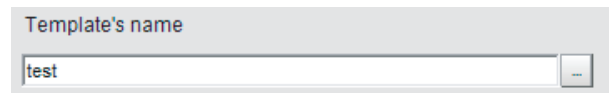


**2 Select the check box of the target data for back up.**

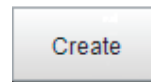
Clear the check box for settings you do not want to save.



**3 Enter the template's name.**

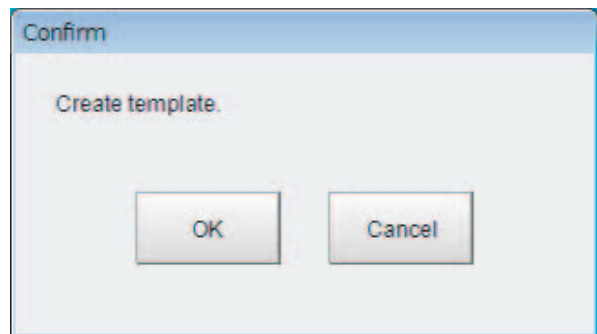


**4 Click [Create] button.**

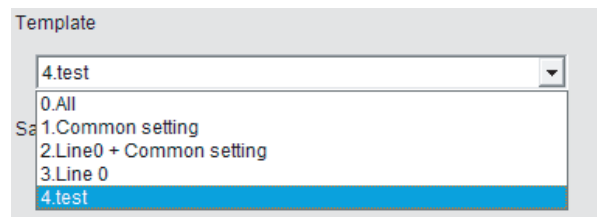


**5 [Confirm] dialog box is displayed.**

After confirming the setting data and template's name, click the [OK] button.



**6 A new template name will be created.**



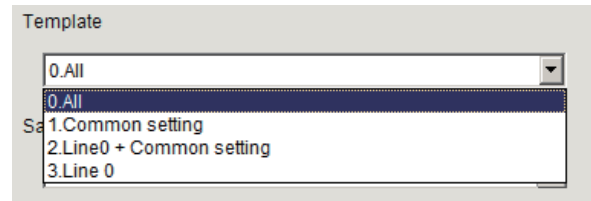
**Note**

- A template number is automatically assigned to a template in ascending order by creation time of the template. If a template is deleted, its assigned number will be re-assigned when a new template is created.
- It is possible to create multiple templates with the same name, however it is recommended to use different names.

## Updating a template

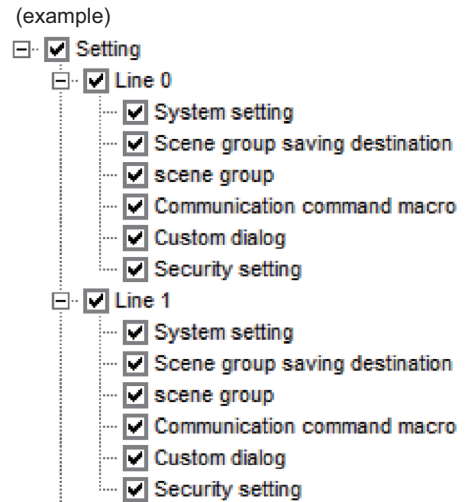
Describes the steps for creating a new template.

### 1 Select the template to update.



### 2 Select the check box of the target data for back up.

Clear the check box for settings you do not want to save.



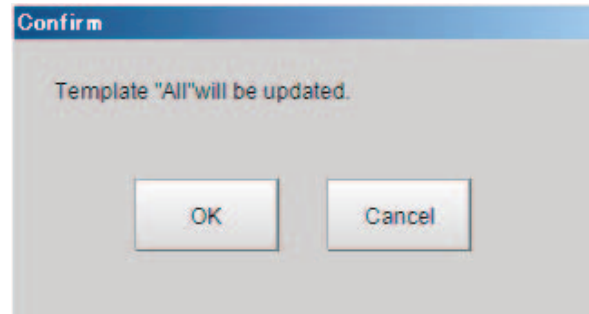
### 3 Click [Update] button.



### 4 [Confirm] dialog box is displayed.

After confirming the setting data, please click [OK] button.

A template is updated.



#### Note

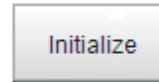
When [Update] button is clicked after the template name is changed, it's possible to change the template name.



### Initialize a template

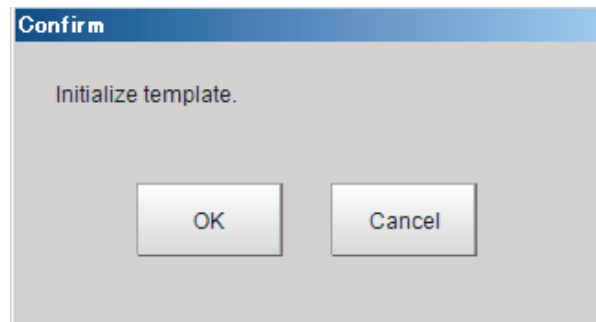
Describes the steps for creating a new template.

**1** Click [Initialize] button.



**2** [Confirm] dialog box is displayed.

Click [OK] button.

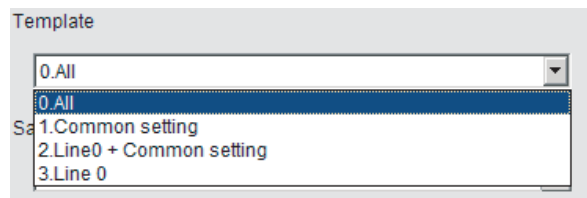


**3** The template settings revert to the factory default settings.

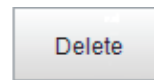
### Deleting a template

Describes the steps for creating a new template.

**1** Select the target template to delete.

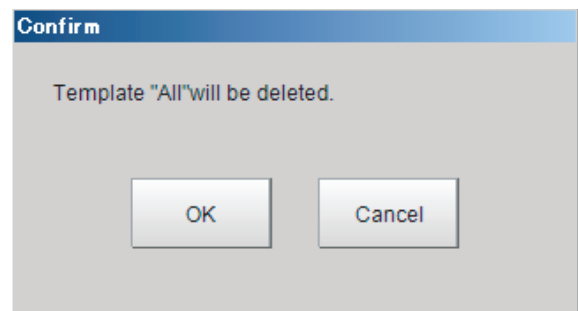


**2** Click [Delete] button.

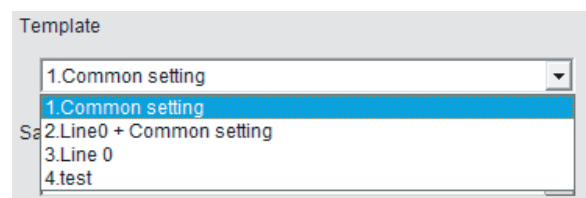


**3** [Confirm] dialog box is displayed.

After confirming, click [OK] button.



**4** The template is deleted.



Note

Even if a template is deleted, the template number isn't updated. When a template is deleted, and there is a space in the template number, the template number is assigned to an ascending order at the time of creation of a template and to fill a vacancy.

## Restoring settings with saved settings data

Saved settings for a sensor controller can be restored, or copied.

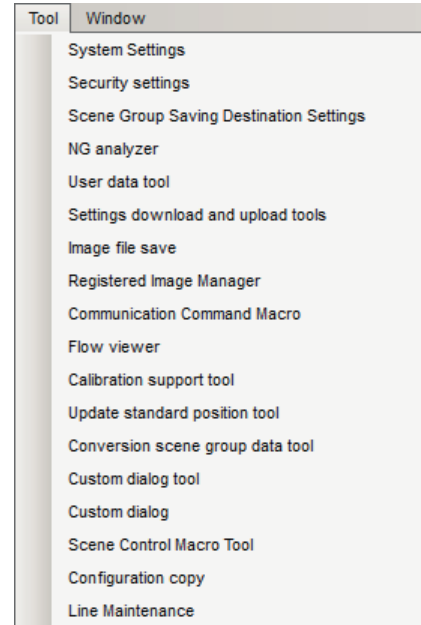
This section explains the procedures for loading a sensor controller project with the Configuration copy function.

### IMPORTANT

- Do not manually edit a file in a sensor controller project. Doing so will cause an error and the project will not be readable.
- Before loading a sensor controller's project, it is recommended to back up the setting of the Sensor Controller. If failure to load a sensor project occurs, the sensor controller does not return to its previous state.
- When connecting an external memory device to the sensor controller, make sure that it is the same device to which the sensor controller project was saved.

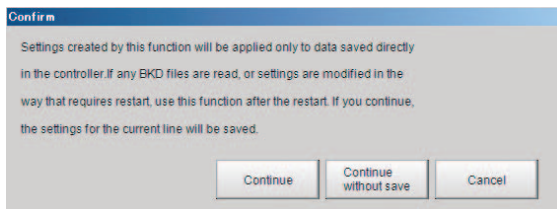
**1** Connect the External Memory device to the Sensor Controller.

**2** From the [Tool] menu, select [Configuration Copy].



**3** [Confirm] dialog box is displayed.

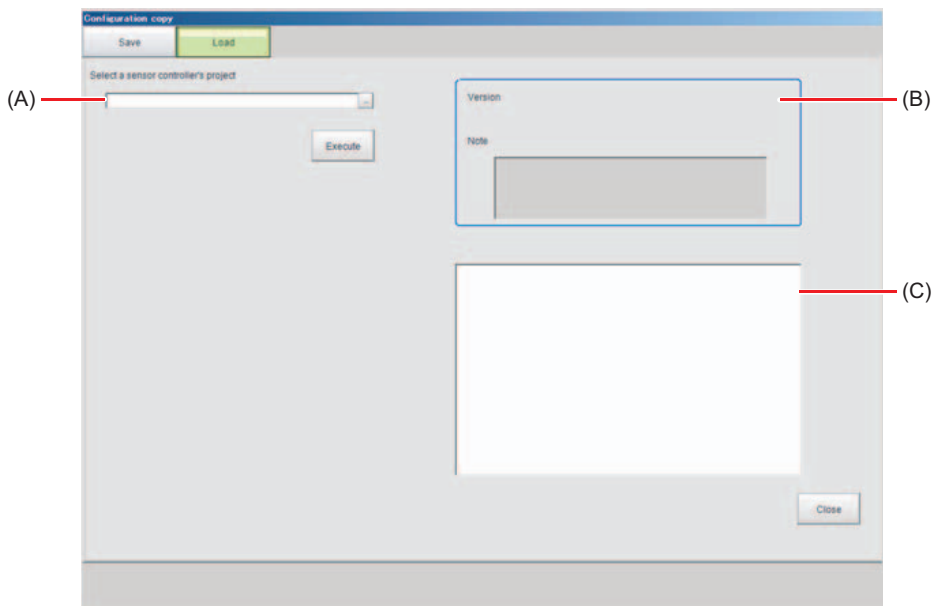
After confirming, please click [Continue] button. [Configuration copy tool] starts.



**4** Click [Load] tab.



## 5 Load screen is displayed.



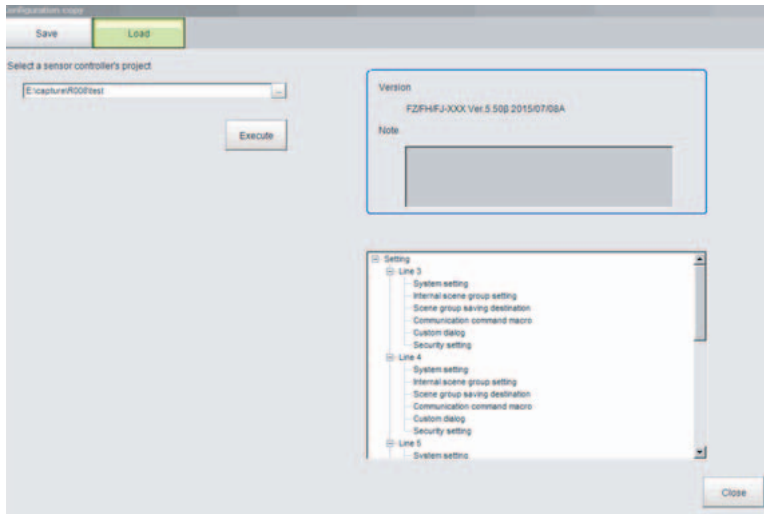
	Name	Set value [Factory default]	Description
A	Select a sensor controller's project	[Blank]	Select a sensor controller's project file to load to the Sensor Controller.
B	Information view	[Blank]	The information for the selected sensor controller's project is displayed. <ul style="list-style-type: none"> <li>• Version: The version of the sensor controller which saved sensor controller's project is displayed. Reference: ►Checking System Information [System Information] (p.295)</li> <li>• Description: The description of saved sensor controller's project is displayed.</li> </ul>
C	Tree structure area	---	A list of the setting of the sensor controller's project is displayed.

## 6 Select the sensor controller's project from [Select a sensor controller's project].

Select the Sensor Controller's project on the [Folder selecting] window with clicking [...] in [Select a sensor controller's project].

The version and note of the Sensor Controller of selected the sensor controller's project is displayed in the information view.

Selected Version information and Note are displayed in the information display label.



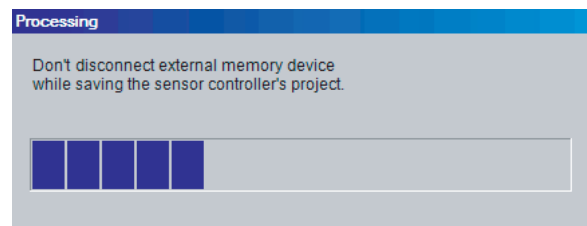
## 7 Click [Execute] button.

Starts to load the setting data including the selected sensor controller project in Step 6.

The following screen is displayed.

If an error occurs during this process, refer to below.

Reference: ► Troubleshooting (p.199).

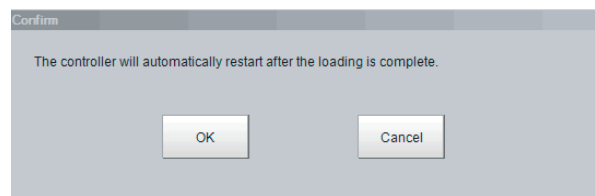


### IMPORTANT

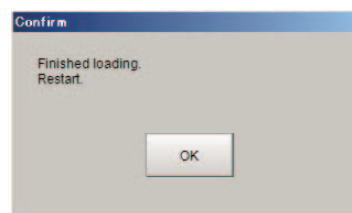
Do not turn off the power, or disconnect the external memory device during the loading of the sensor controller project. Doing so may cause damage to the external memory, or the sensor controller project.

## 8 The following confirmation dialog box is displayed when the loading is finished.

Restarting the Sensor Controller is required to apply the loaded settings



## 9 The following [Confirm] dialog is displayed. Click the [OK] button to restart the Sensor Controller.

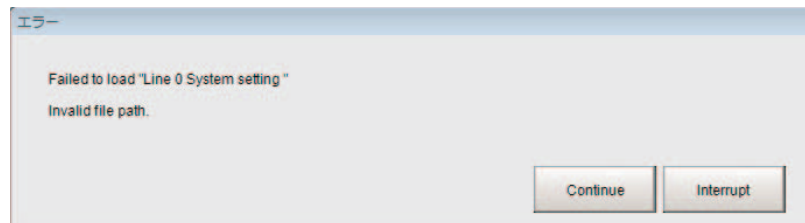


## Troubleshooting

This section explains possible error messages that may be displayed while using Configuration Copy, as well as possible solutions.

### Errors that may occur when loading.

During the loading of a sensor controller's project, the following error message is displayed.  
(example) Loading of settings data file failed.



### To continue the loading of the Sensor Controller's project

Click [Continue] button.

Loading of the sensor controller will continue, however, the settings data that caused the error message to display will not be applied.

### To cancel the loading of the sensor controller's project

Click [Cancel] button.

Loading of the sensor controller will stop. After stopping, you can refer to the troubleshooting list to find the possible cause and solution for the problem.

After that, initialize the sensor controller, and then reload the sensor controller's project.

## Troubleshooting list

message	Cause	Action
An error message occurred because the Sensor Controller's project cannot be saved.	Save destination is not set.	Set the save destination.
	Name of the Sensor Controller's project is not entered.	Enter the Sensor Controller project name.
	An empty capacity of the external memory is insufficient.	<ul style="list-style-type: none"> <li>• Change to external memory device with larger memory capacity.</li> <li>• Delete the unnecessary files.</li> </ul>
An error message is occurred because loading of the Sensor Controller's project failed. "File writing failed."	Insufficient free memory in Sensor Controller	Resave to the Sensor Controller after increasing free memory space by deleting Scenes, or Processing units, adjusting the measurement region of Processing unit, or registered model size.
	External memory is not plugged in.	Plug in the external memory.
	Sensor Controller's project files is corrupted.	<ul style="list-style-type: none"> <li>• Power was possibly turned off during last save operation.</li> <li>• Insufficient memory can occur due to increased memory requirement for current Operation mode.</li> </ul>
	Sensor Controller's project which saved via FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series is loaded via FZ5-L series/FZ5-600 series.	Save destination of Scene group can be differ if the created environment and loading environment are different. Set the save destination.
An error message is occurred because loading of the Sensor Controller's project failed. "File destination is not exist."	External memory is not plugged in.	Plug in the external memory.
	Drive name of external memory differs from the Sensor Controller project.	Set the save destination.
Change screen of the save destination setting for Scene grope is displayed.	Sensor Controller project saved via FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series.	Save destination of Scene grope can be differ if the created environment and loading environment are different. Set the save destination.
	Model type is different from saved Sensor Controller and loading one.	Save destination of Scene grope can be differ. Reset the save destination.
	Connected storage configuration differs.	

# Changing settings for each line in Multi-line Random-trigger mode (Line Maintenance)

This tool can be used in Line 0 in Multi-line random-trigger mode to copy line settings for one line to other lines. It can also clear settings.

This function is only for Multi-line Random trigger mode.

## IMPORTANT

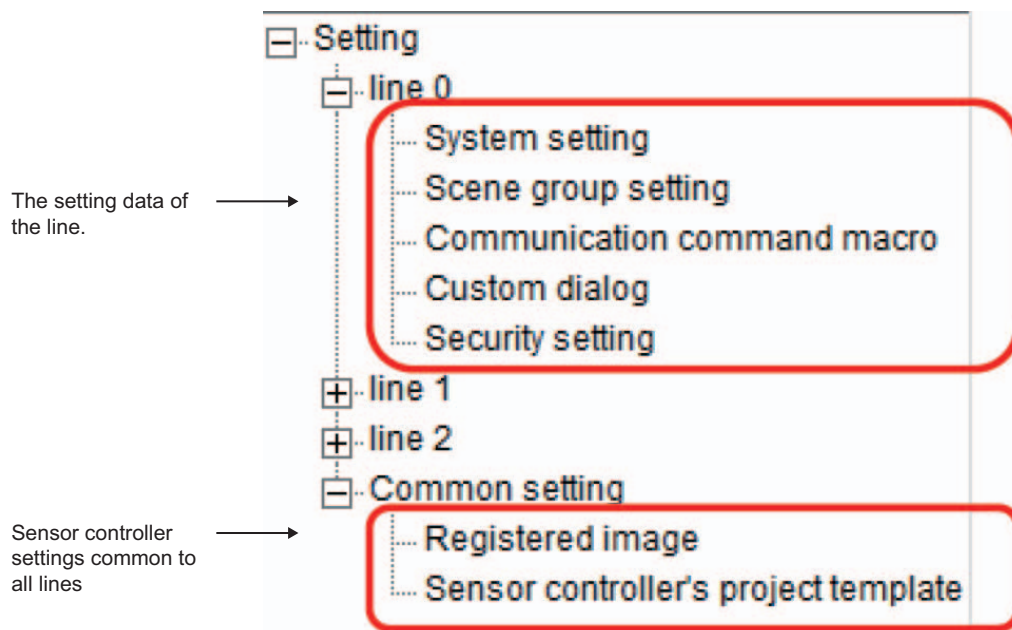
- Launch the Line Maintenance tool from Line 0. It cannot be launched from other lines (1-7).
- System setting data from line 0 can be copied to lines 1-7, but the opposite, copying System setting data from lines 1-7 to line 0 is not possible.

## Note

For copying, or clearing line-specific scene data, or scene group data, select Line Maintenance from the Function menu.  
Reference: ▶ Editing Scenes (p.70)

## Before use of Line Maintenance

There are two types of settings data that can be configured with the Line Maintenance tool, Line-specific settings data and sensor controller settings common to all lines. Line-specific settings data can be copied and cleared. Sensor Controller settings common to all lines can be cleared.



## Applicable Line Maintenance settings data

A detailed list of all settings data that can be copied, or cleared.

Type	Name	Definition
Line settings	System setting	System settings include the following. <ul style="list-style-type: none"> <li>• Menu contents of the System settings screen Reference: ► Changing the System Environment (p.233)</li> <li>• Layout information for layouts 0-8 Reference: ► Arranging Windows (p.85)<sup>*1</sup></li> <li>• User Data Reference: ► Sharing data within the controller (User data tool) (p.165)</li> </ul>
	Scene group	This setting is applied to the Scene group saved to the Sensor Controller or the external storage device. <sup>*2</sup> Scene group settings include the following All scene flow settings Scene control macro commands for all scenes. <ul style="list-style-type: none"> <li>• Flow Settings of all scenes.</li> <li>• Macro code of Scene Control Macro for all Scene.</li> <li>• Scene Control Macro data of all Scenes. Reference: ► <i>Components of the Setting Screen of the Communication Command Macro Tool and How to Configure Settings</i> in the <i>Vision System FH/FZ5 Series Macro Customize Functions Programming Manual</i> (Cat. No. Z367)</li> <li>• Image Container Window Settings of all scenes Reference: ► Arranging Windows (p.85)</li> <li>• Image Window Settings of all scenes. Reference: ► Arranging the Window Display (p.102)</li> </ul>
	Communication Command Macro	Applicable codes for Communication Command Macro. Reference: ► <i>Components of the Setting Screen of the Communication Command Macro Tool and How to Configure Settings</i> in the <i>Vision System FH/FZ5 Series Macro Customize Functions Programming Manual</i> (Cat. No. Z367)
	User dialogue	Applicable to all User dialogue settings Reference: ► Custom Dialog Tool (p.106)
	Security Settings	The following are the applicable security settings. <ul style="list-style-type: none"> <li>• All accounts</li> <li>• Layout restrictions</li> <li>• Operation restrictions</li> </ul> Reference: ► Saving/Loading/Deleting the Security Settings (p.151)
Sensor Controller settings data	Registered image	Applicable to images registered in the Registered image management tool. <sup>*3</sup> Reference: ► Managing images used for model registration and reference (Registered Image Manager) (p.172)
	Sensor controller's project template	Applicable to templates created in the Configuration Copy tool. Reference: ► Editing a template (p.192)

\*1: Excludes settings for the image container window. Image container window settings are included in the scene.

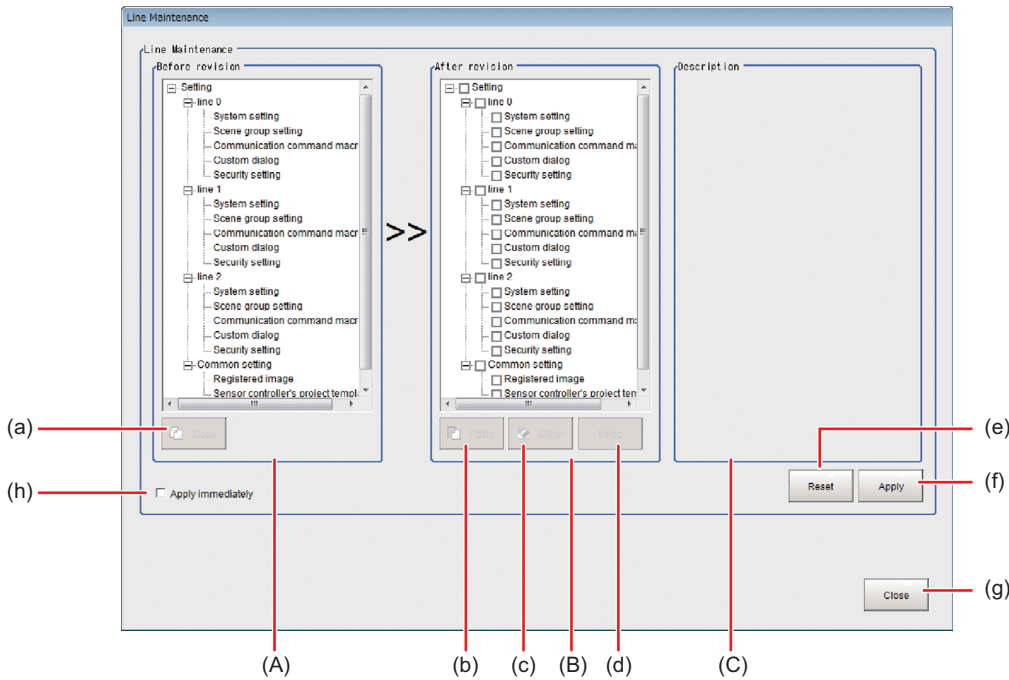
\*2: FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series:  
The file will be the same as that specified in the settings menu of the Scene Group Save Destination for external memory device.  
FZ5-L series/FZ5-600 series:  
Scene Group Save destination settings do not matter and it will be at least one Scene Group file in the USBDisk folder.

\*3: FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series:  
Save destination for the registered image will be:"E:\RegisteredImage".  
FZ5-L series/FZ5-600 series:  
Save destination will be "USBDisk:\RegisteredImage".



## Line Maintenance Screen Layout

A description of the Line Maintenance screen layout and settings.



**(A) Before revision area**

The area for selecting setting data to copy. Display line settings data for Multi-line random-trigger mode.

**(B) After revision area**

Selection area for settings data to Paste/Clear. The line settings data for the lines set in Multi-line random-trigger mode will display.

**(C) Description area**

The area where a description of the settings data is displayed. Clicking on the settings in either the Before revision area, or the After revision area will display the settings data.

**(h) [Apply immediately]**

There are some functional limitations when [Apply immediately] is selected. The timing of when copied, or cleared settings data gets reflected in the sensor controller settings varies.

Reference: ▶ Operating with Functional Limitations (p.211)

## Button functions

An explanation of sensor controller button functions.

Symbol	Buttons	Definition
(a)	Copy	The selected settings data in the Before revision area will be copied.
(b)	Paste (*1)	The settings data copied from the Before revision area will overwrite the settings data in the After revision area.
(c)	Clear (*1)	The selected settings data in the After revision area will be re-initialized, or deleted.
(d)	Undo (*2)	All operations of [Paste] and [Clear] in After revision area are canceled.
(e)	Reset (*2)	All operations executed in both the Before revision and After revision areas will be erased. The settings will be restored to the time when the Line maintenance tool was launched, or to the same as when the last Apply immediately operation was done.
(f)	Apply immediately (*2)	Copied, or cleared settings data will be applied immediately to the sensor controller. Will not revert to the system state prior to applying the setting change.
(g)	Close	This will close the Line Maintenance window. After the window is closed the sensor controller will automatically restart and the changes made with the Line Maintenance tool will be reflected.

\*1: If the [Apply immediately] box is not checked, the changes will not be reflected in the sensor controller settings until the [Apply] button is clicked.

If the [Apply immediately] box is checked, changes will be reflected in the sensor controller settings immediately after [Copy], or [Clear] are clicked.

\*2: If [Apply immediately] is checked, it can not be clicked.

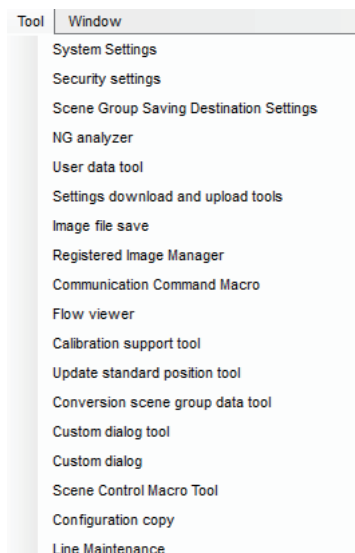
## Line Maintenance tool operations

Copies settings being used for one line to other lines. Also can clear settings for multiple lines. This explains the steps for using the Line Maintenance tool, from launching the tool to applying the results of Copy, or Clear operations to the sensor controller.

### Launching the Line Maintenance tool

This explains the steps for launching the Line Maintenance tool.

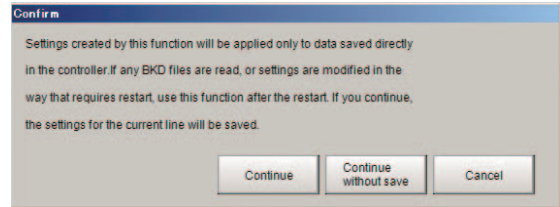
- 1 In the [Tool] menu, select [Line Maintenance].**



## 2 The Confirm screen is displayed.

Click [Continue].

- The current settings for Line 0 and common sensor controller settings will be saved to Sensor Controller memory and then the Line Maintenance tool will launch.
- If the applicable settings data for Lines 0-7 has already been saved to Sensor Controller memory, select [Continue without save]. The Line Maintenance tool will be launched.
- For Lines 0-7, if any BKD files are read, or setting modifications that require a restart are made, the line settings data selected for Copy will not be saved in sensor controller memory. In that case, you should select [Cancel] to close the tool and re-launch the Line Maintenance tool after using [Data save] in the Function menu. Refer to the information in IMPORTANT below for the steps to take after closing the tool.
- Do the following immediately after loading the BKD data.
  1. Restart the Sensor Controller without performing [Data save].
  2. Launch the Line Maintenance.
- Do the following immediately after changing [System setting].
  1. Click [Data save] each Lines.
  2. Restart the Sensor Controller.
  3. Launch the Line Maintenance.



### IMPORTANT

- Use [Data save] for each line prior to launching Line Maintenance tool. Settings data for lines which have not already had {Data save} performed can not be copied. The settings data for line 1-7 will not be saved to sensor controller memory if [Continue] is selected.
- After loading a BKD file (System setting + Scene group 0 data), do not save the data. Launch the Configuration copy function after restarting Sensor Controller without saving.
- After loading the change of system setting or INI file (system set data), save to the Sensor Controller, restart the Sensor Controller, and then launch the Configuration copy function.  
(Reference: ▶ Saving Image files to a RAMDisk, or External memory device (Image file save) (p.170))

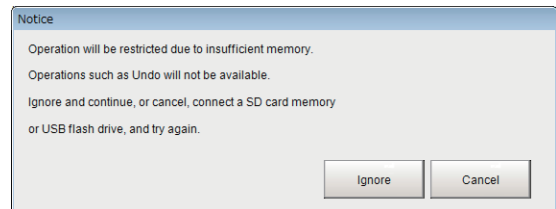
### Note

If you do not want to copy settings that have been modified, select [Continue without save]. The pre-modified settings data will be copied.

### 3 If there is insufficient sensor controller memory, the Caution screen will display.

If there is enough free memory, this screen will not display and you can proceed to Step 4.

Select [Cancel] and close the tool. Launch the Line Maintenance tool after connecting an external memory device (2 GB, or higher recommended).

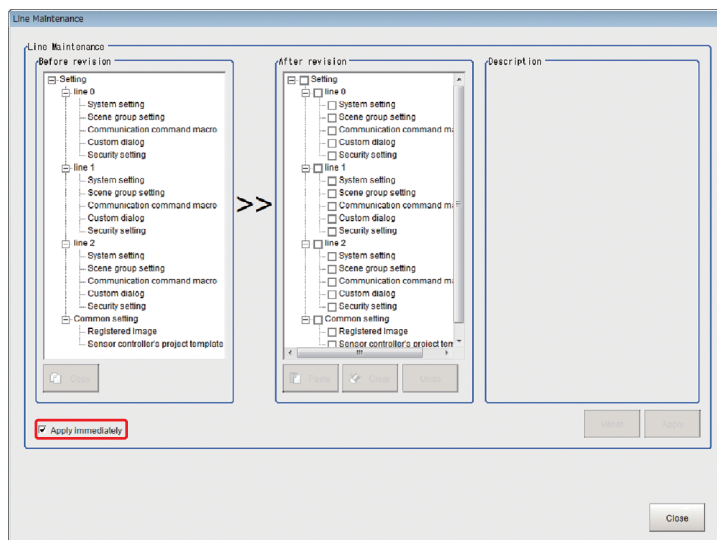


## IMPORTANT

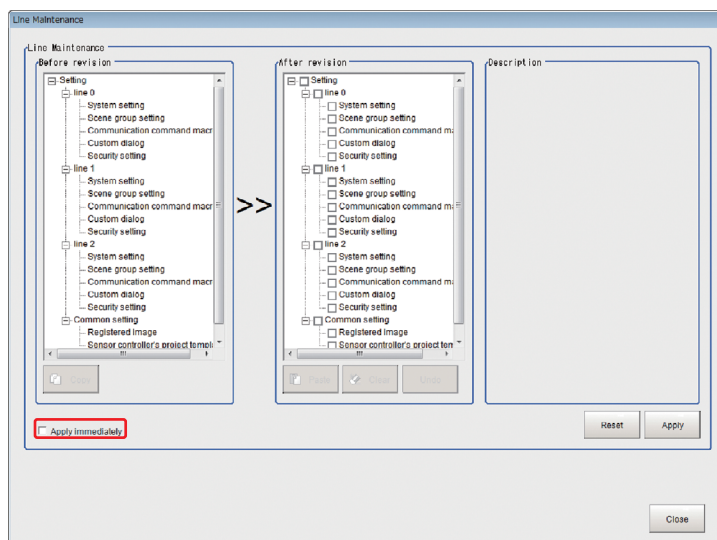
- When copying, or clearing settings data that requires higher memory capacity, some functions may be limited depending on the available sensor controller memory. It is recommended that the sensor controller be connected to an external memory device prior to launching the tool. (2 GB, or higher recommended)
- Do not disconnect the external memory device while using the Line Maintenance tool. Doing so could corrupt the external memory device, or cause the sensor controller to not operate normally.

If the [Ignore] button is selected, the Line Maintenance tool will be launched with the [Apply immediately] check box checked. this will cause some function limitations. Be careful when performing Clear, or Paste operations, as they will be applied immediately.

Reference: ▶ Operating with Functional Limitations (p.211)



### 4 Launch the Line Maintenance tool.

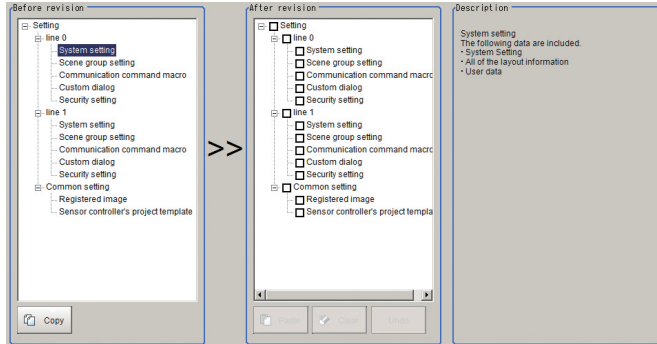


## Copy Setting data

This describes the steps for copying settings data. Settings data can be copied from one line and pasted in to another line.

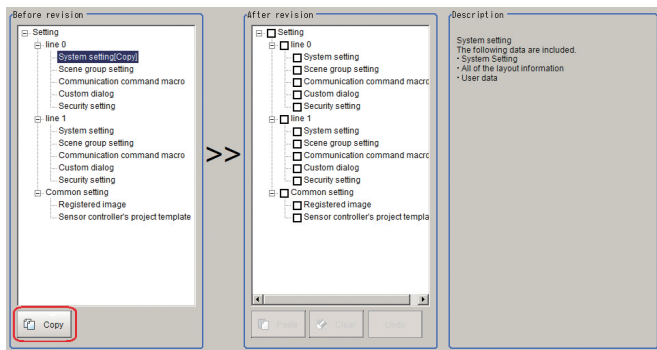
### 1 Select the setting data to copy in the Before revision area.

A description of the selected setting data will be displayed in the Description area.



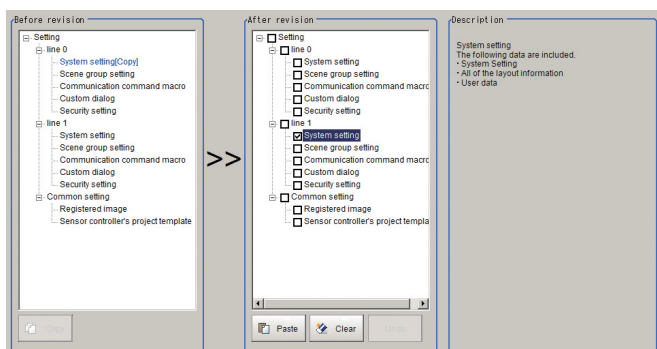
### 2 Select [Copy].

[Copy] will be appended to all the selected setting data. The font color will change to blue.



If a mistake is made in the setting copy selection, re-select the setting data to copy and click [Copy].

### 3 In the After revision area, the setting data to be pasted will have its check box checked.



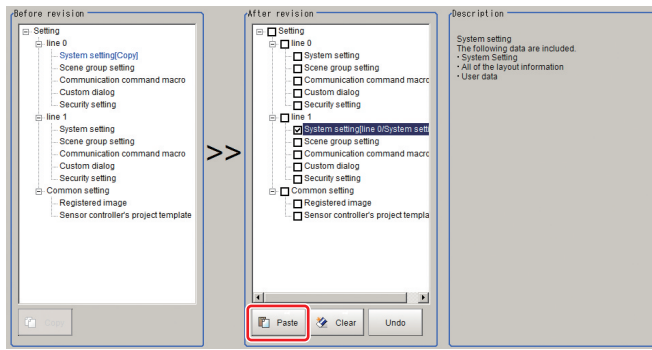
In the following situations, the [Paste] button will be grayed out and a paste operation will not be possible. Verify the setting data in the After revision area.

- If the setting data for the same line as the copy setting data is checked.
- If the checked setting data differs from the setting data selected for copy.

The check boxes for the selected setting data in the After revision area will be cleared.

Reference: ► Clearing setting data (p.209)

## 4 Click [Paste].



The font color of the checked setting data will change to blue.  
If the paste operation was done by mistake, click [Undo].  
The setting data will revert to the status described in Step 3.

## 5 To copy other setting data, repeat Step 1-4.

### Note

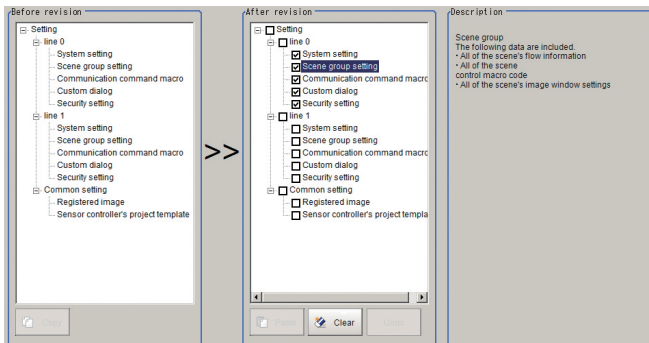
If there is insufficient memory in the sensor controller, the tool will be launched with [Apply immediately] checked.  
Reference: ▶ Launching the Line Maintenance tool (p.204)

## Clearing setting data

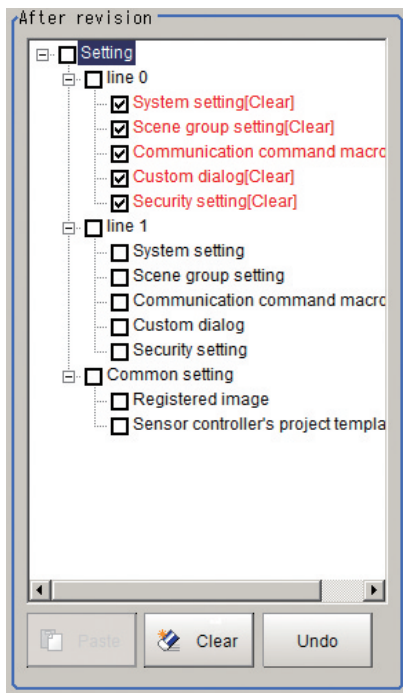
This describes the steps for clearing setting data. All types of setting data can be cleared.

### 1 In the Line Maintenance tool, select the setting data in the After revision area.

Multiple setting data can be selected.



### 2 After selecting the settings, click the [Clear] button.



The font color of the setting data that will be cleared will change to red.

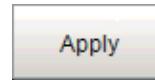
If setting data was cleared by mistake, click the [Undo] button. The setting data will revert to the status described in Step 1.



## Applying Copy/Clear Operations

This explains the steps for applying Copy/Clear operations on setting data to the sensor controller.

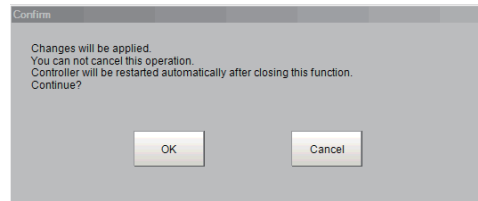
- 1 After a Copy/Clear operation on all setting data is complete, click the [Apply] button.



- 2 The following Confirm screen is displayed.

After confirming the After revision setting data is correct, click the [OK] button.

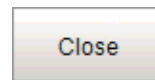
The setting data selected for Copy/Clear will be applied to the sensor controller. The applied settings can not be reverted to the previous state.



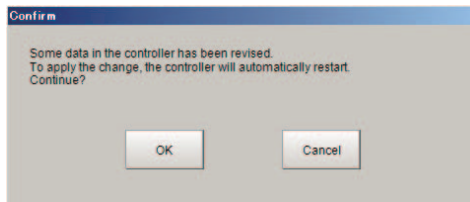
### IMPORTANT

- Setting data is being applied. Do not turn off power. Doing so may cause the sensor controller to not operate properly.
- Do not disconnect the external memory device while using the Line Maintenance tool. Doing so could corrupt the data in the external memory device, or cause the sensor controller to not operate properly.

- 3 Click [Close].

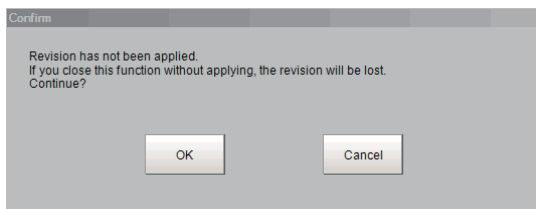


- 4 The following Confirm screen will display.



Click [OK]. The sensor controller will automatically restart.

- If, after a Copy/Clear operation is done and [Apply] is not selected, the following dialogue will be displayed when closing the tool.



- If the setting data selected for Copy/Clear has not been applied, click the [OK] button. The sensor controller will automatically restart.
- If the setting data selected for Copy/Clear has been applied, click the [Cancel] button. Return to Step 1 and click the [Apply] button.

### IMPORTANT

When copying system settings, verify the Communication settings for each line after restarting the sensor controller. Depending on the Communication settings selected, if Lines 0-7 have the same settings, the sensor controller may not be able to communicate with other devices.



## Operating with Functional Limitations

There are some functional limitations for the Line Maintenance tool when operating with [Apply immediately] checked. This is an explanation of the steps for operating the Line Maintenance tool with functional limitations.

### Steps for Operating with Functional Limitations

This describes the steps for operating with [Apply immediately] checked.

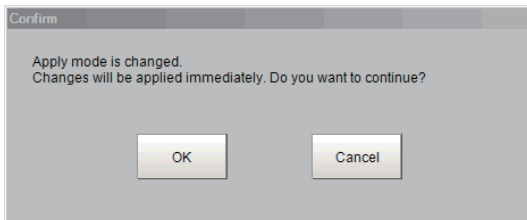
#### Note

If there is insufficient memory in the sensor controller, the tool will be launched with [Apply immediately] checked.  
Reference: ▶ Launching the Line Maintenance tool (p.204)

#### 1 With [Apply immediately] checked.



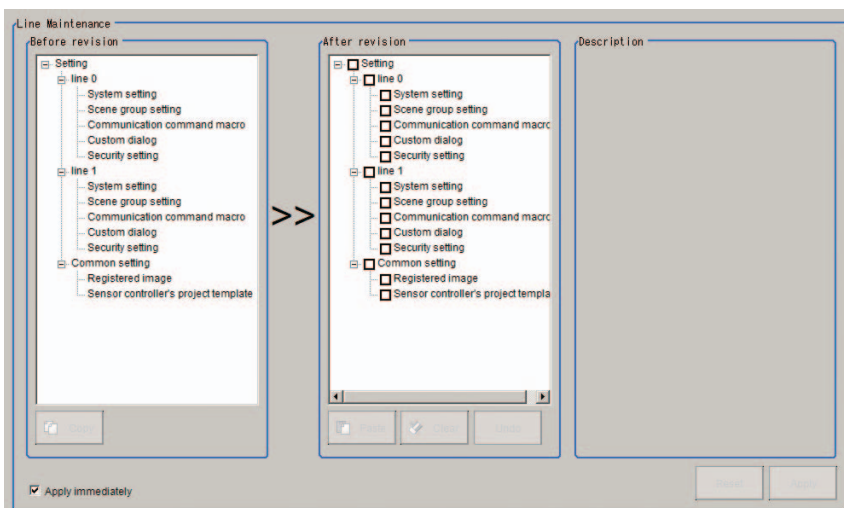
#### 2 The following Confirm dialogue screen will display.



After verifying the setting data in the After revision area is correct, click the [OK] button.

Prior to checking the check box for [Apply immediately], the setting data is applied to the sensor controller immediately by the Copy/Clear operation.

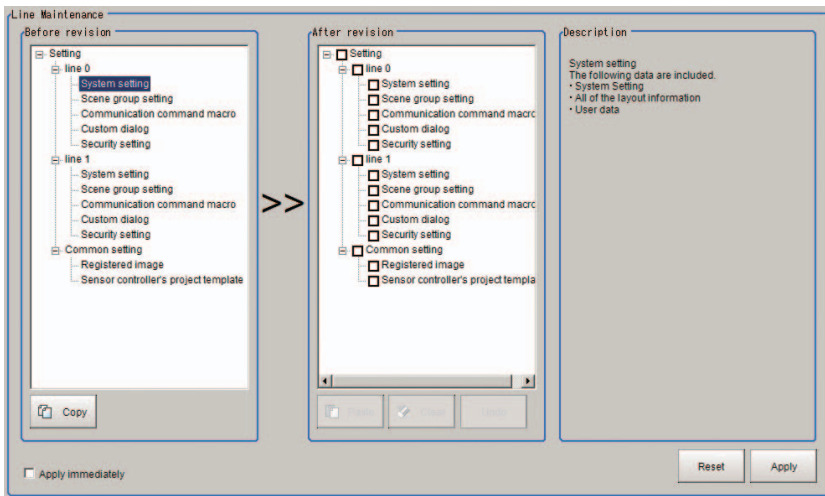
#### 3 The [Undo], [Reset] and [Apply] buttons will be grayed out.



## Using Copy with Functional Limitations

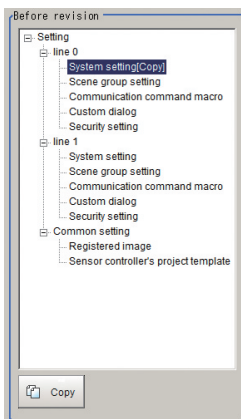
This explains the steps for copying setting data when [Apply immediately] is checked.

### 1 Click on the setting data in the Before revision area you want to copy.

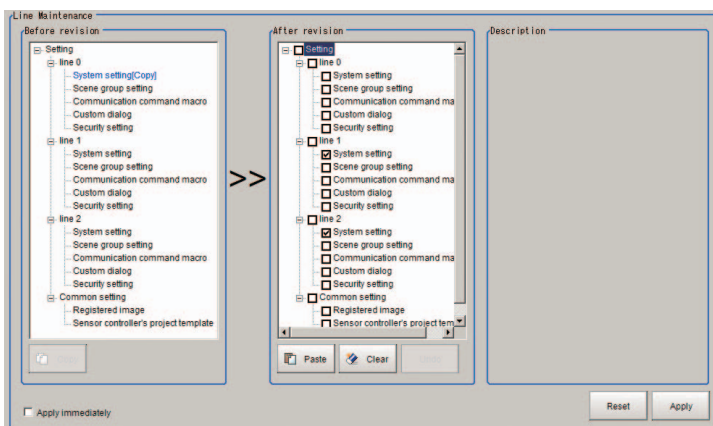


In the Description area, a description of the selected settings will be displayed.

### 2 Click [Copy]



### 3 In the After revision area check the settings that will be copied.

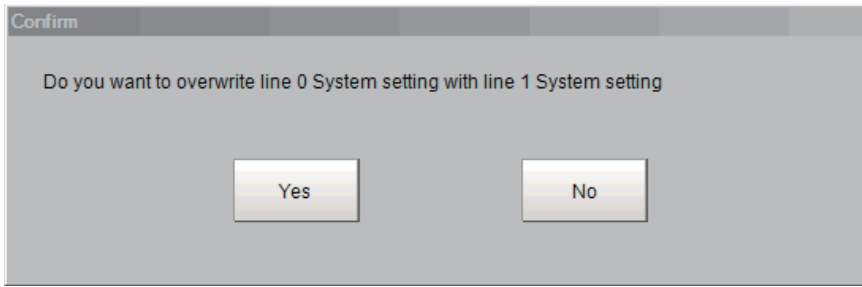


The [Paste] button will be grayed out in the following cases.

- If the same line as that selected for setting copy is checked.
- If the setting data type differs from that which is checked for Copy operation.

**4** Click the [Paste] button.

**5** The Confirm dialogue screen is displayed.



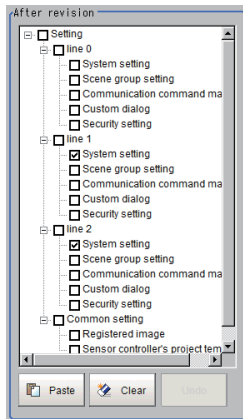
After verifying the setting data in the After revision area is correct, click the [Yes] button.

The selected setting data will be copied. Once the [Yes] button is clicked, the applied changes cannot be undone.

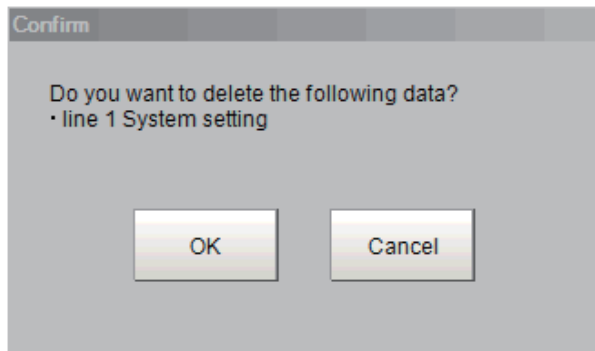
## Using Clear with Functional Limitations

This explains the steps for clearing setting data when [Apply immediately] is checked.

- 1 Select the setting data to clear in the After revision area. Multiple setting data can be selected.**



- 2 The following Confirm dialogue screen is displayed.**

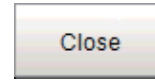


After verifying the selected setting data in the After revision area is correct, click the [OK] button. The selected setting data will be cleared. Once the [OK] button is clicked, the applied changes cannot be undone.

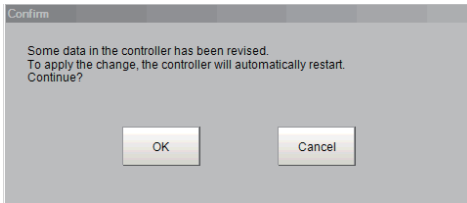
## Applying Copy/Clear changes with Functional Limitations

After the Line Maintenance tool is closed, the sensor controller will restart and the setting changes will be applied. This will describe the steps for closing the Line Maintenance tool.

**1** Click [Close].



**2** The following Confirm dialogue screen will display.



After verifying that the copied/cleared setting data is correct, click the [OK] button. The sensor controller will automatically restart.

### IMPORTANT

When copying system settings, verify the Communication settings for each line after restarting the sensor controller.

## Troubleshooting

A list of some common errors that may occur when using the Line Maintenance tool.

Problem	Cause	Action
An error message displays after clicking the [Apply] button. Failed to apply changes. Failed to access file due to insufficient memory.	The external memory device is not connected.	<ul style="list-style-type: none"> <li>Connect an external memory device</li> <li>Use the Copy/Clear function after checking [Apply immediately]</li> </ul>
	There is insufficient free memory available in the external memory device.	<ul style="list-style-type: none"> <li>Re-connect an external memory device with more memory capacity.</li> <li>Delete un-needed files in the external memory device to free up space.</li> <li>Disconnect the external memory device and use the Copy/Clear function after checking [Apply immediately].</li> </ul>

# Remotely operating the controller (Remote Operation)

## Overview

You can remotely edit the processing items that are performed by the Controller or remotely perform actual measurements on the Controller from a network computer. This function is enabled only with Ethernet connection. The Remote Operation Tool software (FZ\_FH\_FJ Remote Operation tool) is included in the FZ\_FH\_FJ Simulation Tool CD-ROM. To purchase the CD-ROM contact your sales representative.

### IMPORTANT

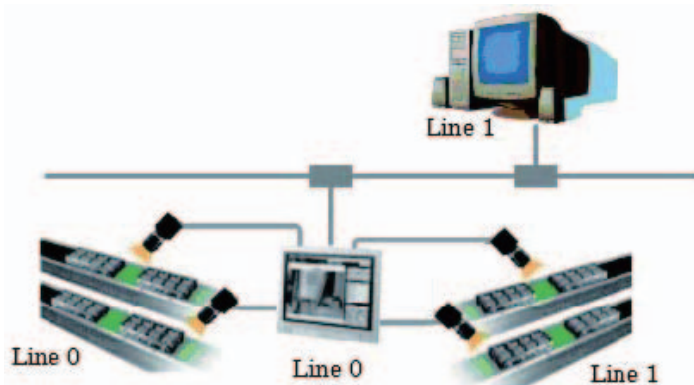
A Controller window cannot be operated or displayed simultaneously on multiple PCs on the network.

For example, the function can be used as follows.

- (1) GUI operations, such as editing multiple inspection and measurement line processing items and changing the settings, can be performed by a single dedicated PC.



- (2) Two measurement windows in Multi-line Random Trigger Mode can each be operated from a different window.



- (3) In the non-stop adjustment mode, adjustments can be made remotely without having to stop the line measurement.



Note that the physical storage location of the data, such as the set data and the data save location, is on the Controller side.

## Operation Environment Condition

The following is required on both the Controller and on the remote operation PC to start the remote operation.

- **Controller side = Set up a server to achieve the remote operation.**
- **Remote operation PC side = Prepare a communications environment and a GUI environment for remote operation.**

Installs the FZ\_FH\_FJ Simulation Tool to the PC to be used for remote operation. The FZ\_FH\_FJ Remote Operation Tool will also be installed at the same time.

### IMPORTANT

Make sure that the Simulation software installed on the remote operation PC is of the same version as that on the Controller.

## Environment Settings on the Remote Operation PC

The recommended operating conditions for the remote operation PC are as follows:

<b>CPU</b>	Intel Pentium Processor (SSE2 or higher)
<b>OS</b>	Windows 7 Professional (32/64bit) or Enterprise (32/64bit) or Ultimate (32/64bit), Windows 8 Pro (32/64bit) or Enterprise (32/64bit), Windows 8.1 Pro (32/64bit) or Enterprise (32/64bit)
<b>Memory</b>	2 GB (3 GB or higher recommended)
<b>Hard disk free capacity</b>	2 GB or higher
<b>Display window</b>	Resolution 1,024 x 768 dots or higher Display color True Color (32 bits)
<b>Network</b>	10Base-T compatible network (100Base-TX recommended)
<b>Optical drive</b>	CD/DVD drive

To use the remote operation software, Microsoft .NET Framework 3.5 must be installed. This CD-ROM contains the Microsoft .NET Framework 3.5 installer. Please use as required.

### IMPORTANT

For remote operation, use the following ports on the PC to communicate with the Sensor Controller.

- 9900 + Line number (e.g., port 9900 for line 0)
- 9910 + Line number (e.g., port 9910 for line 0)
- 9920 + Line number (e.g., port 9920 for line 0)
- Line Numbers: FH: 0 to 7, FZ5: 0 or 1

If you cannot use these ports due to security settings of your PC or the domain security policies, you will not be able to perform remote operation.

Either change the settings of the PC firewall or security software or contact your domain security administrator.

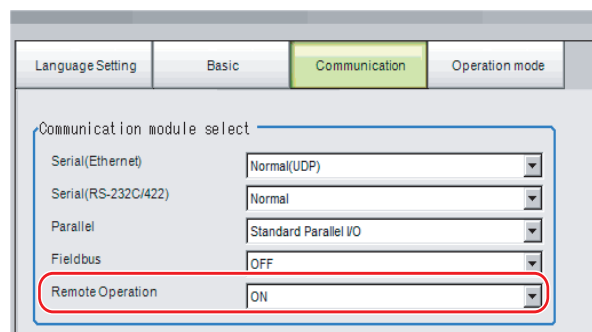
## Set the network

Specify the network settings on both the Controller and the remote operation PC.

In the Communications Module, specify the module by serial (Ethernet) and enter the IP address.

