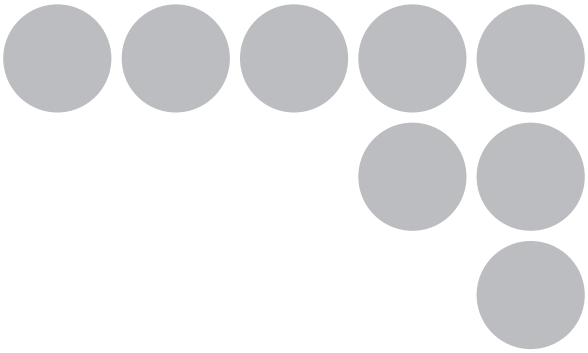
OMRON

Vision Sensor

FZ4 Series



User's Manual

Cat. No. Z318-E1-02B

Introduction

Thank you for purchasing the FZ4 Series.
This manual provides information regarding functions, performance and operating methods that are required for using the FZ4 Series.
When using the FZ4 Series, be sure to observe the following:

- The FZ4 Series 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.

Contents

How This Manual Is Organized

This manual includes two manuals: the "User's Manual", which describes basic operations and settings for vision sensors, and the "Processing Item List Manual", which describes the setting options for each processing item.

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.

Version Upgrade Information

The newly added functions are described here.

Revision history

Newly added function	Description of newly added functions	Reference in manual
Measurement flow control function	The measurement flow control function is now supported. Supported software version: 4.20 or later	Reference: ▶ "Processing Items List Manual", "Fieldbus Flow Control" (p.556) Reference: ▶ "Processing Items List Manual", "PLC Link Flow Control" (p.561) Reference: ▶ "Processing Items List Manual", "Parallel-flow Control" (p.565) Reference: ▶ "Processing Items List Manual", "Non-procedure Flow Control" (p.569)
Operation log function	The operation log function is now supported. Supported software version: 4.20 or later	Reference: ▶ "User's Manual", "Using the Operation Log Functions" (p.104)
Registered image management function	The registered image management function is now supported. Supported software version: 4.20 or later	Reference: ▶ "User's Manual", "Using Registered Image Administration Tool" (p.132)
Security setting function	The security setting function is now supported. Supported software version: 4.20 or later	Reference: ▶ "User's Manual", "Using Account Functions" (p.136)
Customize I/O command function	The custom command function is now supported. Supported software version: 4.20 or later	Reference: ▶ "User's Manual", "Using Custom Commands" (p.152)

Communication command addition	The communication command is now added. Supported software version: 4.20 or later	Reference: "User's Manual", "Methods for Connecting and Communicating with External Devices" (p.359)
EtherNet/IP message communication function	The EtherNet/IP message communication function is now supported. Supported software version: 4.20 or later	Reference: "User's Manual", "Communicating with the controller with Ethernet/IP message communications" (p.536)

Regulations and Standards

● Using Product Outside Japan

This regulation applies to FZ4 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.

● Conformance to EC Directives

This regulation applies to FZ4 sensor controller and peripheral devices.
The FH Sensor Controller is compliant with the standards below:

- EMC Directives(2004/108/EC)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 Directives.EMC-related performance of the OMRON devices that comply with EC 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 KC Standards

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

A 급 기기 (업무용 방송통신기자재)
이 기기는 업무용(A 급) 전자파적합기기로서 판매자
또는 사용자는 이 점을 주의하시기 바라며, 가정외의
지역에서 사용하는 것을 목적으로 합니다.

- **Class A Device (Broadcasting Communications Device for Office Use)**
  This device obtained EMC registration for office use (Class A), and it is intended to be used in places other than homes.
  Sellers and/or users need to take note of this.

● Conformance to CSA Standards

This regulation applies to FZ4 sensor controller and peripheral devices.
This product complies with CSA Standards.
CSA C22.2 No.61010-1

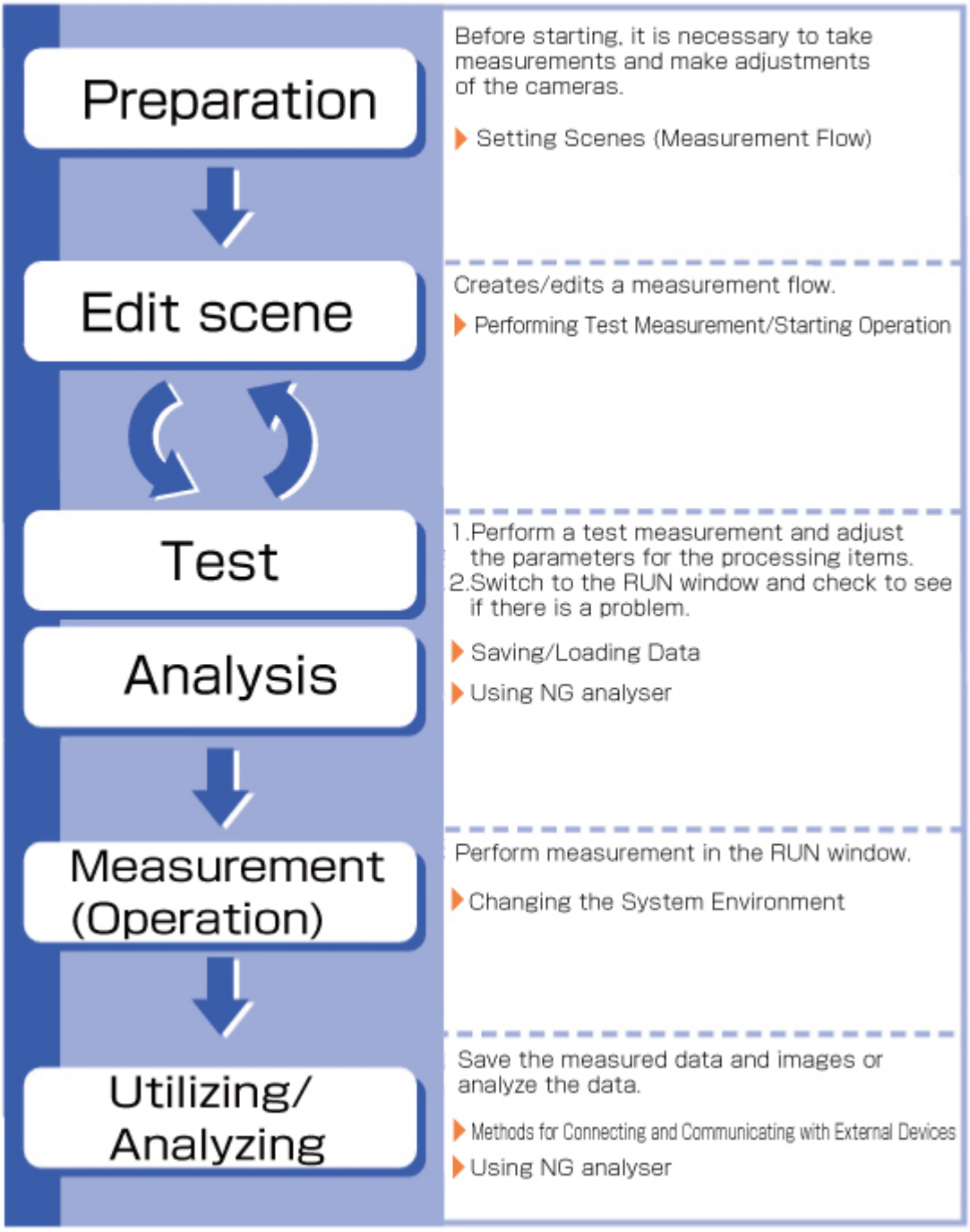
Before Operation

This chapter describes the basic flow and preparations before beginning operation.