### 1 Set the Communications Module.

In the Main Window, select [System settings] – [Startup] – [Startup settings] from the [Tool] menu, and then select [ON] for Remote Operation in the Communications Module Area.

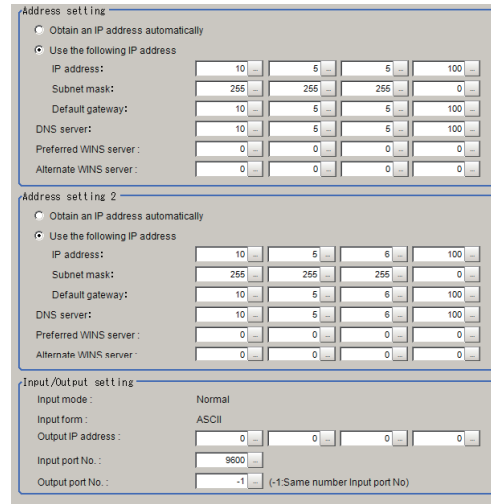


**2** Click the [Data save] button to save the settings, and then restart the Controller.

**3** Set the IP address.

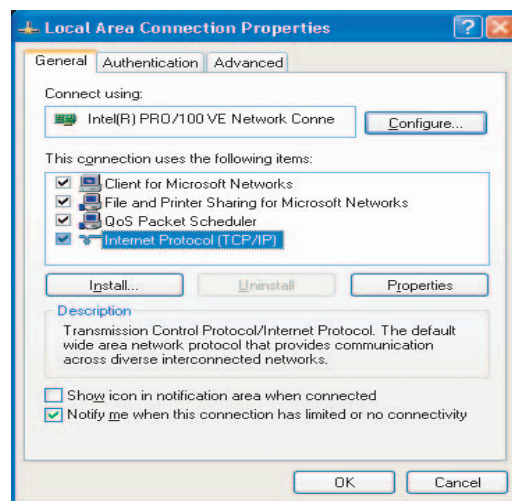
In the Main Window, select [System settings] – [Communications] – [Ethernet (\*\*\*\*\*)] from the [Tool] menu, and then set the IP address.

\*1: The “(\*\*\*\*\*)” shows the [Serial (Ethernet)] setting that was set in [Communications] in step 1 above.

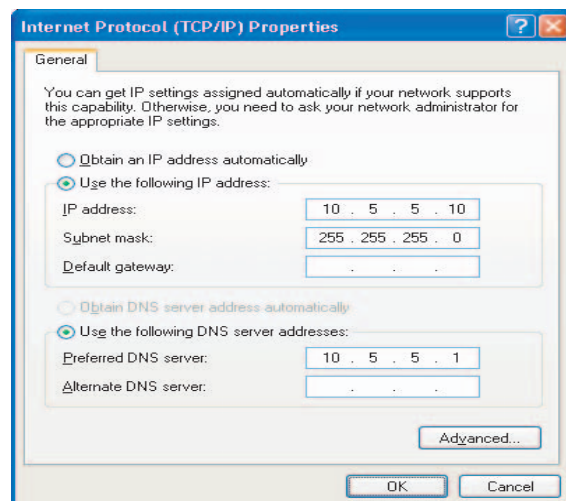


Next, specify the IP address of the remote operation PC.

Open the local area connection properties on the remote operation PC.



Enter the IP address.





## How to Start

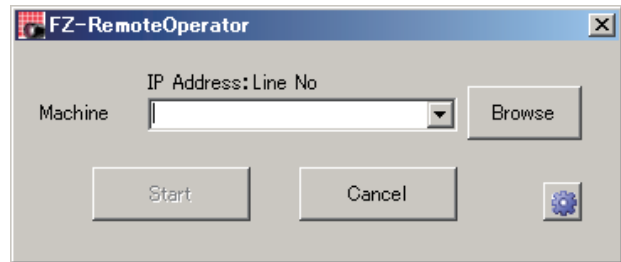
- 1 From the Start button located in the lower left area of the window of the remote operation PC, select [Start] – [All Programs] – [OMRON] – [FZ\_FH Simulator] and then select and launch [FZ\_FH Remote Operation Tool].

Note that a window that can be measured must be displayed on the Sensor Controller.

### IMPORTANT

Do not connect or disconnect [FZ\_FH Remote Operation Tool] when a measurement is being performed or the system is running.

- 2 In the dialog box displayed by [FH-RemoteOperator], select or directly enter the IP address and the "Line No" of the Controller to be connected. Press [Browse] to find the IP address and the line number of the Controller that can be connected.




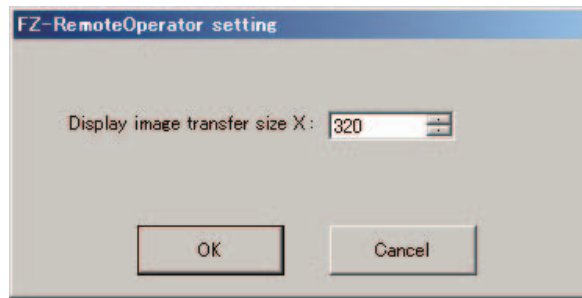
\* The "Line No" selected here is one of the following based on the system's operation mode.

Operation mode		Setting
Standard		Line No = 0
Double Speed Multi-input		Line No = 0
Non-stop adjustment	Measurement window	Line No = 0
	Non-stop adjustment window	Line No = 1
Multi-line random trigger*1	Line 0 side	Line No = 0
	Line 1 side	Line No = 1
	Line 2 side	Line No = 2
	Line 3 side	Line No = 3
	Line 4 side	Line No = 4
	Line 5 side	Line No = 5
	Line 6 side	Line No = 6
	Line 7 side	Line No = 7

The Sensor Controller cannot be connected if a line number other than above is specified.

\*1: The FZ5-1100 series Sensor Controller always has two lines (lines 0 and 1), and the FH series Sensor Controller allows you to select as many as eight lines. Set the line numbers based on the number of lines that are set for the Sensor Controller.

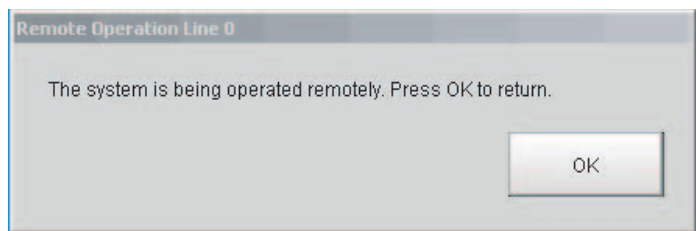
- 3** As necessary, change the size of the image to transfer for the remote operation. Select (  ) to set.



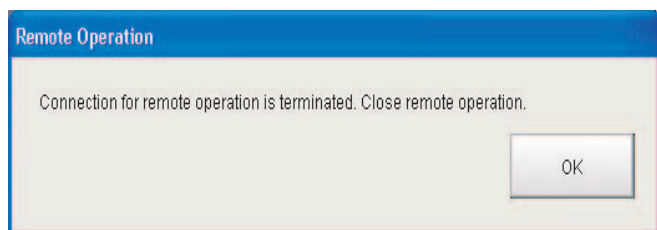
Description	Set value [Factory default]	Description
Display image transfer size (Size of the image to transfer)	4 to 640 [320]	This sets the size of the image to display on the remote operation window.

- 4** Click [Start]. Remote Operation time message will be displayed at the start of Remote operation.

You cannot operate the Sensor Controller when this message is displayed. Clicking [OK], you can operate the Sensor Controller.



A message saying the connection for Remote Operation is terminated will be displayed on the Remote operation PC window.

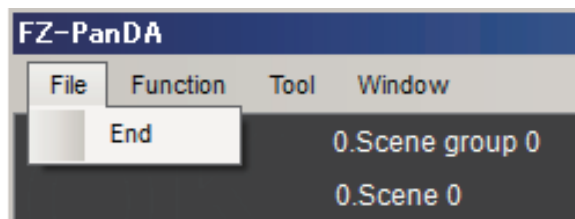


**Note**

- Entering password of security setting item is required on the Remote operation window when you set the setting on the connected Sensor Controller.

- 5** To finish the Remote operation on the Remote operation PC, click [End] in the FZ\_FH Remote Operation Tool.

A window running the Remote operation on the Sensor Controller window will be closed.



**IMPORTANT**

The above procedures are important when completing the operation of the [FZ\_FH Remote Operation Tool]. Not following those procedures may cause the task manager on the Remote PC to force a shutdown of the Remote operation, which may in turn cause the Sensor Controller to not operate normally.

Note

When either the remote operation PC or the sensor controller is changed to Layout 8 by layout switching, operation on the sensor controller will be possible during remote operation. Note the following when using this feature:

- Switch either the remote operation PC or the sensor controller to Layout 8 with layout switching, not both. If the layouts of both are changed to Layout 8, operation on the sensor controller will not be possible during remote operation and only normal remote operation can be executed.
- The layout can be changed to Layout 8 during remote operation. After changing to Layout 8 on the remote operation PC, close the remotely operated dialog box on the sensor controller. Operation on the sensor controller will be possible while remote operation continues. To exit remote operation from this state, exit the FZ\_FH Remote Operation Tool on the remote operation PC.
- In Layout 8, an error dialog is not shown when an error occurs and instead an error string appears in the Error Pane. If an error occurs, check the error in the Error Pane.
- In Layout 8, only the panes below can be used in Layout Modification Mode. To use panes other than these, use a layout other than Layout 8 and execute normal remote operation.
  - Flow Display Pane
  - Image Pane
  - Judgment Pane
  - Error Pane

## Differences from Local Operation and Limitations

There is no fundamental difference between local operation on the Sensor Controller and a remote operation. The remote operation PC windows, however, are not the windows of the Sensor Controller themselves, and thus, the following types of operational differences can be caused.

Major differences are listed as follows:

Functions to be noted	Description	
	Sensor Controller side	Remote operation PC side
Controller restart	Automatically restart	The Controller automatically restarts, while the remote operation PC waits to be shut down manually.
Operation mode	All modes can be executed.	All Operation Mode are applicable except Double Speed Multi-input.
Screen capture	Sensor controller screen capture possible.	Controller screen capture is possible by remote operation.
Date-time setting	The system date and time on the controller are changed.	The system date and time on the remote operation PC are changed.
Image display	Displays the camera images and figures, etc.	Displays the camera images and figures, etc. with low pixels.
Unit Macro Unit Calculation Macro Scene Group Saving Destination Settings Communication Command Macro Custom dialog tool Configuration copy Line Maintenance	Usable	Not Usable
Number of Image Panes	24 max. (Image Pane numbers 0 to 23)	16 max.
Layout change	Changes in layout settings will be reflected to the actual layout after the layout switches.	Changes in layouts settings will be reflected to the actual layout immediately after finalizing the layouts edit. The displays on the Sensor Controller side and the remote operation PC side will not be consistent before the layout switch is performed on the sensor controller.

### IMPORTANT

- The remote recovery dialog box may be hidden behind a window in the non-stop adjustment mode and the multi-line random trigger mode, both of which contain two windows. Press [Alt+Tab] to switch between the windows.
- The remote operation communications will be disconnected if a network setting (such as the IP address, subnet mask, and default gateway) on the Sensor Controller is modified using the remote operation function. Restart FZ\_FH Remote Operation Tool to establish the connection again. The connection may fail immediately after a network setting has been changed. Please wait for a while before reconnecting.

# Saving Data to the FH series/FZ5 series

This section explains the methods for saving and loading settings and image data.

<b>Saving Data to the FH series/FZ5 series .....</b>	<b>224</b>
<b>Saving Settings Data to the Flash Memory and Restarting.....</b>	<b>227</b>
<b>Saving Settings Data to the Controller RAMDisk or an External Memory Device.....</b>	<b>228</b>
<b>Saving Logged Images in the Controller Memory (RAM) to a RAMDisk or an External Memory Device ...</b>	<b>229</b>
<b>Copying or Moving Files between the Controller RAMDisk and an External Memory Device .....</b>	<b>230</b>
<b>Loading Settings Data from the Controller RAMDisk or an External Memory Device to the Sensor Controller.....</b>	<b>231</b>

# Saving Data to the FH series/FZ5 series

This section describes how to save and load setting data and logged image data.

## About Saving Areas

The following saving areas can be used with the Sensor Controller.

Saving area		Description	Save operation
Controller	Flash memory in the Controller	The settings data (system data, scene data, and scene group data) is saved to this area when you click the [Data save] button. Data is held even after the power supply is turned OFF. When you restart the Controller, the Controller loads and enables the settings data in the flash memory.	[Function] – [Data save] or the [Data save] button
	Controller memory (RAM)	This is the area where images are temporarily stored when logging images using the logging function. This memory is a ring memory. Images will be overwritten starting with the oldest image if the maximum number of save images is exceeded.	
	RAM disk in the Controller	<ul style="list-style-type: none"> <li>You can use this memory as a temporary file save destination.</li> <li>The data is cleared when you turn OFF the power supply to the Controller. As this is memory inside the Controller, files can be saved and read faster than when using external memory.</li> <li>The RAMDisk memory is as follows. <ul style="list-style-type: none"> <li>FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series: 256MB</li> <li>FZ5-L series/FZ5-600 series: 40MB</li> </ul> </li> <li>The RAMDisk data can be sent to or received from external devices using FTP.</li> </ul>	[Function] – [Save to file] or [Function] – [Screen capture]
External memory	USB flash drive	This memory is used to back up setting data as a precaution, to copy setting data to another Controller, and to load data to a computer.	
	SD memory card (FH series only)		
	Shared folder on a computer connected to the network		

The following table shows the data that is retained or cleared and the data that is saved when the power supply is turned OFF.

Saving area		At power OFF	Target data				
			Settings data (system data, scene data, and scene group data)	Logged images	Last input image and last NG image	Logged data (measurement data)	Capture image
Sensor Controller	Flash memory of the Controller	Retained	OK	---	---	---	---
	Controller memory (RAM)	Cleared	---	OK <sup>*1</sup>			
	RAM disk	Cleared					
External memory	USB flash drive	Retained	OK	OK <sup>*2</sup>	OK	OK	OK
	SD Memory Card						
	Shared folder on a computer connected to the network						

\*1: If images are being logged by the system, select [Other] – [Logging setting] under the System Settings and set the destination for logged images to [Save to memory].

\*2: If images are being logged by the system, select [Other] – [Logging setting] under the System Settings and set the destination for logged images to [Save to memory + file].

## IMPORTANT

**During data transfer, do not turn OFF the power supply.**

- When a message indicating that processing such as saving or loading is in progress is displayed, do not restart the Controller or turn OFF the power supply. Data will be corrupted and the system will not work properly at the next startup.
- Do not remove external memory devices while data is being saved or loaded. The operation of the Controller may corrupt the data or external memory.
- Do not change the file name extension of saved files. If you change the extension, the file cannot be loaded as setting data. In addition, if setting data in which the extension was changed is loaded, the system may not work properly later.
- Depending on the settings, saving may fail due to insufficient external memory space. If saving fails and the error message "Please check" appears, check to see if there is unnecessary data in the external memory and save the data after the unnecessary data has been deleted.
- The file system supported by USB flash drive or SD memory card differ by the Sensor Controller. Format USB flash drive or SD memory card according to the Sensor Controller series.

Sensor Controller	FAT32	NTFS	exFAT
FH series/FZ5-800 series/ FZ5-1200 series	OK	OK	OK
FZ5-1100 series	OK	OK	---
FZ5-L series/FZ5-600 series	OK	---	---

## External Drive Names

### ● Drive Names for USB Devices

Sensor Controller has two or four USB connectors. If more than one USB flash drive is inserted, specify the USB flash drive that is to be the destination.

- FZ5-L series/FZ5-600 series

The drive names of USB flash drives are USBDisk, USBDisk2, USBDisk3 and USBDisk4 according to the sequence in which devices are inserted into the Controller.

If the Controller, however, is started with more than one USB flash drive inserted, drive names will be assigned based on the ports in which the USB flash drives are inserted. Depending on the Controller type, USB flash drives are recognized and drive name are assigned using the following sequence.

- **Controller with Integrated Panel**

1: Left side on the front - 2: Right side on the front - 3: Front on the side - 4: Back on the side

- **Box-type Controller**

1: Lower left on the front - 2: Lower right on the front - 3: Upper left on the front - 4: Upper right on the front

- FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series

USB devices are assigned as drives E:\, F:\, G:\ and H:\ in the order in which they are inserted.

### ● Drive Name of SD Memory Card

When FH series Sensor Controller is used, "M:\" is assigned as a fixed drive.

## IMPORTANT

### Box-type Controllers

If USB flash drives are separately connected to adjacent USB connectors, the contact between USB flash drives may possibly lead to failure or damage.

### USB hub

When connect the USB flash drive using USB hub, the drive name can be differ as a previous saved. If you want fixed name, directly connect the USB port without USB hub.

## Using External Memory Devices (FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series only)

Use the following procedure to remove the external memory device.

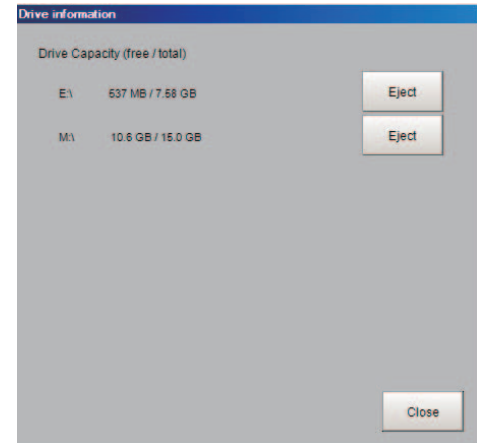
**1 In the Main Window, select [System information] from the [Function] menu.**

The system information is displayed.

**2 Click [Drive information].**

Each drive information is displayed.

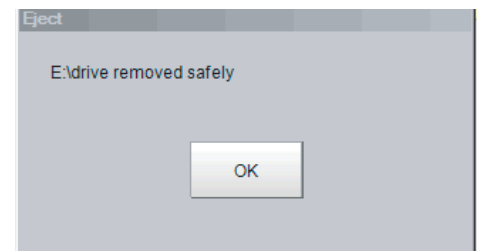
If an external memory device is inserted, the [Eject] button is displayed.



**3 To remove the external memory device, click the [Eject] button.**

**When the External Memory Device Can Be Removed**

If the removal failed, wait until the external memory device is no longer being accessed and then try removing the device again.



**IMPORTANT**

Never try to remove the external memory device while the external memory is being accessed. A critical failure may occur.

## Shared folder on a computer connected to the network

You can setup a network drive in the system settings. This allows the Sensor Controller to handle the hard drive on a computer that is connected to the local area network as an external memory device.

Reference: ► Network drive setting [Other] (p.291)



# Saving Settings Data to the Flash Memory and Restarting

This section describes the procedure to save settings data (system data, scene data, and scene group data) in the flash memory of the Sensor Controller. Make sure to save setting data when settings have been changed. Every time you restart the Sensor Controller, the data in the memory is loaded and enabled.

## IMPORTANT

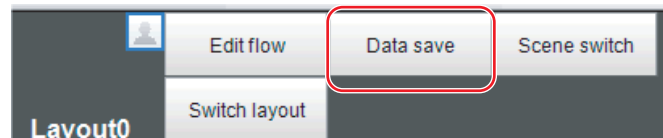
- If [Save to file] is performed for [System + scene group 0 data], the data being saved will also be saved to the Controller's flash memory at the same time. Do not turn OFF the power supply during this process. The Controller may not start up properly the next time it is turned ON.
- During data transfer to external memory, do not remove the external memory device until the transfer is completed. Data and the external memory may be corrupted.

### 1 For FZ5-L series/FZ5-600 series:

The system data and Scene group 0 data are saved to the Controller's flash memory and Scene groups 1 to 31 data is saved to the external memory.

### 2 Click [Save to file] on the toolbar in the Main Window.

A confirmation message is displayed.



### 3 Click [OK].

For FZ5-L series/FZ5-600 series:

The system data and Scene group 0 data are saved to the Controller's flash memory.

Scene groups 1 to 31 data is saved to the external memory.

(FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series: All data is saved in the flash memory in the Controller by default.)

If you connect more than one the external memory to the Controller, confirm in the File Explorer window that the external memory you wish to save the Scene group data to is recognized as a drive.

Reference: ► External Drive Names (p.225)

#### Note

If an external memory device is not inserted, a confirmation message is displayed.

If [OK] is clicked, only system data and data from scene group 0 are saved in the Controller's flash memory.

# Saving Settings Data to the Controller RAMDisk or an External Memory Device

Setting data files are saved to the RAMDisk or to an external memory device. The following table lists the data that can be saved.

Data	Description
System data (*.ini)	Indicates the shared setting data, i.e. [System] menu.
Scene data (*.scn)	Indicates each setting data, i.e. unit setting value, Scene order, layout or size of Image Pane.
Scene group data (*.sgp)	Indicates data including 128 Scene.
System + Scene group 0 data (*.bkd)	Indicates both system data and Scene group 0 data.

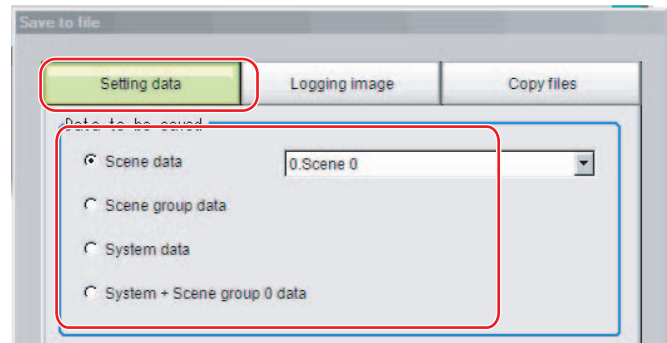
## IMPORTANT

- Do not try to restart, turn OFF the power source, or remove the external memory during saving data. Data may be corrupted and will not be performed correctly next launching. In particular, when the target data of [Data save] is System + Scene group 0 as it is saved to the flash memory of Sensor Controller simultaneously.
- Forward compatibility is supported for the setting data. Backward compatibility is not guaranteed.

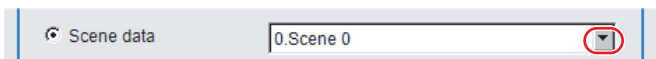
## Note

When [Save to file] is executed, the data to save is also saved in the Controller (except scene group data 1 to 31).

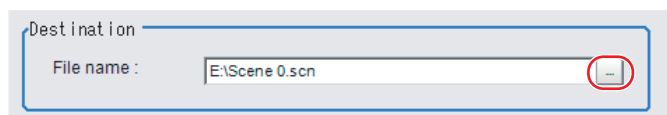
- 1 To save to a USB flash drive (or an SD memory card), insert the USB flash drive (or SD memory card) in the Controller.**
- 2 In the Main Window, select [Save to file] from the [Function] menu.**  
The [Save to file] dialog box is displayed.
- 3 Click the [Setting data] button to select the data to save.**



- 4 If you selected [Scene data], click the [▼] button to select the number of the scene to save.**



- 5 Specify the destination folder and file name.**



- 6 Click [OK].**

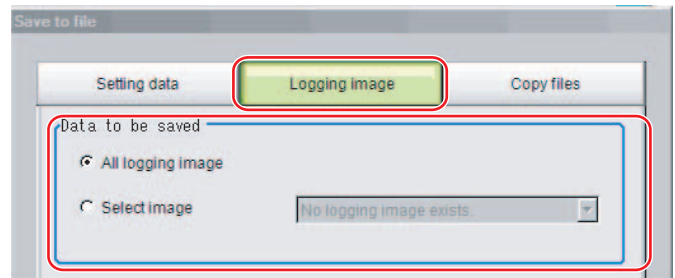
The dialog box showing transfer status is displayed, and the data is sent to the save destination.

# Saving Logged Images in the Controller Memory (RAM) to a RAMDisk or an External Memory Device

Use the following procedure to save image data that was logged in the Controller memory (RAM) to the Controller RAM disk or an external memory device.

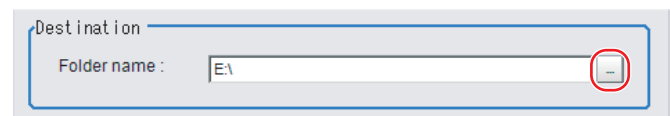
Reference: ► About Saving Areas (p.224)

- 1** When saving data to external memory, insert an external memory device into the Sensor Controller.
- 2** In the Main Window, select [Save to file] from the [Function] menu.  
The [Save to file] dialog box is displayed.
- 3** Click [Logging image] and select the file to save.



Parameter	Set value [Factory default]	Description
Data to be saved	[All logging image]	All logged images are saved.
	Select image	The selected logged images are saved. Click [▼] to select the image to save. When [Latest measurement] - [Logging image] is selected, the save file name will be LoggingImage000.ifz.

- 4** Specify the destination folder.



- 5** Click [OK].

The dialog box showing transfer status is displayed, and the data is sent to the save destination.

### Note

When you select [All logging image], the save file name is automatically specified as "Loggingimage000.ifz".

The file names for the images through the image captured one trigger before the latest image are:

- Loggingimage000.ifz (latest image)
- Loggingimage001.ifz (image from one trigger ago)

The file names for the images through the image captured two triggers ago are:

- Loggingimage000.ifz (latest image)
- Loggingimage001.ifz (image from one trigger ago)
- Loggingimage002.ifz (image from two triggers ago)

The file names for the images through the image captured n triggers before the latest image are:

- Loggingimage000.ifz (latest image)
- Loggingimage001.ifz (image from one trigger ago)
- Loggingimage002.ifz (image from two triggers ago)
- 
- Loggingimage n.ifz (image from n triggers ago)

# Copying or Moving Files between the Controller RAMDisk and an External Memory Device

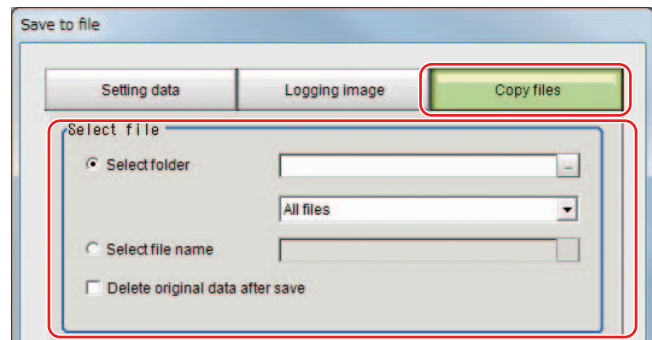
You can copy or move files between the Controller RAMDisk and an external memory device. Images and data saved on the RAMDisk are deleted if the power supply is turned OFF. To keep these images and data, copy or move them to an external memory device. The types of files that can be copied/moved are as follows:

- **Setting data: System data, Scene data, and Scene group data**
- **Logged images**
- **Logged data: Measurement data**

- 1** Insert an external memory device in the Controller.
- 2** In the Main Window, select [Save to file] from the [Function] menu.

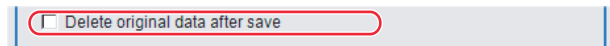
The [Save to file] dialog box is displayed.

- 3** Click [Copy files] and select the file or folder to copy or move.



Parameter	Set value [Factory default]	Description
Select file	[Select folder]	Copies or moves more than one file in the folder. <ul style="list-style-type: none"> <li>• Click the [...] button and specify the source folder to copy or move a file from.</li> <li>• Click the [▼] button and specify the file type to select. Select [All files] to copy or move all files in the folder. Specify a file type to copy or move only files that are of the specified file type in the folder.</li> </ul>
	Select file name	Copies or moves the selected file. Click the [...] button and specify the file name.

- 4** To delete the copy source file after saving a copy to external memory, select [Delete original data after save].



- 5** Click [OK].

The dialog box showing transfer status is displayed, and the data is sent to the save destination.

# Loading Settings Data from the Controller RAMDisk or an External Memory Device to the Sensor Controller

Use the following procedure to load settings data that is saved in the Controller RAMDisk or an external memory device to the Sensor Controller. The scene name and scene group name that have been loaded are displayed in the Measurement Information Display Area.

## IMPORTANT

- Always restart the Sensor Controller immediately after you load the settings data.
- If [Load from file] is performed for [System + scene group 0 data], the data being loaded will also be saved to the Controller's flash memory at the same time. While data is being loaded, do not restart, turn OFF the power supply, or remove the external memory device. Data will be corrupted and the system will not work properly at the next startup.
- If Non-procedure (Ethernet) or PLC Link (Ethernet) is used when Multi-line random-trigger mode is selected for Operation mode, change of [Input port No.] and [Output port No.] is required when loading the line 0 setting data to one of the line 1 to 7.
- If the software version to load is not older than the software version which is saved the setting data, it is possible not to be loaded the setting data file.

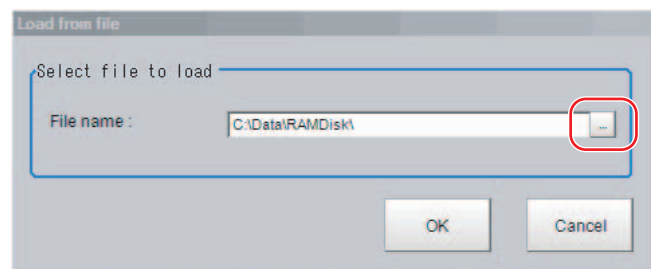
### 1 Perform either of the following in advance.

- Send the setting data to the Controller's RAMDisk using the FTP.
- Insert the external memory device that has the load data saved in it into the Controller.

### 2 In the Main Window, select [Load from file] from the [Function] menu.

The [Load from file] dialog box is displayed.

### 3 Select the file to load.



### 4 Click [OK].

A dialog box that shows the progress of the transfer is displayed, and the data is transferred. The loaded settings are enabled after the Sensor Controller is restarted.

### 5 Select [System restart] from the [Function] menu.

#### Note

- You can change the Communicate Module after restarting. Restart it after loading, if you load the system data that is changed the Communicate Module. For applying the details of parameters after restarting, you should re-load the system data. Additionally, you can load only once because the bkd data write the backup data at once.
- Layout settings will be applied when [Switch layout] is executed. Note that Layout change remains until [Switch layout] is executed when System data which changes the layout setting is loaded.

## IMPORTANT

- When the Scene data created via FZ series Sensor Controller, i.e. FZ5 series or FZ5-L series, [Camera Image Input] is automatically converted to [Camera Image Input FH]. The automatically converted contents is the common items between [Camera Image Input] and [Camera Image Input FH]. The other settings is set to the default settings of the connected camera to the FH-1000, FH-3000, or FH-L series Sensor Controller.
- When you load the created data via FH series Sensor Controller, i.e. FH-L series or FH-1000 series. via FZ series Sensor Controller, the automatically conversion is not performed.



# Changing the System Environment

---

This section describes the settings that are related to the system environment of the Controller.

<b>Setting the Camera Conditions .....</b>	<b>234</b>
<b>Setting the Conditions That Are Related to Operation during Measurement .....</b>	<b>239</b>
<b>Setting the Operation Mode.....</b>	<b>240</b>
<b>Parallel Processing .....</b>	<b>255</b>
<b>Multi-trigger Imaging Processing Function .....</b>	<b>265</b>
<b>Setting the Operating Environment of the System .....</b>	<b>279</b>

# Setting the Camera Conditions

## Checking the Camera Connections: [Camera Connection]

You can check whether a Camera is connected. There are no settings.

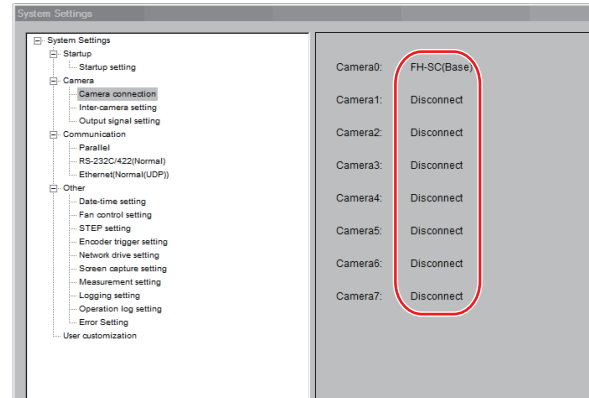
- 1 In the Main Window, select [System settings] – [Camera] – [Camera Connection] from the [Tool] menu.**

The Camera Connection Settings View is displayed.

- 2 Check the connection status.**

If a Camera is connected, the model name of the connected Camera will appear next to the Camera number.

If the [Disconnect] is displayed even though a Camera is connected, there could be a failure or a disconnected line. Check the physical connection.



- 3 Click the [Close] Button.**

## Setting the Trigger Delay: [Inter-camera setting]

- This setting is used to set the delay time from when the STEP signal for the input trigger is received to when the shutter is triggered. You can use this to prevent mutual interference caused by the lighting when more than one Camera is used, or as a simple trigger delay when only one Camera is used.

### IMPORTANT

- Do not perform next camera image input processing before STGOUT signal output is completed. STGOUT signal may not be output.  
Perform camera image input processing after STGOUT signal output completion, or set the STEP-camera delay, STEP-STGOUT delay and STGOUT pulse width so that the electronic flash operates synchronizing with the exposure time.
- When you want the electronic flash to lite synchronously with the exposure time, set the delay between STEP and the camera or the delay between STEP and STGOUT, taking into consideration the response time of the external strobe controller.

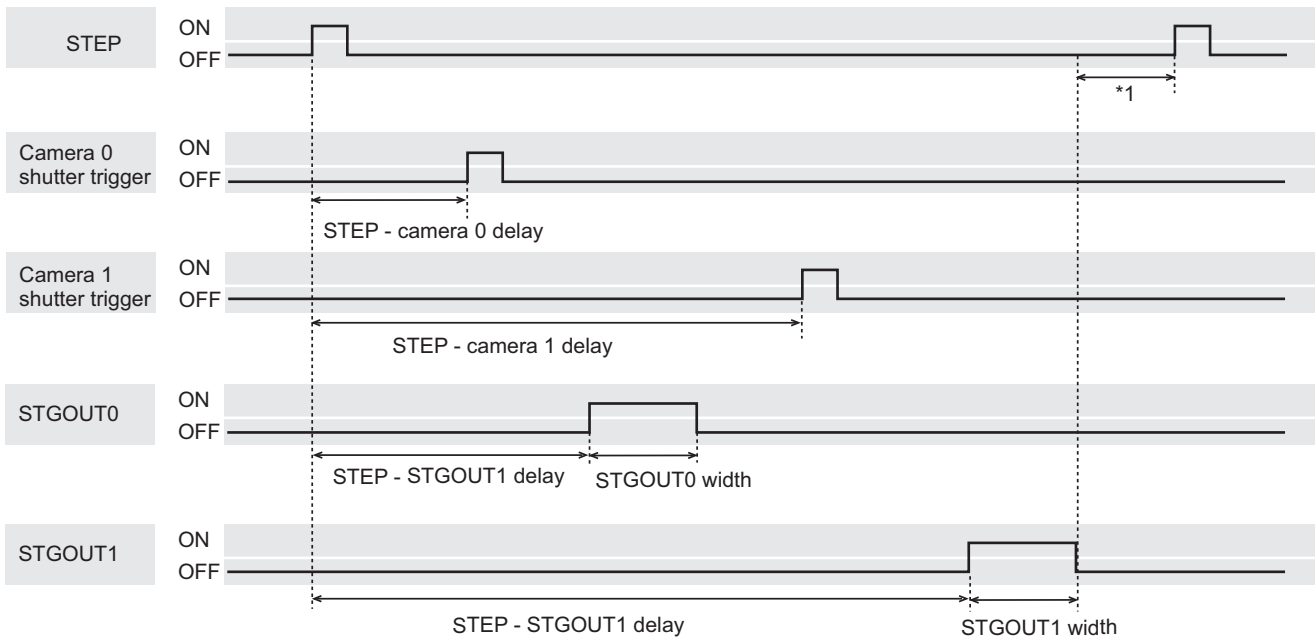
### Note

Set the delay between STEP and STGOUT of STGOUT pulse width, use the [Electronic flash setting] in [Camera Image Input] or [Camera Image Input FH].

Reference: ► *Electronic Flash Setting of the Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

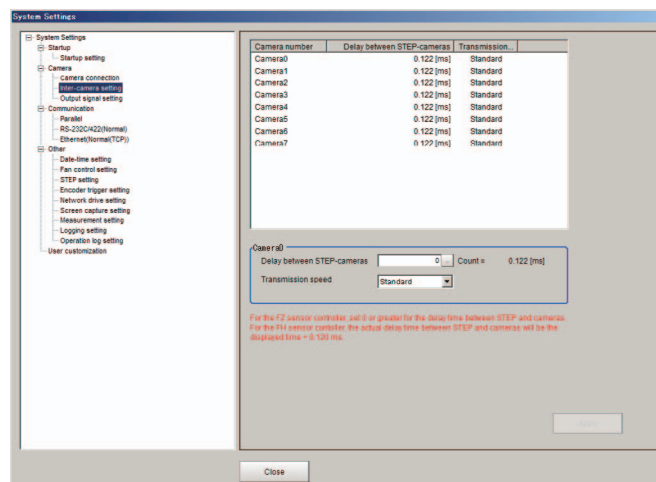


## Trigger Delay Setting [Delay between Cameras]



- \*1: Do not enter the next STEP until STGOUT pulse turns OFF.  
Set the STEP-Camera delay, STEP-STGOUT delay and STGOUT pulse width so that the electronic flash operates synchronizing with the exposure time.

- 1** In the Main Window, select [System settings] – [Camera] – [Inter-camera setting] from the [Tool] menu  
The Inter-camera Settings View is displayed.



**2** Click a camera number to set the delay between STEP-cameras and then specify the delay count value.

Item	Set value [Factory default]	Description
Delay count between STEP-cameras	<ul style="list-style-type: none"> <li>• FH series Sensor Controller: -4 to 511 [0] (1 count is 30 μs)</li> <li>• FZ5 series Sensor Controller: 0 to 511 [0] (1 count is 30 μs)</li> </ul>	<p>Sets the delay time from when the STEP signal is received to when exposure begins for the selected Camera. The delay time differs in FH series / FZ5 series.</p> <ul style="list-style-type: none"> <li>• Delay time of FZ5 series Sensor Controller: (=Delay count between STEP-camera × 30 μs + 122 μs<sup>*1</sup>) + 120 μs.</li> <li>• Delay time of FH series Sensor Controller: When using cameras other than FH-S□05R, the time displayed for STEP-camera delay time is (STEP-camera delay counts × 30 μs + 122 μs) + 120 μs. When using the FH-S□05R camera, the time displayed for STEP-camera delay time is (STEP-camera delay counts × 30 μs + 122 μs) + 470 μs.</li> </ul>
Transmission speed	[Standard] or High speed	<p>When you connect a camera that supports High speed mode using a camera cable shorter than 5m, image input time can be shortened by selecting [High speed] for frame rate. For details about frame rate values, refer to the Instruction manual for the Camera.</p> <p>The following cameras support [High speed]:</p> <ul style="list-style-type: none"> <li>• FH-SC02/FH-SM02</li> <li>• FH-SC04/FH-SM04</li> <li>• FH-SC12/FH-SM12</li> </ul>

**Note**

- FH-1000 series/FH-3000 series:  
Maximum number of settable camera is 8.
- FH -L series/FZ5 series/FZ5-L series:  
Maximum number of settable is 4, camera 0 to camera 3.
- FH series Sensor Controller:  
Connecting the camera by Medium Configuration, the image input time will be shorten. Refer to Preparing the Controller and Cameras (p.78).

## Setting the SHTOUT Signal: [Output Signal Settings]

This function is exclusively for an FH series Sensor Controller.

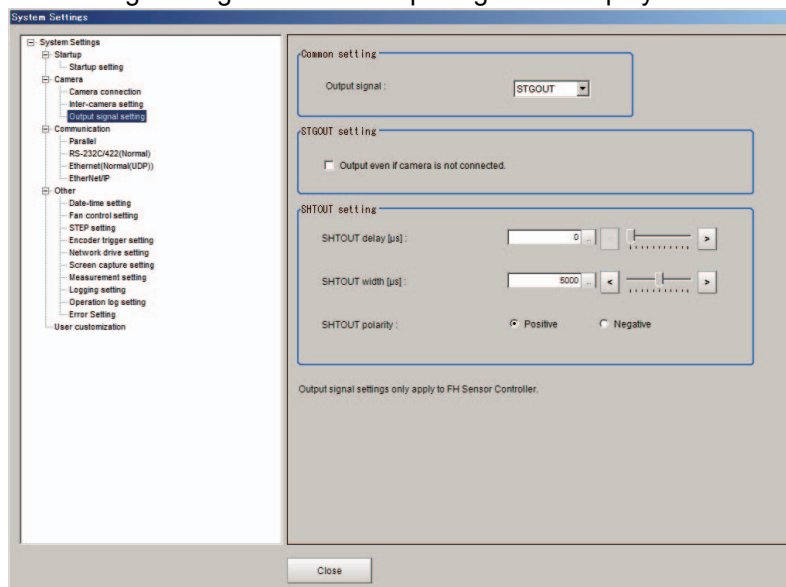
This setting affects the SHTOUT signal that is output when the exposure of the Camera ends. You can detect when the exposure ends with the SHTOUT signal to minimize the time to hold the workpieces still for taking images. This allows you to move the workpiece or the Camera immediately after the exposure ends.

### IMPORTANT

- You cannot use the STGOUT signal and SHTOUT signal at the same time. Select the signal to output depending on the application.
- [Output signal setting] is effective only with FH series.
- SHTOUT signal: SHTOUT0 to SHTOUT7 is tied to the Line number, not camera number. When use the Multi-line random-trigger mode, confirm the Line number, and then use SHTOUT signal.
- [Output Signal Settings] apply only to the FH series Sensor Controller.  
In FZ5 series Sensor Controller, you cannot use the SHTOUT signal regardless of what is set in [Output Signal Settings].

### 1 In the Main Window, select [Camera] – [Output Signal Setting] from the [Tool] menu.

The settings dialog box for the output signals is displayed.



### Note

- If the [Output Signal Selection] is set to [SHTOUT], the SHTOUT signal is output according to the settings in the [Individual Line Settings]. If the [Output Signal Selection] is set to STGOUT, the STGOUT signal is output according to the settings in the [Electronic flash setting] for a camera input processing item.
- If you are using the Camera Image Input HDR, or Camera Image Input HDR Lite processing item, the SHTOUT signal is output for every image that is taken.
- If you are using the Through Image Mode in the Main Window, the SHTOUT signal is output for every through image that is taken.

### 2 Select the output signal in the [Common setting].

Parameter	Set value [Factory default]	Description
Output signal	[STGOUT]	The STGOUT signal line is used for the STGOUT signal. If you selected STGOUT, you cannot use the SHTOUT output signal.
	SHTOUT	The STGOUT signal line is used for the SHTOUT signal. If you selected SHTOUT, you cannot use the STGOUT output signal.

### 3 Select the output method of STGOUT signal in the [STGOUT setting]. Please uncheck if you select [SHTOUT] in the [Output signal].

Parameter	Set value [Factory default]	Description
Output without a Camera connection	<ul style="list-style-type: none"> <li>• [Unchecked]</li> <li>• Checked</li> </ul>	<ul style="list-style-type: none"> <li>• Unchecked Only STGOUT signal with which a Camera is connected is output.</li> <li>• Checked STGOUT signals that are not connected with cameras will output, too. This setting can be used to change the brightness of the light quickly. Use the [Electronic flash setting] in [Camera image input FH], [Camera image input HDR] and [Camera image input HDR Lite] to configure the STGOUT signal.</li> </ul>

#### IMPORTANT

- The setting of [Output even if camera is not connected] can be used only with FH series. This can not be used with FZ5 series.
- The STGOUT signals that are applicable with the setting [Output even if camera is not connected] are as follows.  
: FH-1000 and FH-3000 series: STGOUT 0 to 7  
: FH-L series: STGOUT 0 to 3
- The setting for Multi-line Random-trigger Mode is as follows.  
[Output signal setting]  
: Configurable only in Output signal setting of Line 0. For other lines settings for Line 0 are commonly applied.  
[Output even if camera is not connected]  
: Selectable for each line.
- If a check is placed for [Output without a Camera connection], set the pulse width for the [Camera Image Input FH] processing item of corresponding STGOUT signal (STGOUT0 to STGOUT7)  
Refer to *Electronic Flash Setting in the Camera Image Input FH* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat No. Z341)*.
- STGOUT0 to STGOUT7 is tied to the camera connector number of the sensor controller, not the camera number. When you use CameraLink Medium Configuration or the Multi-line random-trigger mode, confirm the camera connector number that corresponds to the camera number of Sensor Controller.

### 4 Set SHTOUT for each line in the [Line setting] area.

Parameter	Set value [Factory default]	Description
SHTOUT signal delay [ $\mu$ s]	[0] to 1,000	Sets the delay time from when exposure is completed to when the SHTOUT signal turns ON in increments of 10 $\mu$ s.
SHTOUT signal pulse width [ $\mu$ s]	40 to 10,000 [5,000]	Sets the time to output the SHTOUT signal in increments of 10 $\mu$ s.
SHTOUT signal pulse polarity	<ul style="list-style-type: none"> <li>• [Positive]</li> <li>• Negative</li> </ul>	Set the polarity of the SHTOUT signal. Positive: The SHTOUT signal changes from OFF to ON when the exposure ends. Negative: The SHTOUT signal changes from ON to OFF when the exposure ends.

#### IMPORTANT

Do not perform next camera image input processing before SHTOUT signal output is completed. SHTOUT signal may not be output.  
Perform camera image input processing after confirming SHTOUT signal output completion, or set the SHTOUT signal delay and SHTOUT signal pulse width so that the SHTOUT signal output is completed before camera image input processing.

### 5 Click the [Close] Button.

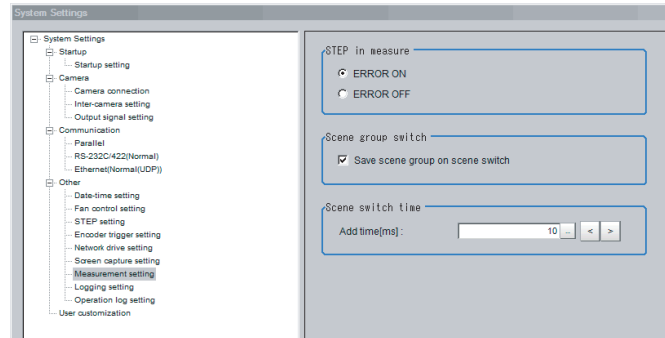
# Setting the Conditions That Are Related to Operation during Measurement

You can change the following items of operation during measurement.

- Operation when the next STEP signal is input during measurement
- Whether the scene group is saved when you change to another scene group
- Setting for when the scene switch time is short and switching cannot be detected by the external device

**1** In the Main Window, select [System settings] – [Other] – [Measurement settings] from the [Tool] menu.

The [Measurement settings] dialog box is displayed.



**2** Set each item as necessary.

Item	Set value [Factory default]	Description
STEP in measure	[ERROR ON] or ERROR OFF	Specify the status of the ERROR signal (READY signal is OFF) while Camera Image Input cannot be used, i.e. during capturing, and STEP signal is input.
Save scene group on switch scene	<ul style="list-style-type: none"> <li>• [Selected]</li> <li>• Not selected</li> </ul>	Set the operation to perform when you change to another scene group. Set whether the scene group should be saved when changing to another scene group. The scene group switching time can be reduced if the selection of this check box is cleared, but if the power supply is turned OFF without saving changes to settings, the changes will be lost.
Scene switch time, Add time [ms]	0 to 1000 [10]	The BUSY signal is turned ON during scene switching. When this time is short and the change from ON to OFF cannot be detected by the external device, you can increase the time that the BUSY signal is ON. Set in units of 1 ms. Click [<] or [>] to increment the time in 5 ms from the displayed value.

## IMPORTANT

When you select Through image, and even if you select [ERROR ON], ERROR signal is not output when the STEP is input while READY signal is OFF.

## Note

The [Save scene group on switch scene] is linked to the setting for the [Scene group switch] dialog box. Settings specified later override the previous settings.

Reference: ▶ Changing the Scene or Scene Group (p.68)

**3** Click the [Apply] button.

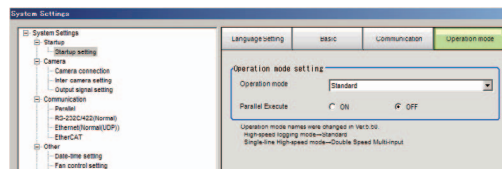
# Setting the Operation Mode

This section describes the operation mode (FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series only). You can use a multi-core CPU to set the operation mode according to the application conditions. This helps to reduce the takt time and downtime. The operation mode is set in the startup settings.

Reference: ▶ Setting the Status at Startup [Startup Settings] (p.280)

Reference: ▶ Functional Comparison between the FH-series and FZ5-series Controllers (p.45)

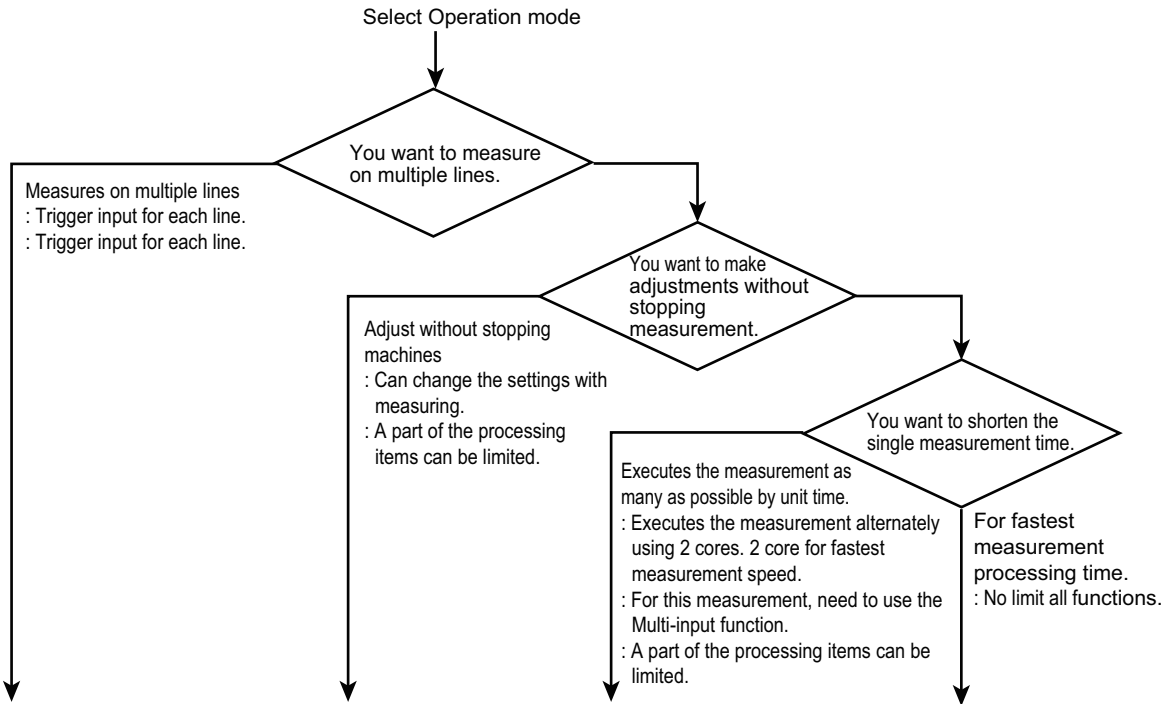
- 1** In the Main Window, select [System settings] – [Startup settings] from the [Tool] menu.
- 2** Click the [Operation mode] button and select the operation mode.
- 3** Click the [Apply] Button.



- 4** In the Adjustment Window (layout 0), click [Data save] in the Toolbox Pane to save the settings data.
- 5** In the Main Window, select [System restart] from the [Function] menu.  
The System restart dialog box is displayed.
- 6** Click [OK].

# Selection Guide for Operation mode

A guide to using the most suitable operation mode for your purpose.



Multi-line Random-trigger mode	Non-stop Adjustment mode	Double Speed Multi-input mode *1	Standard mode *2
<ul style="list-style-type: none"> <li>This mode can input the trigger to each lines.</li> <li>Input or Output of communication can be limited depending on used the number of lines.</li> <li>Processing time may be longer than Standard mode if you increase the number of lines.</li> </ul>	<ul style="list-style-type: none"> <li>This mode allows changes to be made to settings while running measurement processing.</li> <li>Some processing items may not be applied to use or may be restricted.</li> <li>Using commands from the external device are restricted.</li> <li>Unintended operation may be occurred if you change the Scene while this function is running.</li> </ul>	<ul style="list-style-type: none"> <li>For this Operation mode, need to use the Multi-input function.</li> <li>In this mode, processing time of all Operation mode in a unit time may be longest.</li> <li>In this function, some processing unit items are not applied or limited.</li> <li>Using the command from external device is limited.</li> </ul>	<ul style="list-style-type: none"> <li>In this mode, one measurement time will be fastest in all of the Operation mode.</li> <li>All functions can be used without restriction.</li> </ul>

\*1: This mode name is changed from Ver. 5.50. This function name is Single-line High speed mode in old model.

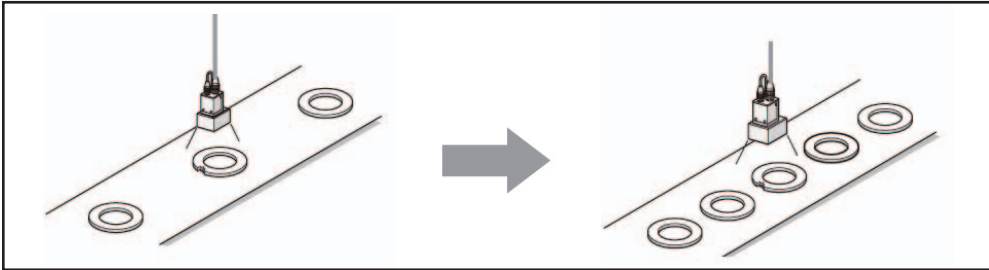
\*2: This mode name is changed from Ver. 5.50. This function name is High-speed Logging mode in old model.

Reference: ▶ Multi-input Function (p.243)

Reference: ▶ Functional Comparison between the FH-series and FZ5-series Controllers (p.45)

## Double Speed Multi-input

You can execute the measurement process with a multi-core CPU to inspect more measurement targets in the same amount of time than conventional processing would allow. This mode uses up to four CPU cores (or eight threads) on a CPU that take turns in the execution of a single inspection flow every time the STEP signal is input. Reference: ► Multi-input Function (p.243)



### IMPORTANT

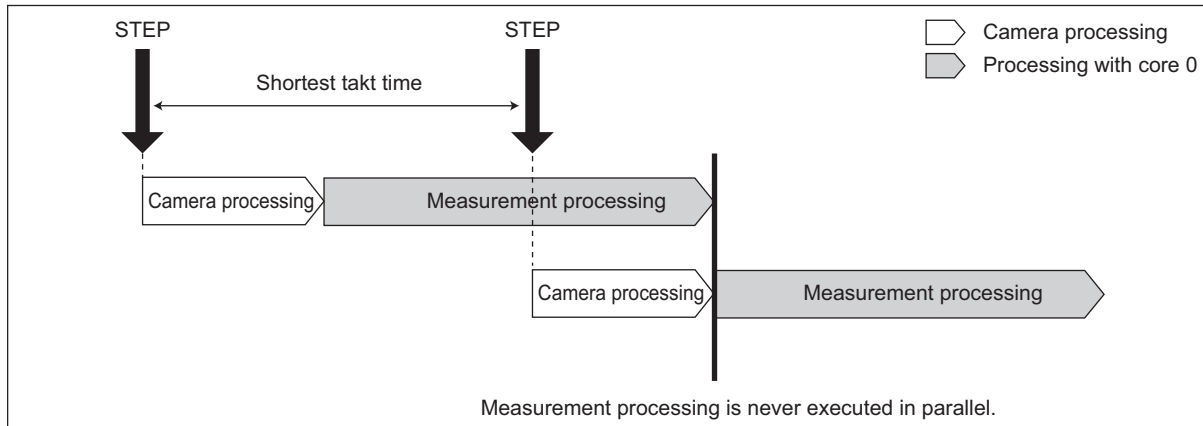
- The transaction time for a single workpiece is shorter if parallel processing is enabled to allow parallel execution of the measurement flow.  
Reference: ► Parallel Processing (p.255)
- It is assumed that the [Double Speed multi-input] will be used together with the multi-input function. Refer to *Multi-input Function* before you use the Double Speed Multi-input. When the multi-input function cannot be used, the Double Speed Multi-input mode is not available. Choose another mode than the Double Speed Multi-input mode.  
Reference: ► Multi-input Function (p.243)
- Certain processing items, such as Serial Output, Parallel Output, and Parallel Judgement Output, may slow the performance of the Double Speed Multi-input mode if they are programmed in the first half of the flow. If the performance drops significantly, consider the use of parallel processing.
- Some processing items, such as Trend Monitor and Last NG Display, may not function correctly if Double Speed Multi-input is used. Do not use them. Calculation items that use the numeric values from a previous STEP may not calculate correctly.
- You cannot use Simplified Non-stop Adjustment Mode during Double Speed Multi-input.
- External commands to obtain and set unit data will not operate correctly. Do not use them.
- If you use external commands, the BUSY signal will remain ON during command execution longer than for other operation modes.
- Screen refresh, Scene switch, Scene group switch and Edit flow processing times will be longer compared to other operation modes.