- Reference: Operation Flow (p.10)
- Reference: Layouts of Screens/Windows (p.11)
- Reference: Checking System Configuration (p.21)
- Reference: Preparing Controllers and Cameras (p.23)
- Reference: Input Operations (p.25)
- Reference: Returning Controller to Factory Settings (p.27)
- Reference: Saving Settings and Turning Power Off (p.28)
- Reference: Setting Operation Mode (p.30)

Operation Flow

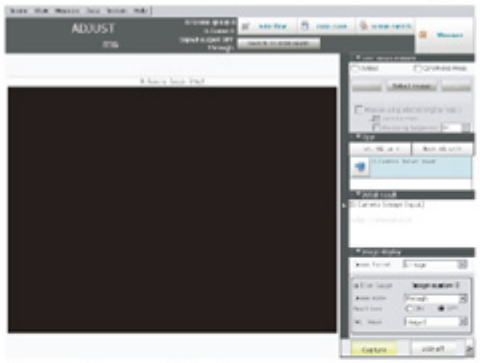
Here describes the operation flow.



Layouts of Screens/Windows

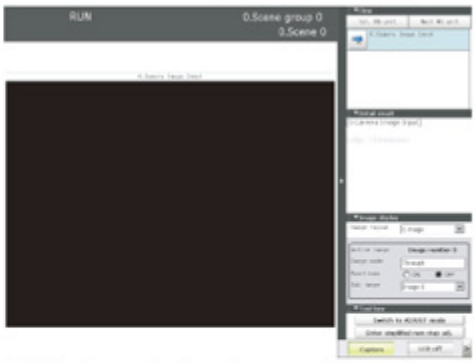
Screens vary with the status of the operation being performed. The structure of some typical screens and the functions for the various buttons are described here.

Main screen (ADJUST window)



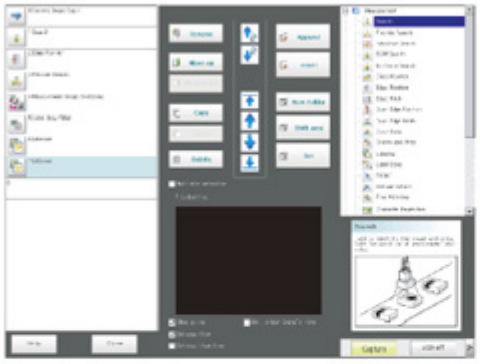
Screen for confirming measurement status and for performing adjustment.
When the power is first turned on, the ADJUST window is displayed after the Language Setting window.
To set the measurement conditions, move to the Edit Flow window.
If there is no problem with the measurement conditions, move to the RUN window.

Main screen (RUN window)



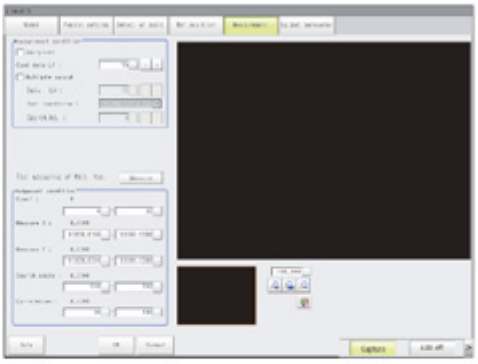
This is the window for actually starting operation. Only information necessary during operation is displayed.

Edit flow window



Window for assembling the measurement flow.
Flow parts (processing items) are displayed on the right side, and the measurement flow (scene) is displayed on the left side. When the measurement trigger is activated, processing is executed in sequence starting from the top of the flow.

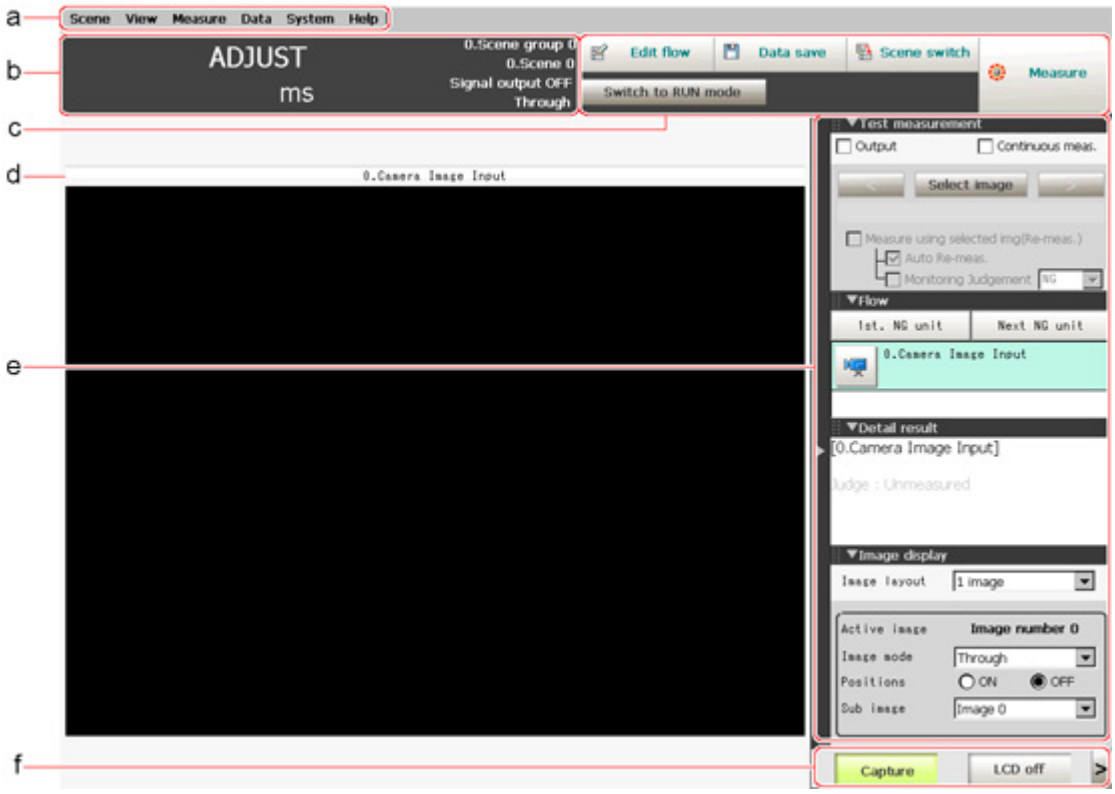
Property window



Window for setting conditions for processing units (processing items registered in the scene) set in the flow. This window can also be displayed directly from the Main screen (ADJUST window).

Layout of Main Screen (ADJUST Window)

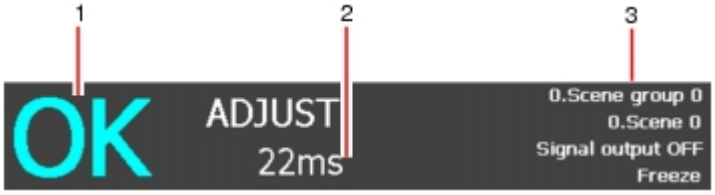
This screen is used to check whether measurement is being performed correctly according to the set conditions.



a. Menu Bar

Select operations and settings menus related to measurement.

b. Measurement Information Display Area



1. Overall judgement

   Displays a scene's overall judgement result ([OK]/ [NG]).

2. Processing time

   Displays the time required for the measurement process.

3. Status display

   Displays the scene group number, scene number, external output status, and image mode for the currently displayed scene.

c. Toolbar

Commonly-used functions appear in the toolbar.

- Edit flow

  The Edit Flow window is displayed. Addition and deletion of processing units and switching of the processing sequence is performed in the Edit Flow window.
- Data save

  Setting data is saved into the internal flash memory in the controller. Make sure to save when settings have been modified.
- Scene switch

  To switch a scene group or scene.
- Measure/Stop meas.

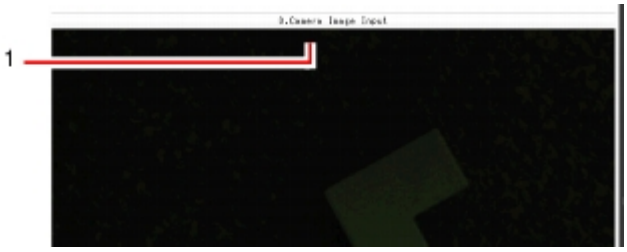
Starts/stops measurement.

- Switch to RUN mode

Switches to the RUN window.

d. Image Display Area

Displays the measured image.



1. Property setting buttons

Displays the name of the currently selected processing item.Moving to the property setting window can be done by tapping here.

e. Control Area

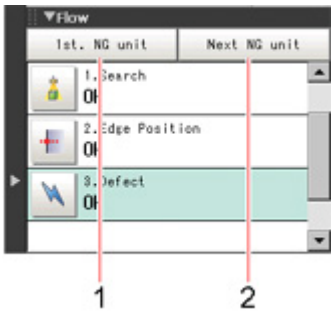
Displays "Test measurement", "Flow", "Detail result", and "Image display".

- Test measurement

Use when test measurement conditions and images that have been acquired are used for remeasurement.

- Flow

Displays the judgement results for the flow and each unit.



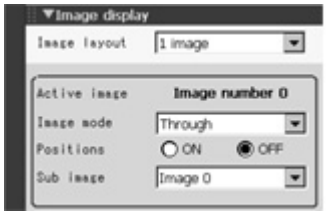
1. Moves to the top processing unit with an NG error.

2. Moves to the next processing unit with an NG error.

- Detail result

The detailed measurement results of the processing units selected in the measurement flow are displayed as text.

- Image display
  Sets the display method for the Image Display area.

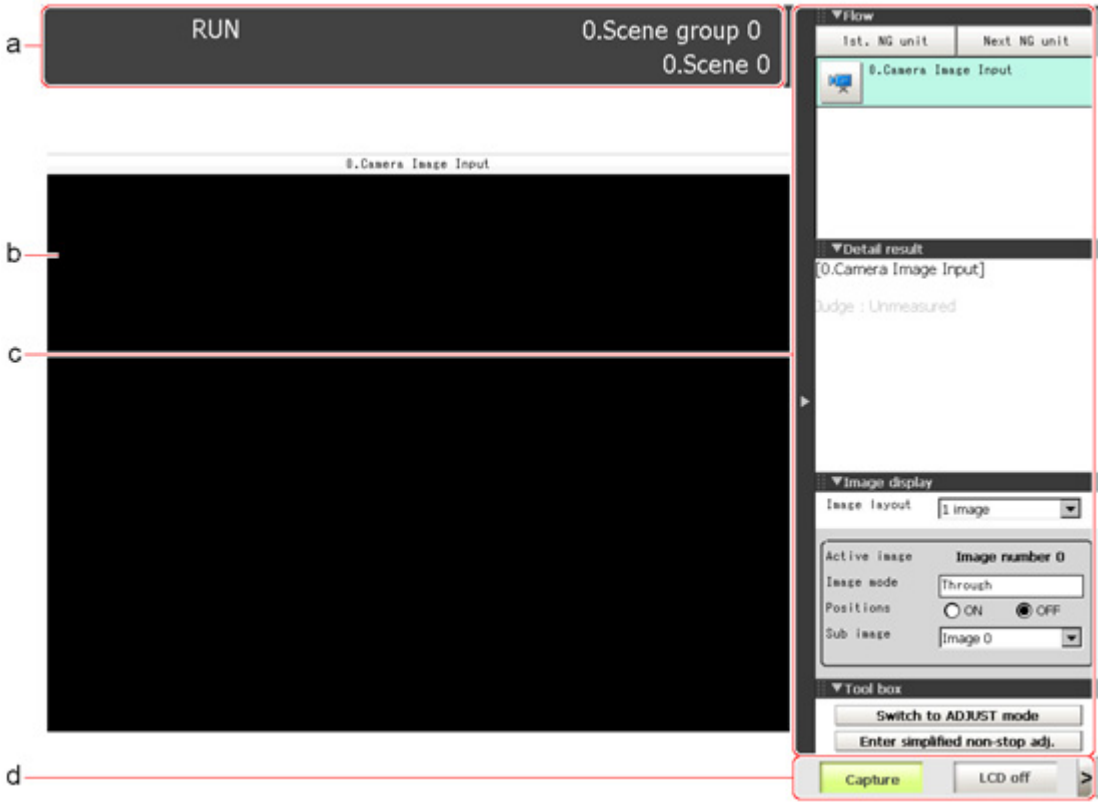


f. Measurement Manager Bar

1. [Capture]
   Saves the content displayed on the monitor as an image.
   Reference: Set the save destination for captured images. (p.104)
2. [LCD Off] (Displayed only with LCD-integrated controllers.)
   Turns off power to the LCD monitor. Tap the bottom of the monitor screen to turn on power to the LCD monitor again.

Layout of Main Screen (RUN Window)

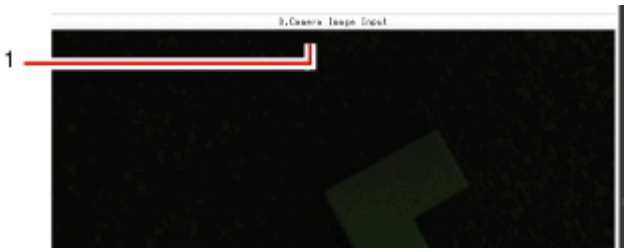
This window is used during operation.



a. Measurement Information Display Area

1. Overall judgement
   Displays a scene's overall judgement result ([OK]/ [NG]).
   The judgement results for each processing unit are displayed in the Control area.
2. Processing time
   Displays the time required for the measurement process.
3. Scene Group Name, Scene Name
   Displays the scene group number and the scene number of the currently displayed scene.

b. Image Display Area
Displays the measured image.