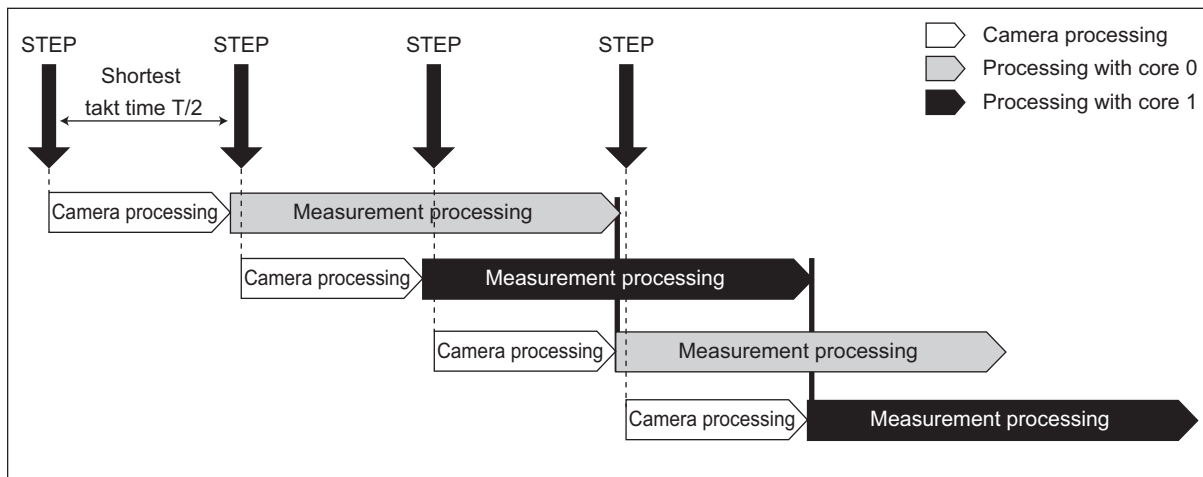
## About Double Speed Multi-input

Two cores performs the same inspection flow alternatively, which help to shorten measurement takt time.

Example: Normal processing with a single core CPU



Example: Processing using the Double Speed Multi-input with dual-core CPU



## Multi-input Function

With the multi-input function, images are input consecutively and at high speed. This allows the next STEP to be received as soon as the image input processing is completed. There is no need to wait for measurement processing to be completed. You can check whether image input processing has been completed with the status of the READY signal.

There are no setting items for the multi-input function. You can use it as long as you can check the status of the READY signal, i.e., as long as you use parallel or EtherCAT communications. With EtherCAT communications, check the status of the Trigger Ready signal instead of the READY signal.

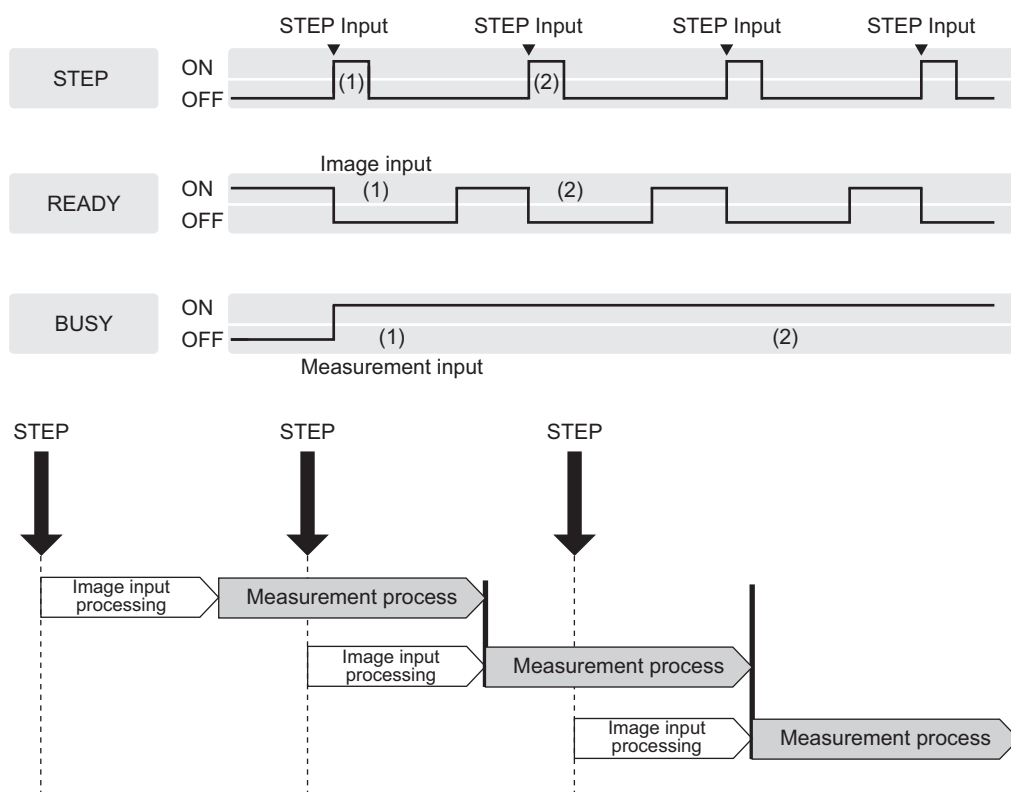
The FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller both have a multi-core CPU. Using the Double Speed Multi-input, where each CPU core takes turns in the execution of the measurement processing, realizes the reduction of the minimum takt time<sup>\*1</sup> by up to 1/2 for the FZ5 series Sensor Controller and 1/4 for the FH-3050.

\*1: The fastest takt time is the shortest time that is allowed to accept a STEP signal without causing a backlog of images.

Reference: ► Double Speed Multi-input (p.242)

## IMPORTANT

- Click the upper left of the Image Display Pane and set the [Image mode] to [Freeze Image].  
Reference: ▶ Changing the Image Mode and Other Display Contents (p.102)
- If images are taken consecutively at high speed, the number of images that you will be able to take will be limited. If the maximum number of images have been taken, the READY signal will not turn ON until the current processing is completed. Therefore, the next STEP signal cannot be input.
- The ERROR terminal turns ON if a STEP signal is input when the READY signal is OFF.
- If the trigger signal input rate is faster than the communications output, some STEP signals may be skipped and measurements may be delayed. Make sure to input trigger signals at a rate that does not cause a delay in communications.
- The multi-input function cannot be used in the following cases:
  - The flow has more than one camera input processing unit.
  - The flow has a Camera Image Input HDR or Camera Image Input HDR Lite processing unit.
  - Branching is used to process a single camera input processing unit more than one time.
  - Measurement triggers are input through means other than parallel or EtherCAT communications (non-procedure commands or measurement commands through a PLC Link).
  - If a measurement trigger is input while using the multi-input function, the last NG image cannot be displayed.
  - If images and data are logged to a network drive, the use of the multi-input function and other heavy measurement loads on the Controller may slow down communications and cause logging errors. In this case, set the measurement takt time so that there is some leeway.
- When the multi-input function is in use, most of the resources of the CPU are allocated to measurement processing. This may cause performance drops (delayed responses and packet losses) and communications errors. Do not use Ethernet/IP communications while the multi-input function is in use.



The following processing items are supported in Double Speed Multi-input:

OK:Supported processing item, RST: Processing item with restricted support, ---:Unsupported processing item

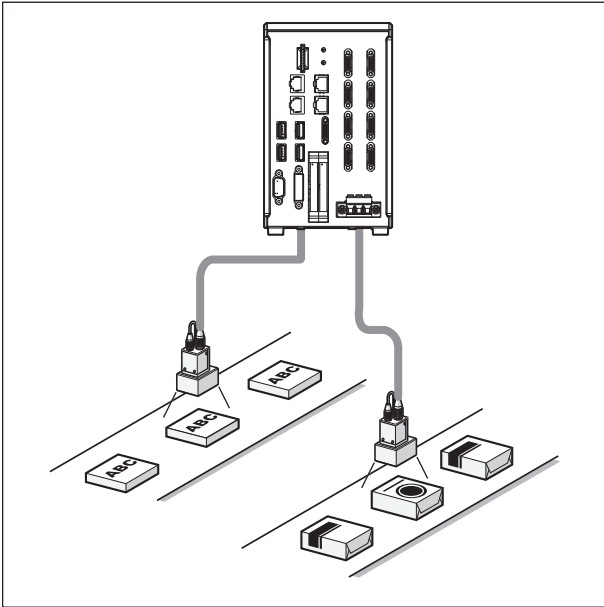
Processing item	Support	Processing item	Support	Processing item	Support
Camera Image Input	OK	Glue Bead Inspection	OK	Statistics	---
Camera Image Input FH	OK	Position Compensation	OK	Calibration Data Reference	OK
Camera Image Input HDR	---	Filtering	OK	Position Data Calculation	OK
Camera Image Input HDR Lite	---	Back Ground Suppression	OK	Stage Data	OK
Camera Switching	OK	Brightness Correct Filter	OK	Robot Data	OK
Measurement Image Switching	OK	Color Gray Filter	OK	Vision Master Calibration	---
Search	OK	Extract Color Filter	OK	PLC Master Calibration	---
Flexible Search	OK	Anti-Color Shading	OK	Transfer Position Data	OK
Sensitive Search	OK	Stripes Removal Filter II	OK	Calc Axis Move	OK
ECM Search	OK	Polar Transformation	OK	Calc Axis Move by Multipoint	OK
EC Circle Search	OK	Trapezoidal Correction	OK	Detection Point	OK
Ec Corner	OK	Machine Simulator	OK	Camera Calibration	OK
Ec Cross	OK	Image Subtraction	RST(*1)	Data Save	OK
Shape Search II	OK	Advanced Filter	OK	Conditional Branch	OK
Classification	OK	Panorama	OK	End	OK
Edge Position	OK	Calculation	OK	DI Branch	OK
Edge Pitch	OK	Line Regression	OK	Control Flow Normal	---
Scan Edge Position	OK	Circle Regression	OK	Control Flow PLC Link	---
Scan Edge Width	OK	Precise Calibration	OK	Control Flow Parallel	---
Circular Scan Edge Position	OK	User Data	OK	Control Flow Fieldbus	---
Circular Scan Edge Width	OK	Set Unit Data	OK	Selective Branch	OK
Color Data	OK	Get Unit Data	OK	Data Output	OK
Gravity and Area	OK	Set Unit Figure	OK	Parallel Data Output	OK
Labeling	OK	Get Unit Figure	OK	Parallel Judgement Output	OK
Label Data	OK	Trend Monitor	---	Fieldbus Data Output	OK
Defect	OK	Image Logging	RST(*2)	Result Display	OK
Precise Defect	OK	Image Conversion Logging	RST(*2)	Display Image File	OK
Fine Matching	OK	Data Logging	OK	Display Last NG Image	---
Character Inspection	OK	Elapsed Time	OK	OCR	OK
Date Verification	OK	Wait	OK	OCR User Dictionary	OK
Model Dictionary	OK	Focus	OK	Conveyor Calibration	---
2D Codes	OK	Iris	OK	Conveyor Panorama Display	---
Circle Angle	OK	Unit Macro	OK	Multi-Trigger Imaging	---
Shape Search III	OK	Unit Calculation Macro	OK	Multi-Trigger Imaging Task	---
Intersection	OK	Parallelize	OK		
Barcode	OK	Parallelize Task	OK		

\*1: The [Subtract only] measurement mode is not supported.

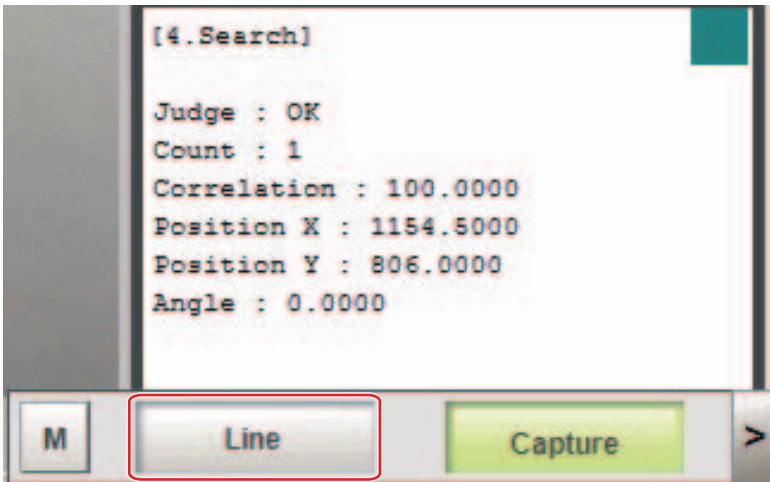
\*2: Images from odd numbered measurements and from even numbered measurements are logged in separate folders.

## Multi-line Random-trigger Mode

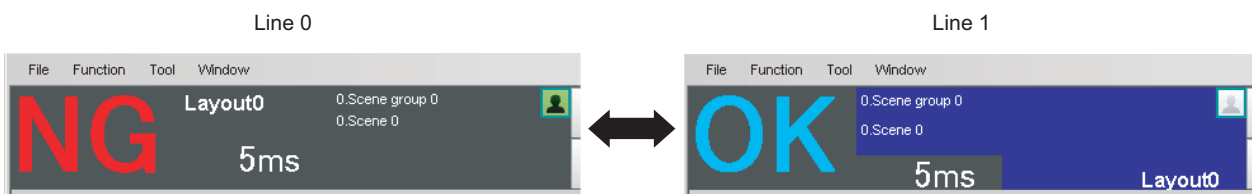
You use the Multi-line Random-trigger Mode when you want to measure more than one line with a single Controller. You can measure the inputs from different Cameras on up to eight independent lines. You can set a scene group data and scene data for each line.



You can switch between lines with the [Line] button that is located on the Measurement Manager Bar that is displayed at the bottom right of the window.



Each line has its own background color.



## ● FH-1000 and FH-3000 series Sensor Controller

You can assign any of up to eight Cameras to each line.

Use the following procedure to assign Cameras to each line.

- 1** In the Main Window, select [System settings] – [Startup] – [Startup settings] from the [Tool] menu.
- 2** Select [Multi-line random-trigger mode] for the operation mode on the [Operation Mode] tab page.
- 3** Set the [Number of lines] and [Camera - line allotment] on the [Multi-line random-trigger mode settings] tab page.

Multi-line random-trigger mode Settings

Number of lines :

Camera - line allotment :

	Camera	0	1	2	3	4	5	6	7
Line0		<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line1		<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Line2		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line3		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line4		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line5		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line6		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line7		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

For example, if you use Cameras 0 and 1 on line 0, you can use up to 6 Cameras from Camera 2 to 7 on line 2.

### IMPORTANT

The settings of the [Multi-line Random-trigger Mode Settings] apply only to the FH series Sensor Controller. In FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller, there will always be two lines and fixed lines assignments to the Cameras regardless of the settings of the [Multi-line Random-trigger Mode Settings].

## ● FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller

The Camera assignments for each line are listed below.

Camera number	Software handling
Camera 0	Camera 0 on line 0
Camera 1	Camera 0 on line 1
Camera 2	Camera 1 on line 0
Camera 3	Camera 1 on line 1

## Functional Limitations of Multi-line Random-trigger Mode

Keep the following points in mind when using Multi-line Random-trigger Mode.

Item		FH series: FH-1000 series/FH-3000 series	FZ5 series: FZ5-800 series/FZ5-1100 series/ FZ5-1200 series
Processing time		<ul style="list-style-type: none"> <li>If the processing load for multiple lines is high, there may be fluctuation in measurement times.</li> <li>If data logging for multiple lines is to the same drive, measurement times may become longer.</li> </ul>	<ul style="list-style-type: none"> <li>If the STEP signal is input at the exact same time for lines 0 and 1, the measurement on the other lines may be delayed (roughly by the same amount of the Camera Image Input processing unit).</li> <li>If data logging for both Line 0 and Line 1 is to the same drive, measurement times may become longer.</li> </ul>
Number of Cameras		The maximum number of Cameras is 8 for all lines.	The maximum number of Cameras is 2 for all lines.
Error messages		Error messages are the same for lines 0 to 7. If an error occurs on any of the lines, an error message is displayed and the ERROR signal is turned ON.	Error messages are the same for lines 0 and 1. If an error occurs on any of the lines, an error message is displayed and the ERROR signal is turned ON.
Saving data in the Controller		To save data in the Controller, the data must be saved separately for each line.	
Save folder for captured images		When you click [Capture] on the Measurement Manager Bar, captured images are always saved to the folder that is specified for line 0.	
Date-time setting, language setting, operation mode setting and Network drive setting.		These settings can be set only for line 0.	These settings can be set only for line 0.
View		Images can be displayed simultaneously for all lines. Use layout modification to set the display position and size for the Main Window for each line.	One of the lines must be selected to be displayed. Both lines cannot be displayed at the same time.
Communications	Parallel	<ul style="list-style-type: none"> <li>Parallel communications can be set only for line 0. The settings for line 0 are applied to lines 1 to 7.</li> <li>Refer to <i>Table 1</i> for details on the differences between parallel I/O and parallel terminals.</li> </ul>	<ul style="list-style-type: none"> <li>Parallel communications can be set only for line 0. The settings for line 0 are applied to line 1.</li> <li>Refer to <i>Table 1</i> for details on the differences between parallel I/O and parallel terminals.</li> </ul>
	Normal (RS-232C/422)	RS-232C can be set only for line 0. Lines 1 to 7 cannot be used.	RS-232C/422 can be set only for line 0. Line 1 cannot be used.
	Normal (Ethernet)	<ul style="list-style-type: none"> <li>To use Ethernet, use a different port number for each line.</li> <li>The IP address for the Controller cannot be set for lines 1 to 7 (the IP address for line 0 is used).</li> </ul>	<ul style="list-style-type: none"> <li>To use Ethernet, use a different port number for each line.</li> <li>The IP address for the Controller cannot be set for line 1 (the IP address for line 0 is used).</li> </ul>
	PLC Link (RS-232C/422)	RS-232C can be set only for line 0. Lines 1 to 7 cannot be used.	RS-232C/422 can be set only for line 0. Line 1 cannot be used.
	PLC Link (Ethernet)	<ul style="list-style-type: none"> <li>To use Ethernet, use a different port number for each line.</li> <li>The IP address for the Controller cannot be set for lines 1 to 7 (the IP address for line 0 is used).</li> </ul>	<ul style="list-style-type: none"> <li>To use Ethernet, use a different port number for each line.</li> <li>The IP address for the Controller cannot be set for line 1 (the IP address for line 0 is used).</li> </ul>

Item		FH series: FH-1000 series/FH-3000 series	FZ5 series: FZ5-800 series/FZ5-1100 series/ FZ5-1200 series
Communications	EtherNet/IP	<ul style="list-style-type: none"> <li>To use EtherNet/IP, use an EDS file that matches the line to be used.</li> <li>Specify different I/O memory addresses for the sending area and receiving area for line 0 and for lines 1 to 7.</li> </ul>	<ul style="list-style-type: none"> <li>To use EtherNet/IP, use an EDS file that matches the line to be used.</li> <li>Specify different I/O memory addresses for the sending area and receiving area for line 0 and for line 1.</li> </ul>
STEP setting		The value of the STEP signal filter for the most recently set line is applied to all lines.	The value of the STEP signal filter for each line is applied to each line.
Communications	EtherCAT	<ul style="list-style-type: none"> <li>The Communications Module is set for each line.</li> <li>The communications settings can be set only for line 0. The settings are applied as shown below. [Output control]: The same setting is used for all lines. [Output period]: The same setting is used for all lines. [Output setting]: This is set for each line.</li> <li>The I/O ports (areas) for communications between the FH series Sensor Controller and master are assigned as shown below. I/O ports for the Command Area: I/O ports are assigned for each line. I/O ports for the Response Area: I/O ports are assigned for each line. I/O ports for the Output Area: I/O ports are assigned for each line. The I/O ports in the Sysmac Error Status Area are shared by all lines.</li> <li>The maximum data size that can be output depends on the number of lines, as shown in the following table. 1 to 5 lines: 256 bytes max. 6 to 8 lines: 128 bytes max.</li> </ul>	---

**Table 1: Parallel I/O Functions and Parallel Terminals for Multi-line Random-trigger Mode**

• **FH-1000 series/FH-3000 series**

I/O	Number of lines			
	1 line	2 lines	3 to 4 lines	5 to 8 lines
STEP	STEP0	STEP0 or STEP1	STEP0 to STEP3	STEP0 to STEP7
DSA	DSA0	DSA0 or DSA1	No output	
DI	DI0 to DI7	DILINE0, DI0 to DI7 (shared by all lines)	DILINE0 to DILINE1, DI0 to DI7 (shared by all lines)	DILINE0 to DILINE2, DI0 to DI7 (shared by all lines)
ENC (phases A, B, and Z)	ENC0 phase A, ENC0 phase B, and ENC0 phase Z	ENC0 phase A, ENC1 phase A, ENC0 phase B, ENC1 phase B, ENC0 phase Z, and ENC1 phase Z	No output	
ACK	ACK (shared by all lines)			
STGOUT/SHTOUT	STGOUT0/SHTOUT0	STGOUT0/SHTOUT0 or STGOUT1/SHTOUT1	STGOUT0 to STGOUT3 or SHTOUT0 to SHTOUT3	STGOUT0 to STGOUT7 or SHTOUT0 to SHTOUT7
RUN	RUN0	RUN0 or RUN1	RUN0 to RUN3	No output
GATE	GATE0	GATE0 and GATE1	No output	
BUSY	BUSY0	BUSY0 or BUSY1	BUSY0 to BUSY3	BUSY0 to BUSY7
OR	OR0	OR0 or OR1	OR0 to OR3	OR0 to OR7
ERROR	ERROR0	ERROR0 or ERROR1	ERROR0 to ERROR3	ERROR (shared by all lines)
READY	READY0	READY0 or READY1	READY0 to READY3	READY0 to READY7
DO	DO0 to DO15	Line 0: D00 to D07 Line 1: D8 to D15	No output	

• **FZ5-800 series/FZ5-1100 series/FZ5-1200 series**

I/O	Number of lines	
	1 line	2 lines
STEP	STEP0	STEP0 or STEP1
DSA	DSA0	DSA0 or DSA1
DI	DI0 to DI7	DI0 to DI7
RUN	RUN	None (This input is assigned as the BUSY signal for line 1.)
GATE	GATE0	GATE0 and GATE1
BUSY	BUSY0	BUSY1 or RUN
OR	OR0	OR0 or OR1
ERROR	ERROR	ERROR (shared by all lines)
READY	READY0	READY0 or READY1
DO	DO0 to DO15	Line 0: D00 to D07 Line 1: D8 to D15



The following processing items are supported in the multi-line random trigger mode:

OK:Supported processing item, RST: Processing item with restricted support, ---:Unsupported processing item

Processing item	Support	Processing item	Support	Processing item	Support
Camera Image Input	OK	Glue Bead Inspection	OK	Statistics	OK
Camera Image Input FH	OK	Position Compensation	OK	Calibration Data Reference	OK
Camera Image Input HDR	OK	Filtering	OK	Position Data Calculation	OK
Camera Image Input HDR Lite	OK	Back Ground Suppression	OK	Stage Data	OK
Camera Switching	OK	Brightness Correct Filter	OK	Robot Data	OK
Measurement Image Switching	OK	Color Gray Filter	OK	Vision Master Calibration	OK
Search	OK	Extract Color Filter	OK	PLC Master Calibration	OK
Flexible Search	OK	Anti-Color Shading	OK	Transfer Position Data	OK
Sensitive Search	OK	Stripes Removal Filter II	OK	Calc Axis Move	OK
ECM Search	OK	Polar Transformation	OK	Calc Axis Move by Multipoint	OK
EC Circle Search	OK	Trapezoidal Correction	OK	Detection Point	OK
Ec Corner	OK	Machine Simulator	OK	Camera Calibration	OK
Ec Cross	OK	Image Subtraction	RST(*1)	Data Save	OK
Shape Search II	OK	Advanced Filter	OK	Conditional Branch	OK
Classification	OK	Panorama	OK	End	OK
Edge Position	OK	Calculation	OK	DI Branch	RST(*2)
Edge Pitch	OK	Line Regression	OK	Control Flow Normal	OK
Scan Edge Position	OK	Circle Regression	OK	Control Flow PLC Link	OK
Scan Edge Width	OK	Precise Calibration	OK	Control Flow Parallel	RST(*2)
Circular Scan Edge Position	OK	User Data	OK	Control Flow Fieldbus	OK
Circular Scan Edge Width	OK	Set Unit Data	OK	Selective Branch	OK
Color Data	OK	Get Unit Data	OK	Data Output	OK
Gravity and Area	OK	Set Unit Figure	OK	Parallel Data Output	RST(*2)
Labeling	OK	Get Unit Figure	OK	Parallel Judgement Output	RST(*2)
Label Data	OK	Trend Monitor	OK	Fieldbus Data Output	OK
Defect	OK	Image Logging	OK	Result Display	OK
Precise Defect	OK	Image Conversion Logging	OK	Display Image File	OK
Fine Matching	OK	Data Logging	OK	Display Last NG Image	OK
Character Inspection	OK	Elapsed Time	OK	OCR	OK
Date Verification	OK	Wait	OK	OCR User Dictionary	OK
Model Dictionary	OK	Focus	OK	Conveyor Calibration	OK
2D Codes	OK	Iris	OK	Conveyor Panorama Display	OK
Circle Angle	OK	Unit Macro	OK	Multi-Trigger Imaging	OK
Shape Search III	OK	Unit Calculation Macro	OK	Multi-Trigger Imaging Task	OK
Intersection	OK	Parallelize	OK		
Barcode	OK	Parallelize Task	OK		

\*1: [DI Register] in the measurement mode is not supported.

\*2: Not supported for 3 or more lines.

## Non-stop Adjustment Mode

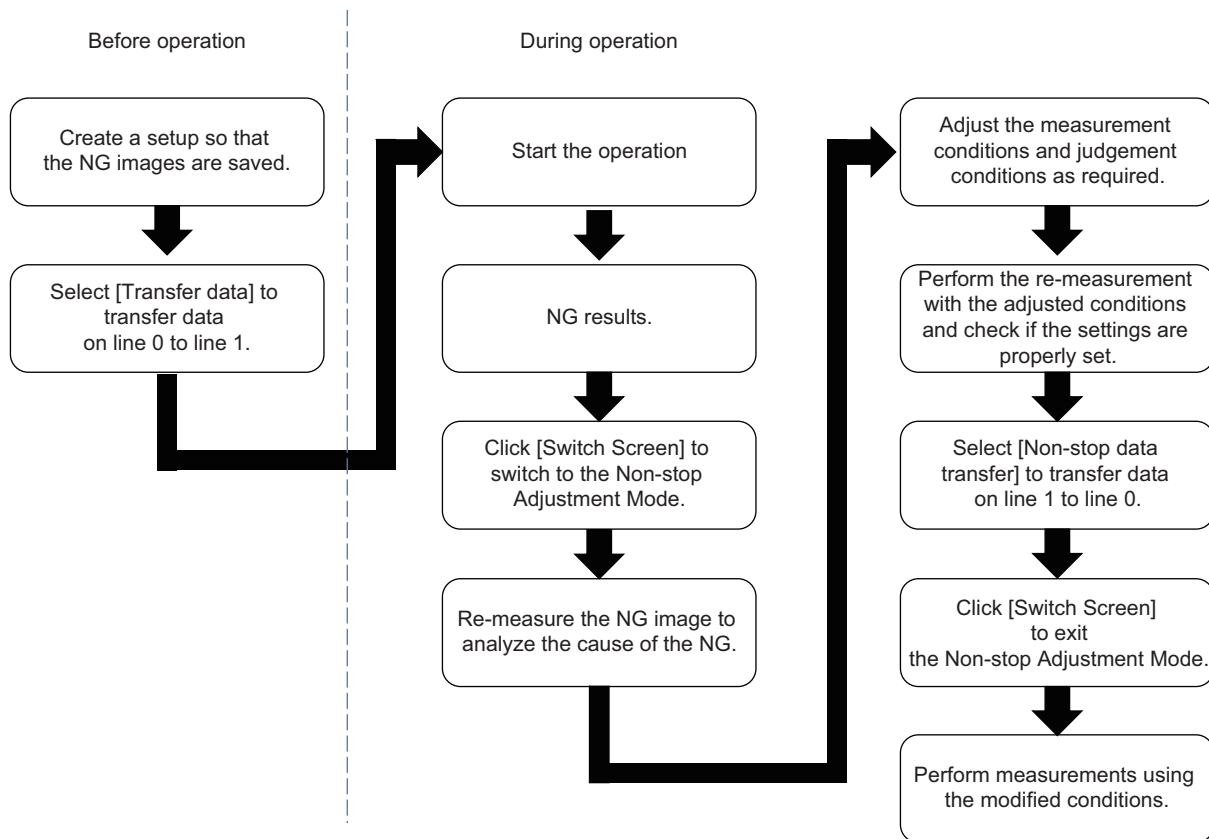
Non-stop Adjustment Mode allows you to change and adjust the measurement flow without having to stop the measurement processing during operation.

You use saved image files to adjust measurement flows. You can apply a modified measurement flow while the Controller is in RUN mode.

Lines 0 and 1 are used simultaneously for the execution of the Non-stop Adjustment Mode.

While the measurement process is executed for line 0, you modify and adjust the measurement flow for line 1.

### Typical Application for Non-stop Adjustment Mode



#### 1 In the Main Window for line 0, select [Transfer data] from the [Function] menu.

The settings for line 0 are transferred to line 1.

Measurement does not stop and continues to be executed on line 0.

#### 2 Click the [Switch Screen] button to display line 1 (Non-stop Adjustment Mode Window).

The display for line 0 changes to the display for line 1. (The main display for line 1 is called the Non-stop Adjustment Mode Window.) This display change will not stop the measurements on images input to line 0.

#### 3 Click the icon portion of the processing unit to adjust.

To change the flow, use the [Edit flow] tool in the Toolbox Pane.

The settings dialog box for the selected unit is displayed.

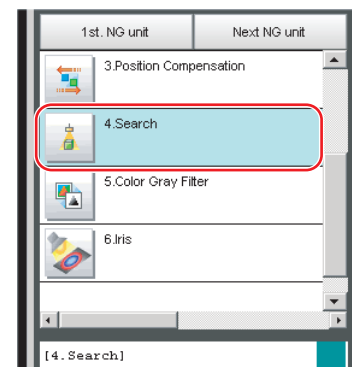
#### 4 Modify the processing units.

#### 5 Click [OK].

The settings dialog box closes and the display returns to the Main Window (layout 1).

If you need to modify the judgement conditions for more than one processing unit, repeat steps 3 to 4.

At this stage, none of the changes have been applied.



## 6 In the Main Window for line 1, select [Non-stop data transfer] from the [Function] menu.

The changes to the settings for line 1 are saved as the settings for line 0 without affecting the measurement.

## 7 Click the [Switch Screen] button to display the Main Window for line 0.

## 8 Click [Data Save] in the Function menu to save the settings.

### IMPORTANT

- When you execute [Non-stop data transfer], the results in the Trend Monitor and Expression processing units are cleared.
- If you use an external command to switch scenes or scene groups, or change the settings of processing units while the Controller is in RUN mode, the results of those changes will not be applied when you change to line 1 (Adjustment Mode) in the Main Window.
- If you use the Non-stop Adjustment Mode after you change the scene group while the Controller is in RUN mode, you may overwrite the scene group data unintentionally.
- The only communications commands that are accepted during a non-stop data transfer are the measurement (parallel, non-procedure, or PLC Link) and continuous measurement (parallel only) commands.
- The larger the size of the scene group file, the longer the non-stop data transfer will take.
- The communications settings cannot be changed in Non-stop Adjustment Mode.
- Do not register a new Camera Image Input processing unit in the Non-stop Adjustment Mode Window.
- If there is not enough external memory when you are about to do a non-stop data transfer, the transfer may not start. Set the destination for image logging to a destination that does not use external memory.
- If there is not enough RAMDisk space, the Nonstop data transfer may not perform. Set the external memory device to save the Image logging, keep the RAMDisk space.
- Do not change the image mode for Non-stop Adjustment Mode.
- If you use image logging in Non-stop Adjustment Mode, the non-stop data transfer may become unavailable. To avoid this, set the trigger frequency so that it is longer than the logging time.
- Do not make the following changes when using Non-stop adjustment mode.
  - (a) Setting changes in Image Input related processing items
  - (b) Camera parameter changes in System setting
  - (c) Changes in loaded scene data and system data, including the parameters described in (a) and (b) above
- Do not select [Transfer data] during Line1 while Non-stop Adjustment Mode Window is running. You cannot measure during data transfer. Make sure to set [Transfer data] before running.
- When [Parallel Execute] in [Operation mode setting] of System setting is [ON], the measurement time might be longer since the Parallel processing effect is reduced.

The following processing items are supported in Non-Stop Adjustment Mode:

OK:Supported processing item, RST: Processing item with restricted support, ---:Unsupported processing item

Processing item	Support	Processing item	Support	Processing item	
Camera Image Input	---	Glue Bead Inspection	OK	Statistics	---
Camera Image Input FH	---	Position Compensation	OK	Calibration Data Reference	OK
Camera Image Input HDR	---	Filtering	OK	Position Data Calculation	OK
Camera Image Input HDR Lite	---	Back Ground Suppression	OK	Stage Data	OK
Camera Switching	OK	Brightness Correct Filter	OK	Robot Data	OK
Measurement Image Switching	OK	Color Gray Filter	OK	Vision Master Calibration	---
Search	OK	Extract Color Filter	OK	PLC Master Calibration	---
Flexible Search	OK	Anti-Color Shading	OK	Transfer Position Data	OK
Sensitive Search	OK	Stripes Removal Filter II	OK	Calc Axis Move	OK
ECM Search	OK	Polar Transformation	OK	Calc Axis Move by Multipoint	OK
EC Circle Search	OK	Trapezoidal Correction	OK	Detection Point	OK
Ec Corner	OK	Machine Simulator	OK	Camera Calibration	OK

OK:Supported processing item, RST: Processing item with restricted support, ---:Unsupported processing item

Processing item	Support	Processing item	Support	Processing item	
Ec Cross	OK	Image Subtraction	RST(*1)	Data Save	OK
Shape Search II	OK	Advanced Filter	OK	Conditional Branch	OK
Classification	OK	Panorama	OK	End	OK
Edge Position	OK	Calculation	OK	DI Branch	---
Edge Pitch	OK	Line Regression	OK	Control Flow Normal	RST(*3)
Scan Edge Position	OK	Circle Regression	OK	Control Flow PLC Link	RST(*3)
Scan Edge Width	OK	Precise Calibration	OK	Control Flow Parallel	RST(*3)
Circular Scan Edge Position	OK	User Data	OK	Control Flow Fieldbus	RST(*3)
Circular Scan Edge Width	OK	Set Unit Data	OK	Selective Branch	OK
Color Data	OK	Get Unit Data	OK	Data Output	OK
Gravity and Area	OK	Set Unit Figure	OK	Parallel Data Output	OK
Labeling	OK	Get Unit Figure	OK	Parallel Judgement Output	OK
Label Data	OK	Trend Monitor	---	Fieldbus Data Output	OK
Defect	OK	Image Logging	OK	Result Display	OK
Precise Defect	OK	Image Conversion Logging	RST(*2)	Display Image File	OK
Fine Matching	OK	Data Logging	RST(*2)	Display Last NG Image	OK
Character Inspection	OK	Elapsed Time	OK	OCR	OK
Date Verification	OK	Wait	OK	OCR User Dictionary	OK
Model Dictionary	OK	Focus	OK	Conveyor Calibration	OK
2D Codes	OK	Iris	OK	Conveyor Panorama Display	---
Circle Angle	OK	Unit Macro	OK	Multi-Trigger Imaging	OK
Shape Search III	OK	Unit Calculation Macro	OK	Multi-Trigger Imaging Task	OK
Intersection	OK	Parallelize	OK		
Barcode	OK	Parallelize Task	OK		

\*1: The [Subt./Reg.] and [DI Register] measurement modes are not supported.

\*2: Re-measured images in Non-Stop Adjustment Mode are logged.

\*3: Sensor Controller in Non-Stop Adjustment Mode does not stand by.

## Standard (Operation Mode)

Normally, the sensor controller executes measurements, image logging, and image display in a designated order. The FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series execute those processes with one of the CPU cores, and uses the rest of the cores for measurement processing. This ensures that measurements are always processed at maximum performance.

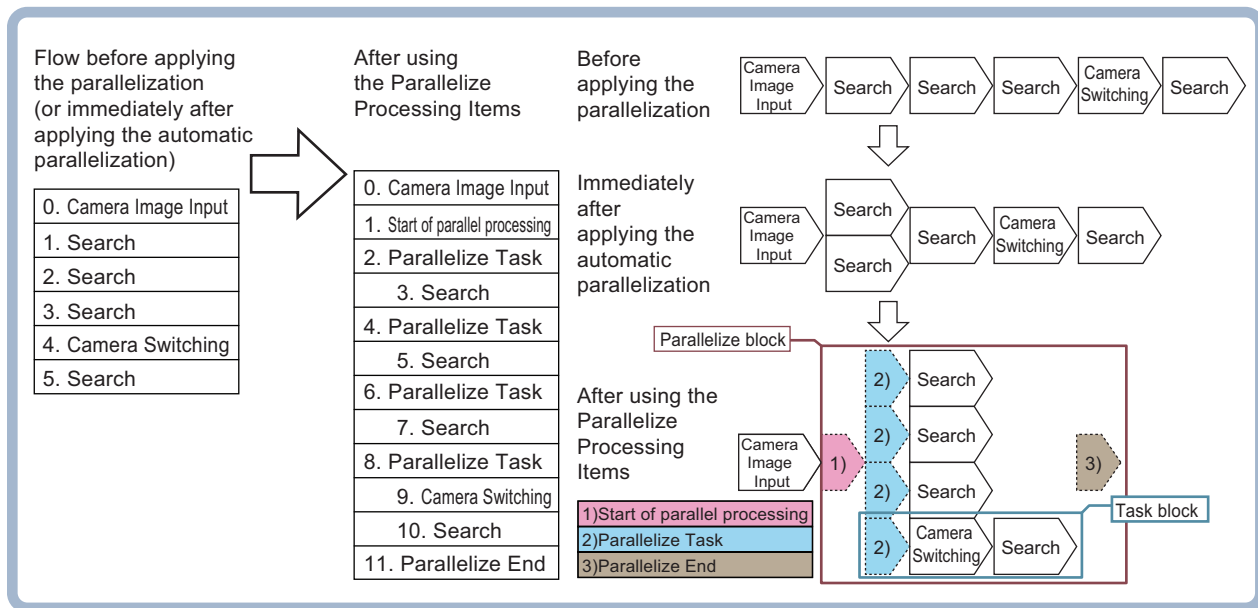
# Parallel Processing

This function is exclusively for an FH series / FZ5-1100 series.

There are two types of processing in the Parallel processing: Automatic parallelization and Manual parallelization.

The automatic parallelization automatically parallelize a measurement flow if [Parallel Execute] under [Operation mode setting] is turned ON.

The manual parallelization allows you to use the processing items for the parallel processings to freely edit a measurement flow after automatic parallelization. If you use the manual parallelization to separate a part of the measurement flow into multiple tasks and process each of these tasks in parallel reduces the processing time of the measurements.



## Parallel Processing Settings (Automatic Parallelization)

Parallel processing is available when [Parallel Execute] is set to ON in the [Operation mode setting].

If you turn ON [Parallel Execute] under [Operation mode setting], the automatic parallelization automatically classify the type of processing items assigned to the measurement flow and parallelize the items of the same classification.

Refer to the following for details on the processing items that are automatically parallelized.

Reference: ▶ Processing Items That Supports Automatic Parallelization (p.263)

It is possible to affect each of Operation mode when Parallel processing is ON. Please if needed, refer to

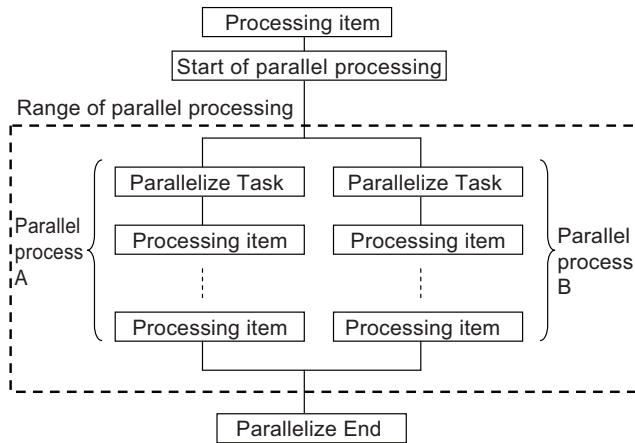
Reference: ▶ The effect of Parallel processing on the Operation mode (p.258).

## Parallel Processing Settings (Manual Parallelization)

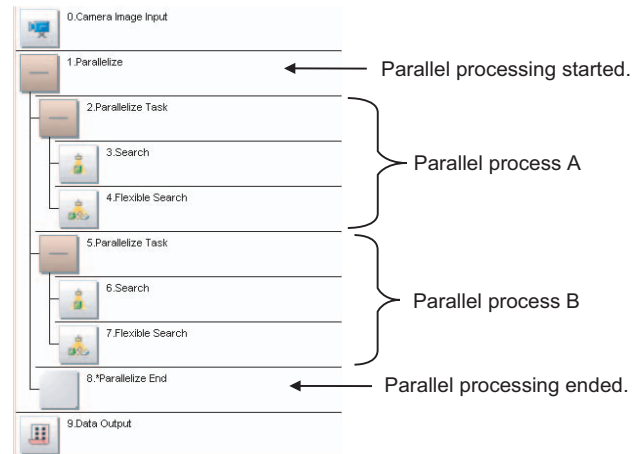
If you use the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller, you will need to convert the measurement flow to the parallelized flow in advance to specify the parallel processing. The conversion can be done by applying the automatic parallelization to the flow and use the parallel processing items.

To specify this yourself, add parallel items as shown in the following measurement flow.

## Concept of a Parallelized Measurement Flow



## Actual Measurement Flow



- The range from the Parallelize processing item to the Parallelize End processing item is called a *parallel block*.
- The processing range of the Parallelized Task processing item is called a *task block*. A task block is a group of measurement processes that are distributed among multi-core CPU.  
In a measurement flow, the task block is the range from the Parallelize Task processing item to the next Parallelize Task processing item, or the point that comes just before the Parallelize End processing item.

### IMPORTANT

Operation mode and parallel processing are not apply to FZ5-L series/FZ5-600 series.

### Note

If [Parallel process] is turned OFF in the [Operation mode setting], the measurement flow is processed in series in order of the unit numbers.

## Processing Items for Parallel Processing

You use the following three items.

Processing item category	Processing item name	Description
Measurement support processing items (Inspection and measurement support items)	Parallelize	Marks the beginning of a parallel processing range.
	Parallelize Task	Gives the range to be parallelized.
	Parallelize End	Marks the end of a parallel processing range.

Reference: Refer to the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for information on the parameters for the above items.

## Programming Parallel Processing Items

- Always use the Parallelize and Parallelize End processing items in pairs.
- Do not place processing items between the Parallelize processing item and Parallelize Tack processing item. Any processing units that are placed in this position will not be executed.
- Always insert the Parallelize Task processing item between the Parallelize processing item and Parallelize End processing item.
- If you program a branch under a Parallelize Task processing item, make sure the branch stays within the range of the Parallelize Task processing item.

## Specific Example of Parallel Processing

You can use the automatic parallelization in combination with the manual parallelization to parallelize the following example flow. First, use the automatic parallelization to parallelize three inspection items, 3. Search, 5. Search, and 7. Search. Then, use the manual parallelization to parallelize two inspection items, 9. Camera Switching and 10. Search.

Example:

Parallelization processing application status	Measurement flow	Flow of processing	Remarks												
Before applying the parallelization (automatic parallelization: OFF, manual parallelization: not applied)	<table border="1"> <tr><td>0. Camera Image Input</td></tr> <tr><td>1. Search</td></tr> <tr><td>2. Search</td></tr> <tr><td>3. Search</td></tr> <tr><td>4. Camera Switching</td></tr> <tr><td>5. Search</td></tr> </table>	0. Camera Image Input	1. Search	2. Search	3. Search	4. Camera Switching	5. Search								
0. Camera Image Input															
1. Search															
2. Search															
3. Search															
4. Camera Switching															
5. Search															
Applying the automatic parallelization only	Same as above.		When using four CPU cores on the FH sensor controller												
Applying the automatic parallelization in combination with the manual parallelization	<table border="1"> <tr><td>0. Camera Image Input</td></tr> <tr><td>1. Start of parallel processing</td></tr> <tr><td>2. Parallelize Task</td></tr> <tr><td>3. Search</td></tr> <tr><td>4. Parallelize Task</td></tr> <tr><td>5. Search</td></tr> <tr><td>6. Parallelize Task</td></tr> <tr><td>7. Search</td></tr> <tr><td>8. Parallelize Task</td></tr> <tr><td>9. Camera Switching</td></tr> <tr><td>10. Search</td></tr> <tr><td>11. Parallelize End</td></tr> </table>	0. Camera Image Input	1. Start of parallel processing	2. Parallelize Task	3. Search	4. Parallelize Task	5. Search	6. Parallelize Task	7. Search	8. Parallelize Task	9. Camera Switching	10. Search	11. Parallelize End		
0. Camera Image Input															
1. Start of parallel processing															
2. Parallelize Task															
3. Search															
4. Parallelize Task															
5. Search															
6. Parallelize Task															
7. Search															
8. Parallelize Task															
9. Camera Switching															
10. Search															
11. Parallelize End															

## Restrictions

### ● The effect of Parallel processing on the Operation mode

- Measurement processing speed will be faster because all cores are used for one measurement when Parallel processing is ON.

However, processing time may vary greatly due to CPU core scrambling.

This may cause a delay in the timing of logging operations and display updates.

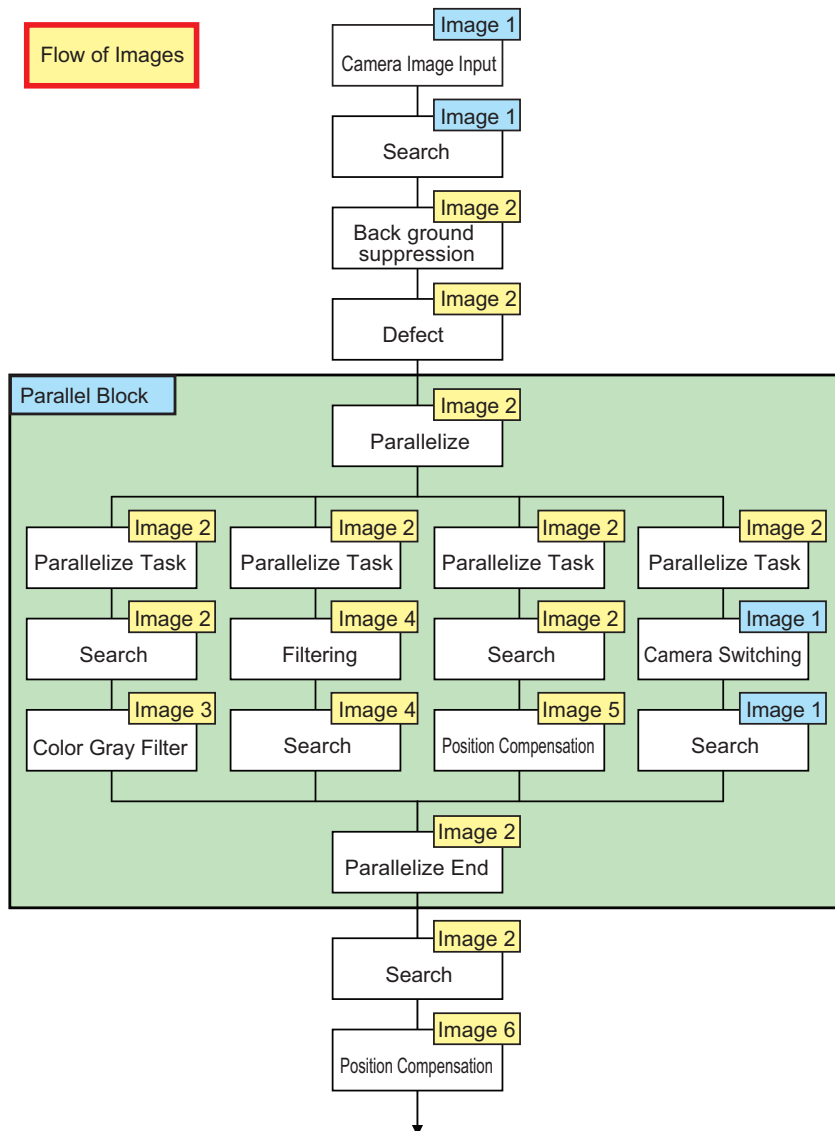
- One CPU core is used at one measurement processing when Parallel processing is OFF. There will be less variation in processing speed because separate cores will be assigned to measurement and other processes.
- It is possible to affect each of Operation mode functions when Parallel processing is ON as described below.

Operation mode	Parallel processing is ON
Standard (Operation mode)	The time for one measurement is fastest for all modes.
Double Speed Multi-input	Highest measurement count per time unit.
Non-stop Adjustment	It is possible the measurement on the Non-stop Adjustment side or transfer of the Non-stop data to affect to the measurement of the running side.
Multi-line Random trigger	Measurement of the other line can affect the measurement processing time.



## ● Flow of Images

- The image at the start of parallel processing is passed on to the next item for use in each task block.
- The image for the start of parallel operation is also the image that is used after the Parallelize End processing item.

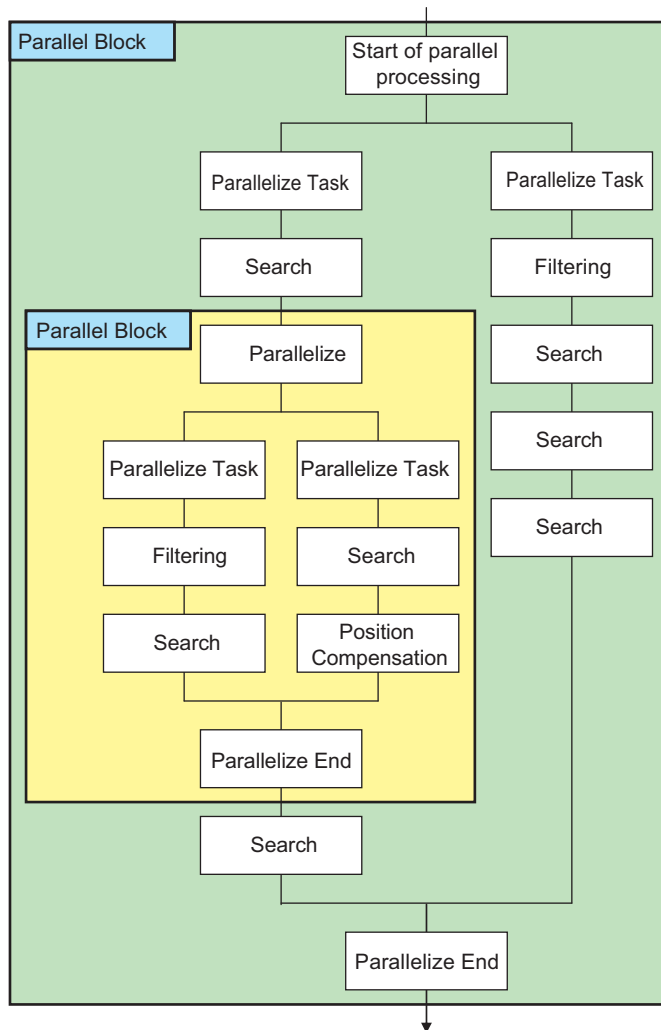


- Note that you cannot assign any Camera Image Input processing item within task blocks. To change the Camera image, you must use the Camera Switching processing item and set a different Camera number.

## Nesting

- Parallel blocks can be nested.

Example:



## Processing Order

The processing order for Parallelize Task processing items is not defined. Do not program a measurement flow that relies on a specific processing order of Parallelize Task processing items.

## Transaction Times

Parallel processing may not be able to reduce transaction times as effectively as expected due to the processing time of each task, and the number of CPU cores. Before commissioning the system, always check the transaction time with the actual measurement flow and image.

## Inserting Camera Image Input Processing Items

- Do not insert a Camera Image Input processing item inside the range of a Parallelize Task processing item. To use a different Camera image for a measurement under a Parallelize Task processing item, use the Camera Switching processing item inside the range of the Parallelize Task processing item.
- When inside the range of a Parallelize Task processing item, do not reference an image that is processed under a different Parallelize Task processing item.

## Getting and Setting Data

- Do not get or set user data and system data inside task blocks.
- When inside the range of a Parallelize Task processing item, do not get or set unit data from a processing unit that is under a different Parallelize Task processing item.
- Do not input or output to the same file from a processing unit that is under a different Parallelize Task processing item.

## Accessing the Same File

Do not input or output to the same file that is used for data logging in a task block.

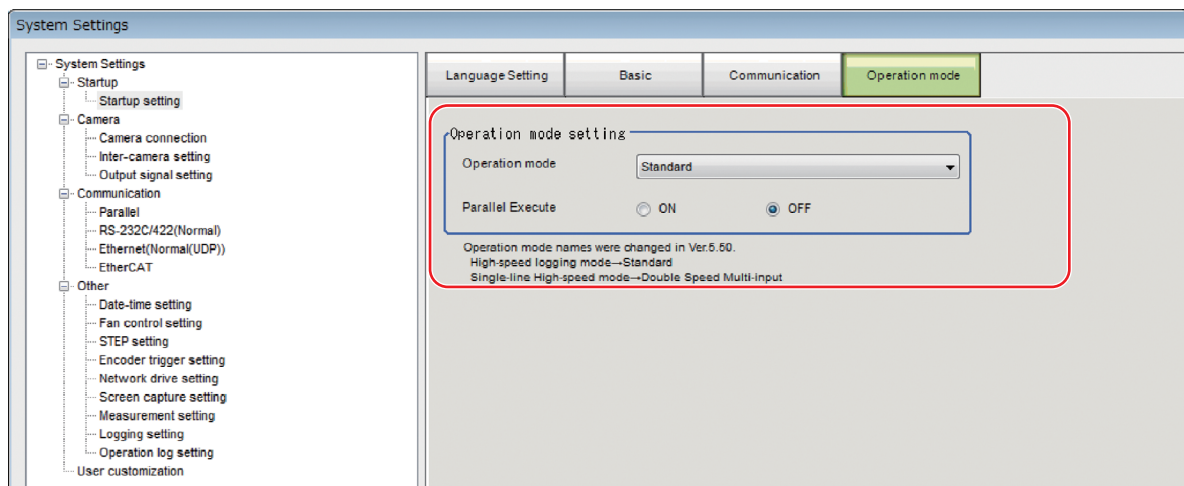
## Setting Procedures

This section describes the settings that are required to enable parallel processing.

### Setting the Operation Mode

Use the following procedure to set [Parallel processing] or ON in the [Operation mode setting].

- 1** In the Main Window (layout 0), select [Tool] – [System Settings].
- 2** In the [Startup setting], click the [Operation mode] tab.
- 3** Select [ON] for [Parallel Execute].



#### Note

It is possible to affect each of Operation mode when Parallel processing is ON. Please if needed, refer to The effect of Parallel processing on the Operation mode (p.258)

Major effects for each operation mode are as follows.

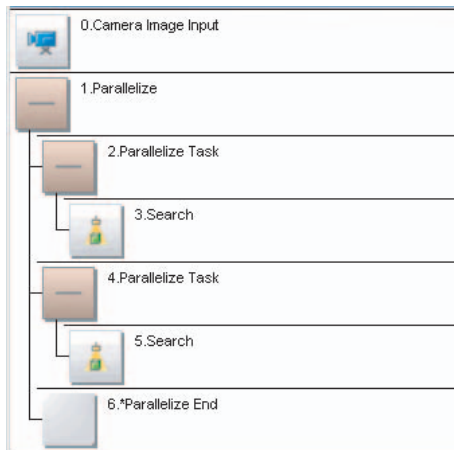
- [Standard] (Operation Mode): Logging processing may take longer.
- Double Speed Multi-input Mode: Measurement time may be inconsistent, although the volume of measurements that can be handled per increment of time is the same.
- Non-stop adjustment mode: If a remeasurement is performed on the Setup Window, processings on Run Window may take longer.
- Multi-line random-trigger mode: Measurement on each line may affect the measurement time on other lines.