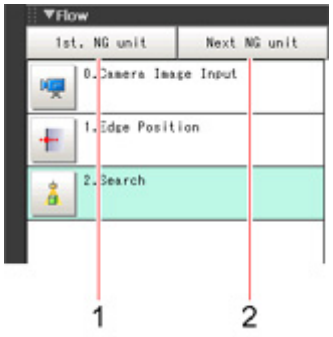
1. Property setting buttons
   Displays the name of the currently selected processing item.

C. Control Area

Displays [Flow], [Detail result], [Image display], and [Tool box].

- Flow

Displays the judgement results for the flow and each unit.



1. Moves to the top processing unit with an NG error.

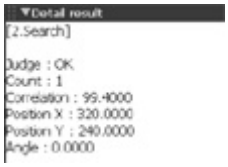
2. Moves to the next processing unit with an NG error.

Note

- The size of the processing unit buttons can be changed through [View] menu - [Display the enlarged flow] in the ADJUST Window.

- Detail result

The detailed measurement results of the processing units selected in the measurement flow are displayed as text.



- Image display

Sets the display method for the Image Display area.

- Tool box

Starts and stops simplified non-stop adjustment, and switches to the ADJUST window.

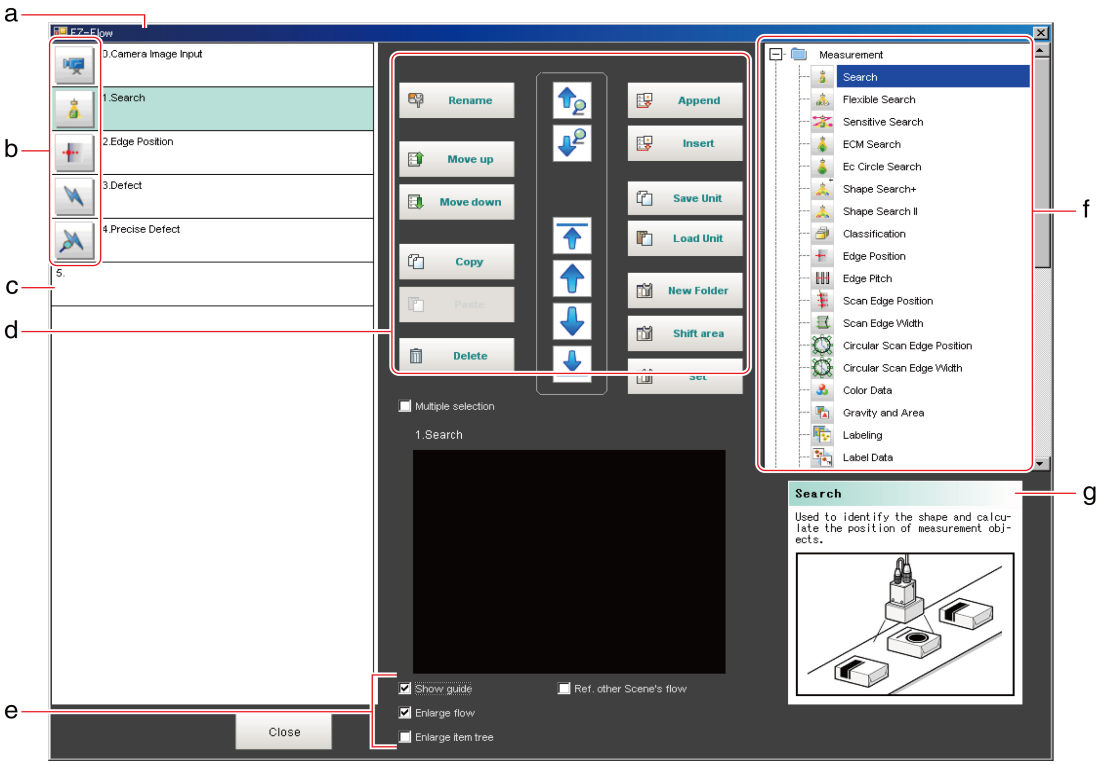
Items for which operation is performed in the ADJUST window can be allocated to buttons, and they can then be executed in the RUN window.

d. Measurement Manager Bar

1. [Capture]
   Saves the content displayed on the monitor as an image.
   Reference: ▸ Set the save destination for captured images. (p.104)
2. [LCD Off] (Displayed only with LCD-integrated controllers.)
   Turns off power to the LCD monitor. Tap the bottom of the monitor screen to turn on power to the LCD monitor again.

Layout of Edit Flow Window

This window is for compiling the measurement flow.Flow parts are displayed on the right side and the measurement flow is displayed on the left. If the measurement trigger is activated, processing is executed in sequence starting from the top of the flow.



a. Unit List
   Lists the processing units included in the flow.
   You can create a flow for a scene by adding processing items to the unit list.
b. Property Setting Buttons
   Displays the property setting window where detailed settings can be performed.
c. End Marker
   Indicates the end of the flow.
d. Edit Flow Buttons

   ·  Search up/Search down

Searching can be performed to find out what position a processing item occupies in the unit list.

The icon for the processing item to be searched for is selected in the processing item tree and clicked.

This function is convenient when setting long flows.

-  Select top/Select bottom

Selects the processing unit at the top or bottom of the flow.

-  Select above/Select below

Selects the processing unit located one above or one below the currently selected processing unit.

- Rename

Displays a window for renaming the selected processing unit.

- Move up/Move down

Moves the selected processing unit upward or downward.

- Copy

Copies the selected processing unit.

- Paste

Pastes the copied processing unit immediately before the selected processing unit.Pasting cannot be performed if any operations other than paste are performed after copying.

- Delete

Deletes the selected processing unit.

- Append (Bottom)

Adds a processing unit to the bottom of the flow.

- Insert

Inserts a new processing unit immediately before the selected processing unit.

- Save unit

This saves the selected processing unit setting data to a file. More than one processing units cannot be saved to one file. However, when saving entire folders, it is possible to save more than one processing units to one file.
The default file name is S (scene number)_U (unit number)_(processing unit identifier).unt. (Can be changed as desired)
Example) Scene 0 unit 0 "Camera Image Input"
S0_U0_CameraImage

- Load unit

This reads the processing unit setting data from a file.
Files other than those saved in Saving unit cannot be read.
Upon reading the file, specify the reference, such as the destination or expression, again.

- New folder

Used when multiple processing units are managed as one group.

- Shift area

Changes related figure data in one batch.

- Multiple selection

Used when processing units are copied or deleted together.

- Set

Displays the processing item setting window for the selected processing unit.

e. Display Options

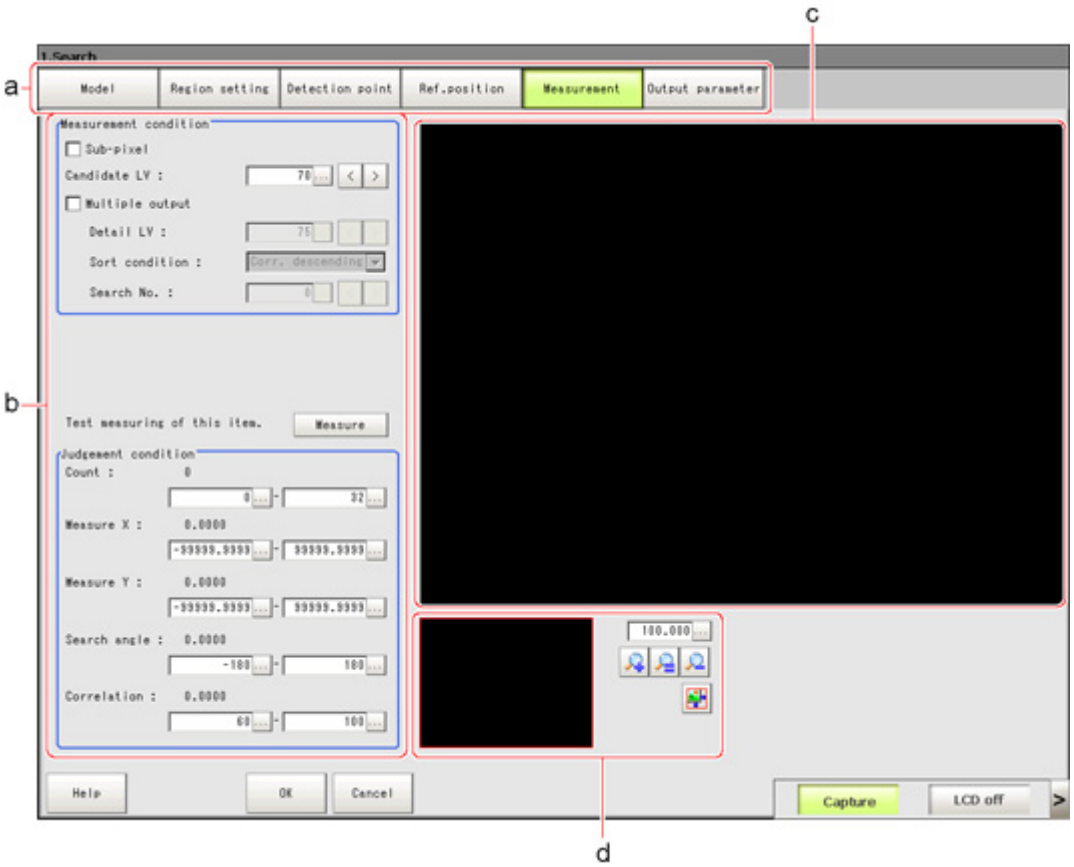
- Show guide
  When checked, explanations for processing items are displayed.
- Enlarge flow
  When checked, the "a Unit list" flow is displayed with large icons.
- Enlarge item tree
  When checked, the "f Processing item tree" is displayed with large icons.
- Ref. other Scene's flow
  When checked, other scene flows within the same scene group can be referred to.

f. Processing Item Tree
This area is for selecting processing items to add to the flow.Processing items are classified by type and displayed as a tree. Tapping the plus sign "+" of any item displays expanded contents below that item. Tapping the minus sign "-" of any item collapses the expanded contents.
When "Ref. other Scene's flow" is checked, the scene select box and other scene flows are displayed.

g. Guide
Shows an explanation for the processing item selected in the processing item tree.These are used as reference when selecting processing items. To display guides, check "Show guide" in "e Display options".

Layout of Property Setting Window

This window is used for detailed setting of measurement parameters and judgement conditions for processing items.



a. Item Tab Area
Displays the settings items for the processing unit currently being set.Perform settings starting

with the item on the left.

b. Detail Area
Set detailed items.

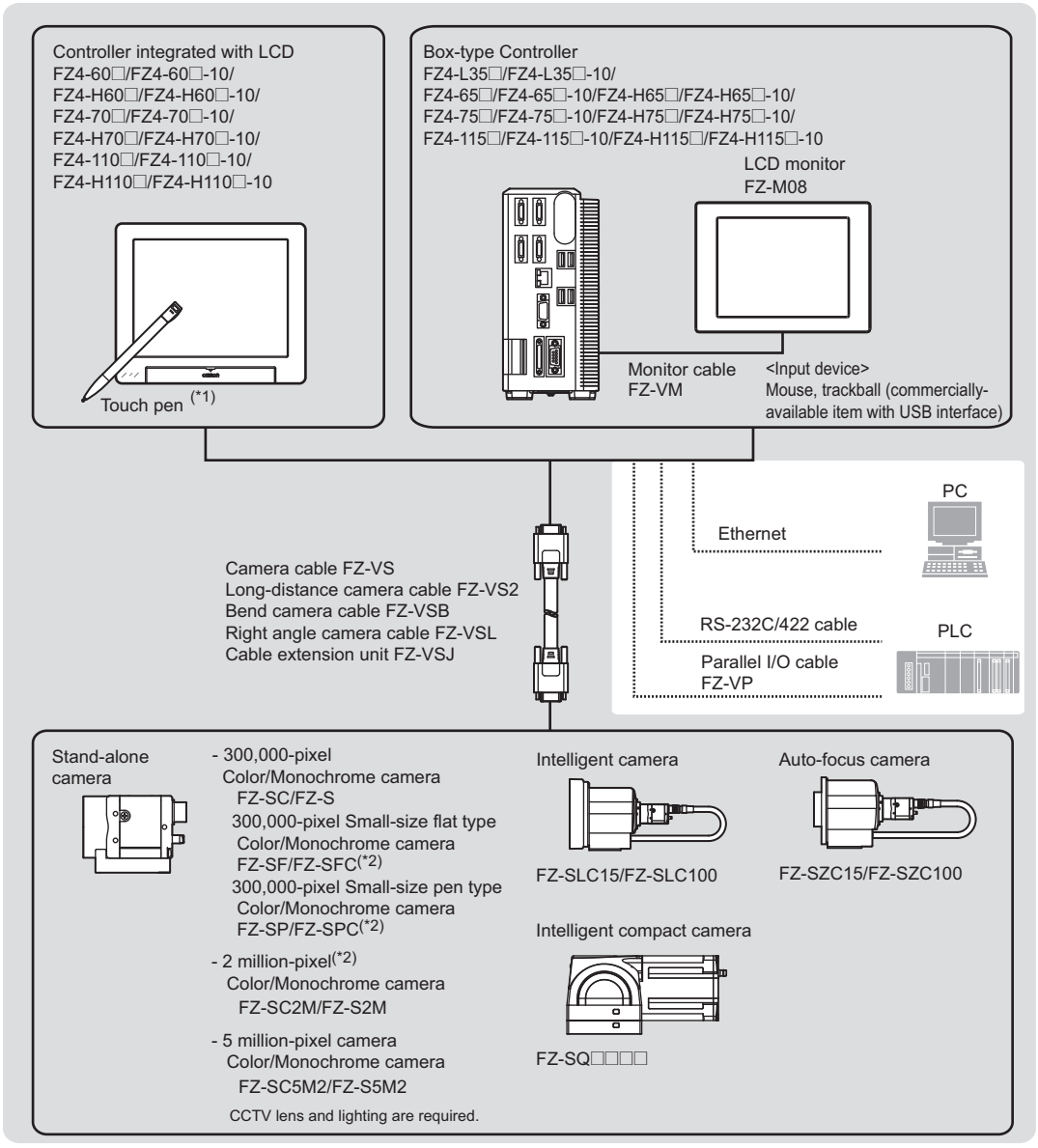
c. Image Display Area
Displays camera images, figures, and coordinates.

d. Zoom Browser Area
Zooms in and out from the displayed image.