## Editing the Measurement Flow

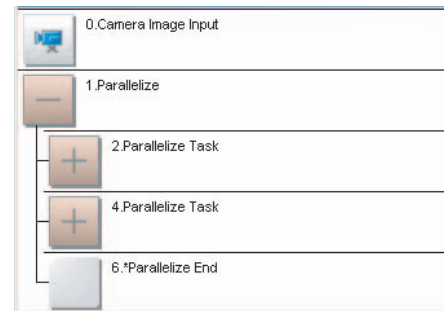
- 1** In the Main Window (layout 0), select [Function] – [Edit Flow].
- 2** Drag the following processing items from under [Inspection and measurement support items], or click the [Insert] button.
  - Parallelize
  - Parallelize Task
- 3** Program the processing items to execute in parallel between two Parallelize Task processing items.

Example:

Fully Expanded



Parallel Blocks Collapsed



The Parallelize processing item is the parent, and everything up to the Parallelize End processing item is a child. Additionally, the Parallelize Task processing item is the parent, and everything up to the step just before the next Parallelize Task processing item or the Parallelize End processing item is a child.

There is no settings dialog box for Parallelize processing items.

The Parallelize End processing item is not displayed in the list of items. (It is registered as a set with the Parallelize processing item).

### Precautions on Flow Editing

- Editing operations on parallel blocks and task blocks, such as register, move, delete, copy, and paste, and unit save and load operations, are performed on the parallel block as a group.
- You cannot delete a Parallelize End processing item by itself. It is deleted as a set with the Parallelize processing item.
- You cannot paste or move items within the same parallel block.
- If a processing item in a parallel block is set to reference data in a processing unit that is inside the block, and if that block is copied, the reference will be replaced with a reference to the unit in the block at the copy destination. References to a unit that is outside the parallel block will be retained.
- You cannot move, paste, or load a task block outside of its parallel block.

## Processing Items That Supports Automatic Parallelization

The following table lists the processing items that support the automatic parallelization.

Processing item	Parallelize processing	Processing item	Parallelize processing	Processing item	Parallelize processing
Camera Image Input	---	Glue Bead Inspection	OK	Statistics	---
Camera Image Input FH	---	Position Compensation	---	Calibration Data Reference	---
Camera Image Input HDR	---	Filtering	---	Position Data Calculation	---
Camera Image Input HDR Lite	---	Back Ground Suppression	---	Stage Data	---
Camera Switching	---	Brightness Correct Filter	---	Robot Data	---
Measurement Image Switching	---	Color Gray Filter	---	Vision Master Calibration	---
Search	OK	Extract Color Filter	---	PLC Master Calibration	---
Flexible Search	OK	Anti-Color Shading	---	Transfer Position Data	---
Sensitive Search	OK	Stripes Removal Filter II	---	Calc Axis Move	---
ECM Search	OK	Polar Transformation	---	Calc Axis Move by Multipoint	---
EC Circle Search	OK	Trapezoidal Correction	---	Detection Point	---
Ec Corner	OK	Machine Simulator	---	Camera Calibration	---
Ec Cross	OK	Image Subtraction	---	Data Save	---
Shape Search II	OK	Advanced Filter	---	Conditional Branch	---
Classification	OK	Panorama	---	End	---
Edge Position	OK	Calculation	---	DI Branch	---
Edge Pitch	OK	Line Regression	---	Control Flow Normal	---
Scan Edge Position	OK	Circle Regression	---	Control Flow PLC Link	---
Scan Edge Width	OK	Precise Calibration	---	Control Flow Parallel	---
Circular Scan Edge Position	OK	User Data	---	Control Flow Fieldbus	---
Circular Scan Edge Width	OK	Set Unit Data	---	Selective Branch	---
Color Data	OK	Get Unit Data	---	Data Output	---
Gravity and Area	OK	Set Unit Figure	---	Parallel Data Output	---
Labeling	OK	Get Unit Figure	---	Parallel Judgement Output	---
Label Data	---	Trend Monitor	---	Fieldbus Data Output	---
Defect	OK	Image Logging	---	Result Display	---
Precise Defect	OK	Image Conversion Logging	---	Display Image File	---
Fine Matching	OK	Data Logging	---	Display Last NG Image	---
Character Inspection	OK	Elapsed Time	---	OCR	OK
Date Verification	---	Wait	---	OCR User Dictionary	---
Model Dictionary	---	Focus	OK	Conveyor Calibration	---
2D Codes	---	Iris	OK	Conveyor Panorama Display	---
Circle Angle	OK	Unit Macro	---	Multi-Trigger Imaging	OK
Shape Search III	---	Unit Calculation Macro	---	Multi-Trigger Imaging Task	OK
Intersection	OK	Parallelize	---		
Barcode	OK	Parallelize Task	---		

### Note

Some processing items are processed in parallel as individual units.

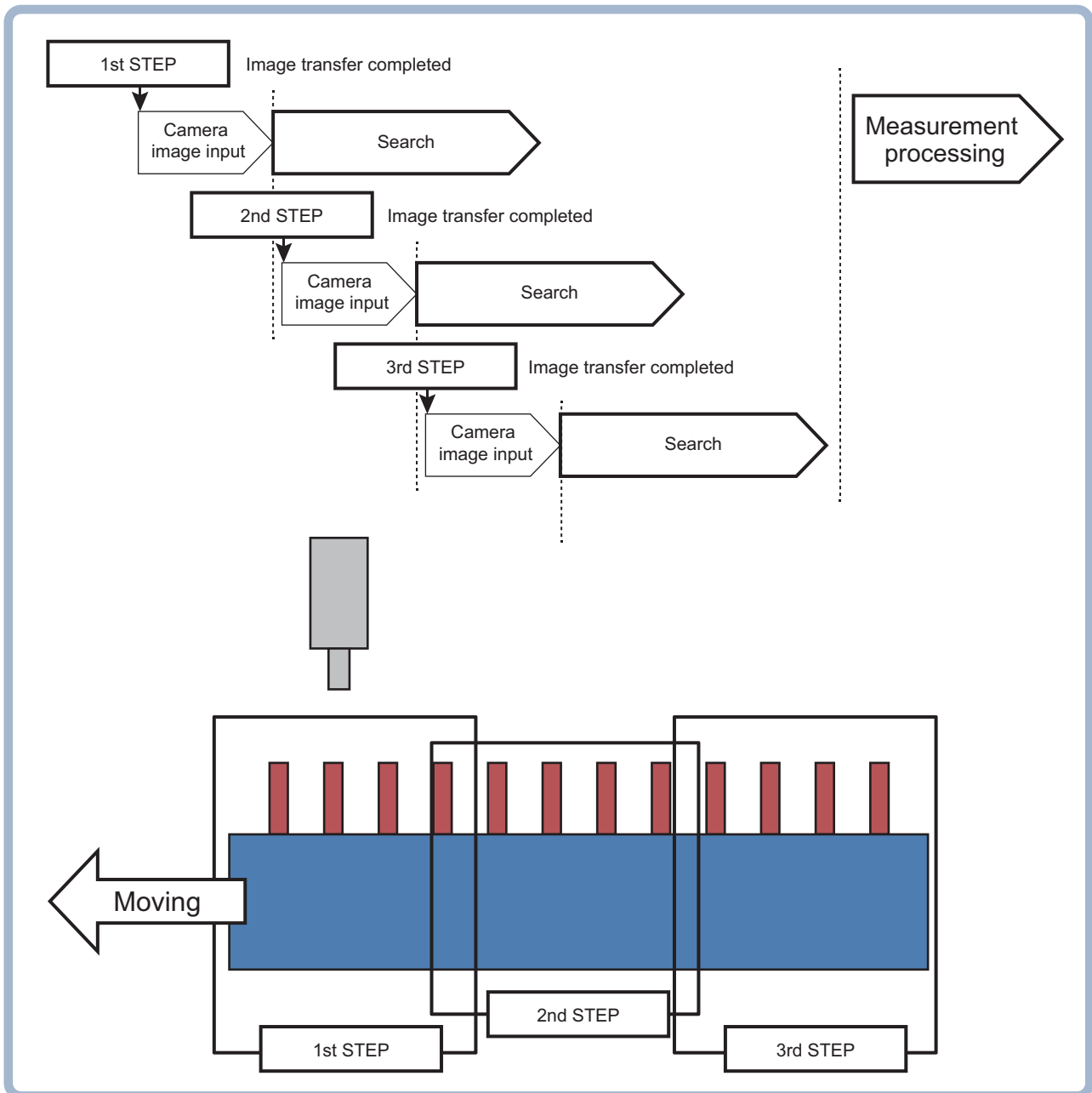
## Troubleshooting

Symptom	Correction
An error message is displayed on the Console Window.	Refer to the error message list.
Insertion position for a unit to parallelize	Do not place items between the Parallelize item and Parallelize Task item. Any process units that are placed in that position will not be executed.
Insertion position of a parallelize processing items	Always insert the Parallelize Task processing item between Parallelize and Parallelize End processing items.
Setting the Parallelize processing item	Always use Parallelize and Parallelize End processing items in pairs.
Camera Image Input processing items are not being processed in parallel	Do not insert Camera Image Input processing items under Parallelize Tasks processing items. To use a different Camera image for a measurement under a Parallelize Task processing item, use the Camera Switching processing item under the Parallelize Task processing item.
Getting and setting the image from more than one Parallelize Task processing item	Do not reference an image that is processed under a different Parallelize Task processing item.
Getting and setting data from more than one Parallelize Task processing item	Do not get or set figure data from a processing unit that is inside the range of a different Parallelize Task processing item. Do not get or set unit data from a processing unit that is inside the range of a different Parallelize Task processing item.
Accessing files from under more than one Parallelize Task processing item	Do not input or output to the same file from a processing unit that is under a different Parallelize Task processing item.
Conditional branching under a Parallelize Task processing item	If you need to branch the processing items inside the range of a Parallelize Task processing item, make sure the branch stays within the range of the Parallelize Task processing item.
Processing order of Parallelize Tasks	The processing order for the Parallelize Task processing units is not defined. Do not program a measurement flow that relies on a specific processing order of Parallelize Task processing items.
Improving processing speed with Parallelize Task processing item	Parallel processing may not reduce transaction times as much as expected due to the processing time of each task, and the number of CPU cores. Before commissioning the system, always check the transaction time with the actual measurement flow and image.
Getting and setting system data under Parallelize Task processing items	Do not get or set user data and system data within the range of a Parallelize Task processing item.

# Multi-trigger Imaging Processing Function

This function can be used only with FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series. The Multi-trigger Imaging processing item captures multiple images at user-defined timings and executes parallel measurement for each image. If the controller has consecutive STEP inputs, it performs measurement processing in each Multi-trigger Imaging Task in parallel. The system can perform high-speed processing and measurement at desired timings.

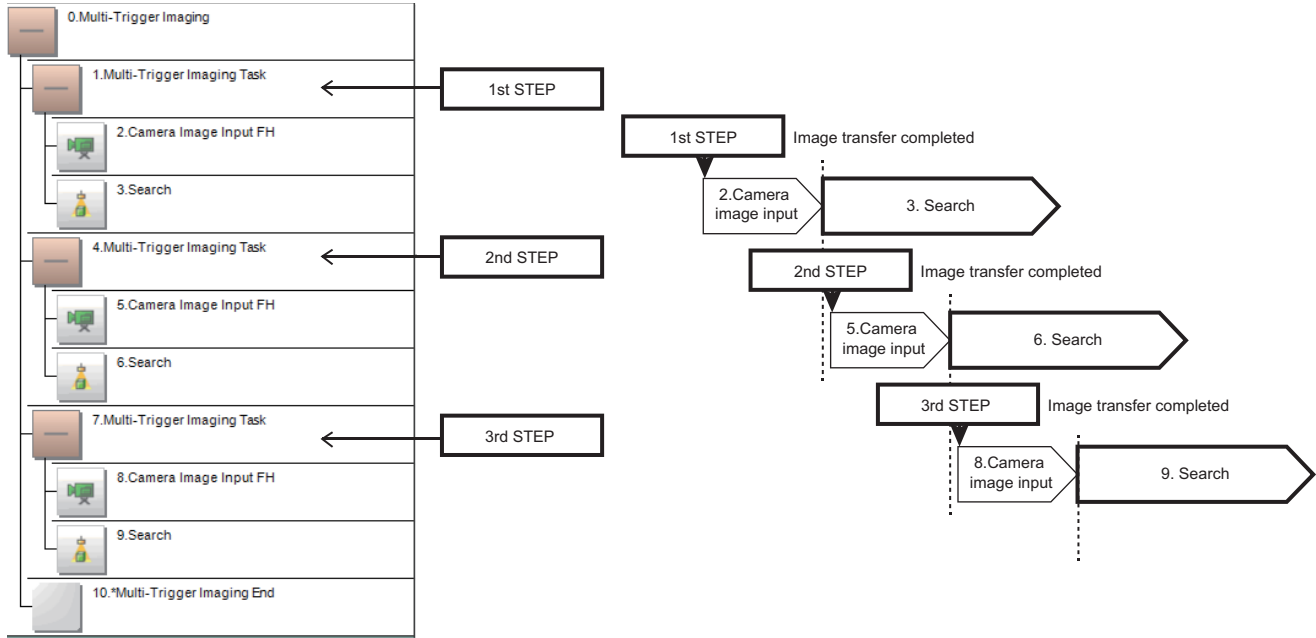
This function takes multiple images of a long and thin workpiece, e.g. a connector at certain timings. While the system takes images for multiple times, it executes measurement for each image in parallel. After that, measurement processing is performed based on the measurement results.



## Settings for Multi-trigger Imaging

To use Multi-trigger Imaging function, enter the Multi-trigger Imaging, Multi-trigger Imaging Task and Multi-trigger Imaging End processing items as a group.

Flow configuration and execution image of Multi-trigger Imaging Processing



### Multi-trigger Imaging Settings

- The Multi-trigger Imaging Tasks that are placed between the Multi-trigger Imaging processing item and Multi-trigger Imaging End processing item are executed one by one with a STEP signal input in the order of flow settings.
- The processing range of Multi-trigger Imaging Task processing item is called as a Multi-trigger Imaging Task block. A task block is a group of measurement processes.
- The Multi-trigger Imaging Task block represents the following in the Measurement Flow.  
Range from Multi-trigger Imaging Task processing item to the point that comes just before the next Multi-trigger Imaging Task processing item.  
Range from Multi-trigger Imaging Task processing item to the point that comes just before the Multi-trigger Imaging Task End.
- If a STEP signal is not input, Multi-trigger Imaging Task processing item waits for the timeout time without executing the processing items included in the Multi-trigger Imaging Task block.  
When the first STEP signal is input, processing items in the first Multi-trigger Imaging Task block is executed.  
When the second STEP signal is input, it moves to the processing items in the second Multi-trigger Imaging Task block and they are executed.  
After processing for all the Multi-trigger Imaging Task blocks are completed reaching to the Multi-trigger Imaging End processing item, the processing items set afterward will be sequentially executed.
- The signals that can be used as an image capture trigger are STEP signal of parallel and Trigger signal of EtherCAT. Measurement executed by signals other than these signals or control command does not wait the STEP signal and flow is executed automatically as the controller does in the previous system. The signals that can be uses as READY signal are READY signal of parallel and Trigger Ready of EtherCAT signal.
- STEP signal can be input only when the READY signal is ON.
- The Multi-trigger Imaging Task block must contain at least one Input Image processing item and executes processing that is assigned after Input Image processing item.



## Processing Items for Multi-trigger Imaging Processing

You can use the following three processing items.

Processing Item Type	Processing item name	Description
Capture Images [Input image]	Multi-trigger Imaging	Processing item which means a start of Multi-trigger Imaging
	Multi-trigger Imaging Task	Processing item which means a start of Multi-trigger Imaging Task Block. With a STEP input, a Multi-trigger Imaging Task Block is executed.
	Multi-trigger Imaging End	A processing item which means an end of Multi-trigger Imaging.

Refer to *Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat No. Z341)* for the details of the settings of above items.

## Allocating Multi-trigger Imaging Processing Items

- Always use the Multi-trigger Imaging and Multi-trigger Imaging End processing items in pairs.
- Do not place processing items between the Multi-trigger Imaging processing item and Multi-trigger Imaging Task processing item. Any processing units that are placed in this position will not be executed.
- Always allocate the Multi-trigger Imaging Task processing item between the Multi-trigger Imaging processing item and Multi-trigger Imaging End processing item.
- If you program a branch under a Multi-trigger Imaging Task processing item, make sure the branch stays within the range of the Multi-trigger Imaging Task processing item.

## Restrictions

### ● About STEP Signal Input

- The signals that can be used as STEP signals are STEP signal of parallel and Trigger input of EtherCAT. The signals that can be used as READY signal are READY signal of parallel and Trigger Ready of EtherCAT.
- Program the PLC so that STEP signal is not input while READY signal is OFF.  
If a STEP signal is input while READY signal is OFF, an ERROR signal will be output and the unit which did not complete imaging will terminate the flow without performing measurement.
- Measurement executed by signals other than STEP signal or control command does not wait the STEP signal and flow is executed automatically as the controller does in the previous system.

### ● About Multi-trigger Imaging

- Always set the Multi-trigger Imaging processing item to the start of measurement flow, processing unit 0.
- Always use only one Multi-trigger Imaging processing item in one flow.

### ● About Multi-trigger Imaging Task

- Always insert at least one Multi-trigger Imaging Task processing item between the Multi-trigger Imaging and Multi-trigger Imaging End processing items.
- The maximum of 32 Multi-trigger Imaging Tasks can be allocated between the Multi-trigger Imaging and Multi-trigger Imaging End processing items.

### ● About Multi-trigger Imaging Task and Input Image processing items

- The Input Image processing items that can be allocated in the Multi-trigger Imaging Task processing item are the following.  
FH series Sensor Controller  
: [Camera Image Input FH], [Camera Image Input HDR], and [Camera Image Input HDR-Lite].  
FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller  
: [Camera Image Input], [Camera Image Input HDR], and [Camera Image Input HDR-Lite].
- Always use at least one Input Image processing unit within the processing range of Multi-trigger Imaging Task processing item (Multi-trigger Imaging Task block).
- When there are multiple Camera Image Input HDR processing items or Camera Image Input HDR-Lite processing items in one Multi-trigger Imaging Task block, the system will operate with the setting [Non-Multi-input] mode, even if you select [Multi-input] mode.
- When there are multiple Input Image processing items in one Multi-trigger Imaging Task block, the system will operate with the setting [Non-Multi-input] mode, even if you select [Multi-input] mode.

### ● Restrictions in allocating processing items

- Use "Conditional Branching" or "Selective Branching" processing items to avoid the following.  
: Settings to move from WITHIN the range between Multi-trigger Imaging processing item and Multi-trigger Imaging End processing item to OUTSIDE of it, or that in reversed direction.  
: Settings to move between the Multi-trigger Imaging Task blocks.
- Do not allocate Input Image processing items to the following positions.  
: Position higher than Multi-trigger Imaging processing item (such as unit 0)  
: Position between the Multi-trigger Imaging processing item and Multi-trigger Imaging Task processing item.
- Do not refer the data between the Multi-trigger Imaging Task blocks for calculations.

### ● About parallel processing

- If parallel processing is activated (if you select ON for the [Parallel Execute] settings in the [System settings]), Multi-trigger Imaging Task block is executed in parallel. The processing items in a task block are not processed in parallel, but executed sequentially.  
The number of Multi-trigger Imaging Task blocks that can be performed in parallel is same as the number of CPU cores.  
If parallel processing is disabled, Multi-trigger Imaging Task blocks are executed sequentially.

### ● About image mode

- If the Image mode of the Image Window Setting is set as [Through], flow is executed automatically as the controller does in the previous system.

## Setting Methods

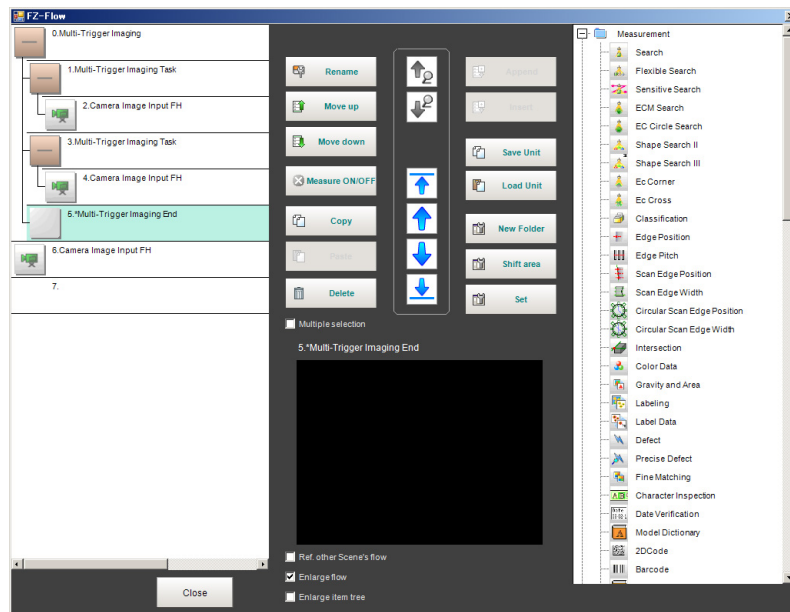
This section explains the setting method to use the Multi-trigger Imaging.

### Editing Measurement Flow

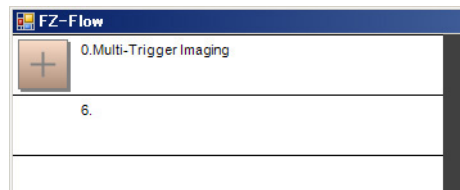
- 1** In the Main Window (layout 0), select [Function] [Edit Flow].
- 2** Select [0.Camera Image Input FH].
- 3** Select [Multi-trigger Imaging] processing item under the [Loading Images], and then click the [Insert] button.
- 4** The warning dialog is displayed. Click the OK button.



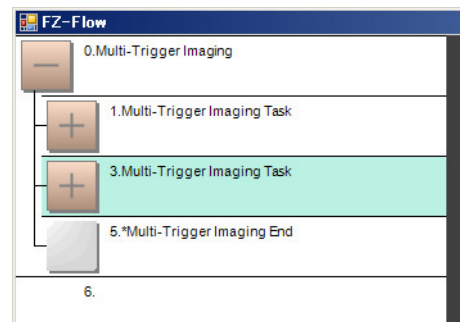
Two task blocks which consist of Multi-trigger Imaging Task and Camera Image Input FH will be added between the Multi-trigger Imaging and Multi-trigger Imaging End.



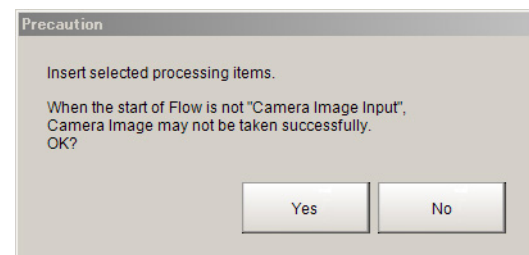
Example:  
 Block of Multi-trigger Imaging and Multi-trigger Imaging Task  
 Multi-trigger imaging collapsed view.



Multi-trigger Imaging Task collapsed view.



- 5** Select [6. Camera Image Input FH].
- 6** Click the [Insert] button.
- 7** The warning dialog is displayed. Click the OK button.

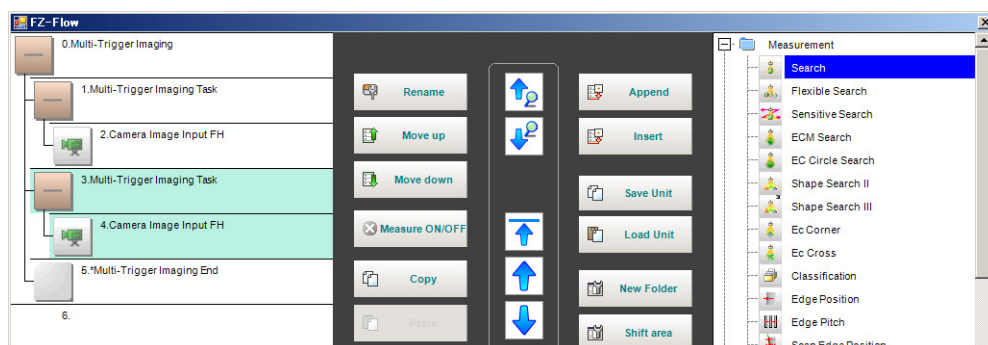


**8** Insert a processing item between two Multi-trigger Imaging Tasks.

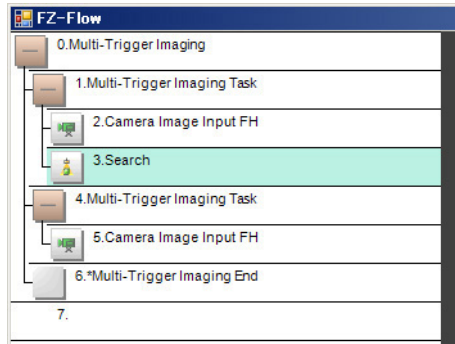
Select a Multi-trigger Imaging Task that is placed just under the Multi-trigger Imaging Task to which a processing item is added. Click a processing item to add, and then click the [Insert] button.

Example:

Inserting Search processing item  
 Before clicking the [Insert] button



After clicking the [Insert] button



The Multi-trigger Imaging processing item is the parent, and everything up to the Multi-trigger Imaging End processing item is a child.

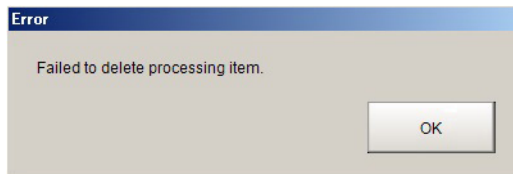
Additionally, the Multi-trigger Imaging Task processing item is the parent, and everything up to the step just before the next

Multi-trigger Imaging Task processing item or the Multi-trigger Imaging End processing item is a child.

The Multi-trigger Imaging End processing item is not displayed in the list of items. (It is registered as a set with the Multi-trigger Imaging processing item).

## ● Precautions on Flow Editing

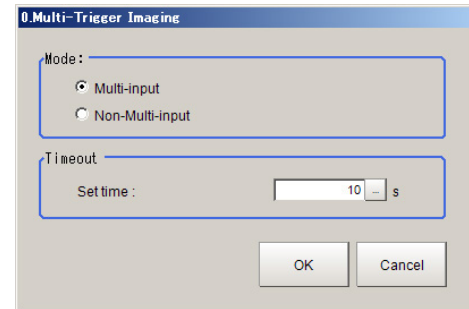
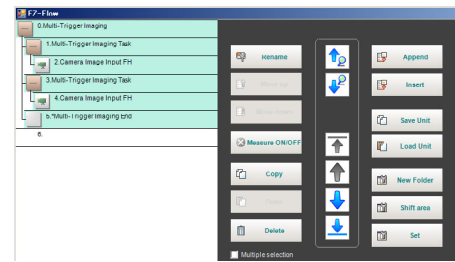
- Editing operations on Multi-trigger Imaging blocks and task blocks, such as register, move, delete, copy, and paste, and unit save and load operations, are performed on the Multi-trigger Imaging block as a group.
- You cannot delete a Multi-trigger Imaging End processing item by itself. If it is deleted, an error dialog will be displayed.



## Setting parameters of Multi-trigger Imaging Processing Items

Follow the steps below to configure the parameters of Multi-trigger Imaging Processing Items.

- 1 In the Main Window (layout 0), select [Function] - [Edit Flow].
- 2 Select the [Multi-trigger Imaging] to configure.
- 3 Click the [Set].
- 4 Select the mode and set the time for timeout.



Setting item	Set value [Factory default]	Description
Mode	<ul style="list-style-type: none"> <li>• [Multi-input]</li> <li>• Non-Multi-input</li> </ul>	<p>Set the processing mode of Multi-trigger Imaging Task</p> <ul style="list-style-type: none"> <li>• Multi-input: Select this if Multi-input mode is used in the Multi-trigger Imaging Task. The Camera setting for the Input image processing item of the first Multi-trigger Imaging Task is applied to that for other Input image processing items that are executed in Multi-trigger Imaging Tasks.</li> <li>• Non-Multi-input: Cameras operate according to their own settings. The Camera setting for the Input image processing item of the Multi-trigger Imaging Task is applied to each execution of Input image processing items. Because Camera setting is executed at each execution of Input image preprocessing item, the time that READY signal stays OFF becomes longer by several ms to several tens of ms compared with that in Multi-input mode.</li> </ul>
Timeout	0 to 60s [10]	<p>Set the time for timeout of Multi-trigger Imaging Task block.</p> <p>It is a wait time between a Multi-trigger Imaging Task and the next one.</p> <p>When a STEP signal is not input within the timeout time after the READY signal turns ON, the Multi-trigger Imaging unit judgment will be NG.</p>

### IMPORTANT

In the following cases, the system operates in Non-Multi-input mode, regardless of the settings for Mode.

- Camera Image Input HDR or Camera Image Input HDR Lite is used.
- Multiple Input image processing items are used in one Multi-trigger Imaging Task block.
- FZ-SQ□□□□ camera is used with its light ON.
- Input image processing item is inserted outside of the range between Multi-trigger Imaging and Multi-trigger Imaging End processing items.

There are restrictions below when FZ-FQ□□□□ camera is used with its light ON.

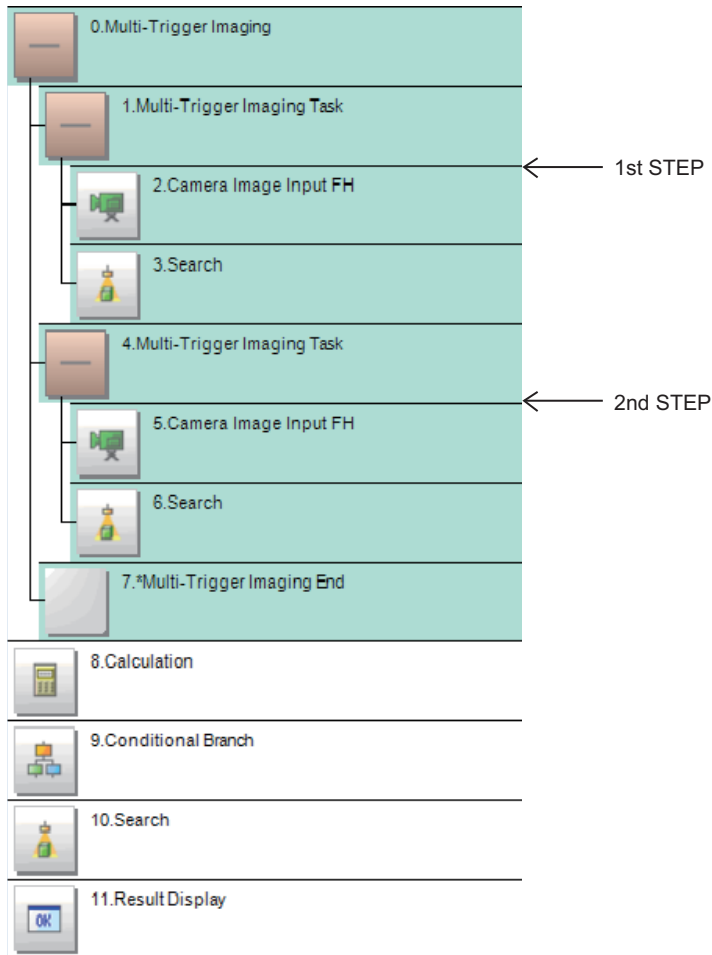
- All Camera Image Input processing items operate with the settings for the Camera Image Input of the first Multi-trigger Imaging Task in the flow.
- The system operates in Non-Multi-input mode. (It takes longer time to turn ON the READY signal).
- When the light of FZ-FQ□□□□ camera is OFF, the camera operates in the same way as other camera does.

## About Multi-input function (Multi-trigger Imaging)

The Multi-input function allows sequential high-speed image input. Next STEP signal can be received when the Input image is completed (READY Signal ON).

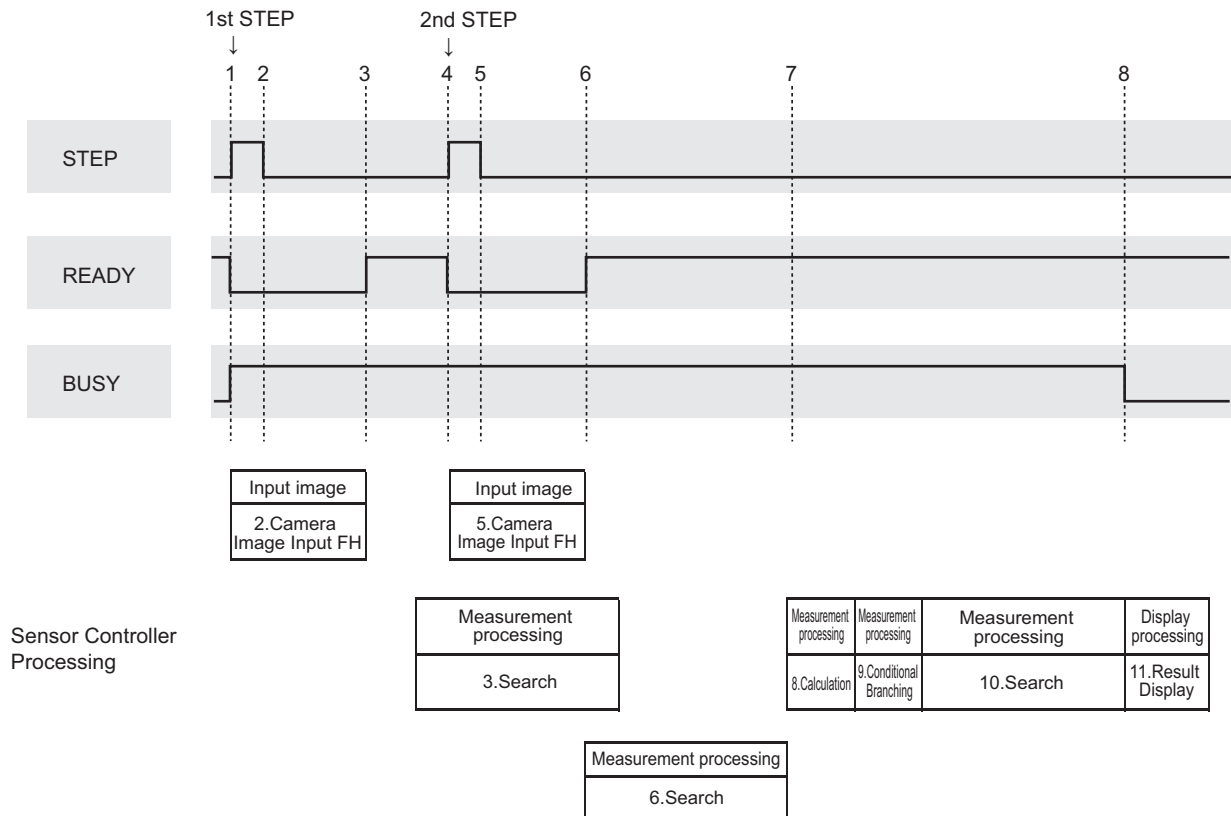
Multi-input function can be used with Multi-trigger Imaging processing. Refer to the following application examples of Multi-trigger Imaging.

### Multi-trigger Imaging Flow Example



## Timing Chart

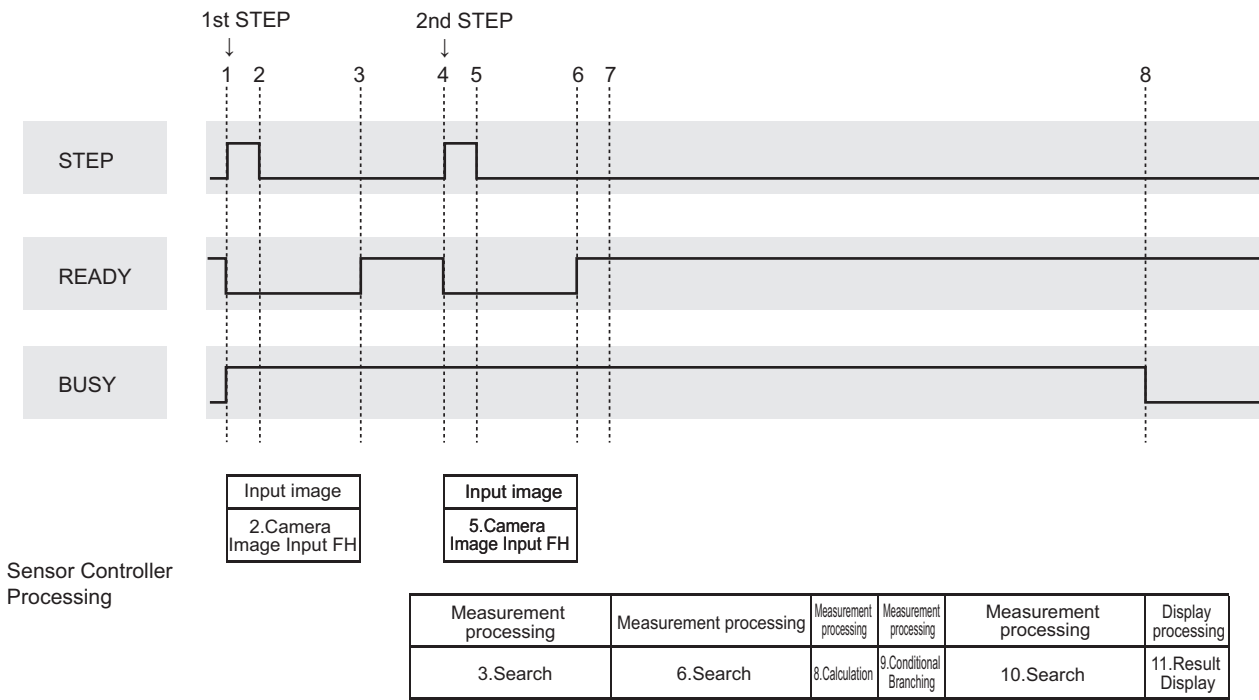
### Multi-input + Parallel processing ON



1.	After checking if READY is ON and BUSY is OFF, turn ON the STEP (1st STEP). When STEP turns ON, READY turns OFF and BUSY turns ON. Camera image (2 Camera image input FH) is input.
2.	After READY turns OFF and BUSY turns ON, turn OFF the STEP.
3.	Since multi-input mode is selected for this example, READY turns ON after completing Camera Image Input (2 Camera Image Input FH). After completing Input image (2 Camera Image Input FH), measurement processing (3 Search) is executed.
4.	After checking if READY is ON, turn ON the STEP (2nd STEP). When STEP turns ON, READY turns OFF. Since multi-input mode is selected for this example, Input image (5 Camera Image Input) is performed in the same way as 2 Camera Image Input FH.
5.	After READY turns OFF, turn OFF the STEP.
6.	After completing Input image (5 Camera Image Input FH), READY turns OFF. In this example, parallel processing is activated; Multi-trigger Imaging Task blocks are performed in parallel. After completing Input image (5 Camera Image Input FH), measurement processing (6 Search) is executed.
7.	After "1 Multi-trigger Imaging Task" and "4 Multi-trigger Imaging Task" are completed, measurement processing (8 Calculation) which is set after the Multi-trigger Imaging End will be performed.
8.	After measurement processing is completed, BUSY turns OFF. Display processing (11 Result Display) is performed.

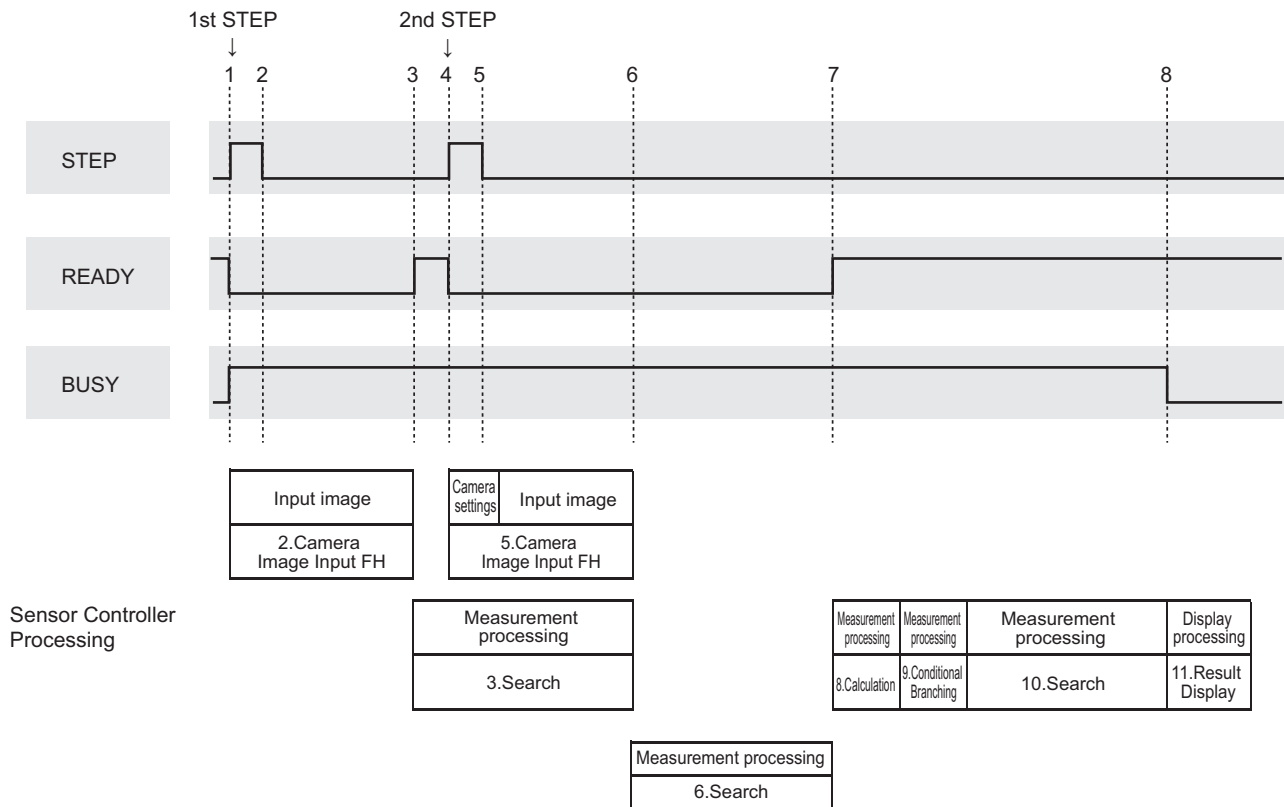


## Multi-input + Parallel processing OFF



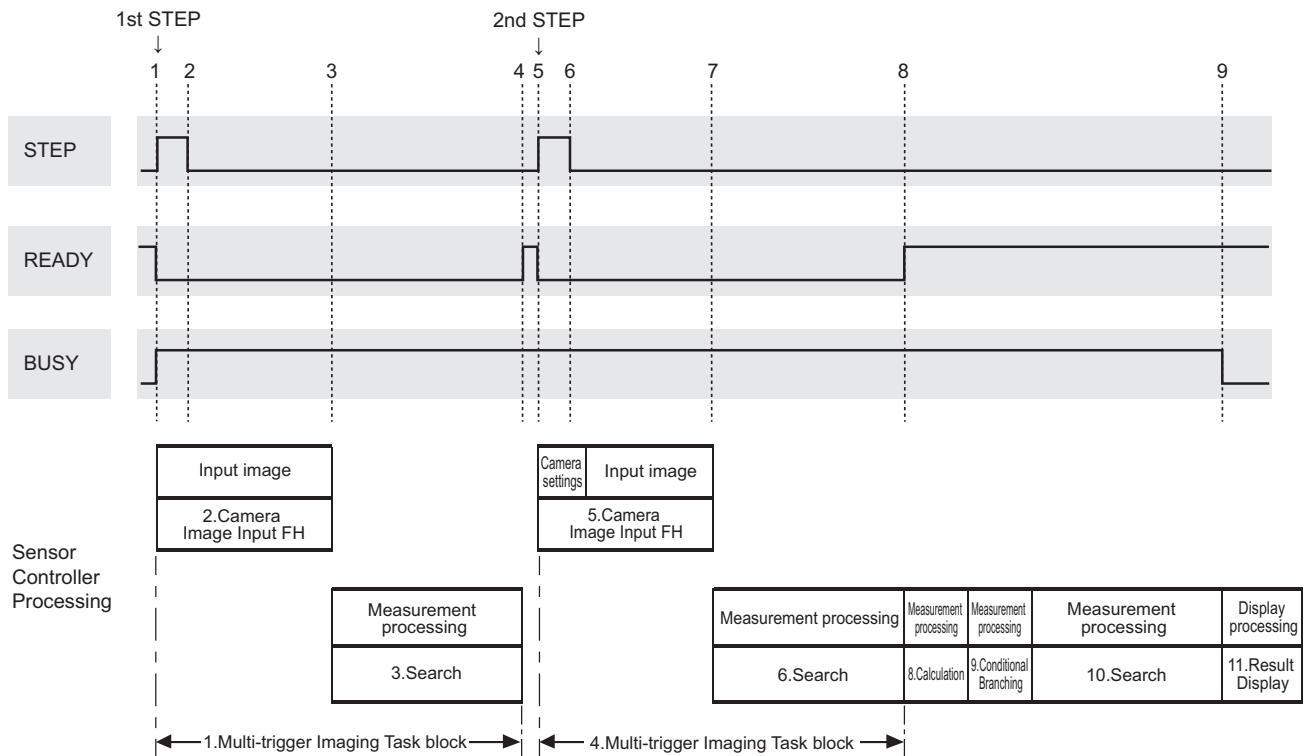
1.	After checking if READY is ON and BUSY is OFF, turn ON the STEP (1st STEP). When STEP turns ON, READY turns OFF and BUSY turns ON. Camera Image Input (2 Camera Image Input FH) is executed.
2.	After READY turns OFF and BUSY turns ON, turn OFF the STEP.
3.	Since multi-input mode is selected for this example, READY turns ON after completing Camera Image Input (2 Camera Image Input FH). After completing image input, measurement processing (3 Search) is executed.
4.	After checking if READY is ON, turn ON the STEP (2nd STEP). When STEP turns ON, READY turns OFF. Since multi-input mode is selected for this example, Input image (5 Camera Image Input) is performed in the same way as 2 Camera Image Input FH.
5.	After READY turns OFF, turn OFF the STEP.
6.	After completing Input image (5 Camera Image Input FH), READY turns OFF.
7.	Since Parallel processing is disabled, "6 Search" measurement processing is executed after "3 Search" measurement processing and camera image processing for [5. Camera Image Input FH] is completed. The measurement is performed according to the flow setting.
8.	After measurement processing is completed, BUSY turns OFF. Display processing (11 Result Display) is performed.

## Non-Multi-input + Parallel processing ON



1.	After checking if READY is ON and BUSY is OFF, turn ON the STEP (1st STEP). When STEP turns ON, READY turns OFF and BUSY turns ON. Camera Image Input (2 Camera Image Input FH) is executed.
2.	After READY turns OFF and BUSY turns ON, turn OFF the STEP.
3.	After Camera Image Input (2 Camera Image Input FH), READY turns ON. Measurement processing (3 Search) is executed.
4.	After checking if READY is ON, turn ON the STEP (2nd STEP). When STEP turns ON, READY turns OFF. Since Non-Multi-input mode is selected, processing starts with camera settings for 5 Camera Image Input.
5.	After READY turns OFF, turn OFF the STEP.
6.	After completing Camera Image Input (5 Camera Image Input FH), measurement processing (6 Search) is executed without turning ON the READY.
7.	After measurement processing (6. Search) is completed, READY turns ON. After "1 Multi-trigger Imaging Task" and "4 Multi-trigger Imaging Task" are completed, measurement processing (8 Calculation) which is set after the Multi-trigger Imaging End is performed.
8.	After measurement processing of Multi-trigger Imaging End is completed, READY turns ON and BUSY turns OFF. Display processing (11 Result Display) is performed.

## Non-Multi-input + Parallel processing OFF



1.	After checking if READY is ON and BUSY is OFF, turn ON the STEP (1st STEP). When STEP turns ON, READY turns OFF and BUSY turns ON. Camera image Input (2 Camera image input FH) is executed.
2.	After READY turns OFF and BUSY turns ON, turn OFF the STEP.
3.	Since both Multi-input mode and Parallel processing are disabled, measurement processing (3 Search) is executed after Camera Image Input without turning ON the READY.
4.	After measurement processing (3. Search) is completed, READY turns ON. (The READY remains OFF until the "1 Multi-trigger Imaging" Task block is completed).
5.	After checking if READY is ON, turn ON the STEP (2nd STEP). When STEP turns ON, READY turns OFF. Since Non-Multi-input mode is selected, processing starts with camera settings for "5 Camera Image Input".
6.	After READY turns OFF, turn OFF the STEP.
7.	Since both Multi-input mode and Parallel processing are disabled, measurement processing (6 Search) is executed after Camera Image Input without turning ON the READY.
8.	After measurement processing (6. Search) is completed, READY turns ON. (The READY remains OFF until the "4 Multi-trigger Imaging" Task block is completed). 8 Calculation that comes after Multi-trigger Imaging End is performed.
9.	After Multi-trigger Imaging End measurement processing is completed, BUSY turns OFF. Display processing (11 Result Display) is performed.

## Troubleshooting

Symptom	Correction
<ul style="list-style-type: none"> <li>STEP signal is input, but it is not received by FH.</li> <li>When STEP signal is input, ERROR signal is output.</li> </ul>	<p>STEP signal can be input when READY signal is OFF.</p> <p>Change the program of the PLC so that it checks if READY signal is OFF when the STEP signal is input.</p>
<ul style="list-style-type: none"> <li>The flow ends unintentionally when the STEP signal is input.</li> </ul>	<ul style="list-style-type: none"> <li>Two or more blocks that contain Multi-trigger Imaging to Multi-trigger Imaging End can be set in the flow. Modify the flow so that the flow has only one block. The Image mode setting in the Image Pane can be [Through]. Change the mode to other than [Through].</li> <li>The STEP signal may not be input within the timeout time. Set the longer timeout time so that timeout will not occur.</li> </ul>
<ul style="list-style-type: none"> <li>The screen is too bright or too dark.</li> </ul>	<p>The camera settings cannot be reflected because Multi-input mode is selected.</p> <p>Change the mode to [Non-Multi-input] from the Main screen.</p>
<ul style="list-style-type: none"> <li>Camera conditions for image taking is same, but it takes longer time to take images.</li> </ul>	<p>[Non-Multi-input] can be selected. After capturing an image, parameter setting processing is performed for next image capturing.</p> <p>Change the mode to [Multi-input] from the Main screen.</p>
<ul style="list-style-type: none"> <li>Judgment of Multi-trigger Imaging Unit is NG.</li> </ul>	<p>STEP signal cannot be input within the set timeout time after READY signal turns ON.</p> <p>Change the timeout time so that timeout will not occur before inputting STEP signal.</p>
<ul style="list-style-type: none"> <li>The calculation result in Multi-trigger Imaging Task is unexpected value.</li> </ul>	<p>The data of other Multi-trigger Imaging Task processing items can be referred.</p> <p>Refer to the data after Multi-trigger Imaging is completed, because the processing of the items is not finished while the Multi-trigger processing is in progress.</p>
<ul style="list-style-type: none"> <li>Not all images of camera image input are saved.</li> </ul>	<p>[OFF] can be selected for [Multiple image logging].</p> <p>Select [ON] for [Multiple image logging] to save all camera image input of Multi-trigger Imaging.</p>

# Setting the Operating Environment of the System

This section describes how to set the operating environment of the Controller. The following settings are available.

- Reference: ▶ **Selecting Language [Startup Settings] (p.279)**
- Reference: ▶ **Setting the Status at Startup [Startup Settings] (p.280)**
- Reference: ▶ **Setting Communication [Startup Settings] (p.282)**
- Reference: ▶ **Setting Operation mode [Startup Settings] (p.286)**
- Reference: ▶ **Date-time setting [Other] (p.287)**
- Reference: ▶ **Fan control setting [Other] (p.287)**
- Reference: ▶ **STEP setting [Other] (p.288)**
- Reference: ▶ **Encoder trigger setting [Other] (p.289)**
- Reference: ▶ **Network drive setting [Other] (p.291)**
- Reference: ▶ **Error Setting [Other] (p.293)**

Confirmation of Sensor Controller's model or Measurement application version.

- Reference: ▶ **Checking System Information [System Information] (p.295)**

## Note

For communication setting with PC or Programming controller, refer to the chapter of Methods for Connecting and Communicating with External Devices in the *FHFZ5\_UM Communications Settings (Z342-E1-05)*.

## Selecting Language [Startup Settings]

You can set the language to use for the characters displayed on the displays. Information about the application software will be displayed in the selected language.

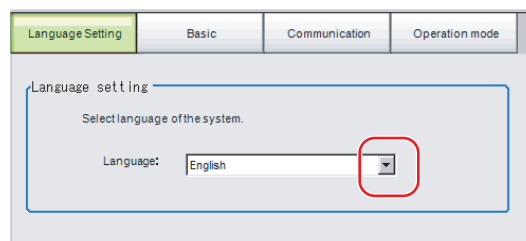
## Note

- When a Controller with default settings is started, the [Language setting] dialog box is automatically displayed.
- The Controller default setting is for Japanese-language displays. If the language setting is changed to a non-Japanese language, the system automatically restarts.

- 1 In the Main Window, select [System settings] – [Startup] – [Startup setting] – [Language Setting] from the [Tool] menu.**

The [Language setting] dialog box is displayed.

- 2 Click the [▼] button to select the language.**
- 3 Click the [Apply] button.**
- 4 Return to the Main Window and click the [Data save] button. Then, restart the Controller. The Controller will start up with the selected language.**



## Note

The [Language setting] dialog box is also displayed when restarting after executing [System initialization].

## Setting the Status at Startup [Startup Settings]

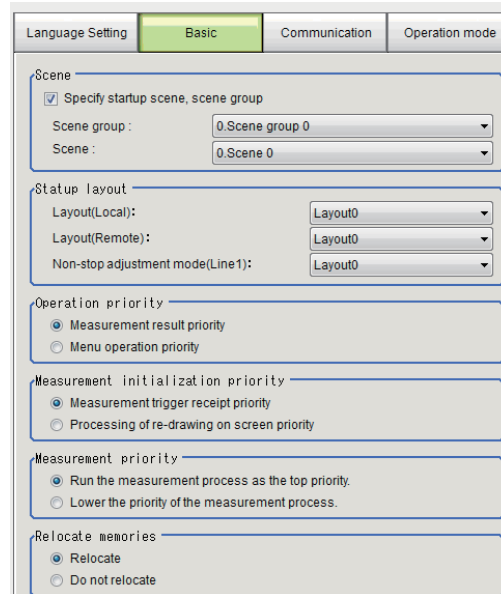
You can set the status when the power supply is turned ON.

Inspection will start immediately after the power supply is turned ON, if you select the Scene number and Scene group number that sets measurement contents.

**1** In the main window, select [Tool] [System settings] – [Basic] tab to see the Startup layout settings.

The [Startup setting] dialog box is displayed.

**2** Change the settings.



Item	Set value [Factory default]	Description
Scene		
Specify startup scene, scene group	[Selected]	The selected the Scene number and Scene group number will be used at startup.
	Not selected	The Scene number and Scene group number last saved with [Data save] function will be used at startup.
Scene group	Scene group 0 to 31 [Scene group 0]	Select the Scene group number at startup.
Scene	Scene 0 to 127 [Scene 0]	Select the Scene number at startup.
Startup layout		Select the Layout number displayed at startup.
Layout (Local)	Layout 0 to 8 [Layout 0]	Select the Layout number displayed at Sensor Controller's startup.
Layout (Remote)	Layout 0 to 8 [Layout 0]	Select the Layout number displayed at Remote PC's startup.
Non-stop adjustment mode (Line1)	Layout 0 to 8 [Layout 0]	Select the Layout number displayed at Non-stop adjustment mode's startup.
Operation priority		Selects the operation priority to either measurement results display or menu operation.
	[Measurement result priority]	Processing of measurement results display is given priority. Menu operation will be harder to receive because of its lowered priority status.
	Menu operation priority	Menu operation is given priority. Measurement results display may be incomplete.

Item	Set value [Factory default]	Description
Measurement initialization priority		Measurement initialization is performed immediately after changing the scene or editing the flow. You can specify whether measurement trigger reception or display refresh processing has priority during measurement initialization.
	[Measurement trigger receipt priority]	Measurement trigger reception is given priority even during measurement initialization processing. Displays for display refresh processing may be incomplete because of its lowered priority status.
	Processing of re-drawing on screen priority	Processing of refreshing the display is given priority. Measurement triggers will not be received until display refresh processing is completed.
Measurement priority		Specify whether the processing priority is Measurement, or Communication.
	[Run the measurement process as the top priority]	Measurement processing is the highest priority. This setting is normally recommended.
	Lower the priority of the measurement process.	Change this setting as needed for communication in an environment where the load is high, causing data loss over EtherNet/IP at the PLC, for example, when the number of lines exceeds the number of CPU cores, or where number of lines exceeds the number of CPU cores due to parallelization processing being ON.
Relocate memories		Select the relocate processing. <sup>(*1)</sup>
	[Relocate]	Relocate processing is executed. More units can be registered to one Scene group because this function improves the memory efficiency. Re-allocation of data memory will be done for the following. <ul style="list-style-type: none"> <li>• At startup.</li> <li>• When the Scene group is selected.</li> <li>• When the Processing Unit is added.</li> <li>• When Scene or Processing Unit is copied.</li> <li>• When the data is changed. e.g. Model Region, Model Re-region, Register is changed.</li> </ul> Relocate setting is normally recommended.
	Do not relocate	Relocate processing is not carried out. Set this setting when Relocate processing takes long time.

### IMPORTANT

\*1 For FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series, [Relocate memories] setting is invalid.

\*2 Relocate processing could be take time depends on relocated data capacity or data fragmentation when [Relocate] is selected.

\*3 An error could be occurred, e.g data is insufficient because data relocate processing is not carried out when [Relocate] is selected. For data memory region, refer to ► About Memories Usable with FH series/FZ5 series (p.361).

## Setting Communication [Startup Settings]

Select the type of Communications Module to determine the communications method to use for communications between the Sensor Controller and external device.

Refer to the ► *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342) for details on how to select the Communications Module.

Item	Set value [Factory default]	Description
Serial (Ethernet)	<ul style="list-style-type: none"> <li>• [Normal (UDP)]</li> <li>• Normal (TCP)</li> <li>• Normal (TCP Client)</li> <li>• Normal (UDP) (Fxxx series method)</li> <li>• PLC Link (SYSMAC CS/CJ/CP/One)</li> <li>• PLC Link (MELSEC QnU/Q/QnAS)</li> <li>• PLC Link (JEPMC MP)</li> </ul>	<p>Specify the Communications Module.</p> <p>Serial/Ethernet Normal/Normal (Fxxx series method): Communications are performed with external devices through [non-procedure] communications. For differences between [Normal] and [Normal (Fxxx series method)], refer to the following note. PLC Link: Communications are performed through link areas with the PLC.</p>
Serial (RS-232C/RS-422)	<ul style="list-style-type: none"> <li>• [Normal]</li> <li>• Normal (Fxxx series method)</li> <li>• PLC Link (SYSMAC CS/CJ/CP/One)</li> <li>• PLC Link (MELSEC QnU/Q/QnAS)</li> <li>• Touch Panel Monitor (FH-MT12)</li> </ul>	<p>Touch Panel Monitor (FH-MT12): Communicate via Touch Panel Monitor (FH-MT12)</p>
Parallel	[Standard Parallel I/O]	<p>Parallel Standard Parallel I/O: Communications are performed with a standard parallel interface.</p>
Fieldbus	<ul style="list-style-type: none"> <li>• [OFF]</li> <li>• EtherCAT</li> <li>• EtherNet/IP</li> </ul>	<p>Fieldbus: Communications are performed through EtherCAT communications and the EtherNet/IP interface. EtherCAT is supported only by the FH series Sensor Controller.</p>
Remote Operation	<ul style="list-style-type: none"> <li>• [ON]</li> <li>• OFF</li> </ul>	<p>Remote operation: The Controller is operated from an external device.</p>

### IMPORTANT

- Do not set [EtherNet/IP] and [PLC Link] at the same time. They cannot be used at the same time.  
Example:  
Set [Serial (Ethernet)] to [PLC Link] and [Fieldbus] to [EtherNet/IP] at the same time.  
Set [Serial (RS-232C/422)] to [PLC Link] and [Fieldbus] to [EtherNet/IP] at the same time.  
Set both [Serial (Ethernet)] and [Serial (RS-232C/422)] to [PLC Link], and set [Fieldbus] to [EtherNet/IP] at the same time.
- Do not set both [Serial (Ethernet)] and [Serial (RS-232C/422)] to [PLC Link]. They cannot be used at the same time.



Note

- Normal (Fxxx Series Method)  
With the [Normal (Fxxx series method)] communications method, the OK response timing in relation to MEASURE commands is different from that of the [Normal] communications method.

Normal (Fxxx series method) communications method	Normal communications method
MEASURE	MEASURE
Measurement result	OK
OK	Measurement result

- OK Responses  
With [Normal communications method], an OK response is returned when the Controller receives a command.  
With [Normal (Fxxx series method)], an OK response is returned when command execution is completed.

## Settings for Touch Panel Monitor

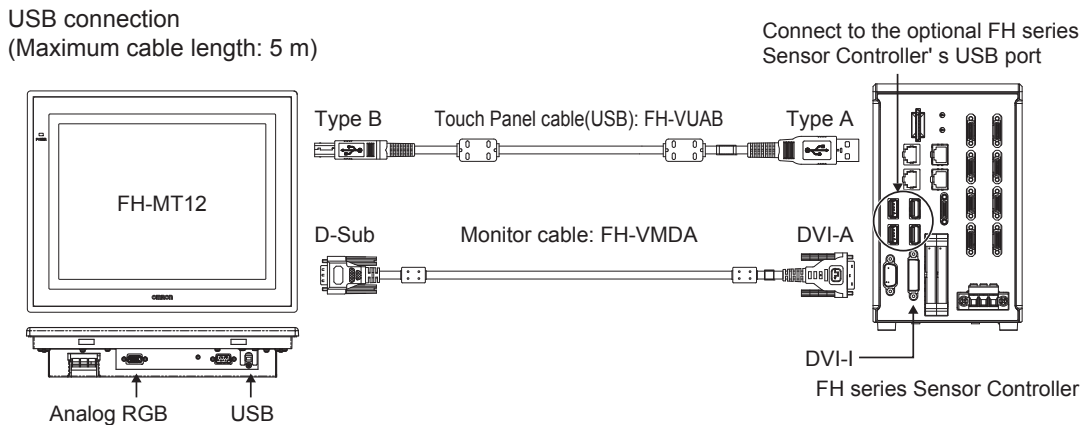
An exclusive touch screen monitor, Touch Panel Monitor is available for FH Sensor Controllers to confirm images or to display menus for condition settings.

### IMPORTANT

- The Touch Panel Monitor (FH-MT12) is used exclusively with the FH series Sensor Controllers. It cannot be used with FZ5 series Sensor Controller.
- The Touch Panel Monitor (FH-MT12) is supported only by Ver. 5.32 or later versions of the FH series Sensor Controller.

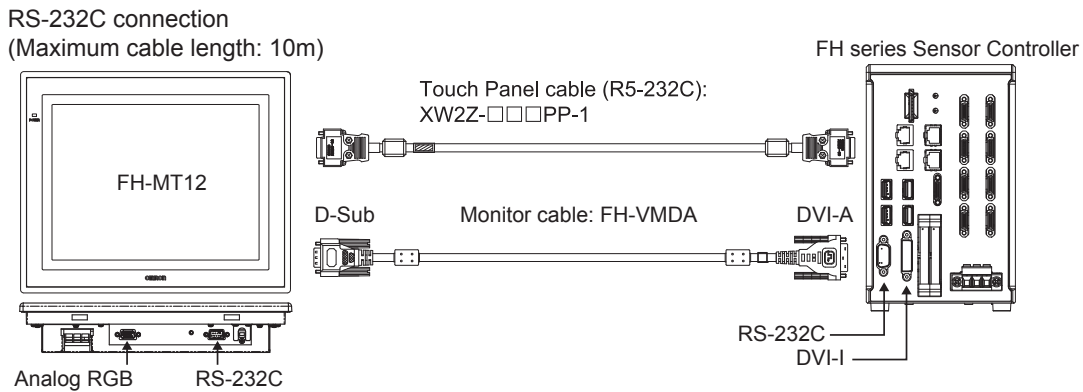
To wire the Touch Panel Monitor (FH-MT12) and an FH series Sensor Controller, a monitor cable for video input and a touch panel cable for touch panel communication are required.

Normally, use a USB cable connection for the Touch Panel Monitor (FH-MT12).



Use an RS-232C cable connection in the following cases.

- The Touch Panel Monitor (FH-MT12) and the FH series Sensor Controller are more than 5 m apart.
- All the USB ports of the FH series Sensor Controller are used for other I/O connections, and thus there is no available USB port for the Touch Panel Monitor (FH-MT12) connection.



For monitor cable of video input or communication cable of Touch Panel, refer to the followings:

### ● Connection cable for FH-MT12

Cable name	Type	Cable length	Model	Minimum bend radius
Monitor cable	DVI-RGB converter cable	2 m	FH-VMDA 2M	36 mm
		5 m	FH-VMDA 5M	
		10 m	FH-VMDA 10M	
Touch Panel cable	USB	2 m	FH-VUAB 2M	25 mm
		5 m	FH-VUAB 5M	
	RS-232	2 m	XW2Z-200PP-1	59 mm
		5 m	XW2Z-500PP-1	
		10 m	XW2Z-010PP-1	

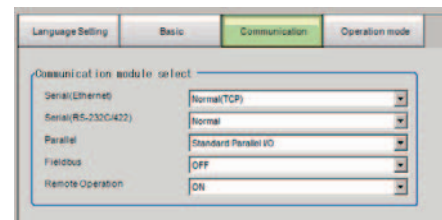
When connect the monitor cable, Sensor Controller recognizes Touch Panel Monitor automatically, and then start to display.

#### Note

When use only monitor function of Touch Panel Monitor (FH-MT12), confirm the followings:

- You can use both FH series Sensor Controller and FZ5 series Sensor Controller.
- No limitation of software version of FH series/FZ5 series Sensor Controller.
- Not cable for Touch Panel Monitor, but only monitor cable for video.

- 1 Connect the Touch Panel Monitor to the FH series Sensor Controller.**
- 2 In the Main Window, click [Tool] - [System Settings] - [Startup] - [Startup setting], then click [Communication]**



**3** On the Communication module select area, select [Touch Panel Monitor (FH-MT12)] from the [Serial (RS-232C/422)].

**4** Click [Apply].

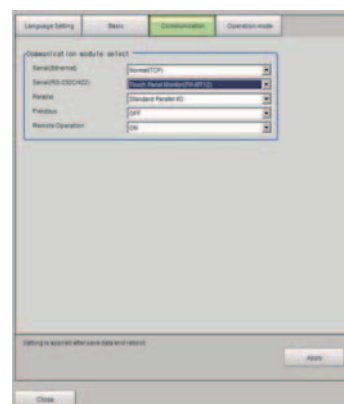
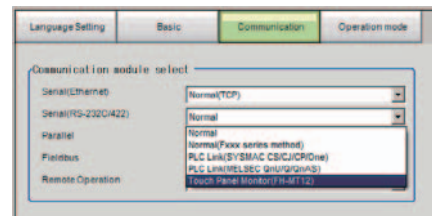
**5** Click [Close].

**6** Click [Data save] in the [OK] menu on the Main Window.

**7** Click [System restart] in the [Function] menu on the Main Window.

**8** Click [OK] on the [System restart] dialog. Restarts the FH series Sensor Controller.

**9** Touch Panel Monitor can be used after restarting.



### IMPORTANT

- When using the Serial (RS-232C/422) cable for RS-232C communication, connect the Touch Panel Monitor (FH-MT12) to the FH series Sensor Controller before startup.
- The limitations when you set the serial (RS-232C/422) for RS-232C communication are the followings:
  - If the RS-232C cable, or Touch Panel Monitor is disconnected when the FH series Sensor Controller is started, the startup time will be approximately 30 seconds longer. If the Touch Panel Monitor cable is disconnected while the FH series Sensor Controller is in operation, it will not be usable, even if reattached, until the system is restarted. Confirm the connection of Touch Panel Monitor (FH-MT12) and FH series Sensor Controller, then restart FH series Sensor Controller.

### Difference in Touch Panel Monitor Communications

There are two types of connections for touch panel communication: USB connection and RS-232C connection. Normally use a USB connection for the touch panel.

Use an RS-232C connection in the following cases.

- The Touch Panel Monitor (FH-MT12) and the FH series Sensor Controller are more than 5 m apart.
- All the USB ports of the FH series Sensor Controller are used for other I/O connections, and thus there is no available USB port for the Touch Panel Monitor (FH-MT12) connection.

Note that following restrictions apply to each type of communication.

Subject	USB connection	RS-232C connection
Cable length	2 m or 5 m	2 m, 5 m, or 10 m
Communication module setting on FH series Sensor Controller	No setting required	Serial (RS-232C/422) setting required
Startup order for Touch Panel Monitor and FH series Sensor Controller	No restriction	1. Connect cables 2. Start the Touch Panel Monitor 3. Start the FH series Sensor Controller
Startup time of FH series Sensor Controller without touch panel cable connected	Standard	30 seconds longer
Resulting behavior when simultaneously using both USB connection and RS-232C connection.	The USB connection overrides the RS-232C connection.	

## IMPORTANT

- If the Touch Panel cable (USB or RS-232C) is accidentally slipped out during FH series Sensor Controller is running, cannot operate the Touch Panel even if you try to re-connection the cable. For continue to operation or perform, connect a wired USB mouse which is not need to install driver.
- To re-operate the Touch Panel, confirm the connection Touch Panel Monitor FH-MT12 and FH series Sensor Controller, and then retry to initiate the Sensor Controller.

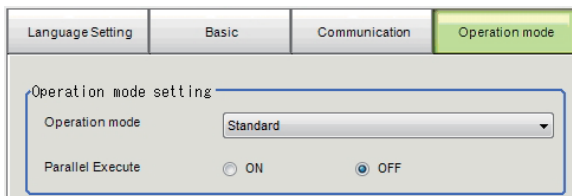
### Note

For detail of OSD (On-screen display), refer to ▶ *Model FH-MT12 Touch Panel Monitor INSTRUCTION SHEET*.

## Setting Operation mode [Startup Settings]

Select the operation mode according to the application conditions, such as the operation mode that is best suited to reduce the takt time and downtime.

Refer to ▶ *Setting the Operation Mode (p.240)* for details on the operation modes.



Item	Set value [Factory default]	Description
Operation mode	<ul style="list-style-type: none"><li>• Double Speed Multi-input</li><li>• [Standard]</li><li>• Multi line random trigger</li><li>• Non-stop adjustment</li></ul>	Set the operation mode. Reference: ▶ <i>Setting the Operation Mode (p.240)</i>
Parallel execution	ON/[OFF]	Set whether to uses parallel processing. Reference: ▶ <i>Parallel Processing Settings (Automatic Parallelization) (p.255)</i>

**1** Click the [Apply] button.

## Date-time setting [Other]

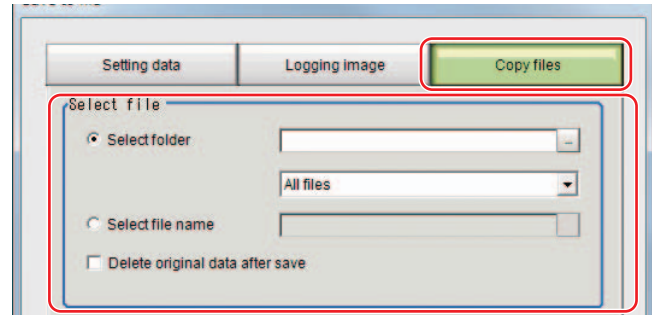
Confirm that the date and time on the built-in calendar are correct, and make corrections if they are not. The log data dates and times are set based on contents set here.

- 1 In the Main Window, select [System settings] – [Other] – [Date-time setting] from the [Tool] menu.

The [Date-time setting] dialog box is displayed.

- 2 Set the current date and time.
- 3 Click the [Apply] button.

Close the [Date-time setting] dialog box.



## Fan control setting [Other]

This procedure describes how to set the rotation speed of the Controller fan. FZ5-600 series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series

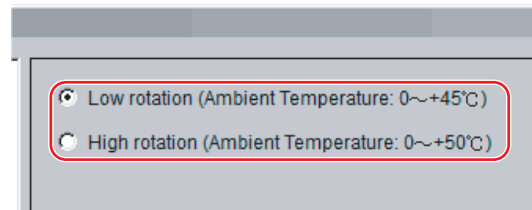
### Note

The default setting is for low rotation. Use fast rotation when using the system in a high-temperature environment between 45 and 50°C.

- 1 In the Main Window, select [System settings] – [Other] – [Fan control setting] from the [Tool] menu.

The [Fan control setting] dialog box is displayed.

- 2 Select a fan setting.



Set value [Factory default]	Description
<ul style="list-style-type: none"><li>• [Low rotation (Ambient temperature: 0 to +45°C)]</li><li>• High rotation (Ambient temperature: 0 to +50°C)</li></ul>	Select the rotation speed of the fan.

- 3 Click the [Apply] button.

### IMPORTANT

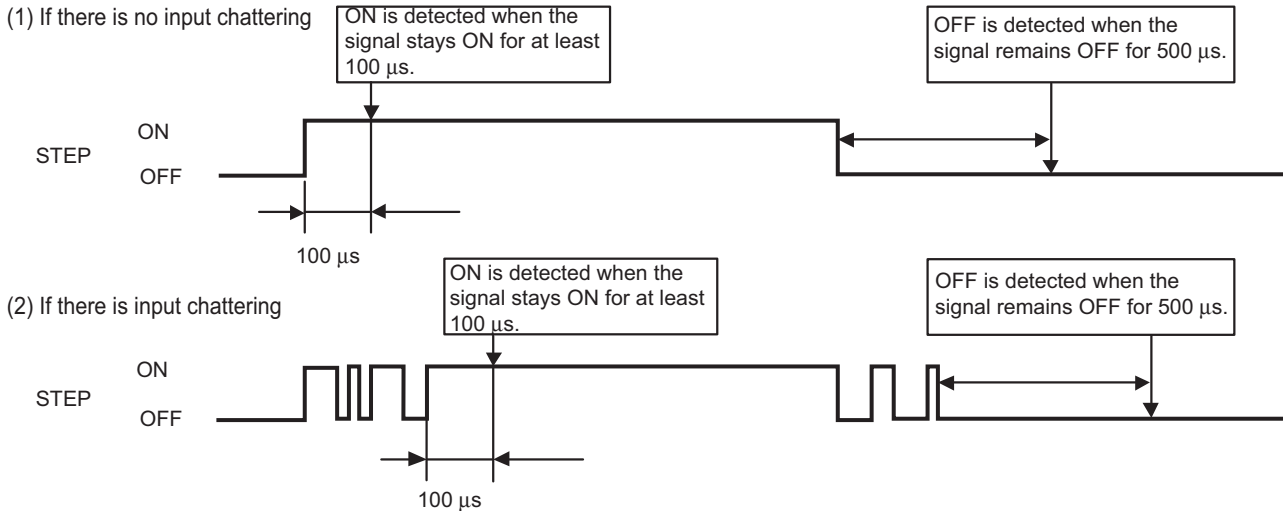
The fan control setting is disabled for the FZ5-L series.

## STEP setting [Other]

You can set a filter as a countermeasure against STEP input chattering and to prevent operation malfunctions due to noise.

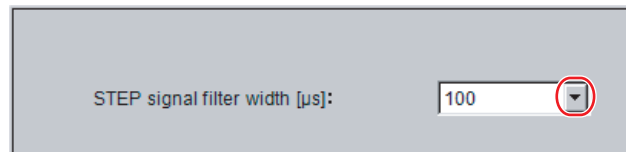
### Filter Set Value of 100 $\mu\text{s}$ (Default Value)

The STEP signal is detected as being ON at the point it is ON continuously for at least 100  $\mu\text{s}$ , and measurement begins at that point. Accordingly, STEP signal detection is delayed by an amount of time equivalent to the set filter value. Also, when turning from ON to OFF, the OFF filter fixed at 500  $\mu\text{s}$  is activated and the STEP signal is detected as OFF when it is OFF for at least 500  $\mu\text{s}$ .



**1** In the Main Window, select [System settings] – [Other] – [Controller] – [STEP setting] from the [Tool] menu.

**2** Set the filter width in the [STEP setting] area.



Parameter	Set value [Factory default]	Description
STEP signal filter width [ $\mu\text{s}$ ]	<ul style="list-style-type: none"> <li>• [100]</li> <li>• 200</li> <li>• 300</li> <li>• 400</li> <li>• 500</li> </ul>	Set the filtering width.

### IMPORTANT

If you use Multi-line Random-trigger Mode for an FH-series Controller, the value for the STEP signal filter on line 0 is applied to all lines.

## Encoder trigger setting [Other]

**1** In the Main Window, select [System setting] – [Other] – [Encoder trigger setting] from the [Tool] menu.

**2** Set the target encoder.

Parameter	Set value [Factory default]	Description
Use encoder trigger	<ul style="list-style-type: none"> <li>Selected</li> <li>[Not selected]</li> </ul>	Set whether to use an encoder trigger.
Encoder input type	<ul style="list-style-type: none"> <li>[Open collector]</li> <li>Line driver</li> </ul>	Select the output format of the encoder to be connected.
Resolution [pulse/rotation]	[1] to 65535	Set how many pulses equal one rotation. Set this parameter according to the resolution of the encoder.
Count rotations with pulse Z	<ul style="list-style-type: none"> <li>Selected</li> <li>[Not selected]</li> </ul>	When this check box is selected, pulse Z is used to determine whether a full rotation is made. When this check box is cleared, a full rotation is determined by whether the number of pulses on phase A has reached the resolution of phase A.

**3** Set the advanced settings for the trigger as necessary.

Parameter	Set value [Factory default]	Description
Trigger signal	[Phase A] Phase Z	Set the phase to use as the trigger signal.
Phase A		
Enable timing	<ul style="list-style-type: none"> <li>• [ENABLE start]</li> <li>• STEP start</li> </ul>	Set the timing for starting the pulse count. ENABLE start: Counts the pulses input during the measurement trigger receipt period. STEP start: The pulses are not counted even during the measurement trigger receipt period until the STEP signal is input.
Pulse reset timing	<ul style="list-style-type: none"> <li>• [Every trigger pulse]</li> <li>• Every rotation (Pulse Z)</li> <li>• Every STEP</li> </ul>	Set the timing for resetting. When [ENABLE start] is specified for [Enable timing], you can select [Every trigger pulse] or [Every rotation (Pulse Z)]. When [STEP start] is specified for [Enable timing], you can select [Every trigger pulse] or [Every STEP]. When [Every rotation] is set, multiple pulses can be set for phase A.
Phase A trigger	[0] to 65535	Set how many pulses it takes to produce a trigger.
Support backlash (using phase B)	<ul style="list-style-type: none"> <li>• Selected</li> <li>• [Not selected]</li> </ul>	Set whether the rotation direction is detected.
Trigger in backlash	<ul style="list-style-type: none"> <li>• Selected</li> <li>• [Not selected]</li> </ul>	Set to produce a trigger during reverse rotation.
Phase Z		
Enable timing	<ul style="list-style-type: none"> <li>• [ENABLE start]</li> <li>• STEP start</li> </ul>	Set the timing for starting the pulse count. ENABLE start: Counts the pulses input during the measurement trigger receipt period. STEP start: The pulses are not counted even during the measurement trigger receipt period until the STEP signal is input.
Pulse reset timing	<ul style="list-style-type: none"> <li>• [Every trigger pulse]</li> </ul>	Set the timing for resetting the pulse count of phase Z. Every trigger pulse: Reset the pulse count of phase Z each time the Sensor Controller outputs a trigger.
Phase Z trigger	[1] to 1023	Set how many pulses it takes to produce a trigger.

### IMPORTANT

The encoder trigger setting is disabled for the FZ5-L series.



## Network drive setting [Other]

You can save logging images to an external device, such as a network-connected computer with a shared folder, using a network drive.

You can also load setting data saved in a network drive into the Controller.

If you register a shared folder on the network drive, the network drive connected to the [Select file] or [Select folder] dialog box of the FH/FZ5 software will be displayed.

- 1 Click [Tool]-[System settings]-[Other]-[Network drive settings].
- 2 Click [Reconnect] if you want to reconnect Network drive, Click [Edit] if you want to edit it.  
For [Reconnect] and [Edit], refer to as followings.

### About [Reconnect]

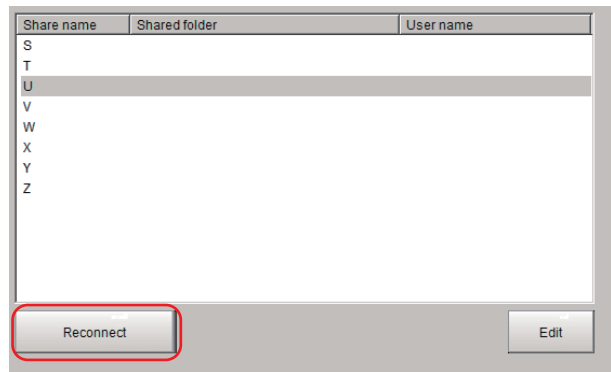
To click [Reconnect], you can reconnect the Network drive without restarting the Sensor Controller.

For example situations of [Reconnect], refer to as followings.

- Network drive communication is filed at Sensor Controller's startup.
- Network drive communication is disconnected while Sensor Controller is running.
- Network drive is changed while Sensor Controller is running.

Setting procedure of [Reconnect] is as followings.

- 1 Select Network drive that you want to reconnect.
- 2 Click [Reconnect].



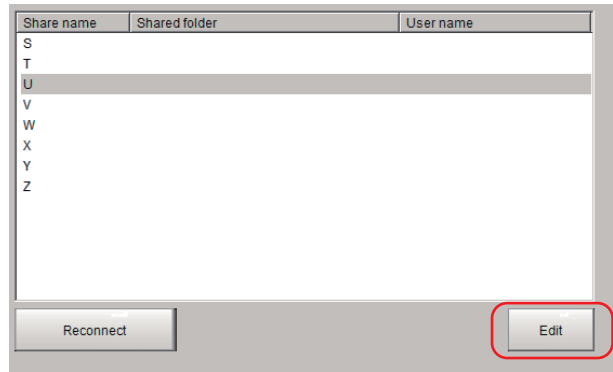
### IMPORTANT

- Click [Reconnect] after completion of saving or loading of Network drive.  
If you click [Reconnect] while the Network drive is running, the network drive file may be corrupted.
- Make sure to do the following when changing the User name and Password of a network drive on the FZ5-L series/FZ5-600 series.
  1. Click [Shared folder], [User name], and [Password]. Then click [Reconnect].  
Note that the Reconnect will fail in this time.
  2. Enter new [Shared folder], [User name], and [Password].
  3. Click [Reconnect] again.

## About [Edit]

You can edit Network drive's name e.t.c.  
Setting Procedure of [Edit] is the following.

- 1 Select Network drive that you want to edit.
- 2 Click [Edit].



- 3 Enter Share name, Shared folder, User name and Password.

Parameter	Set value [Factory default]	Description
Share name	S,T,U,V,W,X,Y,Z	This is the name to be recognized by the Controller as a network drive. Only 1 unit can be connected. For FZ5-L series/FZ5-600 series, the shared name is displayed in the \Network folder. For FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series, a drive letter such as E:, F:, G:, or H: is displayed.
Shared folder	---	Specify the shared folder name. Create a folder in advance on a computer that has a DNS resolved name on the network, and specify this as the shared folder name. For example, if the host name (computer name) is VISION and the shared name is COMMON, specify a name such as \\VISION\COMMON.
Username	---	Enter the user name and the password to access the network drive. If you do not know the user name or the password, contact the device network administrator.
Password	---	

- 4 Click [Edit].

Edited information is saved to the Sensor Controller.

It's information will be available with restarting Sensor Controller.



## IMPORTANT

- Click [Apply] after saving or reading of Network drive. If you click it while Network drive is running, Network drive's file could be given a damage.

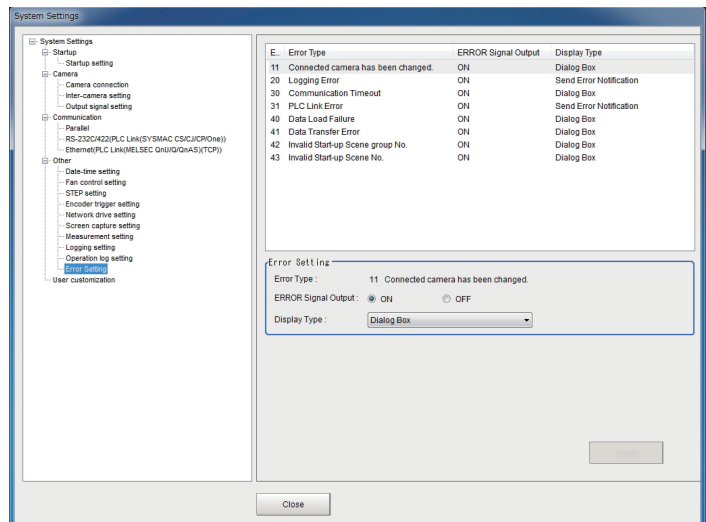
## IMPORTANT

- If images and data are logged to a network drive, the use of the multi-input function and other heavy measurement loads on the Controller may slow down communications and cause logging errors. In this case, set the measurement takt time so that there is some leeway.
- If many drives are set as network drives, it may require a greater amount of time to start the Controller.
- Do not pull out the LAN cable while the Controller is accessing the network drives.
- Start the Controller when the network drives are ready. Connections cannot be established if the network drives are not ready when the Controller is started.
- If there is no access to a network drive for a certain amount of time, the connection will be automatically cut off depending on the network drive setting at the connection target. Make sure that the setting at the connection target is not set to automatic disconnection.
- Dates and Times of the Updates of the Files Created at Network Logging  
If the time zone of the external device is different from the time zone setting of the Controller [GMT-08:00 Pacific Time (US & Canada): Do not automatically adjust clock for Daylight Saving Time], the date and time actually written may be different from the date and time of the file update. Adjust the time zone of the external device to match that of the Controller.
- For Network drive communication with the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series, you can specify IP address instead of Host name on the Shared file setting. On the other hand, in the case of FZ5-L series/FZ5-600 series, Network drive communication cannot be apply even if you specify IP address.
- For FZ5-L series/FZ5-600 series, WINS server setting depends on your network environment.

## Error Setting [Other]

Normally, when an error occurs, an error signal is output to the communication module in use and measurement is stopped. Using this function, you can select whether to output an error signal or show a dialog when a specified error occurs each of Lines.

- On the main window, click [Tool] -[System setting] -[Other] -[Error Setting].
- Valid error type selections and current settings are displayed.



### Note

For error messages and troubleshooting, refer to Error Messages and Troubleshooting (p.319).

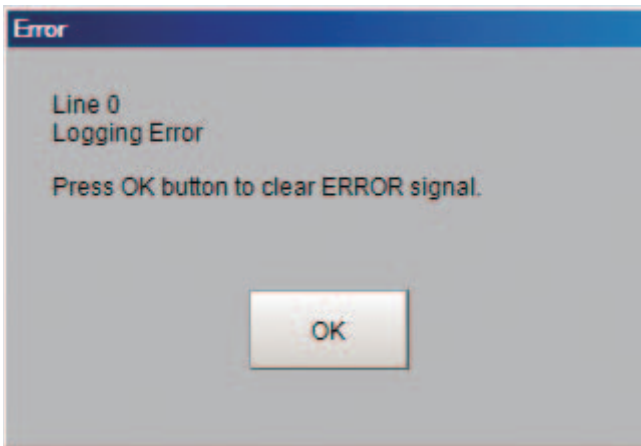
- Select [Error Type] to set the error operation on the error select window.

## 4 Set the error operation on the Error Setting area.

Setting item	Setting value [Factory default]	Description
Error Type	—	Displays the Error No, and Error Type selected on the Error select window.
ERROR Signal Output	<ul style="list-style-type: none"> <li>• [ON]</li> <li>• OFF</li> </ul>	Select the Radio button to output the error signal when selected Error Type occurs.
Display Type	<ul style="list-style-type: none"> <li>• No Error Notification</li> <li>• Dialog Box</li> <li>• Dialog Box (Clear ERROR Signal)</li> </ul>	Select the notification or operation of error when specified error type occurs.
		Do not display any error notification on the window when the selected Error Type occurs.
		<p>No Error Notification: Displays the error information on the Information Pane when the selected Error Type occurs.</p> <p>Dialog Box: Displays the error information on the window when the selected Error Type occurs. When you select [ON] in [ERROR Signal Output], the error output remains on even if you close the dialog box.</p> <p>Dialog Box (Clear ERROR Signal): Displays the error information on the window as a dialog box when the selected Error Type occurs. When you select [ON] in [ERROR Signal Output], the error output is turned OFF when you close the dialog box.</p>

### Note

A dialog is displayed when [Dialog Box (Clear ERROR Signal)] occurs.  
 Show an example when a logging error of Line 0 occurs.  
 Click [OK] to close the dialog.



## Checking System Information [System Information]

The Controller model and measurement application version can be checked.

You can check the external memory status only on the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series.

Reference: ▶ Using External Memory Devices (FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series only) (p.226)

Additionally, you can use a Firmware upgrade tool. Make sure to contact your OMRON representative.

### Note

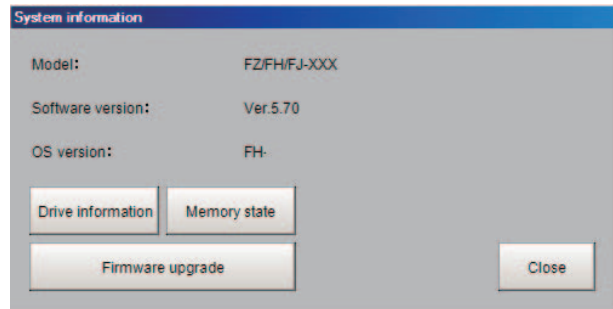
Firmware upgrade tool is a software what is used when change the version of the measurement application soft. For the update, need to USB flash drive or SD memory card to save the data.

### 1 In the Main Window, select [System information] from the [Function] menu.

The [System information] dialog box is displayed.

### 2 The following information can be checked.

- Sensor Controller model
- Version of measurement application
- OS version of Sensor Controller

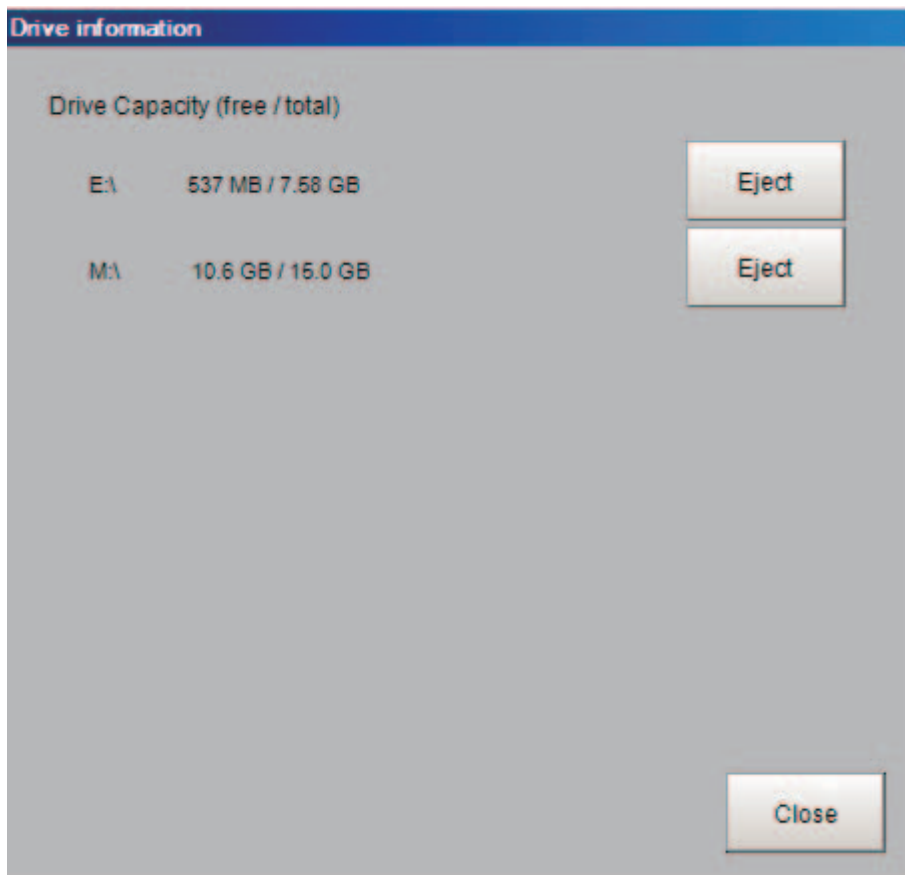


## ● About [Drive information] button

### 1 Click the [Drive information] button.

The information of the drive that is connected to the Sensor Controller is can be checked.

Reference: ▶ External Drive Names (p.225) and Using External Memory Devices (FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series only) (p.226)



## 2 Click the [Close] button.

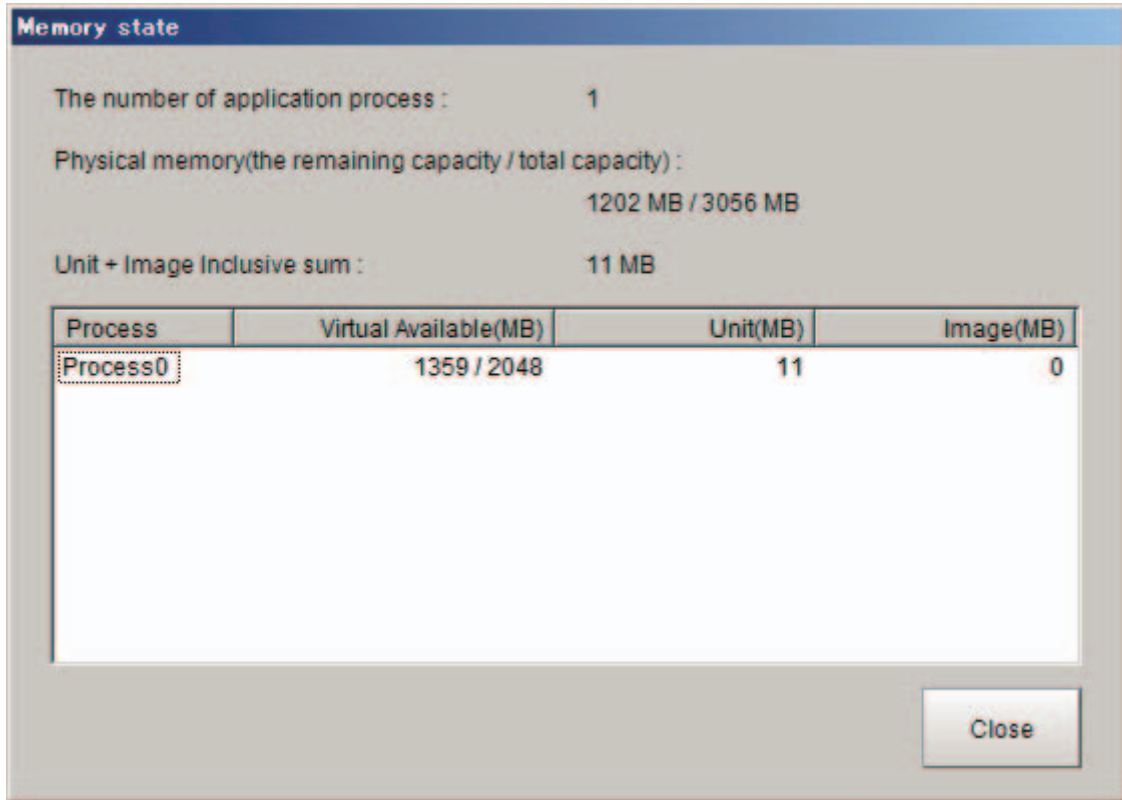
The Drive information window will be closed.

### ● About [Memory state] button

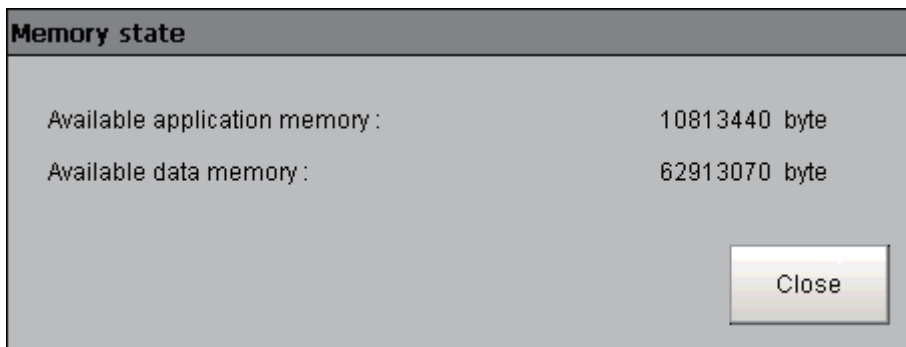
#### 1 Click the [Memory state] button.

Below information is displayed.

**FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series**



**FZ5-L series/FZ5-600 series**



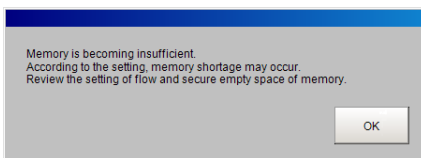
Displayed item	Description
The number of application process	Differs depending on the Sensor Controller mode. (Reference: ► Setting the Status at Startup [Startup Settings] (p.280)) Standard = 1 Double Speed Multi-input = 2 Non-stop adjustment = 2 (Operation: Process 0, Adjustment: Process 1) Multi line random trigger mode = Number of set lines (Each line number corresponds to the process number).
Physical memory (the remaining capacity/total capacity)	The remaining capacity and total capacity of the Physical memory installed in the Sensor Controller.
Unit + Image Inclusive sum	Total size of unit that is held by the scene group loaded to the Sensor Controller and image data.
Virtual Available (MB)	Amount of virtual memory usable. 2GB is applied to each application process. This memory region can be temporary used by application process. If you check the remaining capacity, you can confirm the operating status. Users can not access to this memory.
Unit (MB)	Total data size of the units held by Scene groups that are loaded to the Sensor Controller.
Image (MB)	Total data size of the image data held by Scene groups that are loaded to the Sensor Controller.
Available application memory	Item displayed with FZ5-L series and FZ5-600 series. This is a memory region temporary used for the application. If you check the remaining capacity, you can confirm the operating status. Users can not access to this memory.
Available data memory	Item displayed with FZ5-L series and FZ5-600 series. Available data memory represents the memory capacity which can be used for unit data and setting data for each unit out of the memory for Scene group data. If the data memory used exceeds this, it becomes impossible to add units in the flow and copy the scenes. Check the available data memory and modify the scenes.

## 2 Click the [Close] button.

Memory state window will be closed.

### Note

With FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series, when the amount of memory used in the Sensor Controller exceeds a certain level, below warning message dialog will be displayed.



If this dialog is displayed, check the memory status and take the following measures to enlarge the Virtual Available (MB).

Status	Countermeasures
Unit value is too large.	Modify the Scenes and reduce the number of processing items. Or split the Scene group.
Image value is too large.	Modify the Scenes and reduce the filter units. Replace some filtering processing into one advanced filter. Or lower the camera resolution.

Note

The Memory state window can be displayed from Measurement Manager Bar, as well as taking above steps starting from System information.

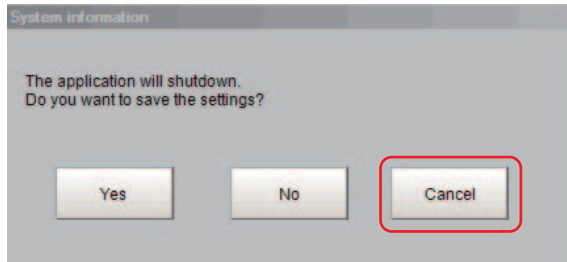
Reference: ▶ Checking the Memory Consumption and Percentage of Memory Used (p.138)

● **Regarding [Firmware upgrade] button**

Click the [Firmware upgrade] button only when launch the Firmware upgrade tool.

Do not click it except when launch this tool.

If you accidentally click [Firmware upgrade] button, a dialog which informs you need to end the tool. In this case, click [Cancel], and then back to a window to confirm the system information.



**IMPORTANT**

If you click the [Firmware upgrade] button without insert an external memory which saved data of Firmware upgrade tool, a dialog appears indicates you should end the measurement application.

To click [Yes] or [No], the measurement application finishes.

When you want to re-launch the measurement application, turn OFF the power source once, and then turns ON.



# Appendices

---

<b>Alignment .....</b>	<b>300</b>
<b>Error Messages and Troubleshooting .....</b>	<b>319</b>
<b>FAQ .....</b>	<b>325</b>
<b>Measurement Mechanism .....</b>	<b>330</b>
<b>Basic Knowledge about Operations .....</b>	<b>339</b>
<b>Setting Figures .....</b>	<b>344</b>
<b>Image file .....</b>	<b>352</b>
<b>About Number of Logging Images .....</b>	<b>355</b>
<b>About Limits on the Number of Image Input Processing Items Used .....</b>	<b>358</b>
<b>About Max. Number of Loading Images during Multi-input .....</b>	<b>359</b>
<b>Character Code Table.....</b>	<b>360</b>
<b>About Memories Usable with FH series/FZ5 series.....</b>	<b>361</b>
<b>Memory Usage Guidance For Processing Items .....</b>	<b>362</b>
<b>Memory Display Image on PLC I/O .....</b>	<b>367</b>
<b>Operation log input information list .....</b>	<b>369</b>
<b>Manual Revision History .....</b>	<b>382</b>

# Alignment

An FH/FZ5-series Controller has an alignment function that you can use to position workpieces for stage and robot applications (hereafter called *external devices*).

Alignment executes a combination of more than one processing item.

This section gives an overview of alignment, and provides details on its use in general.

Refer to the ► *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for details on the processing items that are used for alignment.

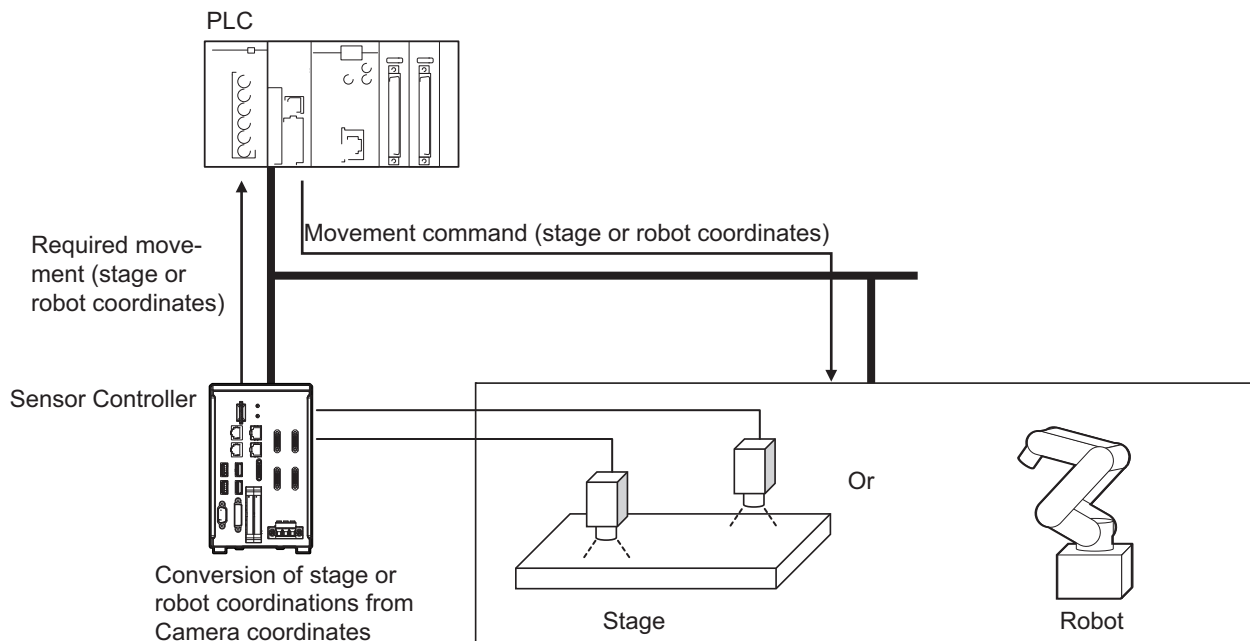
## Overview

An FH/FZ5-series Controller measures the position of alignment marks on the workpiece, or the position of specific features of the workpiece (such as corners), and outputs the axis movement to a PLC or stage controller, which aligns the workpiece into a specified position (hereafter called the *reference position*).

The PLC or stage controller simply needs to send a movement command to the external device for the axis movement amount that was output from the FH/FZ5-series Controller to align the position of the workpiece.

The following two measurement flows are used to perform alignment. Set both flows for each scene.

- Calibration flow  
This flow associates the coordinates of the external device with the Camera coordinates.
- Alignment flow  
This flow uses the calibration parameters that were created in the calibration flow to align the position of the workpiece.



## Supported External Devices

Alignment is supported for the following external devices.

Type				
Stages	X(Y)			
	X $\theta$	$\theta$ axis: Direct drive	Camera axis movement: None	
			Camera axis movement: X axis	
		$\theta$ axis: Linear drive	Camera axis movement: None	
			Camera axis movement: X axis	
	Y $\theta$	$\theta$ axis: Direct drive	Camera axis movement: None	
			Camera axis movement: Y axis	
		$\theta$ axis: Linear drive	Camera axis movement: None	
			Camera axis movement: Y axis	
	$\theta$ X	$\theta$ axis: Direct drive	Camera axis movement: None	
			Camera axis movement: X axis	
		$\theta$ axis: Linear drive	Camera axis movement: None	
			Camera axis movement: X axis	
	$\theta$ Y	$\theta$ axis: Direct drive	Camera axis movement: None	
			Camera axis movement: Y axis	
		$\theta$ axis: Linear drive	Camera axis movement: None	
			Camera axis movement: Y axis	
	XY			
	XY $\theta$	$\theta$ axis: Direct drive	Camera axis movement: None	
			Camera axis movement: X axis	
			Camera axis movement: Y axis	
			Camera axis movement: XY axes	
		$\theta$ axis: Linear drive	Camera axis movement: None	
			Camera axis movement: X axis	
			Camera axis movement: Y axis	
			Camera axis movement: XY axes	
		$\theta$ XY	$\theta$ axis: Direct drive	Camera axis movement: None
				Camera axis movement: X axis
Camera axis movement: Y axis				
Camera axis movement: XY axes				
XY $\theta$	$\theta$ axis: Linear drive	Camera axis movement: None		
		Camera axis movement: X axis		
		Camera axis movement: Y axis		
		Camera axis movement: XY axes		
UVW	Direct fulcrum motion			
	Rotary fulcrum motion			
UVWR	Direct fulcrum motion			
	Rotary fulcrum motion			

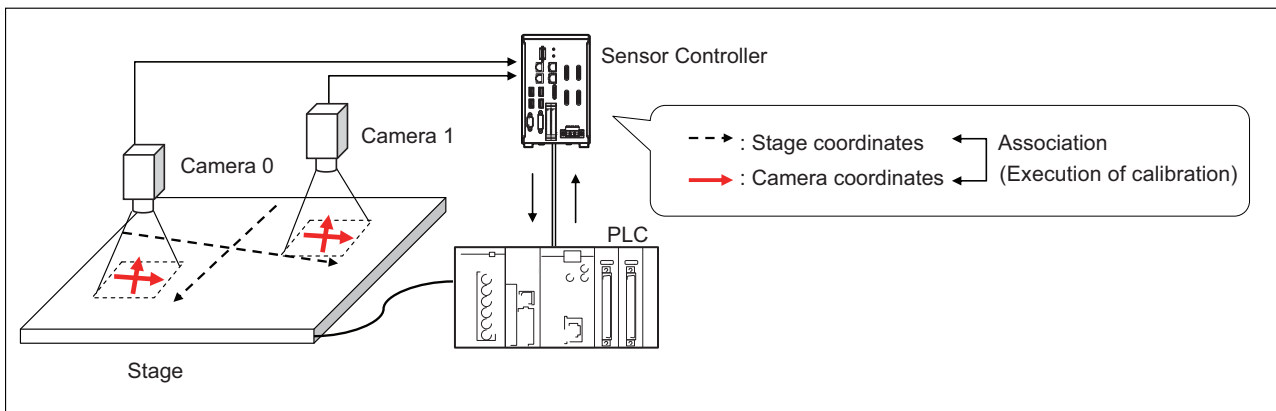
Type		
Robots	3 axes	
	4 axes	Control method: Fixed positions
		Control method: Measured positions

## Using Alignment

### ● Calibration

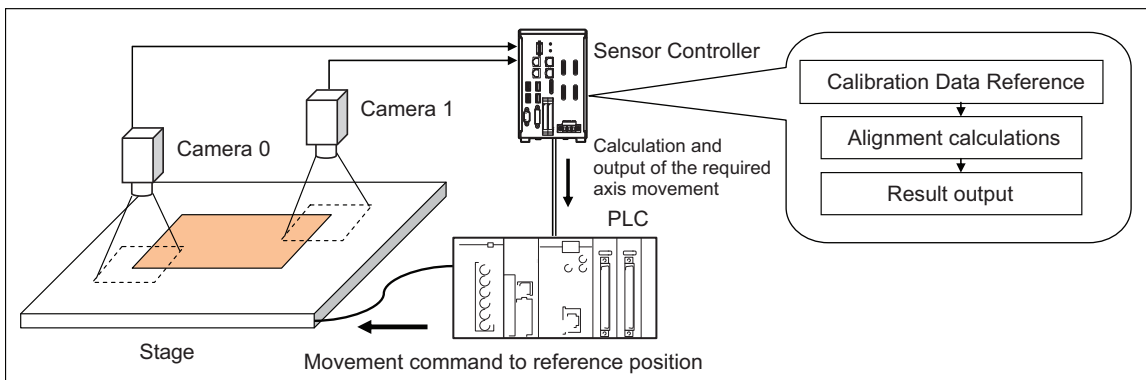
The Camera and external device both have their own coordinates, so it is necessary to calculate the relationship of the coordinates of the Camera and the external device in advance. This process is called *calibration*.

The FH/FZ5-series Controller uses the external device to move the workpiece and measure it. This is repeated to calculate the calibration parameter.



### ● Alignment: Aligning the Position of the Workpiece

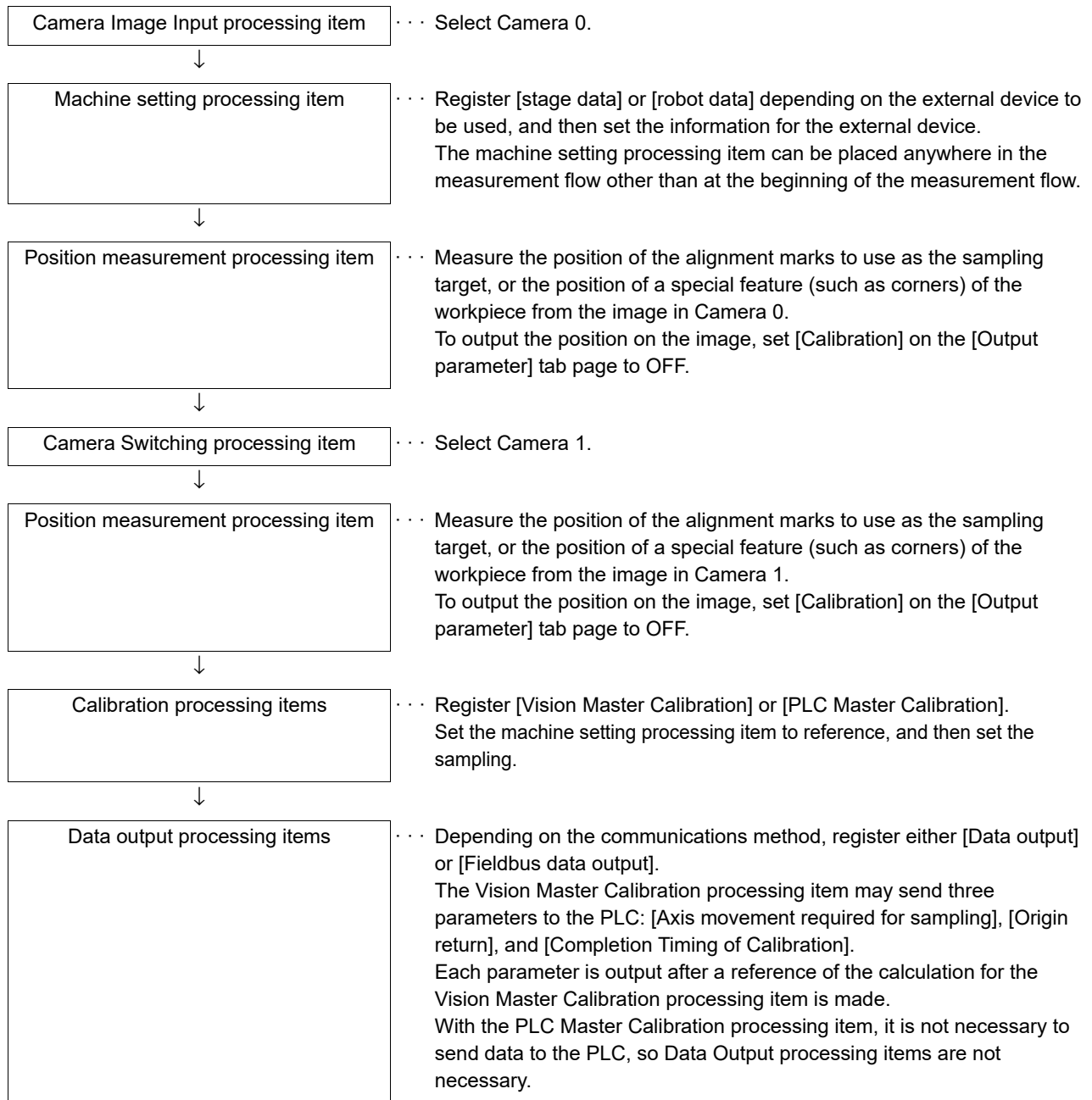
The image taken by the Camera is used to measure the position of alignment marks on the workpiece, or the position of specific features of the workpiece (such as corners) in Camera coordinates (pixels). The calibration parameter that is calculated in the calibration flow is used to convert the measured position into the coordinates of the external device. Finally, the axis movement that is required to match the measured position to the reference position angle is calculated and output to the external device.