Checking System Configuration

This product is a vision sensor for performing image processing measurement through a controller of objects photographed using a camera. By connecting an external device such as a PC, measurement commands can be input and measurement results can be output from the external device.

Basic Configuration of FZ4 Series



*1: The touch pen is a controller accessory.

*2: Lenses for small-size cameras are required for small-size 0.3 megapixel cameras.

Reference

- For details on connector specifications, etc., see the "Operator's Manual (Setup)" of each model.

Description of Model-specific Functions

Operation mode

With the multi core CPU installed, different operation modes can be set to meet different purposes of use.
A desired operation mode can be selected from [Parallel-operation high-speed mode], [Single-line high-speed mode], [High-speed logging mode], [Non-stop adjustment mode] and [Multi-line random-trigger mode].
Reference: ▸ Setting Operation Mode (p.30)

List of functions by model

New function	Type of controller			
	FZ4-6□□ FZ4-7□□	FZ4-H6□□ FZ4-H7□□	FZ4-11□□	FZ4-H11□□
Function				
Operation mode Reference: ▸ Setting Operation Mode (p.30)	-	-	Supported	Supported
Processing item				
Standard processing item	Supported	Supported	Supported	Supported
Sophisticated processing item (processing item having + at the end of the item name)	-	Supported	-	Supported

Preparing Controllers

No special preparation is required with this product as processing items are pre-installed.Please check that the controller is switched on and that the Main screen is displayed.
For details, see the User's Manual.
The first time the program is started up, the Language Setting window is displayed, so select the language.
Reference: Selecting the Language [Language Setting] (p.345)

Adjusting Cameras

Confirm what kind of images are being taken.
Adjust the position of measurement objects and the focus of the lens.

1. Tap [▼] of "Image mode" in [Image display] of the Main screen Control area, and select "Through".
   The through images captured from the camera are viewed in the Image Display area.
   Reference: Changing Display Contents (p.83)

   Note

   - The same operation is available by tapping [View] - [Image mode] - [Through].

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

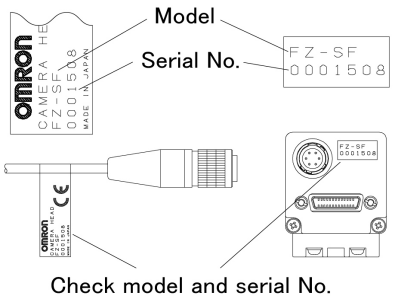
3. Adjust the focal distance of the lens.
   When using an auto-focus camera or an intelligent camera, focus and the iris can be automatically adjusted.

   Note

   - If a camera is used together with a lens, turn the focus ring of the lens to adjust the focus.
     Reference: "Processing Item List Manual", "Lens Setting" (p.29)
   - The light intensity of an intelligent camera can be adjusted from the controller.
     Reference: "Processing Item List Manual", "Lighting Control" (p.25)

Important

- When using a small-size digital camera, check that the model and serial number of the camera head and camera amplifier match.When a camera head and camera amplifier of different models and serial numbers are connected, they may not operate correctly.



Intelligent Camera (with Lighting Function)

Proper lighting is of crucial importance to vision sensors.
If an intelligent camera is connected, lighting can be controlled from the controller.
Features of intelligent cameras are as follows:

- A single camera enables testing of illumination from various angles, so it is possible to shorten the lighting setting time and test measurement time.
- The controller controls lighting, so lighting can be adjusted depending upon the product type.
- Reproducibility of lighting settings is improved.
- Settings can be modified without changing lighting.

Reference: "Processing Items List Manual", "Screen Adjust Settings (Camera Image Input)" (p.25)

Input Operations

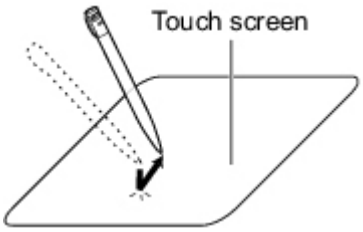
Input operations differ depending on the type of controller.

- Controller integrated with LCD: Operation with touch pen
- BOX-type controller: Operation with mouse and trackball

Operation of Touch Pen

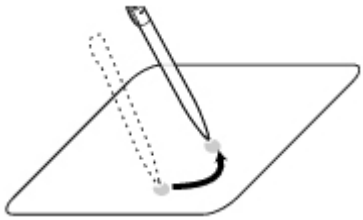
With a Controller integrated with LCD, perform the following operations when operating the touch screen with the touch pen.

Tapping



Lightly touch the screen once with the touch pen and immediately take it off. Perform when selecting items, etc.

Drag



Draw while pressing on the screen lightly with the touch pen.

Important

- Be sure to use the supplied touch pen for touch screen operations.Using a pencil or ballpoint pen may damage the touch screen.
- In addition, response to operations may be delayed if the screen is tapped continuously and rapidly.

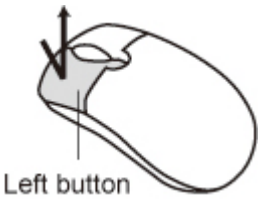
Basic Operation of Mouse and Trackball

With a BOX-type controller, use a mouse with a USB interface or commercially-available trackball.
(See the list for recommended products. Please refer to the product catalog.)

Note

- Do not use the right mouse button, scroll wheel, or other buttons.

Click

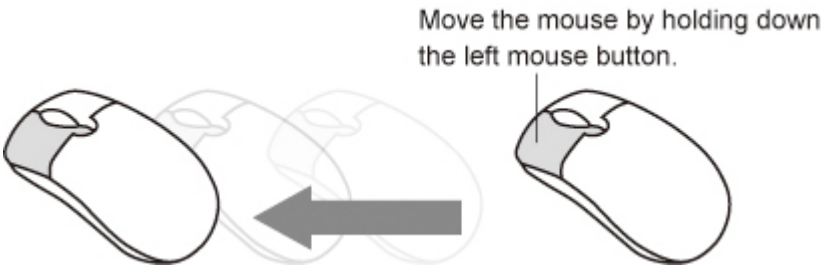


Press the left mouse button once. Perform when selecting items, etc.

Note

- This document primarily describes operations using the term "tapping". When using a mouse or trackball, read "Tapping" to mean "Clicking".