## Execution of Calibration

This section uses two Cameras and a stage as the external device to describe an example for setting the calibration flow and executing calibration.

### Example: Calibration Flow Example for 2 Cameras



## Settings for the External Device to Use

---

Set the parameters that describe the type and specifications of the external device to use.

Add the following machine setting processing item to the flow.

- **Stage Data**

If you are using a stage, use this processing item.

Refer to ► *Stage Data* of the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

- **Robot Data**

If you are using a robot, use this processing item.

Refer to ► *Robot Data* of the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

The settings for the machine setting processing item can be referenced by the following processing items.

- Vision Master Calibration
- PLC Master Calibration
- Transfer Position Data
- Calc Axis Move
- Calc Axis Move by Multipoint

Note
------

---

The settings for the machine setting processing item can be referenced from other scenes.

The machine setting processing item can be registered only in one scene group, but it can be referenced from other the scenes. This enables central management of the external device settings.

---

## Settings for the Calibration To Execute

Add the following Calibration processing items to the flow.

### ● Vision Master Calibration

This processing item calculates the axis movement that is necessary to perform the most accurate calibration within the range of movement of the external device.

This routine is performed repeatedly to create very precise calibration parameters: Output the calculated axis movement to the PLC, the PLC moves the external device, the PLC sends a measurement command to the FH/FZ5-series Controller.

Reference the Calibration Data Reference processing item to access the calibration parameters that were created.

Refer to ► *Vision Master Calibration of the Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

### IMPORTANT

If you are using the measurement results of the Sensor Controller to operate an external device, make sure the movement is within the range of the movement of the external device before you implement the move.

### Note

The Vision Master Calibration processing item has the following advantages over PLC Master Calibration processing item.

- There is no need for trial and error with the order of movements or axis movement, even with complicated external devices, such as UVW stages.  
The order of movement of the workpiece during calibration and the axis movement of the external device that corresponds to each movement are automatically calculated.
- Even if you change the calibration conditions, you do not have to change the PLC ladder programming.  
If you add more sampling points for better precision, or if you reduce the number of sampling points to shorten the calibration time, you can still use the ladder programming as is.
- In conjunction with calibration, you can also calculate the parameters for distortion correction at the same time.  
This allows you to align positions with even greater accuracy without doing any extra work.

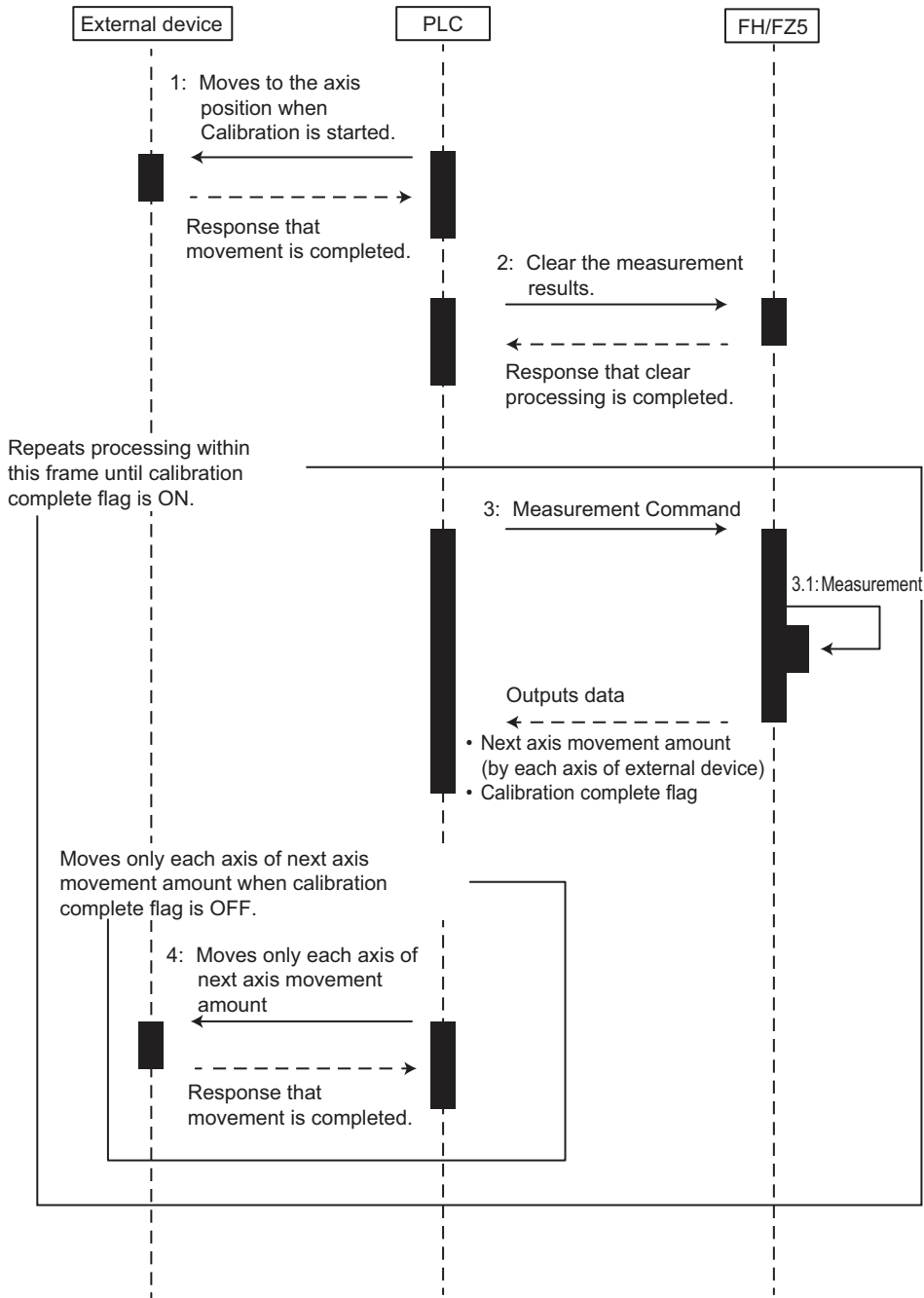
### ● PLC Master Calibration

The PLC Master Calibration processing item creates calibration data as follows: The axis movement that is necessary for sampling is calculated in advance. Then, the following routine is repeated: the PLC moves the external device, it sets the axis movement in the FH/FZ5-series Controller, and then it sends a measurement command to the FH/FZ5-series Controller.

Reference the *Calibration Data Reference* item to access the calibration data that was created.

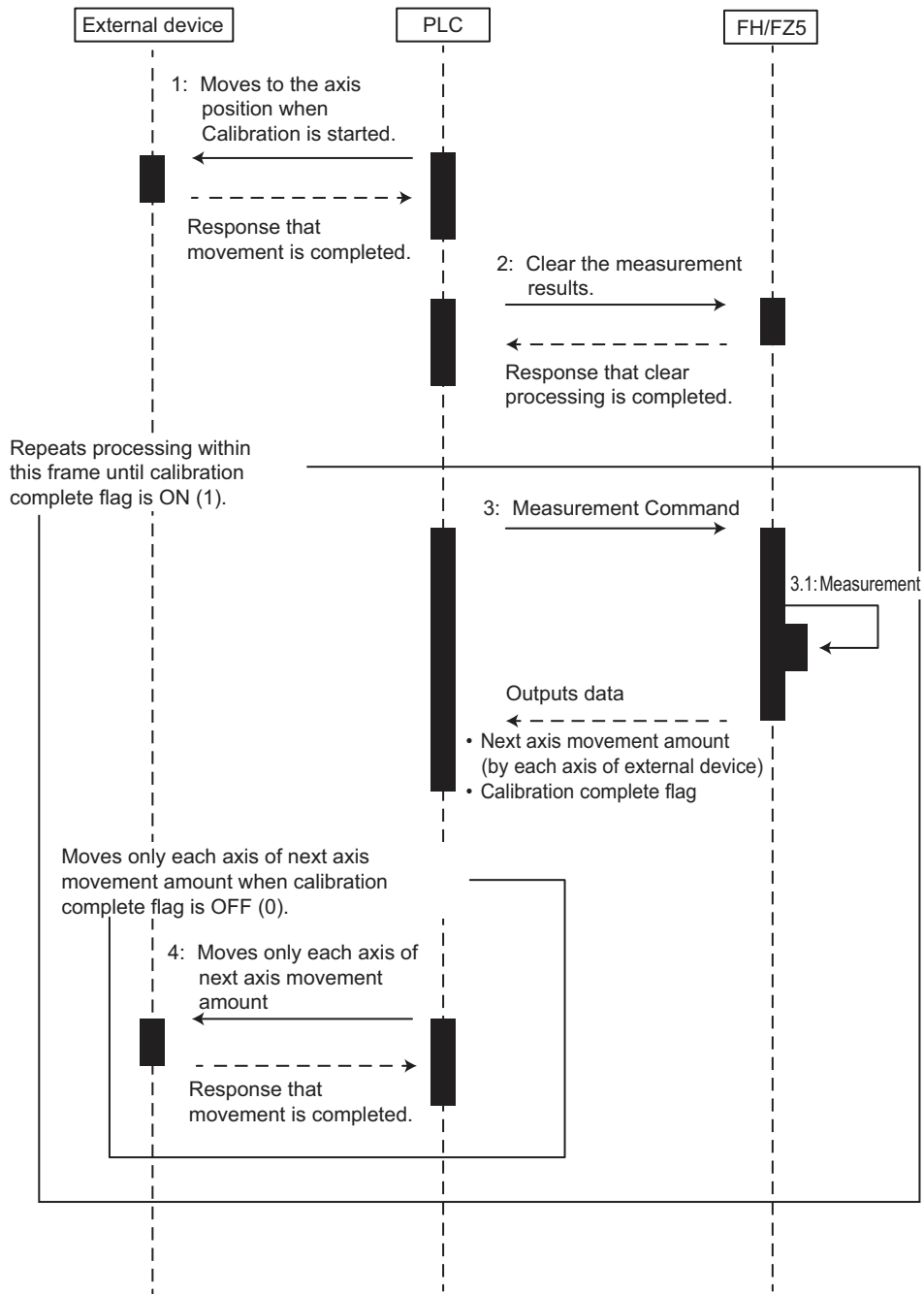
Refer to ► *PLC Master Calibration of the Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

## ● Vision Master Calibration (Homing operation selection is Enable)





● Vision Master Calibration (Homing operation selection is Disable)

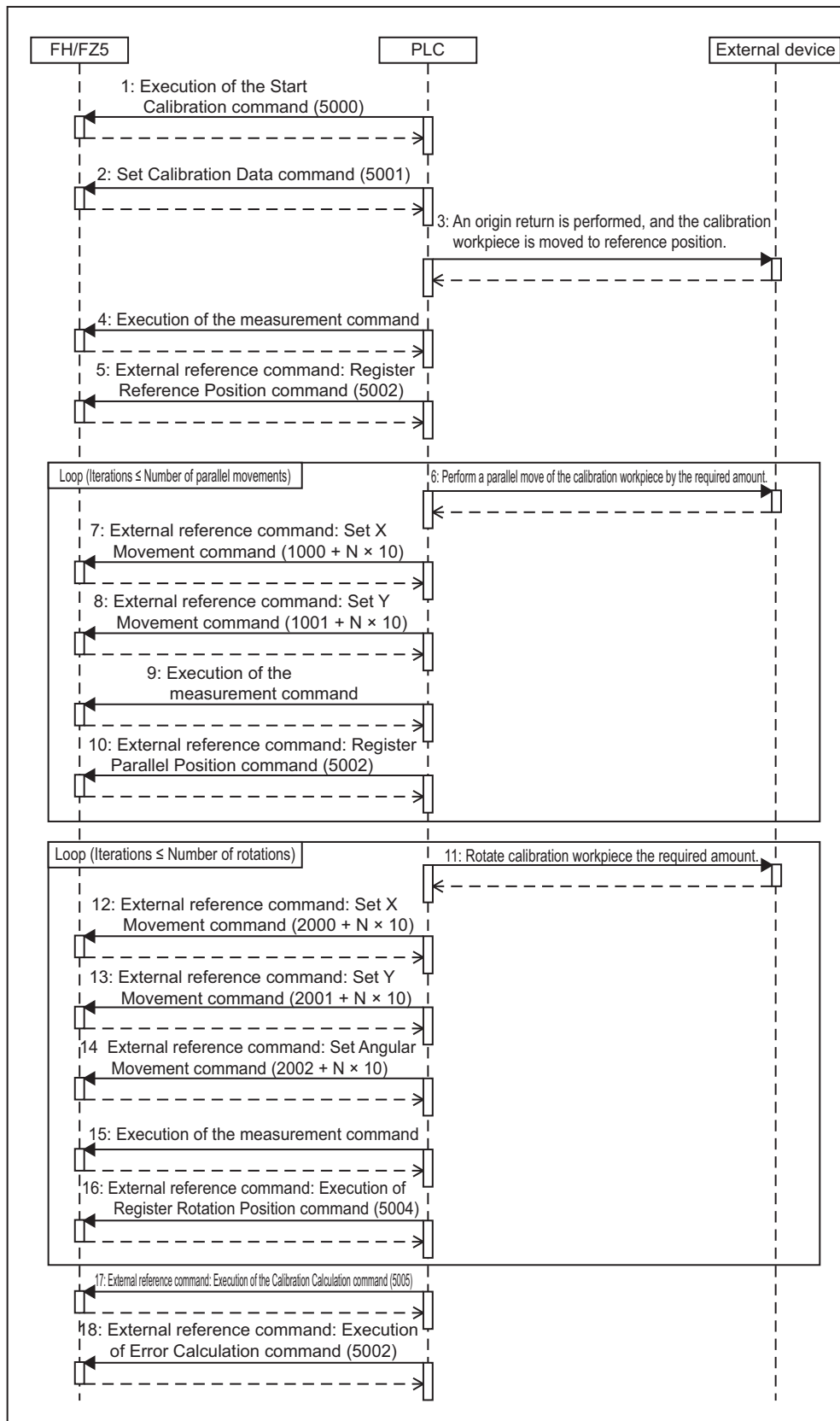


## ● PLC Master Calibration

### • Standard Mode

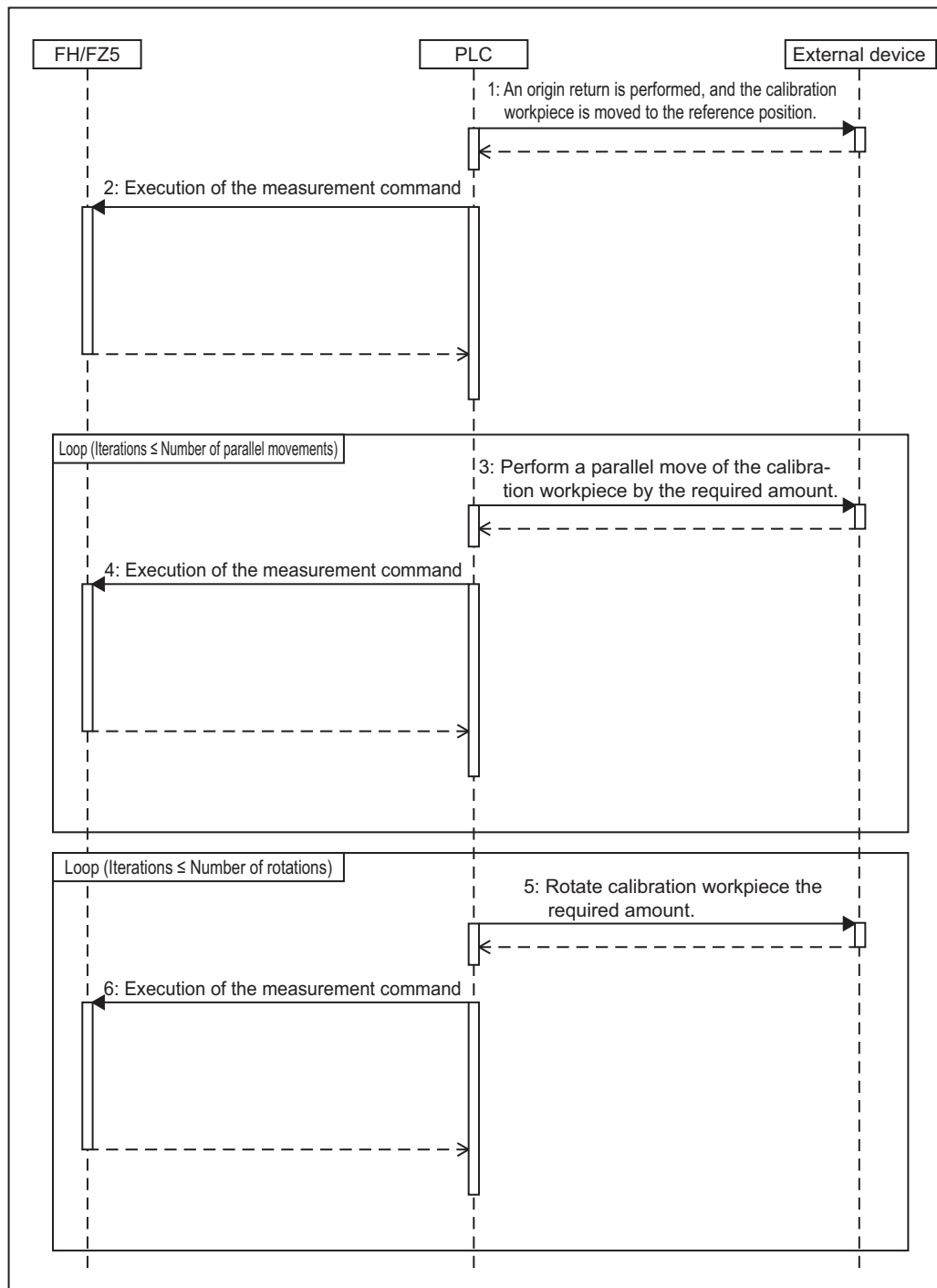
The numbers in parenthesis are the external reference numbers that are used when commands are executed for the PLC Master Calibration processing unit.

Refer to ► *External Reference Table* under *PLC Master Calibration* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).



• **Easy Mode**

The Calibration Execution Flag and movement in actual coordinates must be set in advance in the PLC Master Calibration settings dialog box.



## Troubleshooting

### PLC Master Calibration

Refer to ► *Key Points for Adjustment* under *PLC Master Calibration* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

### Vision Master Calibration

Refer to ► *Key Points for Adjustment* under *Vision Master Calibration* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

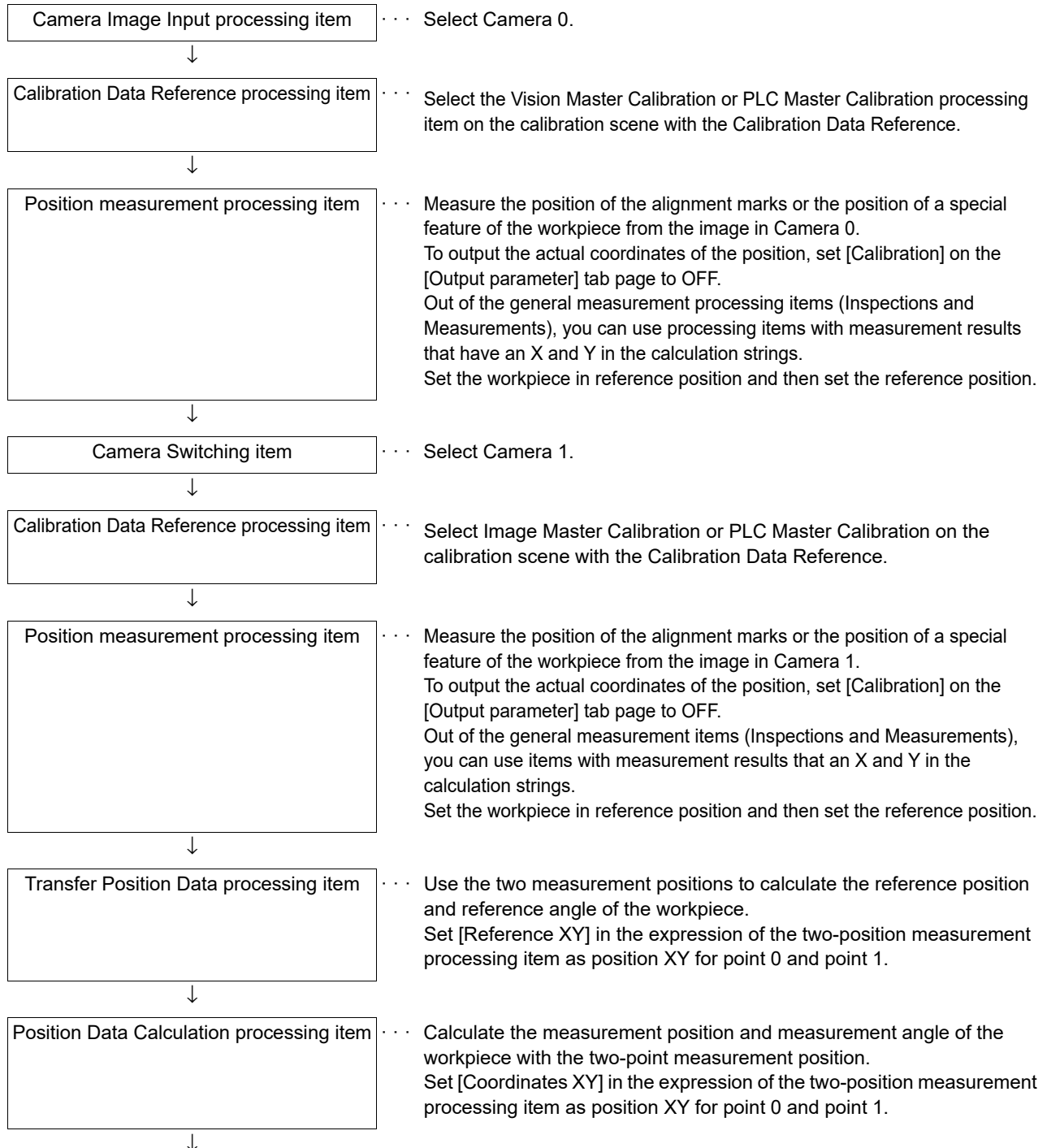
### Calibration Support Tool

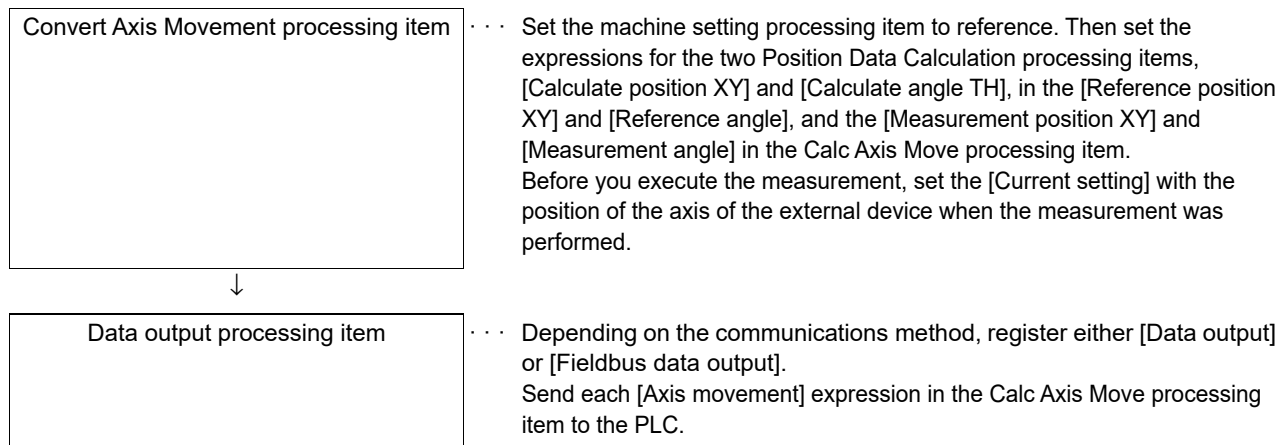
Symptom	Type	Parameters to adjust	Correction
The unit number is set to [None] and cannot be selected.		---	Check whether there are any processing items that retain calibration data that are registered in the current scene.
The setting data is initialized every time the Toolbox is opened.		<ul style="list-style-type: none"><li>• Tool Settings Save Button</li><li>• Tool Settings Load Button</li></ul>	This is the specified behavior. If you need to save the settings data, use the [Save] button in the Toolbox. The saved settings can be loaded with the [Load] button.
How do you rotate the graphic display for better visibility?		<ul style="list-style-type: none"><li>• Standard axis</li><li>• Axis direction</li><li>• Direction of rotation</li></ul>	You can rotate the graphic display along the standard axis, axis direction, and rotation direction on the [Display setting] tab page.

## Alignment

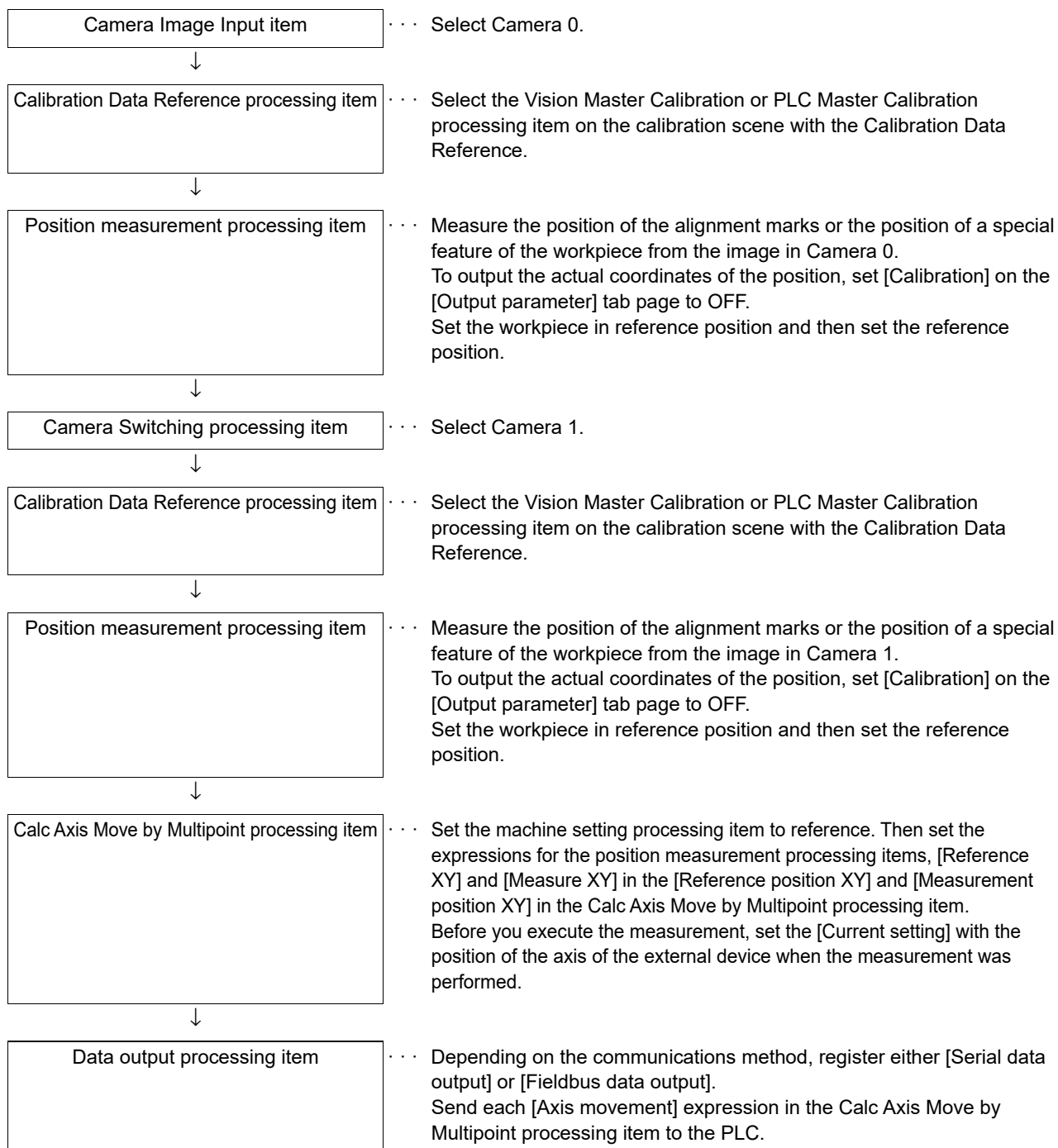
This section will use two Cameras to describe the procedures for setting the alignment flow and executing alignment.

### Example 1: Alignment Flow Example (Position Data Calculation and Axis Movement Conversion) for Two Cameras





### Example 2: Alignment Flow Example (Calc Axis Move by Multipoint) for Two Cameras



## Settings for Position Alignment

### ● Transfer Position Data + Calc Axis Move

Use these settings to align the measured position and measured angle with the reference position and reference angle.

The movement that is required to align each axis of the external device is calculated and output.

Refer to ► *Transfer Position Data and Calc Axis Move* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

### ● Calc Axis Move by Multipoint

Use this setting to align more than one measured position with corresponding reference positions.

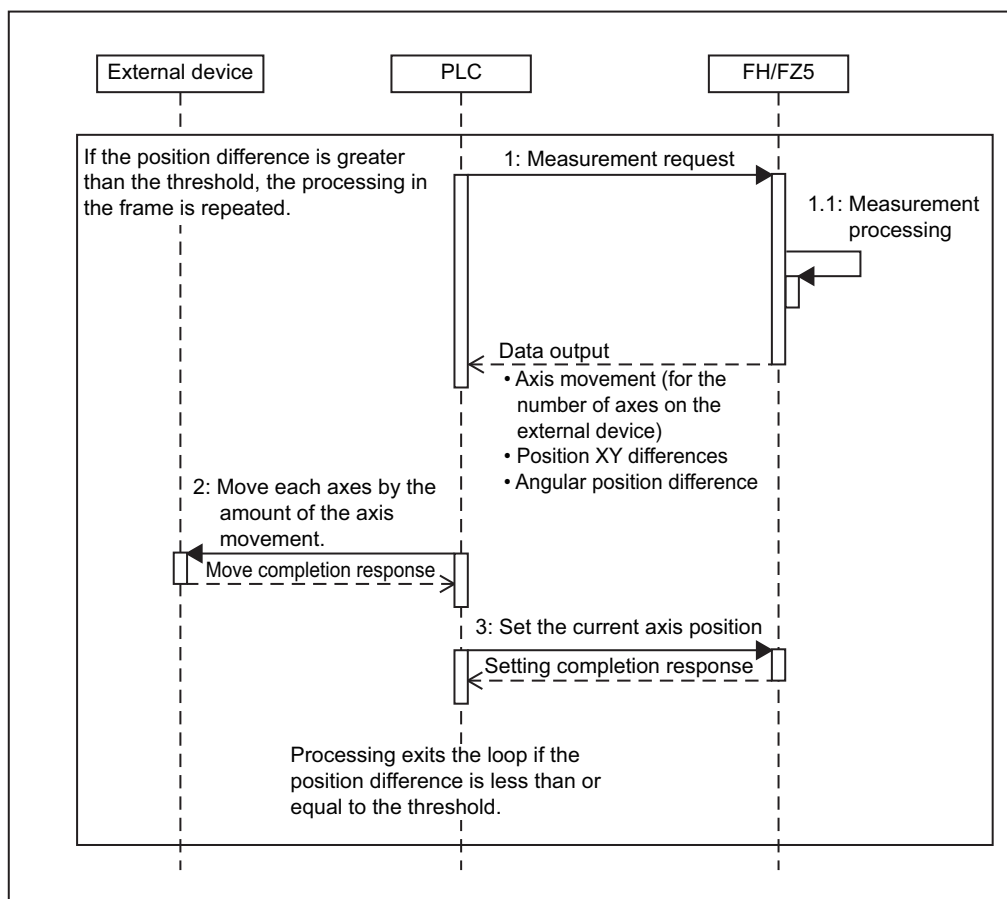
The movement that is required to align each axis of the external device is calculated and output.

Refer to ► *Calc Axis Move by Multipoint* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

### IMPORTANT

If you are using the measurement results of the Sensor Controller to operate an external device, make sure the movement is within the range of the movement of the external device before you implement the move.

### Executing Alignment



### ● Checking the Calibration Results

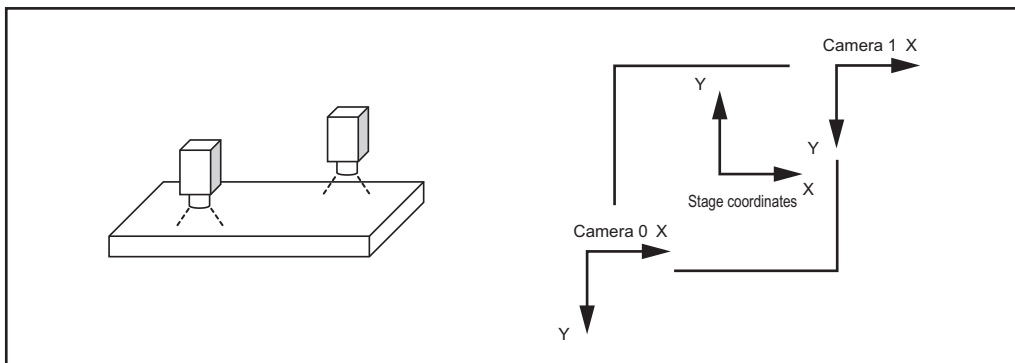
The Calibration Support Tool uses the calibration parameters to graphically display the relationship of the positions that are represented by the Camera coordinates and the actual coordinates. You can compare the relationship of the displayed position with the actual position of the equipment. This allows you to easily check the validity of the calibration parameters. To start the Calibration Support Tool, select [Calibration support tool] from the [Tool] menu.

#### • Overview

The calibration data for the specified data number that is stored in the processing unit for the specified unit number is used to graphically display the positioning relationship of the Camera coordinates and the actual coordinates.

You can specify the following processing items for the processing units

- Camera Image Input
- Camera Image Input HDR
- Camera Image Input HDR Lite
- Camera Image Input FH
- Vision Master Calibration
- PLC Master Calibration
- Camera Calibration
- Calibration Data Reference
- Precise Calibration



Generate calibration parameters

A comparison of the device drawings and the graphic display will easily show calibration errors.

#### Camera 0

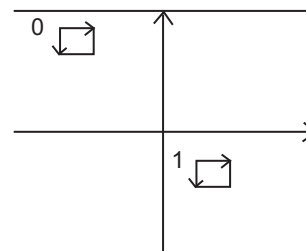
A = 0.2500  
B = 0.0000  
C = -480.0000  
D = 0.0000  
E = -0.2500  
F = 480.0000

#### Camera 1

A = 0.2500  
B = 0.0000  
C = 160.0000  
D = 0.0000  
E = -0.2500  
F = -160.0000



Graphic display



Calibration succeeded.

#### Camera 0

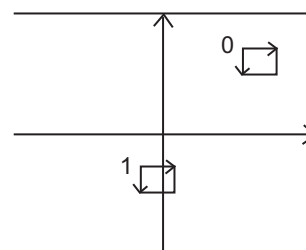
A = 0.2500  
B = 0.0000  
C = 480.0000  
D = 0.0000  
E = -0.2500  
F = 480.0000

#### Camera 1

A = 0.2500  
B = 0.0000  
C = -120.0000  
D = 0.0000  
E = -0.2500  
F = -120.0000

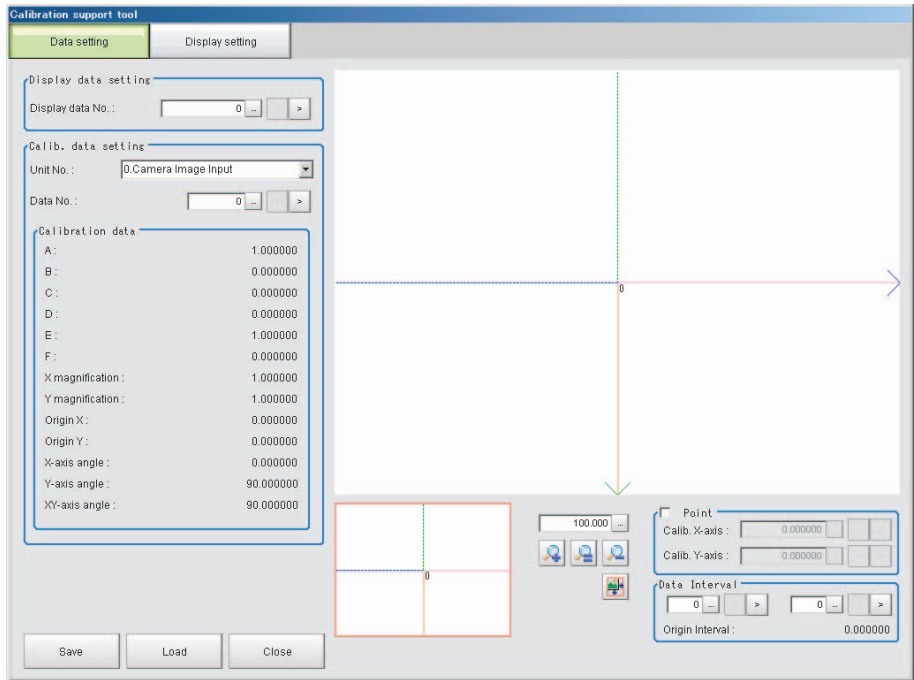


Graphic display



Calibration failed.



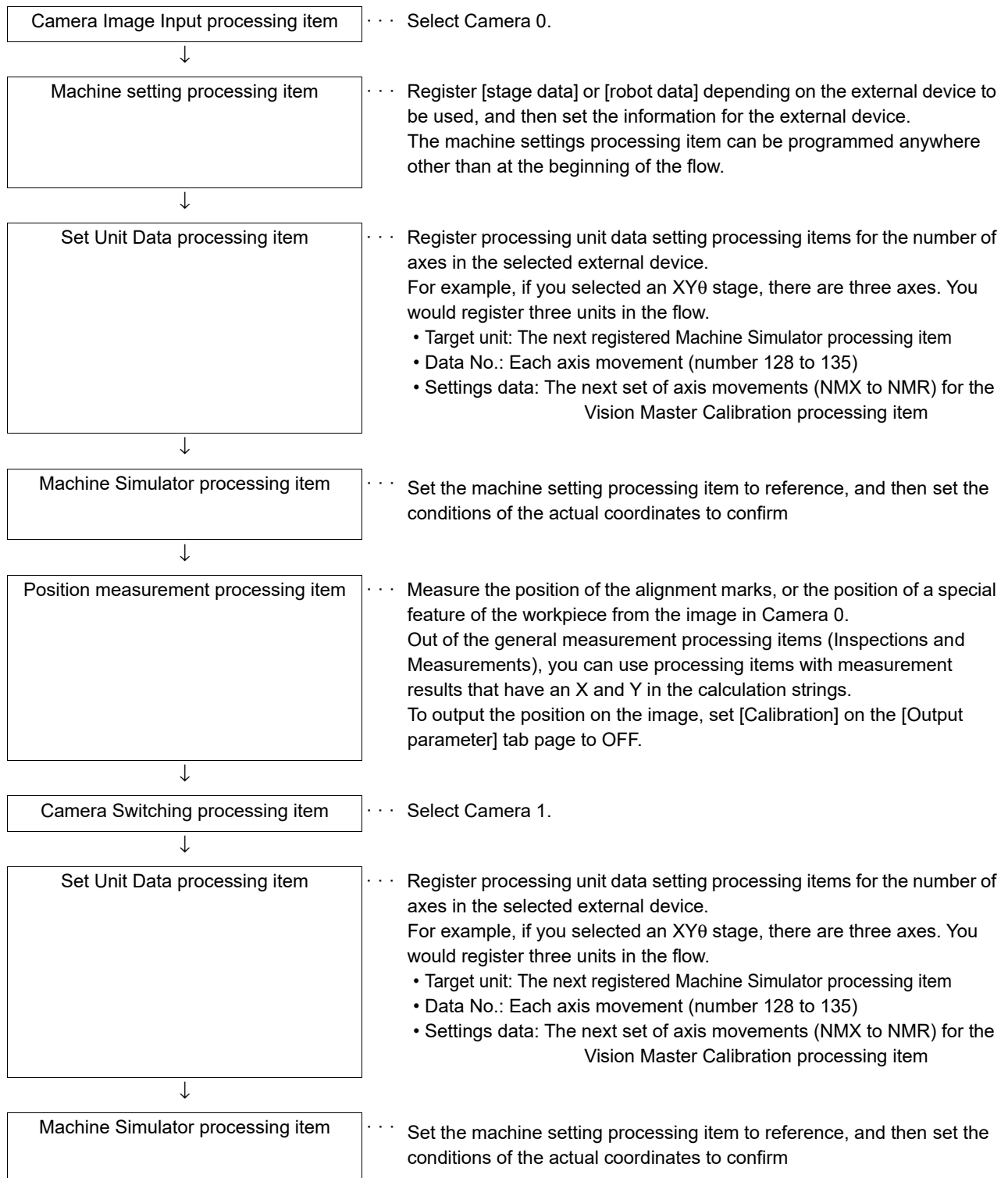


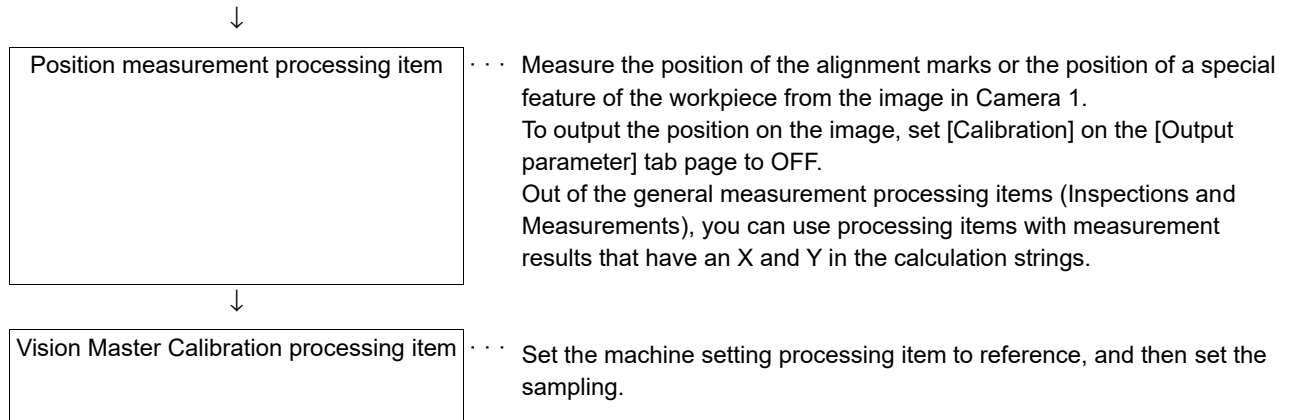
Refer to the *Vision System FH/FZ5 Series Processing Function Reference Manual* (Cat No. Z341) for further information on the alignment processing items.

## ● Machine Simulator

The Machine Simulator processing item allows you to see how the alignment marks move on the image while each axes of the stage or robot is being controlled. You can use it to verify the operation of the alignment processing items even if the actual stage or robot is not available. The following example uses two Cameras to describe the use of the Machine Simulator processing item to verify the operation of a Vision Master Calibration processing item.

### Example: Usage Example for Two Cameras





- **Using the Flow**

The motionless workpiece (or a saved image) is continuously measured until the calibration is completed. This allows you to easily verify the operation of the calibration flow with the FH/FZ5-series Controller. Conventionally, you could not verify the calibration flow unless the Controller was integrated into the system.

Refer to ► *Machine Simulator of the Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

## Alignment Processing Items

The following processing items can be used as alignment processing items.

Refer to the following manual for details on processing items.

Reference: ► *Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat No. Z341)*.

Processing item category	Sub category	Processing item name	Description
Measurement support processing items (Inspection and measurement support items)	Machine setting processing items	Stage Data	This processing item sets and retains data that is related to a stage. Enter the data based on the specifications of the stage to use.
		Robot Data	This processing item sets and retains data that is related to the robot. Enter the data based on the specifications of the robot to use.
	Calibration processing items	Vision Master Calibration	This processing item is specifically for the calibration of the Camera coordinates and external device coordinates. This processing item automatically calculates all axis movements of the external device that are required for calibration. This allows the calibration process to be carried out with greater ease and precision.
		PLC Master Calibration	This processing item is specifically for the calibration of the Camera coordinates and external device coordinates. This processing item allows you to freely set the axis movement of the external device that is required for calibration.
	Calibration Data Reference	Calibration Data Reference	This processing item is used to reference calibration data and distortion data that is stored in other processing items. The referenced data is used to perform coordinate conversion processing and distortion correction on the measurement results that follow this processing item.
	Alignment calculations	Calc Axis Move	This processing item calculates all axis movements of the external device that are required to match the measured position and angle to the reference position and angle.
		Calc Axis Move by Multipoint	This processing item calculates all axis movements of the external device that are required to match the measured position to the reference position. You can set up to eight points each for the measured position and reference position.
		Transfer Position Data	This processing item calculates the position data and angle data after each axis of the external device is moved by a required amount. Use this processing item when you want to move the stage by a required amount, and then perform a measurement to obtain the position data and angle data before the stage was moved.
		Position Data Calculation	This processing item uses the measurement results from more than one processing item to calculate the position data and angle data to be used in a Calc Axis Move processing item.
	Image Correction processing items ([Compensate image])	Scrolling	Machine Simulator

# Error Messages and Troubleshooting

This section lists error messages that display on the screen and solutions.






**ERR** When a message with this symbol is displayed, the ERROR signal on the parallel interface is on.


Error message	Troubleshooting
No value set. Be sure to set up value.	A value must be set for this item. Please set up value.
<ul style="list-style-type: none"> <li>Invalid system disk Replace the disk, and then press any key.</li> <li>Remove disks or other media. Press any key to restart.</li> </ul>	An error occurred in USB flash drive. End the Controller and turn OFF the power supply. Then back up the data from the USB flash drive that you removed from the Controller and then physically format it on your computer with a physical formatting tool. If the problem cannot be solved by physically reformatting the USB flash drive, it may be damaged.
Error of the expression.	<p>Do the following errors exist in settings for an expression set up?</p> <ul style="list-style-type: none"> <li>Different number of open/close parentheses</li> <li>TJG/unit/value/function/operator/comma is lined next to each other.</li> <li>Operator is set at beginning or end of expression</li> <li>The number of function operands is insufficient or there are more than is needed</li> </ul>
Cannot add object. Out of range of specified characters of expression.	Incompliant to the conditions of expression. Please check the content. Reference: ► <i>Calculation-Settings (Calculation)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat No. Z341)</i> .
The problem occurred in the camera connection.	<p>Is the camera cable connected to the controller? Is camera cable disconnected? Do [Select camera] of [Camera Image Input] and [Camera Switching] have any errors? Do you perform camera switching when an image has not been input? Please check the contents of [Camera setting], then switch off and restart. Reference: ► <i>Camera Image Input-Camera Settings</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat No. Z341)</i>.</p>
Failed to start the window. Memory is insufficient.	<p>Because memory available for use was insufficient, memory needed to open the window could not be secured. Check the flow by adjusting the measurement region of each processing unit and the sizes of the registered models.</p> <ul style="list-style-type: none"> <li>When doing Image logging, if the RAMDisk has insufficient capacity, a warning message will appear when opening the Setup window for the selected Processing item. To save an image logging file to RAMDisk, re-open the setup window after increasing the RAMDisk free space by moving data to the USBDisk.</li> </ul>
<p>Loading the startup Scene group failed. No read location found. Try one of the following:</p> <ul style="list-style-type: none"> <li>When reading from external memory device, verify connection to the external memory device and press OK button to do load operation.</li> <li>To change the Startup scene group, select Change startup scene.</li> <li>If there is no external memory device attached, or no Startup scene group set, in the Scene group saving destination settings, select Save all scene group data in the flash memory.</li> </ul>	<p>Here are some things to consider. Choose a remedy noting the messages.</p> <ul style="list-style-type: none"> <li>No read location for the Scene group</li> <li>The external memory device containing the Scene group is corrupted.</li> <li>The Scene group data is corrupted.</li> <li>You have selected a non-existing Scene group.</li> </ul>



**ERR**

Error message	Troubleshooting
Warning range shall be set within the range from judgement lower to upper limit.	Please redefine the upper and lower warning range limits such that they are within the range between the lower and upper evaluation limits. Reference: ▶ <i>Trend Monitor-Judgement Conditions (Trend Monitor)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341).
The "Search" measurement result may be "NG (Insufficient memory)" with the current setting.	Insufficient memory may occur during measurement. Reset the model parameters. • [Search] Reference: ▶ <i>Search - Judgement is NG (Insufficient Memory)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341). • [Flexible search] Reference: ▶ <i>Flexible search - Judgement is NG (Insufficient Memory)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341). • [Classification] Reference: ▶ <i>Classification - Judgement is NG (Insufficient Memory)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341).
Save operation failed due to insufficient flash memory space in the Sensor Controller. The current Scene group data in Sensor Controller memory will be discarded after system reboot.	<ul style="list-style-type: none"> <li>• Increase the free memory space then re-try saving to the Sensor Controller.</li> <li>• Delete Scene, or Processing unit, or try adjusting the Measurement region of the Processing unit, or the size of the registered model.</li> <li>• Set the Save destination for the Scene group data to be external memory device. Reference: ▶ <i>Saving Scene groups in external memory (Scene Group Saving Destination settings)</i> (p.158)</li> <li>• Save the current Scene group data to external memory. Reference: ▶ <i>Saving Settings Data to the Controller RAMDisk or an External Memory Device</i> (p.228)</li> </ul>
The problem occurred in the system.  ERR	This is displayed when the significant abnormality occurs in the controller system. Please contact one of our branches or regional offices.
The problem occurred in system date. The system battery is insufficient.  ERR	Low battery (for the backup of date and time data) level. The batteries need to be replaced. Please return old batteries to one of our branches or regional offices.
Failed to switch scene.	Is a USBDisk set to the controller? A USBDisk is needed to read scenes after scene group 1.
Failed to switch scene group or save scene group on switch.	The cause of the failure to switch or to save when switching may be that the USBDisk was removed from the controller. Set a USBDisk to the controller and try again.
Failed to clear scene group.	Confirm that a USBDisk is set to the controller and try again.
Processing units can not be add.	Refer to the followings: <ul style="list-style-type: none"> <li>• Unusable processing item is selected.</li> <li>• Insufficient memory.</li> </ul>
Failed to load Scene group. Data is corrupted, or memory is insufficient. Scene group data starts with initialized status.	The following causes are suspected: <ul style="list-style-type: none"> <li>• The power may have been cut off during the last data save.</li> <li>• Because the Operation mode was switched, the required memory size may have increased and memory became insufficient.</li> </ul>
Lighting connection has a problem.	Check the following points. <ul style="list-style-type: none"> <li>• Is there a light with a power consumption higher than 7.5 W connected without an external power supply?</li> <li>• Is there a light with a power consumption higher than 15 W connected with an external power supply?</li> </ul>

Error message	Troubleshooting
<p>Processing units can not be add. Refer to the followings:</p> <ul style="list-style-type: none"> <li>• Unusable processing item is selected.</li> <li>• Insufficient memory.</li> </ul>	<p>Confirm the unavailable processing items are added to the Scene.</p> <ul style="list-style-type: none"> <li>• You cannot add [Camera Image Input] processing item to the FH series Sensor Controller. Necessary memory is insufficient to add the processing item due to the usable memory is decreased. Adjusting the registered model size of the each processing unit or measurement region to recreate the flow.</li> </ul>
<p>The camera connected is not the same as the one used for the last save. Please check.</p>	<ul style="list-style-type: none"> <li>• Check if the camera is connected correctly. This message is displayed when the system and the scene group 0 data edited using the simulation software are loaded and the unit is restarted. Save the setting to the controller and then restart.</li> <li>• The camera type has been changed from FZ-SC5M2/FZ-S5M2 type to FZ-SC5M3/FZ-S5M3 type, therefore the scene data has been converted. Verify the input image and adjust settings as needed. Reference: ▶ <i>Camera Image Input FH, Camera Image Input HDR, or Camera Image Input sections of the Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat No. Z341).</i></li> </ul>
<p>Cannot read selected file. Confirm selected file once again.</p>	<p>Check the following points.</p> <ul style="list-style-type: none"> <li>• Have you removed the USBDisk from the controller after selecting files on the USBDisk?</li> <li>• Have you deleted the selected file? (Such as the case when you selected a file on the RAMDisk and the file was deleted via FTP.)</li> </ul> <p>In addition, the selected file may be corrupt.</p> <ul style="list-style-type: none"> <li>• If the OS environment in which the file was created differs from the OS environment in which the file is being read, it is possible that file capacity limitations have been exceeded. For example, in cases where a large file is created in the PC Simulation Tool, it could exceed the file capacity limitations of the FH/FZ5 series Sensor Controller and not be readable.</li> </ul>
<p>The communication time-out is occurred.</p> <p> ERR</p>	<p>Switch off controller, verify the following contents and then restart.</p> <ul style="list-style-type: none"> <li>• Is cable connected correctly?</li> <li>• Does it comply with communication specifications of external devices?</li> <li>• Are external devices functioning normally?</li> </ul> <p>If error is not resolved after confirmation, the controller may be damaged. Please discuss this with one of our branches or regional offices. Reference: ▶ <i>Non-procedure Communications - Communications Specifications Settings in the Vision System FH/FZ5 Series User's Manual for Communications Settings (Cat No. Z342)</i></p>
<p>Failed to transfer data. The free capacity of RAMDisk may insufficient. Increase the free capacity of RAMDisk and then perform this operation again.</p>	<p>Clean up the content of RAMDisk to increase free space. If this error occurs even though enough free space is available, scene group data may be too large. Review the inspection flow.</p>
<p>Do you want to scan and fix Removable Disk (*:)? There might be a problem with some files on this device or disc. This can happen if you remove the device or disc before all files have been written to it.</p>	<p>The external memory which is inserted to the driver is possible to be abnormal. Select [Continue without scanning], confirm the external memory of your personal computer.</p>
<p>Error in input range. Please input using the correct range.</p>	<p>Please verify range for setting and set up again.</p>
<p>File name contains invalid character.</p>	<p>Please confirm that characters such as \ / , ; * ? " &lt; &gt;   &amp; . SPC (space) are not included in the file name.</p>

Error message	Troubleshooting
Failed to save file. Please check.	Check the following points. <ul style="list-style-type: none"> <li>• Is the memory of the save destination sufficient?</li> <li>• For cases where the save destination is the folder in the USBDisk, is the USBDisk connected to the controller? Or, the controller may not have detected the USBDisk.</li> </ul>
Fan/voltage error.  ERR	Switch off controller, and verify if fan is affected. If error message is still shown after restart, the controller may be damaged. Please contact one of our branches or regional offices.
The error concerning parallel interface was detected. Turn OFF the power and check the connection state of the parallel interface.	Turn off the power, and then confirm the following points of parallel interface communication. <ul style="list-style-type: none"> <li>• Is the parallel interface output directly connected to the power or GND?</li> <li>• The reason why current load is exceeded because the resistive load value of the connected parallel interface is low.</li> </ul>
Procltem error xxxx: xxxxerror	This is displayed when the application software detects an abnormality. Please contact one of our branches or regional offices as there may be a software trouble.
Failed to paste. Please check the save source or the save destination.	<ul style="list-style-type: none"> <li>• No more Scene can be added due to lack of memory.<sup>*1</sup> Review the inspection flow and reduce the memory consumption or switch to another scene group.</li> </ul> <p>*1: The display varies depending on the controller. The physical memory is not sufficient for the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series. The remaining data memory capacity is not sufficient for the FZ5-L series/FZ5-600 series.</p> <ul style="list-style-type: none"> <li>• The amount of memory used and free data memory can be checked from the menu of Memory Consumption Monitor on the Measurement Management Bar or the System Information. Reference: ► Checking the Memory Consumption and Percentage of Memory Used (p.138) and Checking System Information [System Information] (p.295).</li> </ul>
A camera outside the guarantee is connected.	A camera outside the guarantee is connected to the controller currently being used.
Destination folder is not found. Please check.	Check the following points. <ul style="list-style-type: none"> <li>• Have you deleted the destination folder?</li> <li>• For cases where the save destination is the folder in the USBDisk, is the USBDisk connected to the controller? Or, has the USBDisk been detected?</li> </ul>
Failed to save the scene group data. The current Scene group data in the flash memory is discarded after restarting. Recover or avoid by the following ways.	<ul style="list-style-type: none"> <li>• Save the data to click "Data Save" after increasing free space of the flash memory. Deleting other Scene data, deleting processing units, or setting measurement regions or model regions as small as possible is effective.</li> <li>• Change the save destination for the Scene group data to the external memory device when the current save destination is set to Sensor Controller. Reference: ► Saving Scene groups in external memory (Scene Group Saving Destination settings) (p.158)</li> <li>• If the current Scene group is not saved, save current scene group to external memory device. Reference: ► Saving Settings Data to the Controller RAMDisk or an External Memory Device (p.228)</li> <li>• The amount of memory used and free data memory can be checked from the menu of Memory Consumption Monitor on the Measurement Management Bar or the System Information. Reference: ► Checking the Memory Consumption and Percentage of Memory Used (p.138) and Checking System Information [System Information] (p.295).</li> </ul>



Error message	Troubleshooting
PLC link error  ERR	PLC link cannot be established. Check the following points. <ul style="list-style-type: none"> <li>• Are the FZ communication settings correct?</li> <li>• Are the PLC communication settings correct?</li> <li>• Is cable connected correctly?</li> </ul>
Failed to register model	For Search, Classification, Flexible search, Shape search II Please register higher-contrast images as models. If the model is registered at full screen size, re-register at a smaller size. <hr/> For Fine matching The two pixels at the edge of the image cannot be registered as the model.
Memory is becoming insufficient. According to the setting, memory shortage may occur.	The free application memory has decreased. Memory may become insufficient, or an error may occur in operation mode switching. Re-configure the inspection flow to reduce memory consumption. <hr/> The amount of memory used and free data memory can be checked from the menu of Memory Consumption Monitor on the Measurement Management Bar or the System Information. Reference: ► Checking the Memory Consumption and Percentage of Memory Used (p.138) and Checking System Information [System Information] (p.295).
Overcurrent was detected. Turn OFF the power supply and remove the USB device to restart.	<ul style="list-style-type: none"> <li>• There may be a problem with the USB device.              Stop the current process and then turn OFF the Sensor Controller. Remove the USB device and restart the Sensor Controller.</li> <li>• The power consumption of the USB device may exceed the power supply capacity of the Sensor Controller.              Stop the current process and then turn OFF the Sensor Controller. Provide power to the USB device by using external power source, i.e. AC adapter.              Then try to launch the Sensor Controller.</li> </ul>
You need to format the disk in drive *: before you can use it. Do you want to format it?	<ul style="list-style-type: none"> <li>• The external memory which is inserted to the drive may have an error. Select [Cancel] and check the external memory with your computer.</li> </ul>
Add to unit is failed. Insufficiency memory may be occurred.	<ul style="list-style-type: none"> <li>• Application memory is insufficient,              Reduce the number of processing units of measurement flow. When you use FZ5-L / FZ5-600 series, reduce the processing type which is registered to the measurement flow and save the system. After that, restart the system. It may be prevent insufficiency memory.</li> <li>• The amount of memory used and free data memory can be checked from the menu of Memory Consumption Monitor on the Measurement Management Bar or the System Information.              Reference: ► Checking the Memory Consumption and Percentage of Memory Used (p.138) and Checking System Information [System Information] (p.295).</li> </ul>
The free capacity of RAMDisk is insufficient. If nothing is done, measurement cannot be performed correctly. Increase free capacity in RAMDisk.	Clean up the content of RAMDisk to increase free space. If this error occurs even though enough free space is available, Scene group data may be too large. Review the inspection flow.
Region size exceeds. Please narrow region.	There are restrictions as to what can be set up based on the camera and processing items being used. Please adjust the region size so that the region is not too large.
Logging error  ERR	Image logging failed due to insufficient memory at the save destination. The error message disappears after 10 s. Please delete unneeded files in the save destination or prepare a new USBDisk.

Error message	Troubleshooting
The Logon to Network Server screen is displayed.	The connection was cut off based on the idling / session time set on the network logging destination PC. At the command prompt on the PC, enter the following: net config server /autodisconnect:-1 Then disable the automatic disconnection setting.

Although an error message such as the following, is not displayed, the ERROR signal and the ERR indicator will turn ON.

Cause	Troubleshooting
The STEP signal was input when the READY signal was turned OFF.	<ul style="list-style-type: none"> <li>• Input the STEP signal after the READY signal turns ON.</li> <li>• Noise is superimposed onto the STEP signal. Keep PLC and FH series / FZ5 series Sensor Controller away from the noise source.</li> </ul>
A non-existing parallel command was entered.	<ul style="list-style-type: none"> <li>• Please enter a correct parallel command.</li> </ul>
The parallel scene group switch command was executed when no USB flash drive was installed. (FZ5-L series / FZ5-600 series)	<ul style="list-style-type: none"> <li>• Switch the scene group with the USB flash drive installed.</li> </ul>

## During Start-up

### POWER LCD is not lit

- Is the power supply connected correctly?
- Is the supply voltage low (24 V DC +10%, -15%)?

### Nothing is displayed on the monitor

- Is the monitor ON?
- Is the monitor cable connected correctly?
- Has the monitor failed?
- Is the power capacity enough (LCD monitor)?
- Have you turned off the LCD? If you have, the monitor recovery will occur if you tap on the bottom of the monitor.

### FH/FZ5 RUN and ADJUST windows are not displayed.

#### Camera connection:

- **When the camera connection is checked and initialized during start-up, the system will not start unless there is a response from the camera side. Check if the system starts with the camera cable disconnected.**

#### Data corruption:

- **The scene group data and system data saved to the controller have been corrupted.**  
In some cases when the power is shut down or the USB flash drive was removed while accessing the CF card in the controller, such as when data is being saved to the controller, a scene group is being switched and scene group is being saved to or loaded from an external memory such as USB flash drive, the data file may get corrupted. The file needs to be repaired. Please contact OMRON.
- **Monitor images are disordered**
- **Are the power supply and cable generating electronic noise?**
- **Is the monitor cable connected correctly?**

### Input cannot be made

- **Are the cables for input devices (mouse, etc) connected correctly?**
- **Is the angle too big when tapping is done with the touch pen?**

### Camera image does not display/Image is blurry

- **Is the lens cap removed?**
- **Is the camera cable connected correctly?**
- **Is the lens aperture the maximum or the minimum?**
- **Is the camera's shutter speed correct?**
- **Is the lighting method correct?**

### Start-up is slow

- **Was the system connected to a LAN when started?**  
If the system is started while connected to a LAN, startup may take a longer time.

#### Note

When [Touch Panel Monitor (FH-MT12)] is selected from the [Serial (RS-232C/422)] box in the [Communication module select] section under [Startup setting], and if a RS-232C cable and a Touch Panel Monitor are not connected to the Sensor Controller, starting the application takes approximately 30 seconds longer than usual.

## During Operation

### Measurement results do not display on the monitor

- Are windows other than the Main screen (the Edit Flow window, etc.) displayed?
- Are any setting windows open?  
\* A setting window is defined as a window that opens separately such as the Edit Flow window and the Scene Maintenance window.

### "NG (memory shortage)" is displayed in the "Detail result" area

- Does the number of specific processing items, such as camera image input, exceed the limit?  
Reference: ► About Limits on the Number of Image Input Processing Items Used (p.358)

### Data cannot be saved

- The data save may have failed because there was not enough free capacity in the flash memory in the controller. The current scene group data in the controller memory is destroyed after the restart. Immediately perform one of the recovery/avoidance procedures specified below.
  - Increase the amount of available memory and re-save to the controller.  
Delete scenes, or processing units, or adjust the measurement area of the processing unit and the size of the registered models.
  - Evacuate the current scene group data to the external memory.  
Click [Function] menu - [Save to file] - [Setting data] - [Scene group data].

### The window switching speed is slow.

- When both lines are set to through display in the multi-line random trigger mode, the controller's response time may be slow.

### Remote Operation Tool operation or operation of tools such as the Communications Command Macro tool is unstable.

- This can occur when there is not enough free application memory space. To free up application memory space in order to resolve this issue, try deleting processing units to reduce the number of processing units in the measurement flow.  
For FZ5-L series/FZ5-600 series, deleting some of the processing item types registered to the measurement flow and then saving the data to the Sensor Controller directly and restarting the system may work to resolve this issue.

### The image will not be displayed when remeasuring saved images

- You may be using the through image mode in the image display pane on the used layouts. If you are used the through image mode in the image display pane, the image will not be displayed. Check the image mode for all used and unused image display pane.  
Refer to "Arranging Windows" (Reference: ► ImageContainerWindow (p.94)) and check the image display mode specifications for all 24 image display panes.

## For Measurement

### Display is not updated.

- Measurement is given priority when the STEP signal input interval is short or continuous measurement is being performed. As a result, the measurement results (overall judgment, image, individual judgment in the flow display, detailed results) may not be updated. When continuous measurement ends, the measurement results for the final measurement are displayed.

### The measurement NG (image mismatch) error will result when connecting a monochrome camera

- Immediately after performing such operation as starting up the FH series / FZ5 series Sensor Controller, changing scenes, and clearing measurement results, there will be no input image. If you edit the settings or press the OK button in the Properties Dialog Box with no input image, the error will occur at the next measurement.
- If you open the Properties Dialog Box and click the OK button to close the dialog box with no input image, the settings will automatically switch to the factory default settings for the color cameras. If measuring an image input from the monochrome camera with these settings, the error will result due to the mismatching color modes between the camera and the settings.
- To correct the settings after the error occurrence, input the image from the monochrome camera and open the Properties Dialog Boxes for each processing unit. Click the OK button on each screen to exit the screen.

### Target figure for the processing unit figure setting has disappeared

- This occurs when image input or image compensation-related units, such as filtering, are set between the processing unit figure setting and the unit to be changed.  
Processing Items List Manual  
Processing Item List > Supporting Inspection and Measurement > Processing Unit Figure Setting  
Refer to the [Important] section of the aforementioned.

### Judgement (JG) value is -10

- The judgement will be -10 when there is incompatibility between the scene setting and the input image. Could the image be a color image even though it is loaded to a scene that is set for a monochrome camera? Please check the setting.

### Communication takes time

- When you select [Through image], communication will more take time from executing the communication command to completion of it.  
If the communication time will take more time, select [Freeze].
- When the host device controls multiple image sensors, the communication time from the execution of the communication command to its completion may increase due to the overload of the host device. Confirm the device configuration or communication cycle, i.e. Polling cycle of PLC Link or EtherNet/IP.

## About Parallel Interface

### Trigger signal (input signal) not accepted

- **Are the cables connected correctly?**
- **Is the signal cable disconnected?**

You can check the communication status in the Confirmation window.

Reference: ► *Parallel Communications - Testing Communications* in the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342)

- **Are windows other than the Main screen (the Edit Flow window, etc.) displayed?**  
**Are there any setting windows open?**

\* A setting window is defined as a window that opens separately such as the Edit Flow window and the Scene Maintenance window.

### Signals cannot be output to external devices

- **Is the trigger signal input?**
- **Are the cables connected correctly?**
- **Is the signal cable disconnected?**

You can check the communication status in the Confirmation window.

Reference: ► *Parallel Communications - Testing Communications* in the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342)

- **Is test measurement being performed?**

Data cannot be output to external devices during test measurement.

### GATE signals are not output

Wiring:

- **Are parallel cables wired correctly?**

Please check if GATE signals are being recognized by the receiving side (such as the PLC) by turning the GATE signal ON/OFF in the System - Communication - Parallel - Confirmation window.

Output setting:

- **Is parallel judgement output or parallel data output set for the scene? Is an expression input for parallel data output?**
- **GATE signals are not output unless these items are specified.**
- **Is [Output] set to ON in the layout setup?**  
Set whether to produce external outputs for each layout.

Timing:

- **Are the parallel communication settings (output cycle and output time) set to a length sufficient for the PLC to recognize?**

Without this processing, the GATE signal will not be output.

- **Could the System - Communication - Parallel output control be set to handshaking or synchronization output?**

**These settings influence the GATE output timing.**

Reference: ► *Parallel Communications - Time Charts* in the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342)

## Serial Interface (RS-232C/422 Connection)

### No communication available

- **Are the cables connected correctly?**
- **Are the communication specifications of the external devices compatible with the Sensor Controller?**

You can check the communication status in the Confirmation window.

Reference: ▶ *Non-procedure Communications - Testing Communications* in the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342)

### The Sensor Controller works fine initially, but there is not response after a while

- **Is the buffer memory of the PC full?**

Please verify if data can be received correctly based on current settings.

### Data cannot be saved

- **Are the communication specifications of the external devices compatible with the Sensor Controller?**
- **Is "Flow control" in communication specifications set to "None"?**  
**To save data, set "Flow control" to "None".**

Reference: ▶ *Non-procedure Communications - Communications Specifications Settings* in the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342)

#### Note

When [Touch Panel Monitor (FH-MT12)] is selected from the [Serial (RS-232C/422)] box in the [Communication module select] section under [Startup setting], and if a RS-232C cable and a Touch Panel Monitor are not connected to the Sensor Controller, starting the application takes approximately 30 seconds longer than usual.

## Camera with Lighting Controller

### The light does not turn ON at all

- **Did you disconnect or connect the Lighting Controller or Light while the power supply was ON?**
- **Are two or more lights connected?**

If more than one light is connected, it may not be possible to turn them ON simultaneously depending on the total current consumption of the lights. If necessary, set the brightness to 0 for all of the lights except for the light to turn ON.

Refer to ▶ *Camera Image Input, Camera Image Input FH, or Camera Image Input HDR* in the *Vision System FH/FZ5 Series Processing Items Reference Manual* (Cat No. Z341).

### The light will not stay ON all the time

- **Are two or more lights connected?**

If two or more lights are connected, the always-on lighting mode cannot be used for lighting if the total power consumption of the lights is 7.5 W or higher.

### The light malfunctions

- **Is the sequence for turning ON power correct?**

If you are using an external power supply, either turn it ON at the same time as the power supply to the Sensor Controller or turn ON the external power supply first.

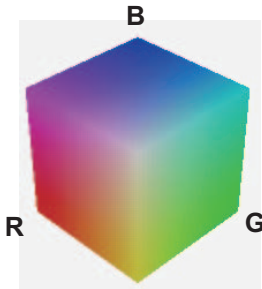
# Measurement Mechanism

This section describes how to configure measurement in accordance with the images acquired from cameras. This product is prepared with comprehensive processing capabilities for measuring items. Common processes for various processing items are described here.

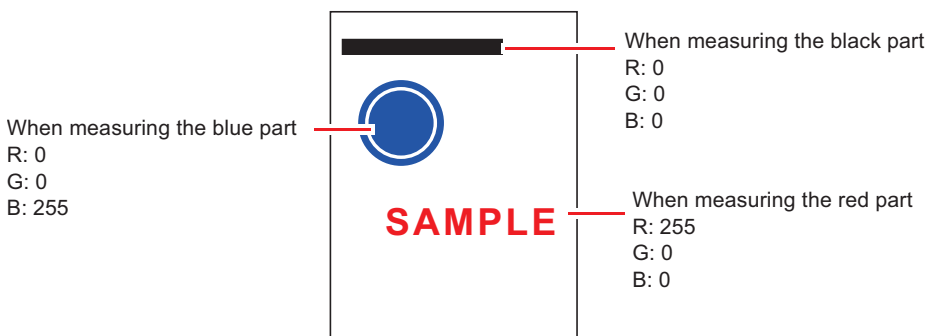
## Color Processing Mechanism

The images acquired from cameras are available with color information such as R(red)/G(green)/B(blue). RGB images can render 16.7 million colors on the screen, and adjustment of color intensity with a range of 0 to 255 can be performed.

For each of RGB, black is rendered with a 0 value and white is rendered with a 255 value.



During measurement of color images, many colors can be measured by adjusting the values for RGB.



### Note

- For monochrome cameras, color processing is not performed.

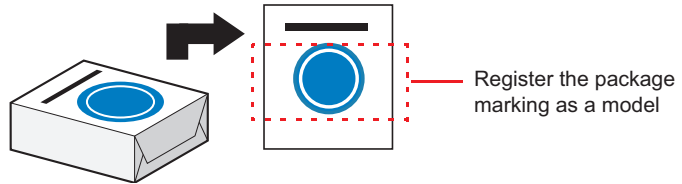


## Search Processing Mechanism

Reference image patterns are registered as models and then search is performed for the parts of input images that most resemble the models. The degree of similarity is represented with a correlation value, inspection for defects and different parts being mixed in can be performed.

The search process is performed over several distinct stages.

### 1 Register a reference model.



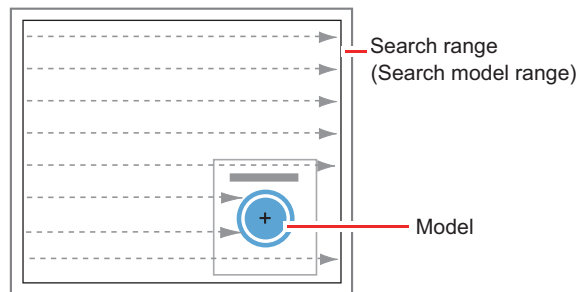
Note

#### Model Status and Measurement Processing

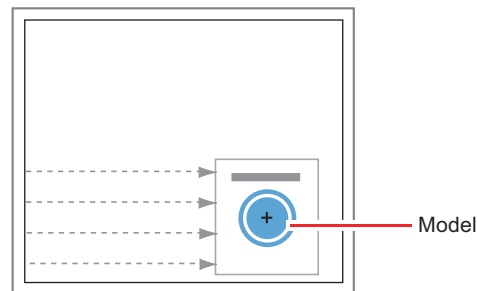
- Measurement time and accuracy may be affected by the status of model in the following ways. Please select measurement objects that are in good condition (clean) for Model Registration.
  - In the case of large or complicated models, processing time is prolonged.
  - With extremely small models or models without features, search processing is unstable.

### 2 Perform rough search of overall measurement region.

Search for the model over the entire measurement region.



### 3 Perform additional searching near the model.



## Search Detection Method

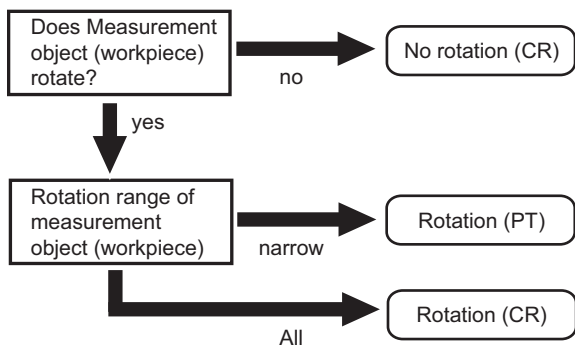
With search processing, there are two types of detection methods: Search by "Correlation (CR)" and search by "Shape (PT)".

The detection method can be selected by changing the "Rotation" settings for each processing item.

Setting item	Description
CR	Measurement for locations where there is high correlation (similar areas) between the color of the model registration image and the input image is performed. Since brightness is normalized in this operation, changes in brightness do not affect searching for correct positions.
PT	Measurement for locations where there is a high degree of similarity between the shape of the model registration image and the input image is performed. Since measurement is based on shape consistency (profile of model), positions can be measured accurately even if portions of the model are missing in images. When the rotation angle range is wide (such as full angle), a search that is faster than a "CR" search can be performed. Note, however, that this method may be less reliable than a "CR" search if the image has low contrast or blurred edges.

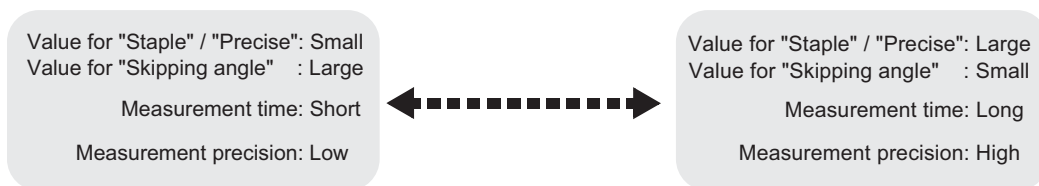
Note

Basic selection flow



Search Speed

For processing items to perform search processing such as [Search] and [Classification], you can specify the search processing speed by through the model parameter items "Stable", "Precise", and/or "Skipping angle". If the value specified for "Stab." or "Prec." is small or if the value for "Skipping angle" is large, the processing speed can be increased since the amount of information for the models will be decreased during the search. In contrast, if the values specified for "Stab." or "Prec." are large or if the value for "Skipping angle" is small, the processing speed is slow because search is performed without the amount of model information being reduced. Specify appropriate values for "Stable", "Precise", and "Skipping angle" according to the measurement conditions.



## Correlation value

With processing items that use search processing, judgement is performed through correlation values. Correlation values are used to check the consistency (degree of similarity) between actual measurement images and reference model images. If portions of measured images are missing or if shapes are different, the correlation value is lower.

Model image



For partial defect



Correlation: 54

For wide line



Correlation: 74

For dark image



Correlation: 99

Larger



Correlation: 43

Horizontal



Correlation: 58

Different shapes



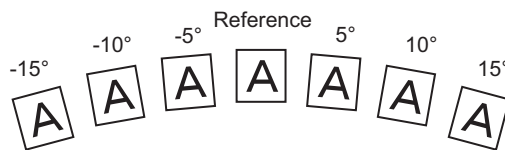
Correlation: 58

## Search Angle Range, Skipping Angle

These are values, based on the model registration image, that indicate the allowable rotation interval (skipping angle) and overall maximum rotation range for the model (angle range). Search is performed for objects that most resemble these acceptable models.

**Example: When angle range is 15° and skipping angle is 5°**

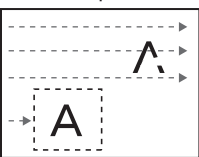
Registration model



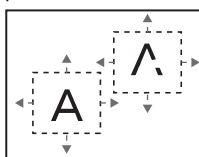
## Candidate Point Level

This is the level used for finding models when searching. Images with a correlation value higher than the candidate point level are used to establish candidate points for search inspection.

Roughly search within the search region for candidate points.

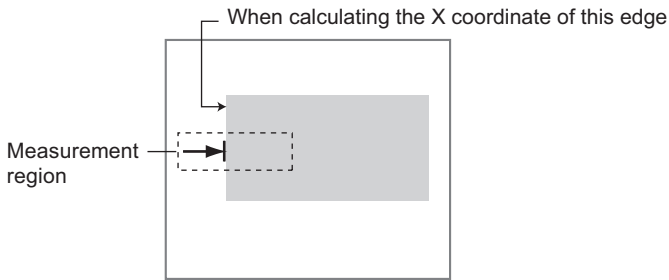


Perform detailed searches in the areas around each candidate point.



## Edge Detection Measurement

This method extracts parts with color changes as edges to perform measurement. Edges are found through color changes in the measurement region.



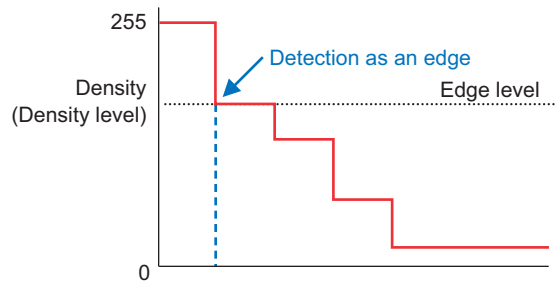
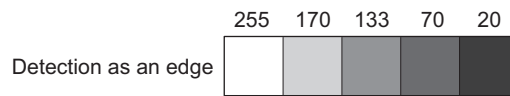
## Edge Detection Method

The following two types of edge detection method are available.

### Projection (Density method)

A projected waveform is formed relative to the density level. The intersection of the density and the threshold (edge level) is detected as an edge.

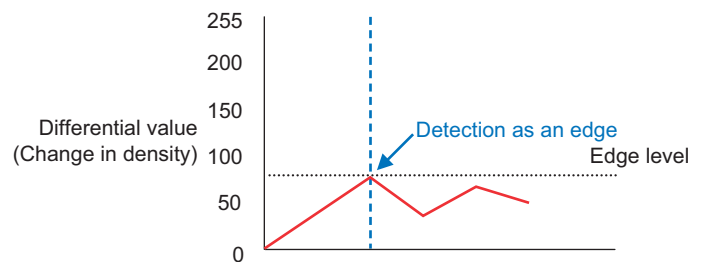
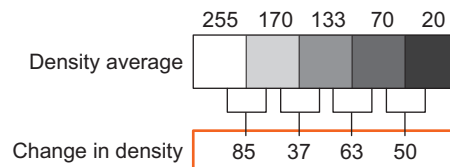
With an image with high noise level or image with blurry edges, the density method is suitable as it allows you to specify the density and color of the edges to be detected.



### Derivation

A differential processing is performed to calculate the change in density between neighboring pixels. A differential waveform with the largest density set as 100% of the region is created, and the maximum value (peak point) of the differential waveform that exceeds the threshold (edge level) is detected as an edge.

With an image with low contrast, the differential method is suitable as it normalizes the differences between the neighboring pixels for processing.



## Edge Level

Indicates the edge color change level (degree of color difference). This level is adjusted if edges cannot be accurately detected.

### Note

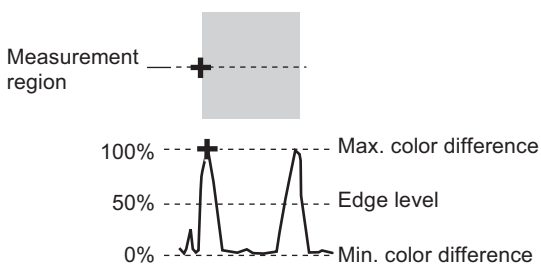
The value 0 to 100 for the edge level indicates the edge intensity. It is not related to color difference in the original images.

### For case of measurement using relative position (%) with regards to width of color difference

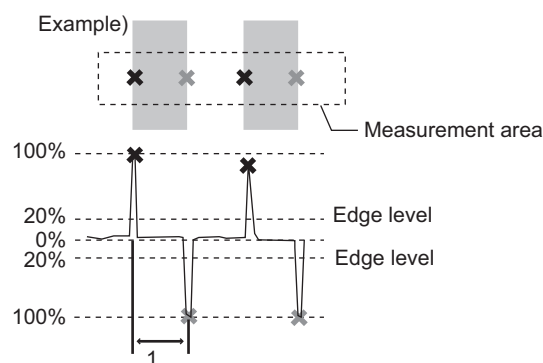
The edges are detected in the following manner.

- 1 Calculate the overall distribution of color difference in the measurement region.**
- 2 Min. color difference value: 0%; Max. color difference value: 100%**
- 3 Locations in which there is an edge level color difference are detected as edges.**

### Edge Position

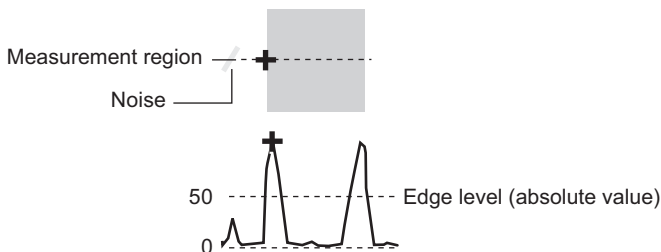


### Edge Pitch



### When performing measurement using color difference value

Edge level is set using color difference absolute value.



## Noise Level

This level judges whether an edge is present or not.

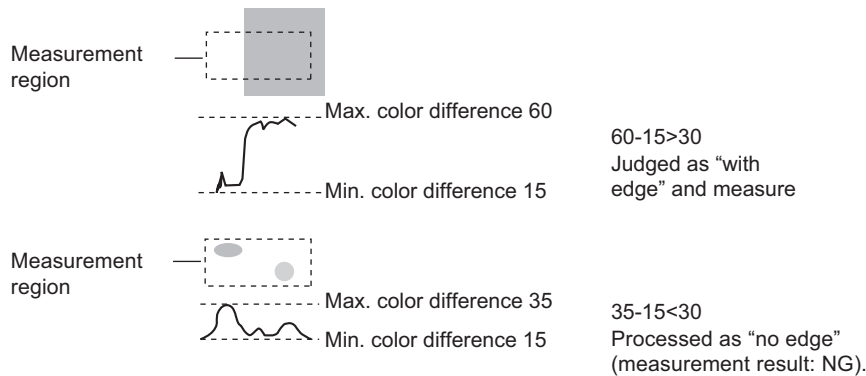
The maximum value and minimum value for color difference in the edge detection area are determined and if the difference is less than the noise level, it is judged that there is no edge. When detection is affected by noise, increase this value.

(within area)

Maximum value - minimum value of color difference < noise level - edge does not exist - measurement result is fail

Maximum value - minimum value of color difference > Noise level - edge exists - targeted for measurement

Example: When noise level is set to 30



## Noise Width

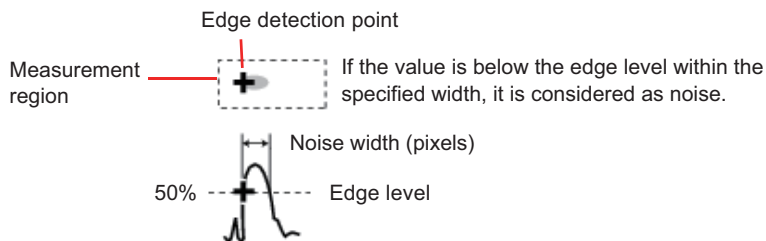
Set the width for judging noise.

- **When no color is specified**

If another edge is detected within the width range starting from the point where an edge was first detected, the newly detected point is considered noise.

- **When a color is specified**

If the color difference distributions again falls below the edge level within the width range starting from the point where an edge was first detected, the newly detected point is considered noise.

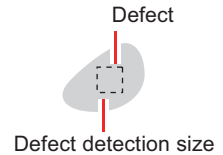


When points are mistakenly detected as edges due to noise, increase the color difference value.

## Defect Detection Measurement

Color changes within the measurement region are used to find defects such as scratches, contamination, and chipping.

After measurement region is drawn, a rectangle (defect detection region) is automatically formed in this region. While moving the defect detection region around, calculate average density for each area to determine the difference between the original area and the surrounding area. This difference is called the defect level. Calculate the defect level for all defect detection areas. If the maximum value exceeds the judgement value, it is judged that there are defects in the measurement region.



Increasing "Defect size" allows for shortening of processing time, but this will reduce measurement accuracy.

Setting item	Description
Upper Lower	<p>Specify the upper and lower limits of defect detection size based on the size of scratch or contamination to be detected.</p> <p>The larger the difference between upper and lower limits, the easier it is to detect the scratches or contamination of various sizes.</p> <p>For both upper and lower limits, higher values for defect detection size limits leads to weaker detection sensitivity and shorter processing time.</p> <p>The diagram shows two grey shaded irregular shapes labeled 'Defects'. A dashed black rectangle is drawn over the left one, labeled 'Defect detection size'. Below the diagram are two horizontal scales. The first scale is labeled 'Sensitivity' and has 'high' on the left and 'low' on the right, with a double-headed arrow between them. The second scale is labeled 'Processing time' and has 'long' on the left and 'short' on the right, with a double-headed arrow between them.</p>

## Handling Coordinates

The processing items for measuring positions have a setting item called "Output parameter" with which you can select how to handle coordinates.

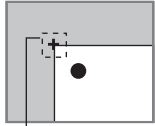
In "Output parameter", you can set "Output coordinates" and "Calibration".

### Output Coordinates

Selects coordinate types to be output to external devices.

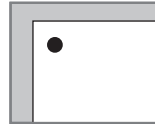
Example)

Image when setting



Reference position  
This angle is used as  
model for position  
compensation

Measurement image  
(image without position  
compensation)



(for left upper deflection)

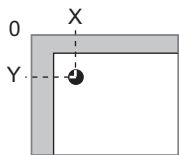
Image with position  
compensation



The area outside of  
imaging range is turned  
into black

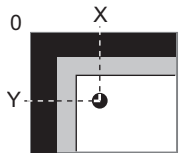
#### Before position compensation

Coordinate values before position compensation are output.



#### After position compensation (with factory settings)

Coordinate values after position compensation are output.



### Calibration

Select whether or not to perform calibration when selecting output to external devices.

#### Calibration: ON

Calibration is performed during output and measured values after calibration are output.

#### Calibration: OFF

Calibration is not performed during output, and coordinate values from camera images are output.



# Basic Knowledge about Operations

## Inputting Values

This section describes how to input values required for setting the judgement conditions and communication specifications. Methods for setting up values include the following, depending on the settings.

- **Specify values directly with the numeric keyboard**

Used to enter specific values, or to fine-tune the value with the UP and DOWN keys.

- **Set numerical values by dragging the slider**

Setting values can be done by dragging the slider on the screen.

The method for displaying the numeric keyboard and setting values is explained here. For other methods, refer to individual setting descriptions.

**1 Click [...] in the item in which a value is to be set.**

The numeric keyboard is displayed.



**2 Click the numeric keys to input values.**

The numerical value is input.

To fine-tune the value, click the UP or DOWN key to increase or decrease the value.



**3 Click [OK].**

This verifies the value and closes the numeric keyboard.

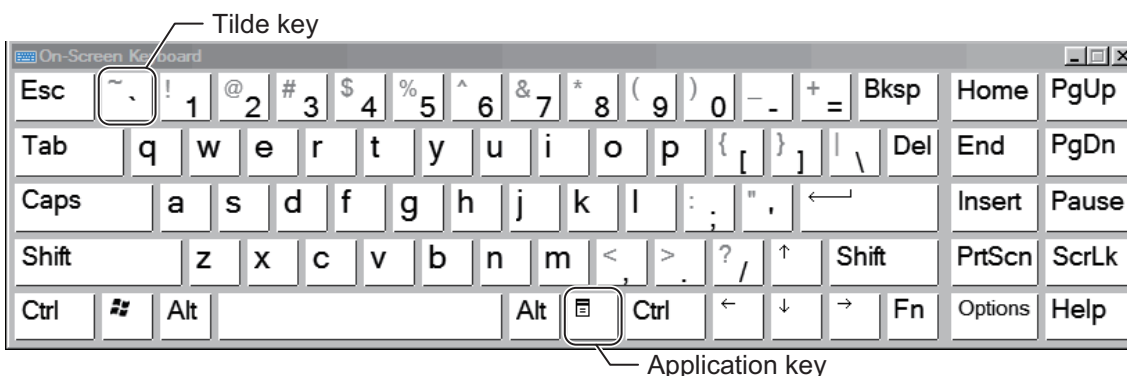
## Inputting Text

This section describes methods for inputting file names and descriptive text. The following software keyboard is displayed in the window for inputting text. It has the same arrangement as an English keyboard (101/104 keyboard). Use one of the following procedures to switch to the Japanese input mode.

- **Press the [Alt] + [~] (Tilde) keys.**
- **Press the application key and select [Open IME].**

Note

If you connect a keyboard to the Sensor Controller with a USB connection, the key arrangement will be the same as an English keyboard.



## Operation Method

- 1 Click [...] in the item in which a character string is to be set.



The soft keyboard is displayed.

- 2 Switch the tabs as needed and Click the character that is to be input.

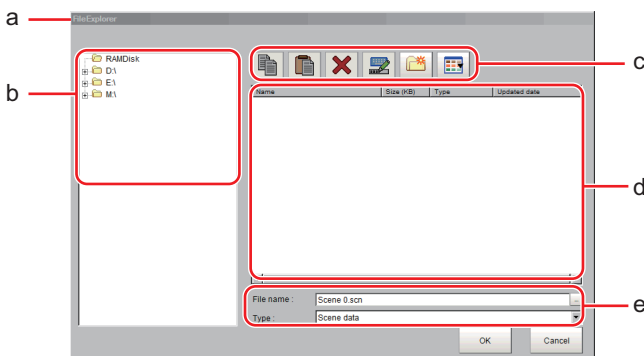
- 3 Click [OK] after text has been entered.

The software keyboard is closed.

## Selecting Files and Folders

This section describes data save/load methods and operation methods for when selecting a save destination folder for images created during remeasurement, etc.

The following window will appear in the window to select a file or a folder.









### a. Window Title

When a file is specified, "FileExplorer" is displayed. If a folder is selected, "Select folder" is displayed.

### b. Folder View Area


A list of folders on the RAMDisk and folders in the mounted the external memory is displayed. At the root of the tree, the drive names of all accessible the external memory devices are displayed (ex. "USBDisk", "USBDisk2").

### c. Toolbar

-  **Copy**  
Reference: ▶ Copying/Pasting a File or Folder (p.342)
-  **Paste**  
Reference: ▶ Copying/Pasting a File or Folder (p.342)
-  **Delete**  
Reference: ▶ Deleting a Folder or File (p.343)
-  **Rename**  
Reference: ▶ Renaming a Folder or a File (p.342)
-  **New folder**  
Creates a new folder.
-  **Toggle list view**  
Switches the display format of the List View area.

### d. List View Area

A list of files and folders contained in the folder selected from the folder view area is displayed.

In addition, when an extension name is selected from "Kind", only the files with the selected extension name are displayed. The content displayed is switched if [List display toggle] (  ) is clicked.

## e. File Name View Area

- **File name**

Names of files selected in the List View area are displayed.

- **Kind**

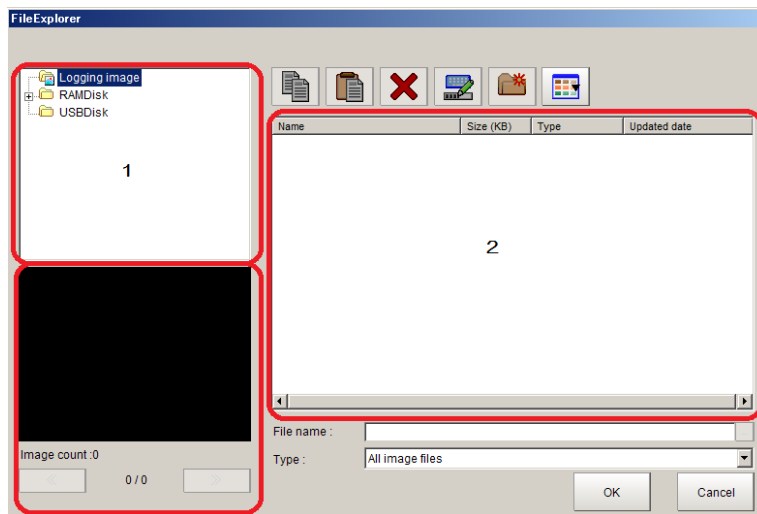
Specifies the types of the file displayed ("Scene data", "System data", etc.) in the List View area.

Note that selection method of BMP(BFZ)/JPG(JFZ) file type differs.

(Reference: ▶ Logging Measurement Values and Measurement Images (p.122), Reference: ▶ Image file (p.352))

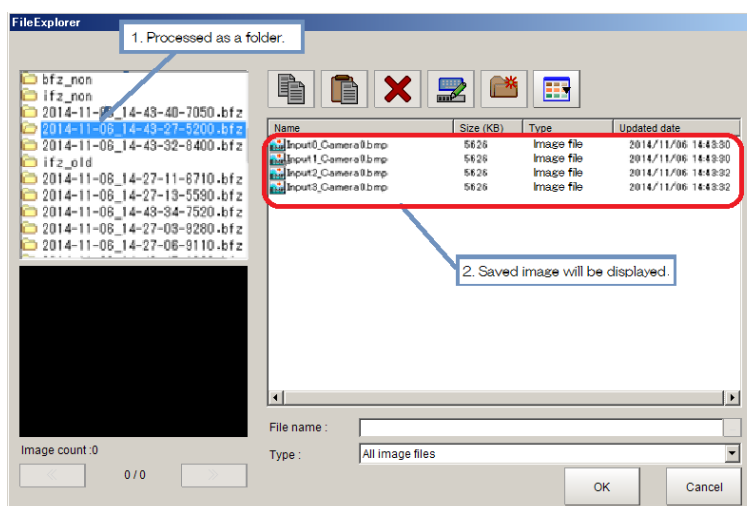
### BMP(BFZ)/JPG(JFZ) file selection in FileExplorer

BMP(BFZ)/JPG(JFZ) file type is a file type included in image file types. Therefore, note that when selecting BMP(BFZ)/JPG(JFZ) file type in FileExplorer, the displayed contents may differ.



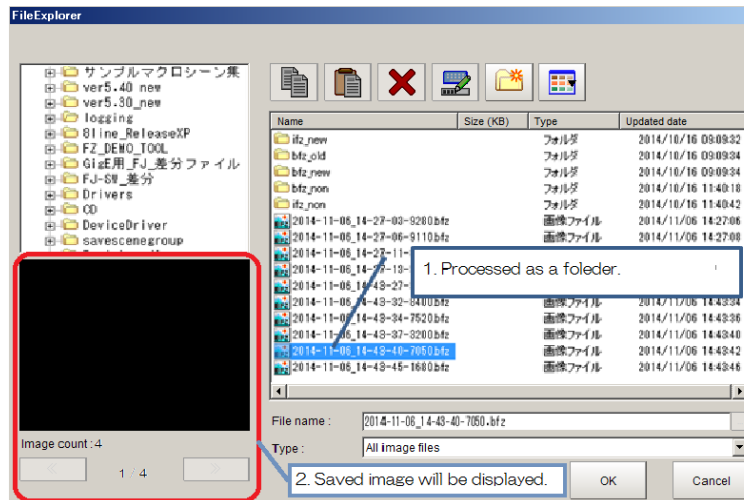
When you select BMP(BFZ)/JPG(JFZ) file type on the 1 area.

1. Selecting BFZ/JFZ file type in FileExplore, it is processed as a folder. BFZ/JFZ file type cannot be selected as a measurement object.
2. If multiple images are saved to selected BFZ file, saved image will display on file select window.



When you select BMP(BFZ) file type on the 2 area.

1. Selecting BFZ file type in FileExplore, it is processed as a file. In this case, those files are processed same as a measurement object file.
2. If multiple images are saved to selected BFZ file, saved image will display on the left-lower window (under part of 1). Clicking [<<] and [>>] buttons, image change is applied.



## Available Operations in Select File Window

This section describes the main operations available from the Select File window.

### Note

If the target file is not displayed in the list view area when selecting a file, please check that the file type of the target file is selected in "Kind".

## Copying/Pasting a File or Folder

### 1 Click the folder or file that you want to copy in the List View area.

The file or folder will be selected.

### 2 Click [Copy] ( ).

### 3 Select the target folder, and Click [Paste] ( ).

## Renaming a Folder or a File

### 1 Click the name of file or folder to be renamed from the List View area.

The file or folder will be selected.

### 2 Click [Rename] ( ).

The soft keyboard is displayed.

### 3 Enter a new name.

Character input method: Reference: ▶ Inputting Text (p.339)

### Note

When a file or folder with the same name exists within the folder, an error message will display telling you that you cannot change the name.

## Deleting a Folder or File

### 1 Click the name of file or folder to be deleted from the List View area.

The file or folder will be selected.

### 2 Click [Delete] ( ).

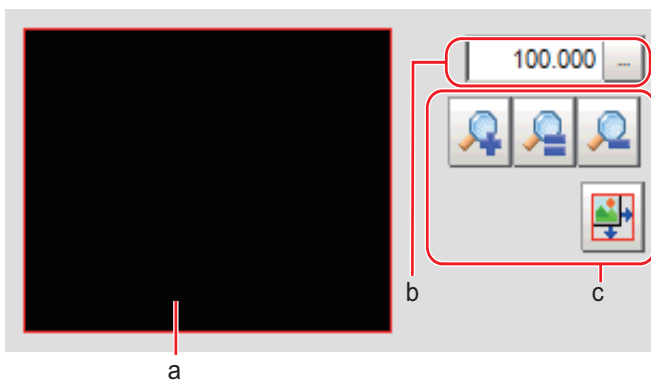
A confirmation window is displayed.

### 3 Click [OK].

The selected file or folder will be deleted.

## Using the Zoom Function

You can adjust the window scaling for the image display on the image display area of Properties Dialog Box. (Reference: ► Properties Dialog Box (p.40))



#### a. Zoom browser

Indicates where the zoom display area is in the original image.

#### b. Magnification factor

Input the magnification factor. A factor of between 25% to 1600% can be indicated.

#### c. Operation buttons

-  **Zoom-in button**

Enlarges the selected area to twice its size.

-  **Original size button**

Displays the selected area in the original size.

-  **Zoom-out button**

Reduces the selected area by half.

-  **Full-screen button**

Enlarges the zoom browser to the entire screen and returns it to its original size.

#### Note

You can use the Zoom function using your mouse wheel on the image display area in FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series.

# Setting Figures

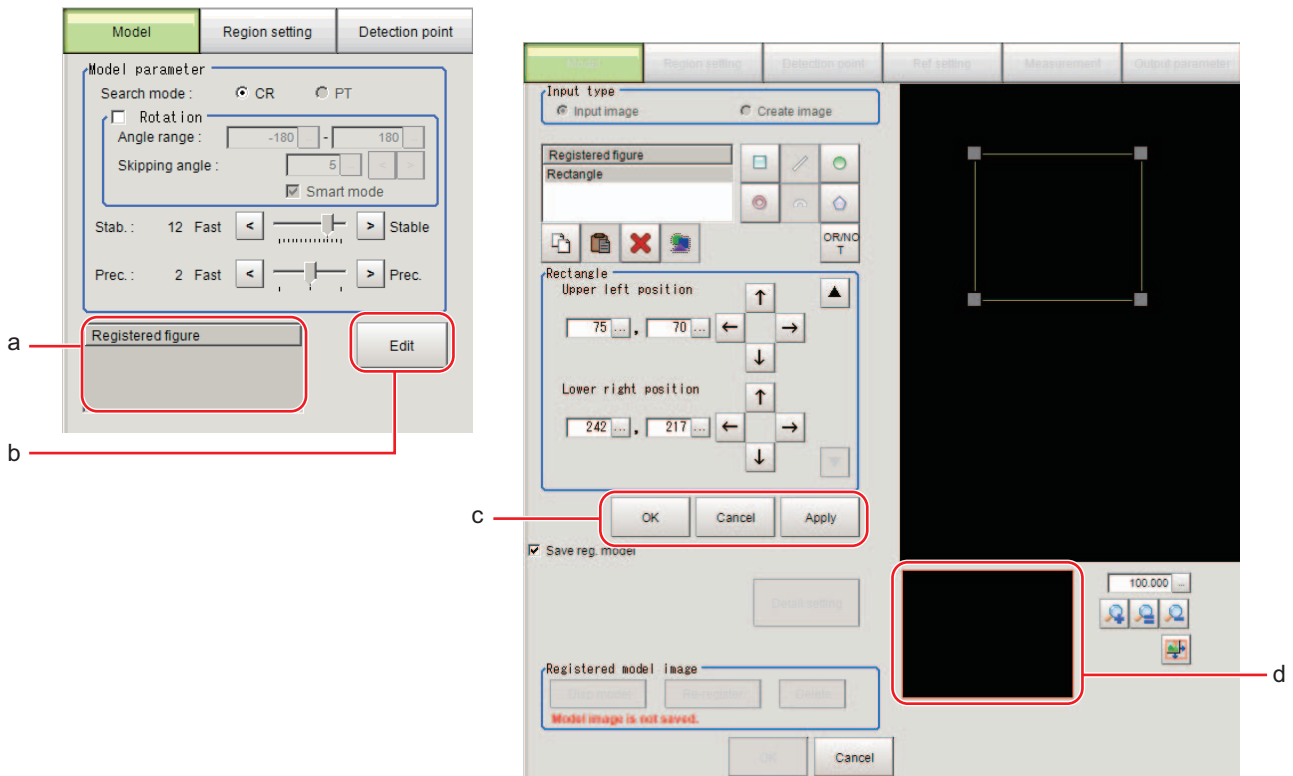
This section describes the setting method for objects (figures and text) when you register Model or set the measurement region on the Properties Dialog Box of Processing units.

(Reference: ▶ Properties Dialog Box (p.40))

The type and number of objects varies depending on different setting options.

## Layout of Figure Setting Area

Window for registering figures when registering or setting areas or models as measurement objects.

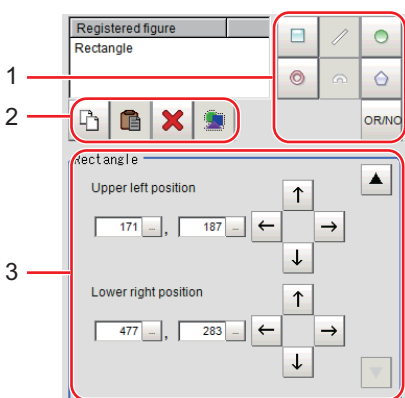


### a. Figures

Displays a list of names of registered objects on the Properties Dialog Box when related figures are set. The figure at the bottom of the list is the nearest object in the foreground. The higher the sequence position of the object, the further back in the background it is. When objects are drawn overlapping, the settings for the object set last are valid.

### b. [Edit]

You can edit on the Properties Dialog Box when related figures are set. By clicking [Edit] button, the following figure editing tool will be displayed.



#### 1. Drawing tool buttons

Sets up objects, such as figures and text. The number and type of objects available is different depending on the applicable setting (ex. "Result display", "Model", "Region setting").

#### 2. Object editing buttons

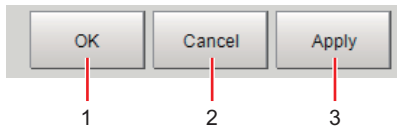
Buttons for editing objects

#### 3. Details

Shows the details of the selected figure. Specify the object coordinates or radius. Tapping [▲] or [▼] will display the items currently not displayed.

### c. Each buttons

These button are displayed under the figure editing tools.



#### 1. [OK]

The Model is registered. Returns to the previous menu.

#### 2. [Cancel]

Changes are discarded. Returns to the previous menu.

#### 3. [Apply]

Updates the figure without leaving edit window.

### d. Zoom Browser Area

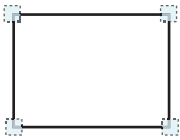
Magnifies the Image Display area by the selected magnification factor.

(Reference: ▶Using the Zoom Function (p.343))

## Setting Methods

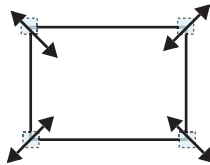
### Rectangle

#### • Image selection status

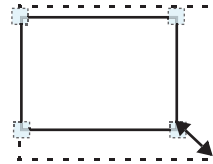


Points are displayed at each of the four corners.

#### • Dimension Adjustment



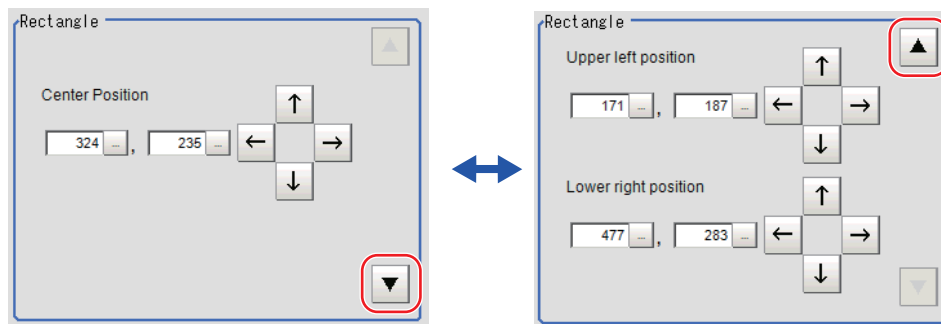
#### • Example) When enlarging



Drag the lower right point down in a diagonal direction.

#### • Using numbers for setting

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.



## Line

- **Image selection status**



Points are displayed at the starting point, ending point, and mid point of lines.

- **Dimension Adjustment**

Drag the points.

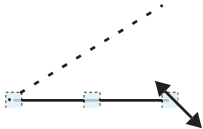


- **Example) When changing the length of a line**

Drag the points toward the intended direction.



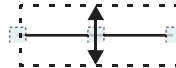
- **Example) When changing the oblique direction**



Drag a point in the direction the line is to be changed.

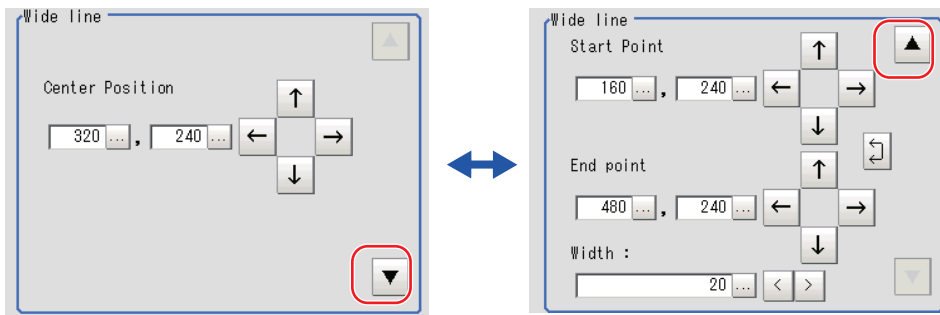
- **Example) When changing the line width**

Drag the center point of the line in a direction perpendicular to the line.



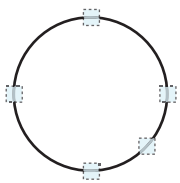
- **Using numbers for setting**

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.



## Circle/Ellipse

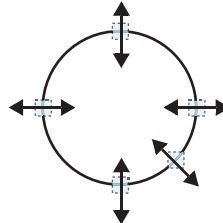
- **Image selection status**



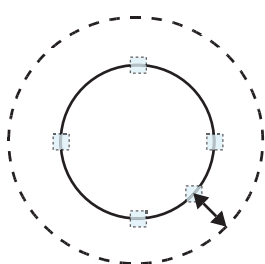
Points are displayed on the top, bottom, left, right, and lower right of the circle.

- **Dimension Adjustment**

Drag the points.

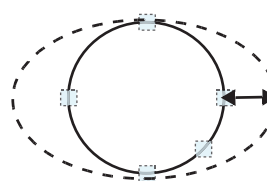


- **Example) When zooming in on a circle**



Drag the point on the lower right of the circle.

- **Example) When transforming a circle into a long horizontal ellipse**

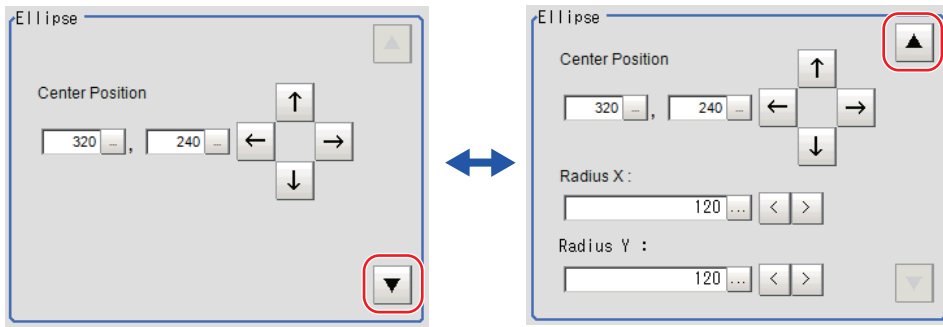


Drag the point on the right of the circle to the right.



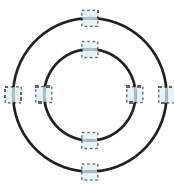
- **Using numbers for setting**

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.



## Circumference

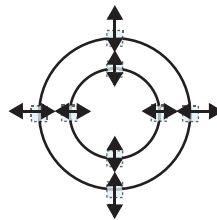
- **Image selection status**



Points are displayed on the top, bottom, left, and right of both the inner and outer circles.

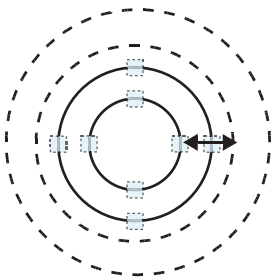
- **Dimension Adjustment**

Drag the points.



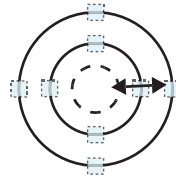
- **Example) When enlarging the entire circumference**

Drag a point on the outer circle.



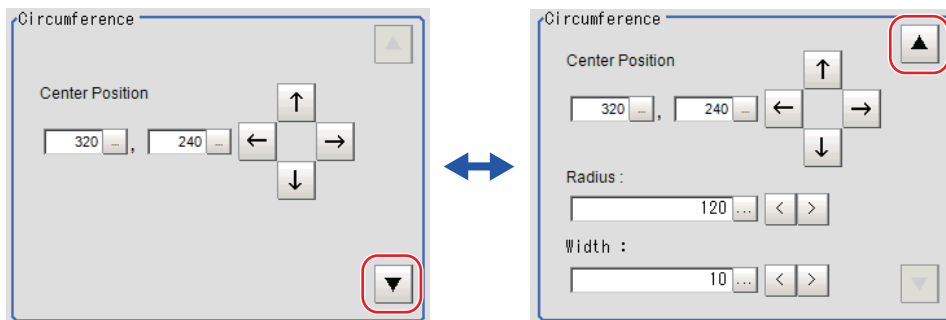
- **Example) When adjusting the width of the circumference**

Drag a point on the inner circle.