Drag



Move the mouse with the left mouse button held down.

Returning Controller to Factory Settings

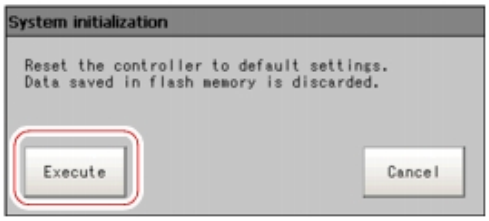
All controller settings can be restored to factory default status (initialization).
In addition, the controller can be restarted.

- Reference: Initializing Controller [System Initialization] (p.27)
- Reference: Restarting Controller [System Restart] (p.27)

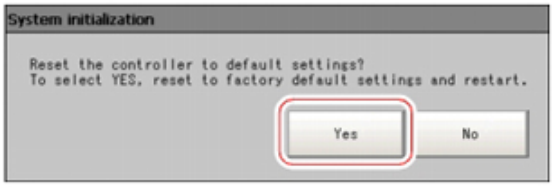
Initializing Controller [System Initialization]

Restores the controller to factory default status. Before initialization, back up required data such as scene data and system data.
Reference: Saving Settings Data to RAMDisk/USB Device (p.334)

1. On the Main screen, tap [System] - [Controller] - [System initialization].
   The System Initialization window is displayed.
2. Tap [Execute].



   A confirmation window is displayed.
3. Tap [Yes].



   The controller is initialized and restarts.

Restarting Controller [System Restart]

Restart the controller. Before restarting, back up required data such as scene data and system data.
Reference: Saving Settings Data to Controller Memory (p.332)

1. On the Main screen, tap [System] - [Controller] - [System restart].
   The System Restart window is displayed.
2. Tap [OK].

   The controller restarts.

Saving Settings and Turning Power Off

Before turning off power to the controller, perform the following operations to save the data that you have set.
The controller loads scene data from the flash memory each time during start-up. Therefore, if the power is turned off without saving data to the flash memory, any changes made will not be saved.

1. On the Main screen (ADJUST window), tap [Data save] in the toolbar to save the setting data.

2. Exit after powering off the controller.

Note

- Data to be saved
  Scene data and system data are saved in the controller. Logging images and data saved in the RAMDisk are not saved. Perform any of the following procedures to keep this data.
  - Copy data saved in the RAMDisk to the USB memory.
  Reference: ▶ Copying/Moving Files (p.338)
  - Change the save destination of logging data to USB memory.
  Reference: ▶ Saving Logging Images to RAMDisk/USB Device (p.336)
- When using the scene group function
  The scene data set in Scene group 0 is saved in the controller. The scene data from scene groups 1 to 31 is saved to the USB memory and overwrites previous saved data. (For FZ4-11 ☐☐ /H11 ☐☐ , all data are saved in the controller.)

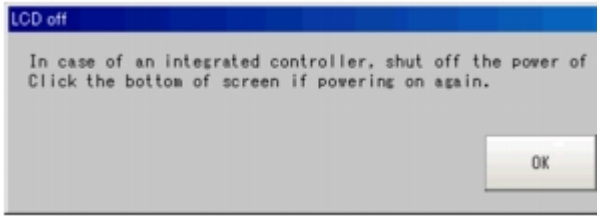
Turning Off LCD

This function is specific to FZ4-600/700/1100 series LCD-integrated controllers.
Turn off the LCD only without turning off the controller.

1. Open the measurement manager bar at the bottom right of the Main screen and tap [LCD Off].

A confirmation message is displayed.

2. Tap [OK].



Power to the LCD is turned off.

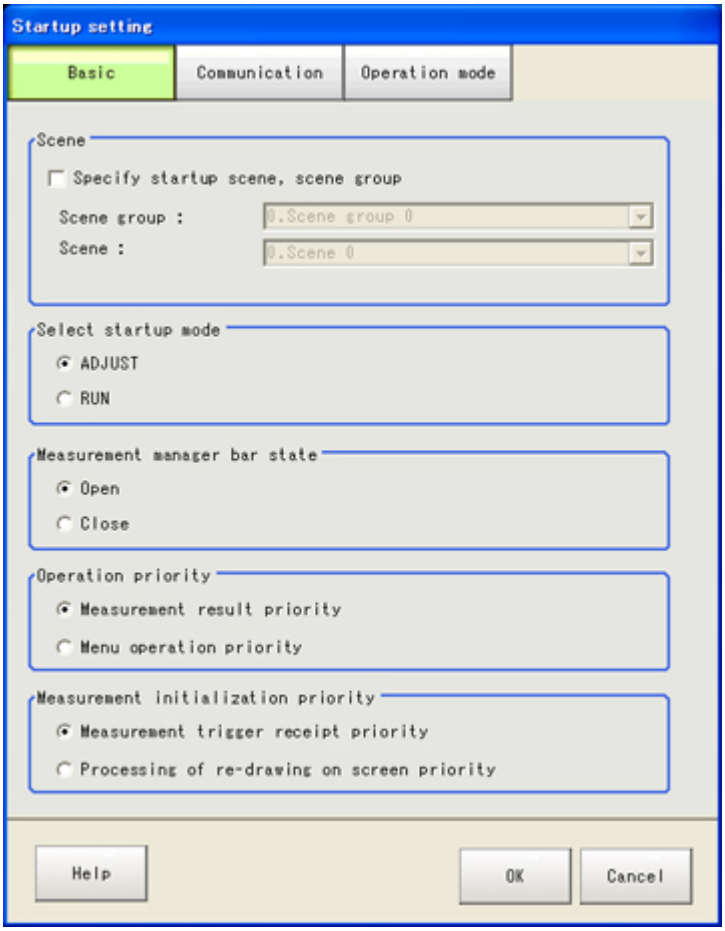
Turning LCD On Again

This function is specific to FZ4-600/700/1100 series LCD-integrated controllers.
Tap the lower part of the monitor screen.
Then, the LCD will be switched on.