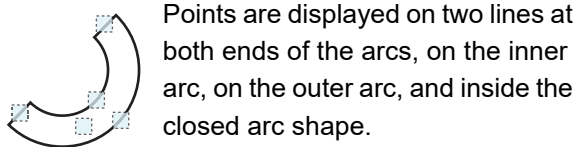


- **Using numbers for setting**

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.

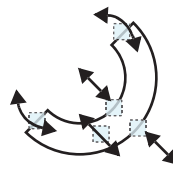


- **Image selection status**



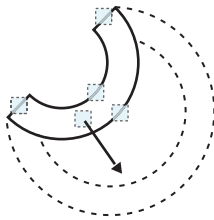
- **Dimension Adjustment**

Drag the points.



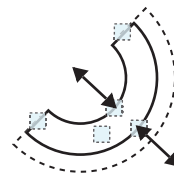
- **Example) When enlarging an arc**

Drag the point inside the arc outward.



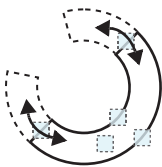
- **Example) When adjusting the width of an arc**

Drag a point on the inner or outer arc inward or outward.



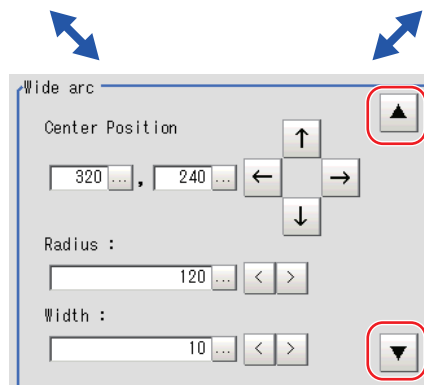
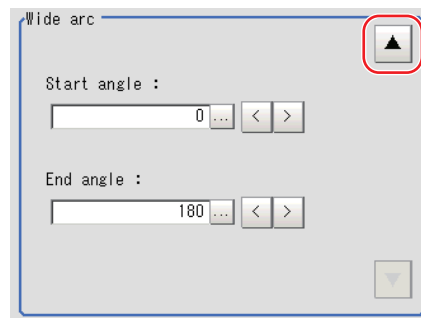
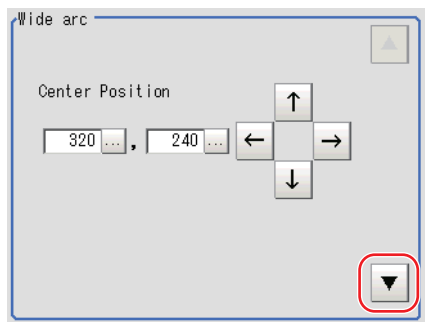
- **Example) When changing the angle of arc (part that is open)**

Drag one of the points at the end of the arc.



- **Using numbers for setting**

The window for settings is split into three. Setting is performed through input of numbers or through tapping on the arrows.



## Crosshair Cursor

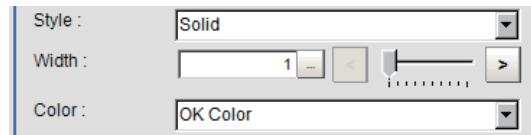
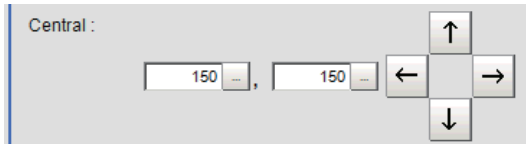
- Image selection status



Entire image is selected.

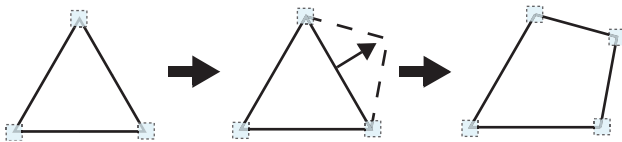
- Using numbers for setting

Setting is performed through input of numbers or through tapping on the arrows. The line type and line color can also be changed at this window.



## Polygons (Triangle to Decagon)

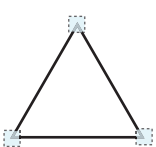
- Drawing methods (for drawing a quadrilateral)



- 1 When [Polygon] is specified, a triangle is drawn at first.
- 2 If you drag and drop one of the sides at the point you want to make a new vertex, a new vertex will be created.

If the number of vertices is not within 3 to 10, the image cannot be confirmed as a polygon.

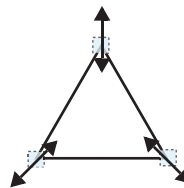
- Image selection status



Point is displayed at vertex of figure.

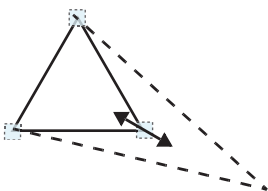
- Dimension Adjustment

Drag the points.



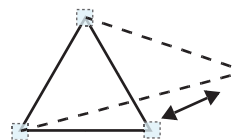
- Example) When changing the angle of one point

Drag points (arbitrarily).



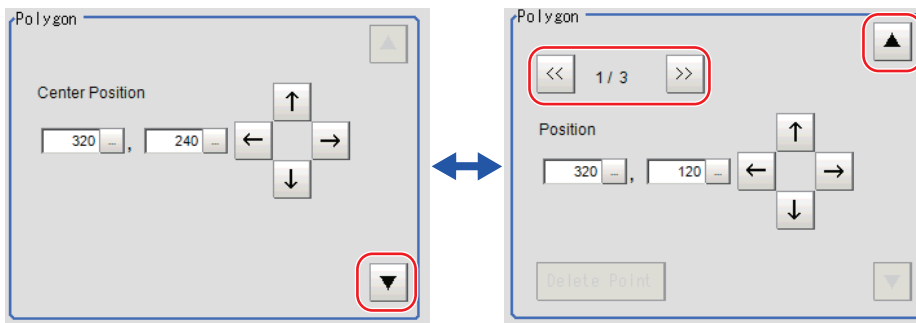
- Example) When changing the region

Drag points (arbitrarily).



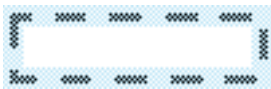
- **Using numbers for setting**

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.



## Text

- **Image selection status**



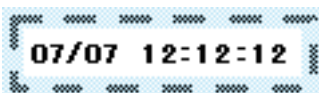
Entire image is selected.

**Note**

- "Text" can only be used in the [Result display] processing item.

## Time

- **Image selection status**




Entire image is selected.

**Note**

- "Time" can only be used in the [Result display] processing item.


## About OR Setting/NOT Setting

The OR setting/NOT setting is used when multiple images are combined.

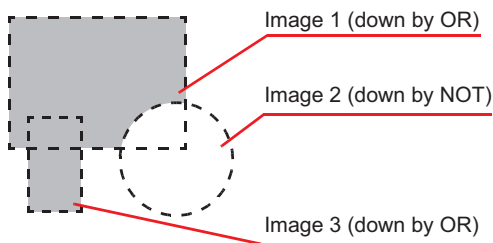
Areas with complex shapes can be drawn through combining figures, and unnecessary parts can be excluded from the area. Each time [OR/NOT] (  ) is tapped, the setting of the selected figure toggles between OR and NOT.

### IMPORTANT

- Images with only the NOT setting cannot be drawn.
- At the location that overlaps another figure, OR/NOT of the region set up later will take priority.

Item	Description
OR/NOT (  )	Used when drawing a model or a region Switching between OR and NOT occurs each time the button is tapped.
OR	The selected figure is displayed with a dotted line in an OK color. When drawing multiple figures, the entire area is registered as one region.
NOT	The selected figure is displayed with a dotted line in an NG color. The area outside of the NOT image is registered as a region.

(Example) The grey parts are measurement regions.



# Image file

IFZ/BMP(BFZ)/JPG(JFZ) file types can be selected as a save image file type.

Select the types according to user environment.

(Reference: ▶ Logging Measurement Values and Measurement Images (p.122), Reference: ▶ Selecting Files and Folders (p.340))

## IFZ file type

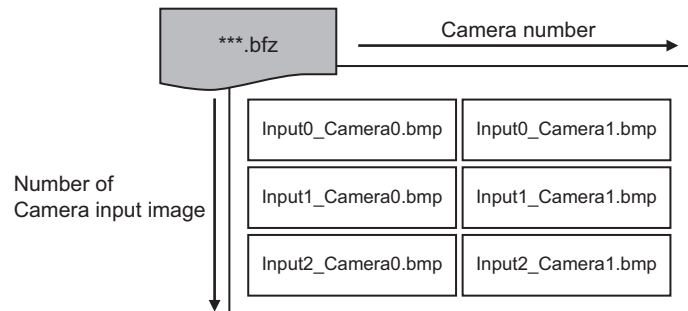
IFZ file type is an OMRON image file type using FH/FZ/FJ series or FQ series.

## BMP(BFZ) file type

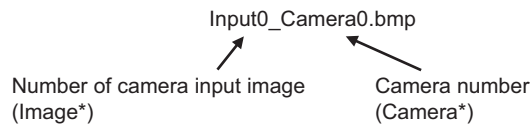
BMP(BFZ) file types are image file types supported in software version 5.50, or later.

This is an image logging file format based on BMP image file types in a directory format.

The BFZ file format is for Multiple image logging and is actually a container file comprised of multiple BMP format image files. See the BFZ file structure below.



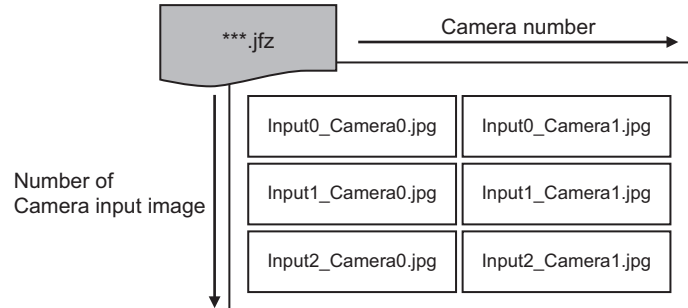
The file names for the BMP image files included in the BFZ image logging file are determined automatically. The name is configured camera number and input order of camera input as below.



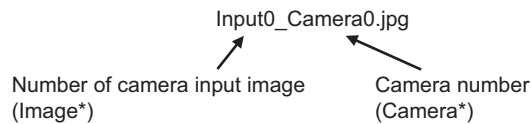
## JPG(JFZ) file type

JPG(JFZ) file types are image file types supported in software version 5.71, or later. This is an image logging file format based on JPG image file types in a directory format.

The JFZ file format is for Multiple image logging and is actually a container file comprised of multiple JPG format image files. See the JFZ file structure below.



The file names for the JPG image files included in the JFZ image logging file are determined automatically. The name is configured camera number and input order of camera input as below.



## Differences among IFZ/BMP(BFZ)/JFZ(JFZ) file types

Item	IFZ	BPM(BFZ)	JPG(JFZ)
File type	OMRON image file type.  This file type has been used in FH/FZ/FJ series.	Image file type configured BMP image file as a folder.  This file type was added from the Sensor Controller software version 5.50.	Image file format in which Jpeg format image files are organized in folders.  A file format added to Sensor controller software version 5.71
File function	For Multiple image logging function.	Corresponding Multiple image logging function.	Supports image logging for multiple image capture.
File compatibility	In Sensor Controller software version 5.30, or earlier, Loading, or measurement is supported and multiple camera configuration is also supported. However, because Multiple image logging is not supported, only the last logging image file can be loaded.	Same support as for a single BMP format image file in Sensor Controller software version 5.30, or earlier.	Loading and measuring with this file type is not supported in sensor controller software version 5.70 or earlier. "Loading and measuring is supported in sensor controller software version 5.71 or later." Since it is an irreversible compression image format, the measurement result differs from IFZ, or BMP (BFZ) format
Image file confirmation	1. Confirm with Sensor Controller. 2. Confirm using dedicated tools if you use PC or confirm to convert IFZ to other file type using same tool.	1. Confirm with Sensor Controller. 2. Dedicated tools are not necessary if you use PC. Confirm it using general image display tools.	1. Confirm with Sensor Controller. 2. Special tools are not necessary when using a PC. They can be confirmed with general image display tools.
File size	---	This file size will be 3x the size of the IFZ file type for color images. For monochrome images, the size will not differ.	Jpeg format file size varies depending on image quality.

Item	IFZ	BPM(BFZ)	JPG(JFZ)
Save counts	---	The number of images that can be saved to an external device will be less.	The number of files that can be saved in external storage is larger than IFZ format, BMP (BFZ) format.
Processing time	---	The read/write processing time will be longer for the BMP(BFZ) file format due to the conversion to/from the IFZ image file format in Sensor Controller memory.	For the Read/Write time for JPG (JFZ) format images, there is some processing time to convert the image format (IFZ) captured in the sensor controller to JPG (JFZ) format.
Restrictions	If there is insufficient memory in the logging destination, the files will not be created.	If there is insufficient memory for the logging destination, the BMP files will not be created, but their container folder will be created.	When the capacity of the logging destination is insufficient, the JPG image is not created and only the folder is created.
Restrictions	---	<ul style="list-style-type: none"> <li>Do not change the names of any BMP images included in the BMP(BFZ) file type. Measurement of loading image may not be executed when loads BMP(BFZ) file type.</li> <li>If there are camera image input numbers for the BMP format files included in the BMP(BFZ) file type that are out of sequence, measurement will not be done on images after the first out of sequence.</li> </ul>	<ul style="list-style-type: none"> <li>Do not change the name of the Jpeg format image file included in JPG (JFZ) format file. When loading a JPG (JFZ) format file, measurement of the loaded image may not be possible.</li> <li>If the Camera Image Input number of the Jpeg image file included in the JPG (JFZ) file format becomes out of sequence, measurement on images after the out of sequence Camera Image Input number will not be performed.</li> </ul>
Restrictions	If you save as BMP(BFZ) format, the handling for the area outside the image differs from the IFZ file format and emphasizes ease of display. If you want to perfectly reproduce the measurement processing, including error processing on the outside part of the image, save it as IFZ file format.		<ul style="list-style-type: none"> <li>The JPG (JFZ) format can be loaded and measured when the Sensor Controller software version is 5.71 or later. Since it is an irreversible compression image format, the measurement result differs from IFZ, or BMP (BFZ) format.</li> </ul>



# About Number of Logging Images

Maximum number of saveable logging images differ depending on type of Sensor Controller, type or counts of connected camera, number of camera input images in flow or settings.

The following table is the number of logging images depending on Sensor Controller type when you use one camera and take image at once.

The following table is the number of image logging when you take a picture for a camera.

Calculate the maximum number of image logging referring to the using the following table and numerical expressions.

## Calculation method

- 1 Confirm the following contents by the maximum number of image logging to calculate.**
  - Model name of Sensor Controller
  - Type of connected camera
  - Number of connected cameras
  - Using times of processing unit items of camera image input in flow. (Camera image input, Camera image input FH, Camera image input HDR or Camera image input HD)
  - Number of camera which transfers images of processing unit items of camera image input in flow. (Camera image input, Camera image input FH, Camera image input HDR or Camera image input HD)
  - Settings for Multiple image logging function
- 2 Find the maximum number of logging(N) depending on model name of Sensor Controller and connected camera when you connect a camera and take a photo at once.**

(Example: When you use FH-1000 series and CCD camera (2 mega pixels with color), see the crossing point 43 of FH-1000 series and CCD camera (2 mega pixels).)
- 3 Number of connected camera is A.**
- 4 Confirm [Multiple image logging] settings in Logging setting of System Settings.**
- 5 Calculates the number of camera input processing items(B). (Camera image input, Camera image input FH, Camera image input HDR or Camera image input HD)**
- 6 Calculates the number of camera transferring images each of camera image input processing items.**

(Example: The number of camera will be checked ones in [Transfer image] area selecting [Select camera] in Camera Image Input FH function.)
- 7 Calculates the number of transferred images by adding all of the camera in 6 step.**
- 8 Calculates the maximum number of image logging using the following numerical expressions.**
  - Multiple image logging function is [ON]  
The maximum number of image logging =  $N / C$  ( $C \leq A \times B$ )
  - Multiple image logging function is [OFF]  
The maximum number of image logging =  $N / A$

## Color camera

Model of Sensor Controller	Type of camera								
	CCD camera (0.3 mega pixels)	CCD camera (2 mega pixels)	CCD/CMOS camera (5 mega pixels)	CMOS camera (0.3 mega pixels)	CMOS camera (2 mega pixels)	CMOS camera (4 mega pixels)	CMOS camera (5 mega pixels)	CMOS camera (12 mega pixels)	Intelligent compact digital CMOS camera
FZ5-L35□	250	40	11	---	---	---	---	---	214
FZ5-L35□-□□									
FZ5-6□□									
FZ5-6□□-□□									
FZ5-8□□	270	43	16	---	---	---	---	---	232
FZ5-8□□-□□									
FZ5-11□□									
FZ5-11□□-□□									
FZ5-12□□									
FZ5-12□□-□□									
FH-L□□□	270	43	16	270	37	20	16	6	232
FH-L□□□-□□									
FH-1□□□									
FH-1□□□-□□									
FH-3□□□									
FH-3□□□-□□									

## Monochrome camera

Model of Sensor Controller	Type of camera							
	CCD camera (0.3 mega pixels)	CCD camera (2 mega pixels)	CCD/CMOS camera (5 mega pixels)	CMOS camera (0.3 mega pixels)	CMOS camera (2 mega pixels)	CMOS camera (4 mega pixels)	CMOS camera (5 mega pixels)	CMOS camera (12 mega pixels)
FZ5-L35□	252	40	11	---	---	---	---	---
FZ5-L35□-□□								
FZ5-6□□								
FZ5-6□□-□□								
FZ5-8□□	272	43	6	---	---	---	---	---
FZ5-8□□-□□								
FZ5-11□□								
FZ5-11□□-□□								
FZ5-12□□								
FZ5-12□□-□□								
FH-L□□□	272	43	16	272	37	20	16	6
FH-L□□□-□□								
FH-1□□□								
FH-1□□□-□□								
FH-3□□□								
FH-3□□□-□□								

# About Limits on the Number of Image Input Processing Items Used

For the FZ5-L/FZ5-600 series, The number of image input processing items that can be used within one scene is limited by the combinations of the camera. (Units that are not used in conditional branching, etc. are also targeted.)

If the limit is exceeded, a measurement NG occurs due to a memory shortage during measurement. Please use within this processing items limitation.

Camera used	Number of image input related processing item restriction
0.3 mega pixels color camera	81
0.3 mega pixels monochrome camera	245
Intelligent Compact Digital Camera (FZ-SQ)	69
2 mega pixels color camera	13
2 mega pixels monochrome camera	39
5 mega pixels color camera	6
5 mega pixels monochrome camera	19

## Image input related processing items

Target processing items are as follows.

Item	Processing item	Item	Processing item	
Loading Images	Camera Image Input	Performing image compensation	Anti Color Shading	
	Camera Image Input HDR		Stripes Removal Filter II	
	Camera Switching		Polar Transformation <sup>*1</sup>	
	Camera Image Input FH		Image Subtraction	
	Camera Image Input HDR Lite		Advanced Filter <sup>*2</sup>	
Performing image compensation	Position Compensation		Machine Simulator	
	Filtering		Panorama	
	Background Suppression		Trapezoidal Correction	
	Brightness Correct Filter		Inspection and measurement support items	Precise Calibration Calibration Data Reference
	Color Gray Filter		Display result to the window	Display Image File <sup>*3</sup>
	Extract Color Filter	Display Last NG image <sup>*4</sup>		
		Conveyor Panorama Display		

\*1: When using a Polar Transformation, each image input related unit after Polar Transformation may consume up to a maximum of 2 items.

\*2: For each unit, 4 items are consumed for Advanced Filter.

\*3: Image file display consumes the number of image setting value items per unit.

\*4: Display Last NG Image consumes the number of save setting value items per unit.

### IMPORTANT

- If there is one or more "Sensitive Search" in the flow, the number of image input items that can be used is only reduced by one.
- In the case of the FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series, the number of processing items is not limited and can be registered as long as there is sufficient free memory. If the amount of used memory increases and the amount of free memory becomes insufficient, it may cause errors in operation mode switching or in adding Processing Units into the measurement flow. Please check the memory consumption when you create scenes.

# About Max. Number of Loading Images during Multi-input

The function that enables continuous high speed image input is called the multi-input function. The maximum number of images that can be loaded based on each specification is shown below.

Type of controller	0.3 megapixel camera	2 megapixel camera	5 megapixel camera
FZ5-L35□ FZ5-L35□-□□	16 (for cameras 0 and 1) 32 (for cameras 2 and 3)	4 (for cameras 0 and 1) 8 (for cameras 2 and 3)	1 (for cameras 0 and 1) 2 (for cameras 2 and 3)
FZ5-6□□ FZ5-6□□-□□ FZ5-8□□ FZ5-8□□-□□ FZ5-11□□ FZ5-11□□-□□ FZ5-12□□ FZ5-12□□-□□	32	8	2
FH-1□□□ FH-1□□□-□□ FH-3□□□ FH-3□□□-□□ FH-L□□□ FH-L□□□-□□	256	64	25

Type of controller	0.3 megapixel camera	2 megapixel camera	4 megapixel camera	5 megapixel camera	12 megapixel camera
FZ5-L35□ FZ5-L35□-□□	---	---	---	---	---
FZ5-6□□ FZ5-6□□-□□ FZ5-8□□ FZ5-8□□-□□ FZ5-11□□ FZ5-11□□-□□ FZ5-12□□ FZ5-12□□-□□	---	---	---	---	---
FH-1□□□ FH-1□□□-□□ FH-3□□□ FH-3□□□-□□ FH-L□□□ FH-L□□□-□□	256	51	32	25	10

## IMPORTANT

- The multi-input function cannot be used when the built-in lighting of an Intelligent Compact Digital Camera, FZ-SQ□□□□, is used.
- The maximum number of images loaded does not change even if partial reading of camera images is selected. When using two camera cables for connection, the maximum number of loaded images during multi-input is twice the number given in the table.

# Character Code Table

For the case of character related process items, recognized characters are output to an external device using a character code (base 10).

Calculation method for output value (base 10)

Number of upper level bits x 16 + number of lower level bits = output value

(Examples) If the recognized character is "2", "50" is output.

If the recognized character is "C", "67" is output.

Upper 4 bits

		0	1	2	3	4	5	6	7
Lower 4 bits	0		D <sub>E</sub>	SP	0	@	P	`	p
	1	S <sub>H</sub>	D <sub>1</sub>	!	1	A	Q	a	q
	2	S <sub>X</sub>	D <sub>2</sub>	"	2	B	R	b	r
	3	E <sub>X</sub>	D <sub>3</sub>	#	3	C	S	c	s
	4	E <sub>T</sub>	D <sub>4</sub>	\$	4	D	T	d	t
	5	E <sub>Q</sub>	N <sub>K</sub>	%	5	E	U	e	u
	6	A <sub>K</sub>	S <sub>N</sub>	&	6	F	V	f	v
	7	B <sub>L</sub>	E <sub>B</sub>	'	7	G	W	g	w
	8	B <sub>S</sub>	C <sub>N</sub>	(	8	H	X	h	x
	9	H <sub>T</sub>	E <sub>M</sub>	)	9	I	Y	i	y
	A	L <sub>F</sub>	S <sub>B</sub>	*	:	J	Z	j	z
	B	H <sub>M</sub>	E <sub>C</sub>	+	;	K	[	k	{
	C	C <sub>L</sub>	↑	,	<	L	\	l	
	D	C <sub>R</sub>	↓	-	=	M	]	m	}
	E	S <sub>O</sub>	→	.	>	N	^	n	~
	F	S <sub>I</sub>	←	/	?	O	_	o	

# About Memories Usable with FH series/FZ5 series

The following types of memory can be used with FH series/FZ5 series Sensor Controller.

## **On-board memory**

This is the area where images are temporarily stored when logging images using the logging function. This uses ring memory and if the maximum number of save images has been reached, images are overwritten starting with the oldest. This is cleared when the power is turned OFF.

## **RAMDisk**

Image logging file, data logging file, and capture images can be saved.

As this is memory inside the FZ4, files can be saved and read faster than using USB flash drive.

However, capacity is a fixed 40 MB (256 MB for FH series/FZ5-800 series/FZ5-1100 series/FZ5-1200 series Sensor Controller). Files saved in RAMDisk are cleared when the power is turned OFF.

## **Application memory**

This is a memory used for all applications.

This is a memory area that is used temporarily by applications. By confirming available memory, this provides a rough standard for confirming status while operating. The user has no access to it.

## **Data memory (FH-L series/FZ5-600 series Sensor Controller)**

This is an area for holding current settings details of scene group data.

If this capacity is exceeded, adding units and copying scenes cannot be performed in edit flow.

Available data memory can be confirmed from the System Information.

Reference: ► Checking the Memory Consumption and Percentage of Memory Used (p.138) and Checking System Information [System Information] (p.295)

# Memory Usage Guidance For Processing Items

Free space is required in the application memory or data memory (FH-L series/FZ5-600 series Sensor Controller only) in order to add a processing unit to the measurement flow. The amount of free space required in memory consists of both the amount necessary to add a processing unit to the measurement flow, and the amount necessary to configure settings for the added unit and execute measurement.

When adding a new processing unit to the measurement flow, or if the memory becomes insufficient when settings are configured, refer to the table below for the approximate amount of memory used and delete a processing unit from the measurement flow or adjust the processing unit settings.

The amount of used memory and free data memory can be checked from the menu of Memory Consumption Monitor on the Measurement Management Bar or the System Information.

Reference: ▶Checking the Memory Consumption and Percentage of Memory Used (p.138) and Checking System Information [System Information] (p.295).

To adjust each processing unit, refer to the section for each processing item in the Processing Item Function Reference Manual. (Reference: ▶Processing Item Function Reference Manual (Cat. No. Z341))

Item	Approximate memory usage		Main settings that affect change of memory used
	Adding to measurement flow	Change due to settings	
Search	Approx. 2KB	Approx. 544 MB (for monochrome image) Approx. 1609 MB (for color image)	Model registration figure, model parameters, saved settings of model registration image, image size, number of detections, whether image is color or monochrome.
Flexible Search	Approx. 2KB	Approx. 2,655MB (for monochrome image) Approx. 7,856MB (for color image)	Model registration count, model registration figure, model parameters, image size, whether image is color or monochrome.
Sensitive Search	Approx. 8KB	Approx. 1,088MB (for monochrome image) Approx. 3,218MB (for color image)	Model registration figure, model parameters, image size, whether image is color or monochrome.
ECM Search	Approx. 2KB	Approx. 2MB	Model registration figure, error model registration figure, extraction amount of edge extraction, image size.
EC Circle Search	Approx. 24KB	Approx. 1MB	-
Shape Search II	Approx. 6KB	Approx. 57MB	Model registration figure, model parameters, saved settings of model registration image, image size, shape of edge in image.
Shape Search III	Approx. 3KB	Approx. 335MB	Model registration figure, model parameters, saved settings of model registration image, image size, number of detections, shape of edge in image.
Ec Corner	Approx. 62KB	No change	-
Ec Cross	Approx. 34KB	No change	-
Classification	Approx. 41KB	Approx. 543,477MB (for monochrome image) Approx. 1,608,757MB (for color image)	Model registration count, model registration figure, model parameters, image size, whether image is color or monochrome.
Edge Position	Approx. 1KB	Approx. 1MB	Measurement region figure, image size.
Edge Pitch	Approx. 5 KB	Approx. 1MB	Measurement region figure, image size.
Scan Edge Position	Approx. 2KB	Approx. 12MB	Measurement region figure, number of measurement points, image size.
Scan Edge Width	Approx. 2KB	Approx. 23MB	Measurement region figure, number of measurement points, image size.



Item	Approximate memory usage		Main settings that affect change of memory used
	Adding to measurement flow	Change due to settings	
Circular Scan Edge Position	Approx. 2KB	Approx. 42MB	Measurement region figure, number of measurement points, image size.
Circular Scan Edge Width	Approx. 2KB	Approx. 83MB	Measurement region figure, number of measurement points, image size.
Intersection	Approx. 4KB	Approx. 23MB	Measurement region figure, image size.
Color Data	Approx. 1KB	Approx. 25MB	Measurement region figure, selected region figure of static mask, image size.
Gravity and Area	Approx. 1KB	Approx. 25MB	Measurement region figure, selected region figure of static mask, image size.
Labeling	Approx. 2KB	Approx. 25MB	Measurement region figure, selected region figure of static mask, image size, maximum number of labels.
Label Data	Approx. 1KB	No change	-
Defect	Approx. 1KB	Approx. 51MB	Measurement region figure, selected region figure of static mask, image size.
Precise Defect	Approx. 20KB	Approx. 29MB	Measurement region figure, detection parameter settings, selected region figure of static mask, image size.
Fine Matching	Approx. 1KB	Approx. 38MB (for monochrome image) Approx. 63MB (for color image)	Model registration figure, image size, whether image is color or monochrome.
Character inspection	Approx. 4KB	No change	-
Date Verification	Approx. 1KB	Approx. 1MB	Length of character string, code parameter settings.
Model Dictionary	Approx. 4KB	Approx. 95,567MB (for monochrome image) Approx. 282,801MB (for color image)	Model registration count, model registration figure, model parameters, image size, whether image is color or monochrome.
2DCode	Approx. 12KB	Approx. 1MB	Length of comparison character string, number and length of sorting comparison character strings.
Barcode	Approx. 3KB	Approx. 1MB	Length of comparison character string, number and length of sorting comparison character strings.
OCR	Approx. 704KB	Approx. 1MB	Number and length of character string formats, number and length of comparison strings, number and length of teaching correct response values, code parameter settings.
OCR User Dictionary	Approx. 1KB	Approx. 1MB	-
Circle Angle	Approx. 1KB	Approx. 1MB	Graduated angle, whether image is color or monochrome.
Glue Bead Inspection	Approx. 1KB	Approx. 25MB	Measurement region figure, mask region figure, image size.
Shape Search +	Approx. 10KB	No change	-
Advanced labeling +	Approx. 472KB	No change	-
Barcode +	Approx. 6KB	No change	-
2DCode +	Approx. 3KB	No change	-

Item	Approximate memory usage		Main settings that affect change of memory used
	Adding to measurement flow	Change due to settings	
Camera Image Input	Approx. 1KB	Approx. 9MB (for monochrome image) Approx. 17MB (for color image)	Model registration figure of calibration settings, image size, whether image is color or monochrome.
Camera Image Input FH	Approx. 1KB	Approx. 9MB (for monochrome image) Approx. 17MB (for color image)	Model registration figure of calibration settings, image size, whether image is color or monochrome.
Camera Image Input HDR	Approx. 3KB	Approx. 9MB (for monochrome image) Approx. 17MB (for color image)	Model registration figure of calibration settings, image size, whether image is color or monochrome.
Camera Image Input HDR Lite	Approx. 1KB	Approx. 9MB (for monochrome image) Approx. 17MB (for color image)	Model registration figure of calibration settings, image size, whether image is color or monochrome.
Camera Switching	Approx. 1KB	No change	-
Measurement Image Switching	Approx. 1KB	No change	-
Position Compensation	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions
Filtering	Approx. 1KB	No change	-
Background Suppression	Approx. 1KB	No change	-
Brightness Correct Filter	Approx. 1KB	No change	-
Color Gray Filter	Approx. 1KB	No change	-
Extract Color Filter	Approx. 1KB	No change	-
Anti Color Shading	Approx. 1KB	No change	-
Stripes Removal Filter II	Approx. 1KB	No change	-
Polar Transformation	Approx. 1KB	Approx. 1MB	Circle radius, circle width, end point overlay, image size.
Trapezoidal Correction	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions
Machine Simulator	Approx. 1KB	No change	-
Image Subtraction	Approx. 1KB	Approx. 63MB	Model registration figure, image size.
Advanced filter	Approx. 9KB	No change	-
Panorama	Approx. 240KB	Approx. 13MB	Whether brightness correction reference image is used, image size.
Trapezoidal Correction +	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions
Stripes Removal Filter +	Approx. 1KB	No change	-
Halation Suppression +	Approx. 1KB	No change	-
Unit Macro	Approx. 1KB	Approx. 4MB	Length of program code
Unit Calculation Macro	Approx. 1KB	Approx. 2MB	Length of program code

Item	Approximate memory usage		Main settings that affect change of memory used
	Adding to measurement flow	Change due to settings	
Calculation	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions, number and length of comments.
Line Regression	Approx. 3KB	Approx. 1MB	Number of points, number and length of calculation expressions
Circle Regression	Approx. 2KB	Approx. 1MB	Number and length of calculation expressions
Precise Calibration	Approx. 660KB	Approx. 51MB	Measurement region figure, image size, specified calibration method.
User Data	Approx. 6KB	Approx. 1MB	Number and length of calculation expressions
Set Unit Data	Approx. 1KB	Approx. 1MB	Length of calculation expression.
Get Unit Data	Approx. 1KB	No change	-
Set Unit Figure	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions, number of figures, figure type.
Get Unit Figure	Approx. 1KB	No change	-
Trend Monitor	Approx. 20KB	Approx. 3MB	Length of calculation expression, number of items saved.
Image Logging	Approx. 1KB	Approx. 1MB	Length of calculation expression, length of sub-folder name, length of prefix
Image Conversion Logging	Approx. 200KB	Approx. 1MB	Length of calculation expression, length of folder name, length of prefix
Data Logging	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions, number and length of comments, length of file name, length of sub-folder name, length of prefix.
Elapsed Time	Approx. 1KB	No change	-
Wait	Approx. 1KB	No change	-
Focus	Approx. 1KB	Approx. 13MB	Figure in region settings, image size.
Iris	Approx. 1KB	Approx. 13MB	Figure in region settings, image size.
Parallelize	Approx. 1KB	No change	-
Parallelize Task	Approx. 1KB	No change	-
Statistics	Approx. 8KB	Approx. 1MB	Number and length of calculation expressions, number and length of comments.
Calibration Data Reference	Approx. 1KB	No change	-
Position Data Calculation	Approx. 2KB	Approx. 1MB	Number and length of calculation expressions
Stage Data	Approx. 1KB	No change	-
Robot Data	Approx. 1KB	No change	-
Vision Master Calibration	Approx. 82KB	Approx. 402MB	Image size.
PLC Master Calibration	Approx. 81KB	Approx. 402MB	Image size.

Item	Approximate memory usage		Main settings that affect change of memory used
	Adding to measurement flow	Change due to settings	
Transfer Position Data	Approx. 2KB	Approx. 1MB	Number and length of calculation expressions
Calc Axis Move	Approx. 4KB	Approx. 1MB	Number and length of calculation expressions
Calc Axis Move by Multipoint	Approx. 5 KB	Approx. 1MB	Number and length of calculation expressions
Detection Point	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions
Camera Calibration	Approx. 7KB	No change	-
Data Save	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions, number and length of comments.
Conveyor Calibration	Approx. 20KB	No change	-
Conditional Branch	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions
End	Approx. 1KB	No change	-
DI Branch	Approx. 1KB	No change	-
Control Flow Normal	Approx. 1KB	No change	-
Control Flow PLC Link	Approx. 1KB	No change	-
Control Flow Parallel	Approx. 1KB	No change	-
Control Flow Fieldbus	Approx. 1KB	No change	-
Selective Branch	Approx. 3KB	Approx. 1MB	Length of conditional expression, number and length of branch setting comments.
Data Output	Approx. 14KB	Approx. 1MB	Communication module settings, number and length of calculation expressions, number and length of comments.
Parallel Data Output	Approx. 1KB	Approx. 1MB	Communication module settings, number and length of calculation expressions, number and length of comments.
Parallel Judgement Output	Approx. 1KB	Approx. 1MB	Number and length of calculation expressions, number and length of comments.
Fieldbus Data Output	Approx. 6KB	Approx. 1MB	Communication module settings, number and length of calculation expressions, number and length of comments.
Result Display	Approx. 1KB	Approx. 1MB	Result display type, number of results displayed, number and length of calculation expressions, number and length of characters.
Display Image File	Approx. 1KB	Approx. 1MB	Number and length of file names.
Display Last NG Image	Approx. 3KB	Approx. 1MB	Number and length of calculation expressions, number and length of comments.
Conveyor Panorama Display	Approx. 491KB	No change	-

# Memory Display Image on PLC I/O

The memory display image on PLC I/O varies depending on the PLC to be used.

Using data output to the Data Output area of the PLC link from the serial data output processing item as an example, this section illustrates how the memory display image varies depending on the model.

## Data storage image (Data Output area DM1000)

When the PLC link Data Output area is set to DM1000, data is stored as follows in the PLC I/O memory.

- \*1: Up to 8 expressions can be registered in the serial output flow on the FZ4 side. If 8 expressions are registered, data is stored as follows.

	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
DM1000	Expression 0		Expression 1		Expression 2		Expression 3		Expression 4	
DM1010	Expression 5		Expression 6		Expression 7					

## CX-Programmer PLC I/O memory display image

As an example, if 3 data items, expression 0 (DATA0) = 1.000, expression 1 (DATA1) = 200.000, and expression 2 (DATA2) = 1000.000, are output from FZ4, they are stored to the PLC Link area as measurement data as follows.

	+0	+2	+4	+6	+8
DM1000	1000	200000	1000000	0	0
DM1010	0	0	0	0	0

Decimal number with sign (2ch-separated display)

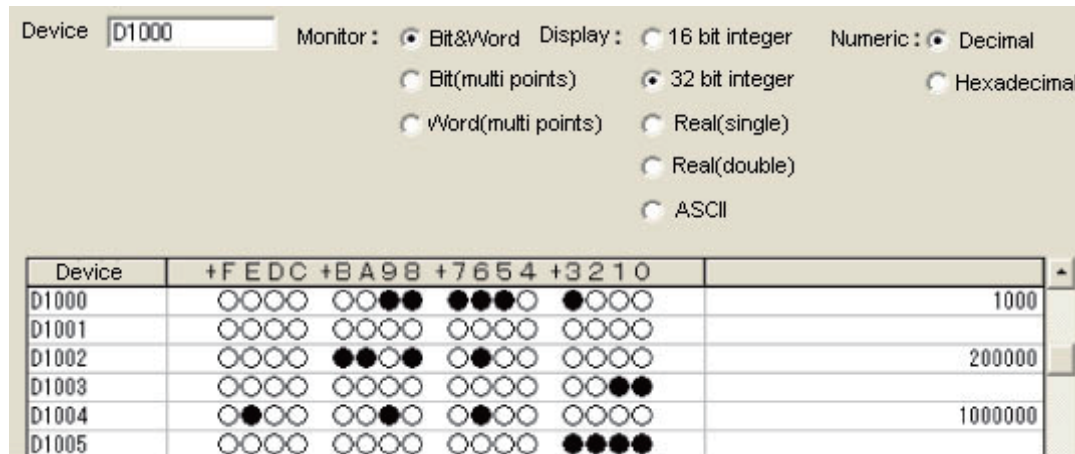
Fixed point (Number of significant figures is 3)  
"1.000"

- \*1: Data is stored to the PLC I/O memory as follows for a decimal number per channel.

	+0	+1	+2	+3
DM1000	1000	0	16960	15

## GX-Developer PLC I/O memory display image

As an example, if 3 data items, expression 0 (DATA0) = 1.000, expression 1 (DATA1) = 200.000, and expression 2 (DATA2) = 1000.000, are output from FZ4, they are stored to the PLC Link area as measurement data as follows.



\*1: Data is stored to the PLC I/O memory as follows for a decimal number per channel.

	+0	+1	+2	+3	+4	+5
DM1000	1000	0	3392	3	16960	15

# Operation log input information list

This is a list of operation log input information. For the operation log format, see below.

Reference: ▶ Operation Log Format (p.141)

Name	Description	References
AddGlobalData	Adds global data.	*1
AddSystemData	Adds system data.	*1
AssignProc	Assigns units to measurement flows.	---
AssignUnit	Registers a processing unit.	*1
BeginSetupUnit	Enters into the unit setting screen.	---
ChangeScene	Switches to the specified scene.	*1
ChangeSceneGroup	Switches to the specified scene group.	*1
CheckAccessControl	Checks the operation authority.	Reference: ▶ Details (p.372)
ClearImageLogCount	Clears the logging count information.	Reference: ▶ Details (p.372)
ClearMeasureData	Clears the measurement results for the processing unit.	*1
ClearMeasureData_S	Clears the measurement results for the processing unit.	---
ClearScene	Clears the scene.	*1
ClearSceneGroup	Clears a scene group.	*1
ClearSecurityData	Clears security related parameters.	Reference: ▶ Details (p.373)
ClearSettingData	Clears setting data.	Reference: ▶ Details (p.373)
ConvertImageFileF	Converts an image file.	---
ConvertImageFileM	Converts an image file.	---
CopyFile	Copies a file.	Reference: ▶ Details (p.374)
CopyScene	Copies scene data.	*1
CopySceneGroup	Copies a scene group.	*1
CopyUnit	Copies a processing unit.	*1
CopyUnit2	Copies a processing unit.	---
CopyUnitFigure	Copies the figure data for a processing unit.	*1
CopyUnitModel	Copies the model data for a processing unit.	*1
CreateDirectory	Creates a directory.	Reference: ▶ Details (p.374)
DeleteUnit	Deletes a processing unit.	*1
DeleteUserAccount	Deletes a user account.	Reference: ▶ Details (p.374)
EndSetupUnit	Closes the unit setting screen.	---
ExitFzProcess	Exits an FZ process.	*1
GetAll	Executes batch input of parallel I/O and other terminal states.	*1
GetDensityProfile	Acquires the image density information.	Reference: ▶ Details (p.375)
GetGlobalData	Acquires global data.	*1
GetHistogram	Acquires the image histogram.	Reference: ▶ Details (p.375)
GetImageCountM	Acquires the image count.	---
GetImageLogInfo	Acquires the specified image logging information.	Reference: ▶ Details (p.376)
GetIoModuleIdent	Acquires the identifier name for an I/O module.	Reference: ▶ Details (p.376)
GetLanguageIdent	Acquires the language identifier.	---

Name	Description	References
GetMeasureOut	Acquires the measurement result output yes/no.	*1
GetPort	Executes individual input of parallel I/O terminal states.	*1
GetSceneCount	Acquires the count of usable scenes.	---
GetSceneDescription	Acquires the count of usable scenes.	---
GetSceneGroupCount	Acquires the count of the valid scene groups on the memory card.	---
GetSceneGroupNo.	Acquires the current scene group No.	---
GetSceneGroupTitle	Acquires the scene group title name.	---
GetSceneMaker	Acquires the scene maker name.	---
GetSceneNo	Acquires the current scene No.	---
GetSceneTitle	Acquires the scene title name.	---
GetSecurityParameter	Acquires security related parameters.	Reference: ► Details (p.377)
GetSystemData	Acquires the system data.	*1
GetUnitDataN	Acquires processing unit data.	---
GetUnitDataN2	Acquires processing unit data.	---
GetUnitDataS	Acquires processing unit data.	---
GetUnitDataS2	Acquires processing unit data.	---
GetUnitFigure	Acquires processing unit figure data.	*1
GetUnitItemIdent	Acquires the identifier name for a processing item.	---
GetUnitItemIdent2	Acquires the identifier name for a processing item.	---
GetUnitTitle	Acquires a processing unit title name.	---
GetUnitTitle2	Acquires a processing unit title name.	---
ImageLogging	Executes image logging.	---
ImageUpdate	Updates image data.	*1
InsertUnit	Inserts a processing unit.	*1
IoInitialize	Executes I/O initialization.	Reference: ► Details (p.377)
LoadBackupData	Load the System + Scene group data	*1
LoadProc	Executes load processing for unit data.	---
LoadScene	Loads scene data.	*1
LoadSceneGroup	Reads scene group data.	*1
LoadSceneGroup0	Executes load processing for scene group data.	---
LoadSecurityData	Loads security related settings.	Reference: ► Details (p.377)
LoadSystemData	Loads system data.	*1
LoadUnitData	Loads processing unit data.	*1
LockMeasureStop	Sets measurement trigger input to disabled.	Reference: ► Details (p.378)
Measure	Executes measurement processing.	*1
MeasureInit	Executes unit measurement initialization processing.	---
MeasureOut	Executes measurement results display processing.	---
MeasureProc	Executes unit measurement processing.	*1
MeasureStart	Sets measurement trigger input to enabled.	*1
MeasureStop	Sets measurement trigger input to disabled.	*1
MeasureStop2	Sets measurement trigger input to disabled.	---



Name	Description	References
MoveUnit	Moves a processing unit.	*1
NonstopSync	Synchronizes the data for non-stop adjustment settings.	Reference: ▶ Details (p.378)
PutAll	Executes batch input of parallel I/O and other terminal states.	*1
PutPort	Executes individual input of parallel I/O and other terminal states.	*1
RaiseOptionEvent	Issues an option event.	*1
ReceiveData	Executes byte type array data input.	*1
Remeasure0	Executes remeasurement processing.	---
Remeasure1	Executes remeasurement processing.	---
RemoveFile	Removes a file or directory.	Reference: ▶ Details (p.378)
RenameFile	Changes a file name or directory name.	Reference: ▶ Details (p.378)
RenumProc	Executes processing for unit number change.	---
RunOut	Outputs the RUN state.	*1
SaveBackupData	Save the System + Scene Group Data	*1
SaveData	Saves data to the controller.	*1
SaveImage	Executes save processing for image data.	*1
SaveProc	Executes save processing for unit data.	---
SaveScene	Saves scene data.	*1
SaveSceneGroup	Saves scene group data.	*1
SaveSecurityData	Saves security related settings.	Reference: ▶ Details (p.379)
SaveSystemData	Saves system data.	*1
SaveSystemData0	Saves system data.	---
SaveUnitData	Saves processing unit data.	*1
ScreenCapture	Captures the screen.	*1
SendData	Executes byte type array data output.	*1
SendString	Sends a character string.	*1
SetAccessControl	Sets operation restrictions.	Reference: ▶ Details (p.379)
SetDisplayUnitNo	Sets the specified processing unit number used for image/text display.	*1
SetGlobalData	Sets global data.	*1
SetImageWindow	Sets the image display window.	*1
SetJudgeWindow	Sets the display attributes for the judgment results display window.	Reference: ▶ Details (p.379)
SetMeasureOut	Sets whether or not measurement results are output.	*1
SetSceneDescription	Sets the scene description.	*1
SetSceneGroupTitle	Sets the scene group title name.	*1
SetSceneMaker	Sets the scene maker name.	*1
SetSceneTitle	Sets the scene title name.	*1
SetSecurityParameter	Sets security related parameters.	Reference: ▶ Details (p.380)
SetSystemData	Sets the system data.	*1
SetTextWindow	Sets the text display window.	*1

Name	Description	References
SetTimeWindow	Sets the display attributes for the measurement processing time display window.	Reference: ► Details (p.380)
SetUnitDataN	Sets processing unit data.	---
SetUnitDataN2	Sets processing unit data.	---
SetUnitDataS	Sets processing unit data.	---
SetUnitDataS2	Sets processing unit data.	---
SetUnitFigure	Sets the figure data for a processing unit.	*1
SetUnitTitle	Sets a processing unit title name.	*1
SetUserAccount	Sets a user account.	Reference: ► Details (p.380)
StartRemoteOperation	Starts remote operation.	---
SyncData	Synchronizes the setting data between Core RA processes.	Reference: ► Details (p.381)
SystemReset	Executes a system reset.	*1
UnLockMeasureStop	Sets measurement trigger input to enabled.	Reference: ► Details (p.381)
UserLogin	Logs in as the specified user.	Reference: ► Details (p.381)
UserLogout	Logs out.	Reference: ► Details (p.381)

\*1: For details of Operation log input information list, refer to ► *Macro Command Reference* in the *Vision System FH/FZ5 Series Macro Customize Functions Programming Manual* (Cat. No. Z367).

## Checking Operation Restrictions

### CheckAccessControl

#### Parameters

name	Operation identifier name
------	---------------------------

#### Return value

For an operation that is not permitted for the logged in user, returns 0.

For an operation that is permitted for the logged in user, returns value other than 0.

## Clearing the Logging Count Information.

### ClearImageLogCount

#### Parameters

None.

#### Return value

If the image logging count is cleared successfully, returns 0.

Otherwise, returns value other than 0.

## Clearing Security Related Parameters

---

### ClearSecurityData

#### Parameters

_userName	User name executed
_password	User password executed
mode	Data to be cleared Bit 0: User account Bit 1: Operation restriction contents Bit 2: Other

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Clearing Setting Data in a Batch

---

### ClearSettingData

#### Parameters

None.

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Copy File

---

### CopyFile

#### Parameters

srcFileName	Name of file to copy from
destFileName	Name of destination file

#### Return value

If the file is copied successfully, returns 0.  
Otherwise, returns value other than 0.

## Directory Creation

---

### CreateDirectory

#### Parameters

directoryName	Name of directory to create
---------------	-----------------------------

#### Return value

If the directory is created successfully, returns 0.  
Otherwise, returns value other than 0.

## Deleting a User Account

---

### DeleteUserAccount

#### Parameters

_userName	User name executed
_password	User password executed
userName	Name of user to be deleted

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Getting Image Density Information

### GetDensityProfile

#### Parameters

unitNo	Image input related and image conversion related processing item processing unit number
imageNo	Image number
imageChannel	Image channel number (Specifies RGB, R: 0, G:1, B: 2. For monochrome image, any value is OK)
rectangle	Target rectangular area. The maximum size to acquire density is 4096 pixels. Keep the size to no more than 4096.
profile	Density value storage array Resized when functions are executed.

#### Return value

If the density is acquired successfully, returns 0.  
Otherwise, returns value other than 0.

## Getting an Image Histogram

### GetHistogram

#### Parameters

unitNo	Image input related and image conversion related processing item processing unit number
imageNo	Image number
imageChannel	Image channel number (Specifies RGB, R: 0, G:1, B: 2. For monochrome image, any value is OK)
rectangle	Target rectangular area. The maximum size to acquire density is 4096 pixels. Keep the size to no more than 4096.
histgram	Histogram array Resized when functions are executed.

#### Return value

If the density is acquired successfully, returns 0.  
Otherwise, returns value other than 0.

## Getting the Specified Image Logging Information.

### GetImageLogInfo

#### Parameters

kind	Type of image logging information to acquire <ul style="list-style-type: none"><li>ImageLogMaxCount: Maximum number of images that can be logged in controller memory</li><li>ImageLogCount: Count of logging images held in the controller memory</li></ul>
------	--

#### Return value

Returns the specified image logging information.

## Getting an I/O Module Identifier Name

### GetIoModuleIdent

#### Parameters

ioModuleNo	I/O module number 0: Registers Parallelo (Parallel I/O). (Fixed) 1: Registers any of the following I/O modules in the module communication system. <ul style="list-style-type: none"><li>SerialNormal: Serial non-procedure communication</li><li>SerialNormal2: Serial non-procedure communication (Fxxx series method)</li><li>SerialPlcLink: Serial PLC link (Omron PLC)</li><li>SerialPlcLinkM: Serial PLC link (Mitsubishi PLC)</li></ul> 2: Registers any of the following I/O modules for Ethernet communication system <ul style="list-style-type: none"><li>TcpNormal: TCP non-procedure communication</li><li>UdpNormal: UDP non-procedure communication</li><li>UdpNormal2: UDP non-procedure communication (FXXX series method)</li><li>UdpPlcLink: UDP PLC link (Omron PLC)</li><li>UdpPlcLinkM: UDP PLC link (Mitsubishi PLC)</li><li>TcpPlcLink: TCP PLC link (Omron PLC)</li><li>TcpPlcLinkM: TCP PLC link (Mitsubishi PLC)</li></ul> 3: Registers one of the following I/O modules or no registration. <ul style="list-style-type: none"><li>EtherCAT: EtherCAT communication</li><li>EtherNetIP: EtherNet/IP communication</li></ul>
------------	--

#### Return value

If the I/O module identifier name is acquired successfully (character string), returns 0.  
Otherwise, returns value other than 0.

## Getting Security Related Parameters

### GetSecurityParameter

#### Parameters

_userName	User name executed
_password	User password executed
dataIdent	Data identifier name userLoginTimeout: Login timeout time (minutes)
data	Acquisition data storage variable

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Executing I/O Initialization

### IoInitialize

#### Parameters

ioIdent	Initializing I/O module identifier name <ul style="list-style-type: none"><li>• Parallelo: Parallel I/O</li><li>• SerialNormal: Serial non-procedure communication</li><li>• UdpNormal: Ethernet UDP non-protocol communication</li></ul>
---------	---

#### Return value

If the specified I/O is initialized successfully, returns 0.  
If initialization failed, returns value other than 0.

## Loading Security Related Settings

### LoadSecurityData

#### Parameters

_userName	User name executed
_password	User password executed
fileName	Data identifier name userLoginTimeout: Login timeout time (minutes)
data	Path for ID to load

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Setting Measurement Trigger Input to Disabled

---

### LockMeasureStop

#### Parameters

timeout	Timeout time
---------	--------------

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Synchronizing the Data for Non-Stop Adjustment Settings

---

### NonstopSync

#### Parameters

None.

#### Return value

If non-stop adjustment data is synchronized successfully, returns 0.  
Otherwise, returns value other than 0.

## File/Directory Name Change

---

### RenameFile

#### Parameters

oldFileName	Old file/directory name
newFileName	New file/directory name

#### Return value

If the file/directory name was changed successfully, returns 0.  
Otherwise, returns value other than 0.

## Deleting File/Directory

---

### RemoveFile

#### Parameters

pathName	Path name
----------	-----------

#### Return value

If the file/directory is deleted successfully, returns 0.  
Otherwise, returns value other than 0.



## Saving Security Related Settings

### SaveSecurityData

#### Parameters

_userName	User name executed
_password	User password executed
fileName	File path to save to

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Setting Operation Restrictions

### SetAccessControl

#### Parameters

_userName	User name executed
_password	User password executed
name	Operation identifier name
userGroup	User group enabled

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Setting Security Related Parameters

### SetJudgeWindow

#### Parameters

handle	Handle
locationX	X coordinate of upper left of window
locationY	X coordinate of upper right of window
fontSize	Font size

#### Return value

If the judgment result display window is set successfully, returns 0.  
Otherwise, returns value other than 0.

## Setting the Measurement Processing Time Display Window

### SetSecurityParameter

#### Parameters

_userName	User name executed
_password	User password executed
dataIdent	Data identifier name userLoginTimeout: Login timeout time (minutes)
data	Data to set

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Setting the Measurement Processing Time Display Window

### SetTimeWindow

#### Parameters

handle	Handle
locationX	X coordinate of upper left of window
locationY	X coordinate of upper right of window
fontSize	Font size

#### Return value

If the measurement processing time display window is set successfully, returns 0.  
Otherwise, returns value other than 0.

## Setting a User Account

### SetUserAccount

#### Parameters

_userName	User name executed
_password	User password executed
userName	Name of user to be set
userGroupNo	User group number to be set
password	Password to be set

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Synchronization of Setting Data Between CoreRA Processes

### SyncData

#### Parameters

srcCoreRANo	Source CoreRA number
destCoreRANo	Destination CoreRA number

#### Return value

If setting data between CoreRA processes is synchronized successfully, returns 0.  
Otherwise, returns value other than 0.

## Setting Measurement Trigger Input to Enabled

### UnLockMeasureStop

#### Parameters

None.

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Logging in as the Specified User.

### UserLogin

#### Parameters

userName	User name
password	Password

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

## Logging Out

### UserLogout

#### Parameters

remoteOperation	Logout target
-----------------	---------------

#### Return value

If it succeeded, returns 0.  
Otherwise, returns value other than 0.

# Manual Revision History

The manual revision symbol is an alphabet appended at the end of the manual number found in the bottom left-hand corner of the front or back cover.

Cat. No. Z421-E1-02

↑  
Revision code

Rev. No.	Rev. Date	Revision Contents	Software Version
01	Jul. 2019	The Catalog Number has been revised from Z365-E1-03 as the FZ5 series manual.	Ver. 5.72
02	Sep. 2022	Added information about Security Measures to Safety Precautions. Corrected mistakes.	Ver. 5.72



**OMRON Corporation Industrial Automation Company**

**Kyoto, JAPAN**

**Contact : [www.ia.omron.com](http://www.ia.omron.com)**

**Regional Headquarters**

**OMRON EUROPE B.V.**

Wegalaan 67-69, 2132 JD Hoofddorp  
The Netherlands  
Tel: (31) 2356-81-300 Fax: (31) 2356-81-388

**OMRON ELECTRONICS LLC**

2895 Greenspoint Parkway, Suite 200  
Hoffman Estates, IL 60169 U.S.A.  
Tel: (1) 847-843-7900 Fax: (1) 847-843-7787

**OMRON ASIA PACIFIC PTE. LTD.**

438B Alexandra Road, #08-01/02 Alexandra  
Technopark, Singapore 119968  
Tel: (65) 6835-3011 Fax: (65) 6835-2711

**OMRON (CHINA) CO., LTD.**

Room 2211, Bank of China Tower,  
200 Yin Cheng Zhong Road,  
PuDong New Area, Shanghai, 200120, China  
Tel: (86) 21-5037-2222 Fax: (86) 21-5037-2200

**Authorized Distributor:**

©OMRON Corporation 2019-2022 All Rights Reserved.  
In the interest of product improvement,  
specifications are subject to change without notice.

**Cat. No. Z421-E1-02** 0922