Setting Operation Mode

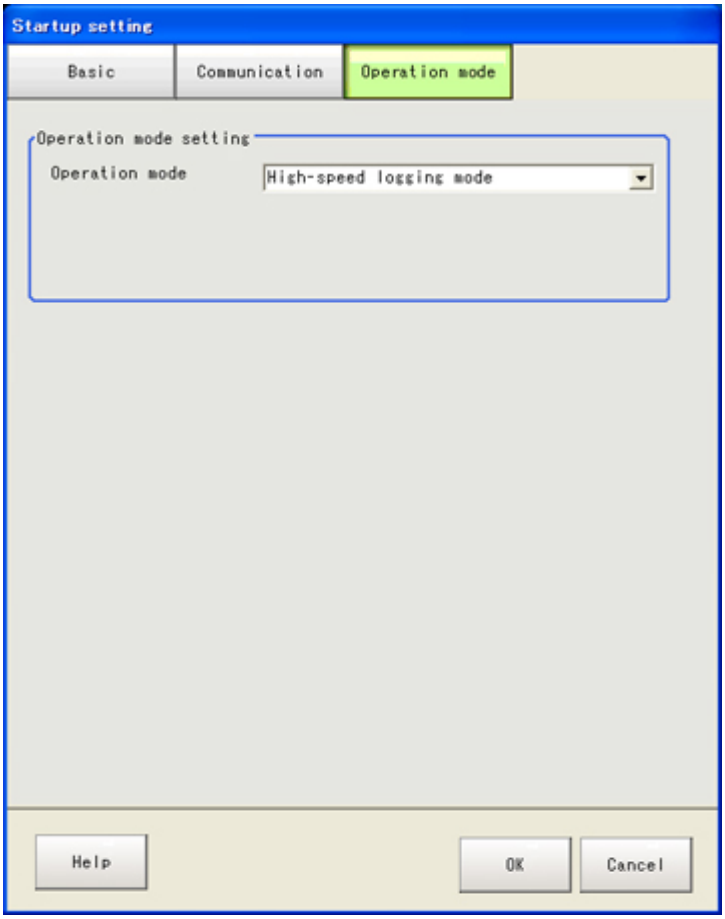
This section describes the operation mode (FZ4-11 ☐☐ /H11 ☐☐ only). Utilize the multi core CPU to set an operation mode appropriate for the condition of use. This function is effective in improving the takt time and reducing the downtime. For setting, use Startup setting.
Reference: ▸ Setting the Start-up Status "Startup Setting" (p.347)

1. On the Main screen, tap the [System] menu - [Controller] - [Startup setting].



2. Tap [Operation mode].

3. Tap [▼] and select a desired operation mode.

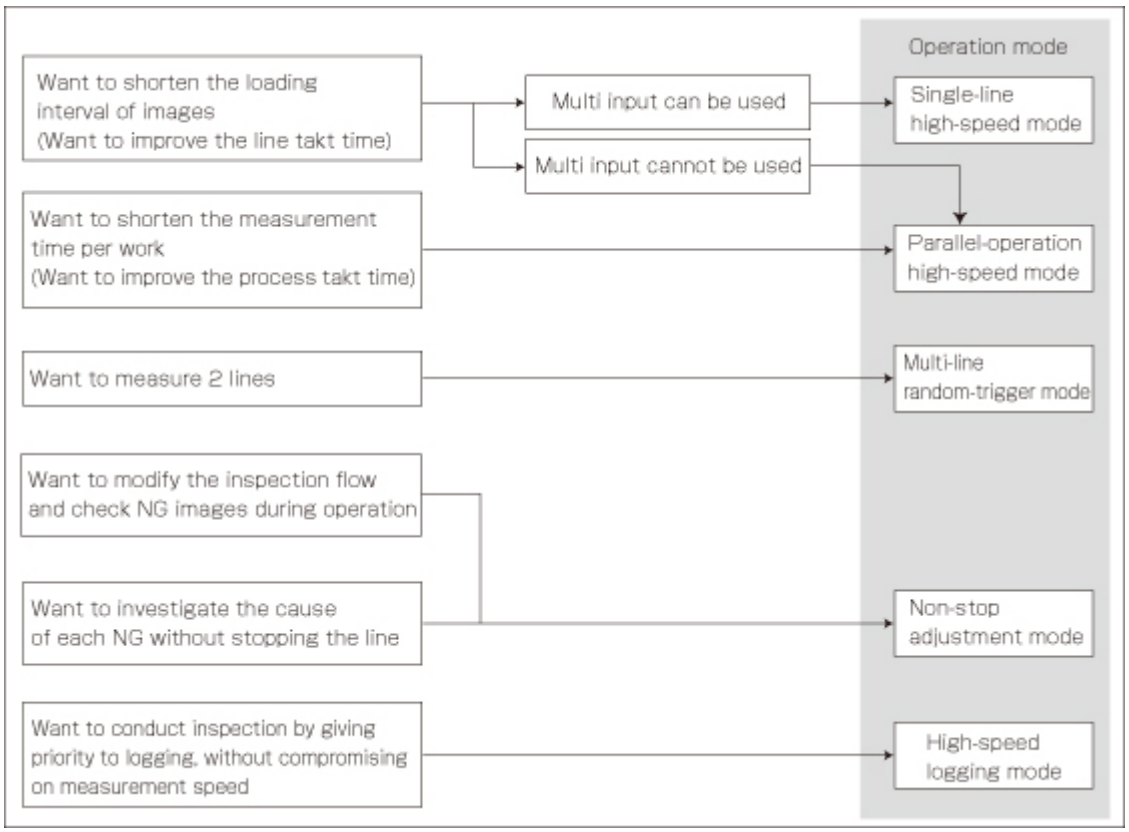


4. Tap [OK].
5. On the Main screen (ADJUST window), tap [Data save] in the toolbar to save the setting data.

6. On the Main screen, tap [System] menu - [Controller] - [System restart].
   The System Restart window is displayed.
7. Tap [OK].

Operation Mode Selection Guidelines

This section describes how to set an operation mode suitable for your specific purpose.



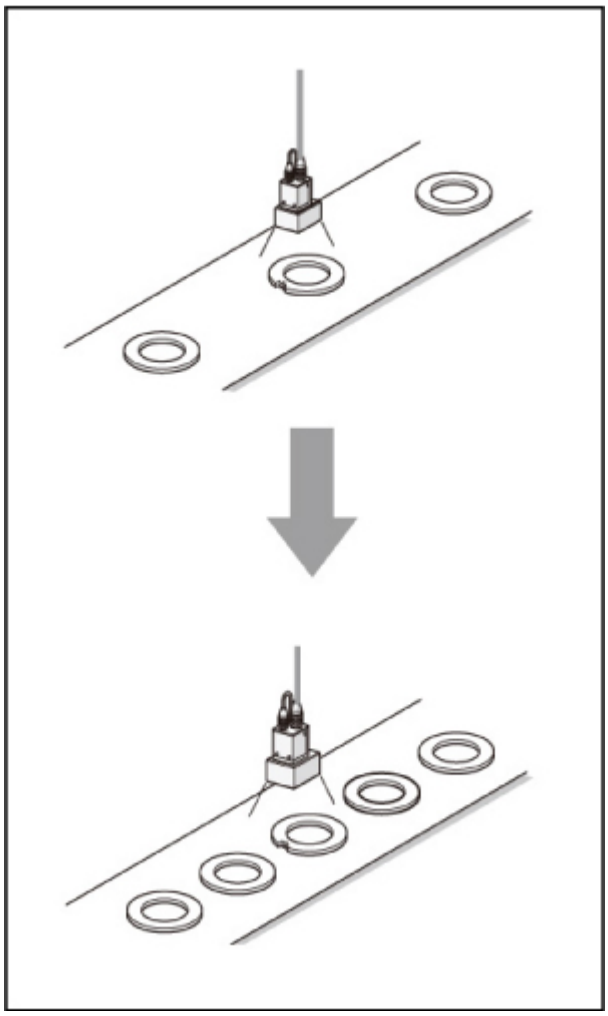
[Note 1]: Reference: ▶ About Multiple Image Input Function (p.559)

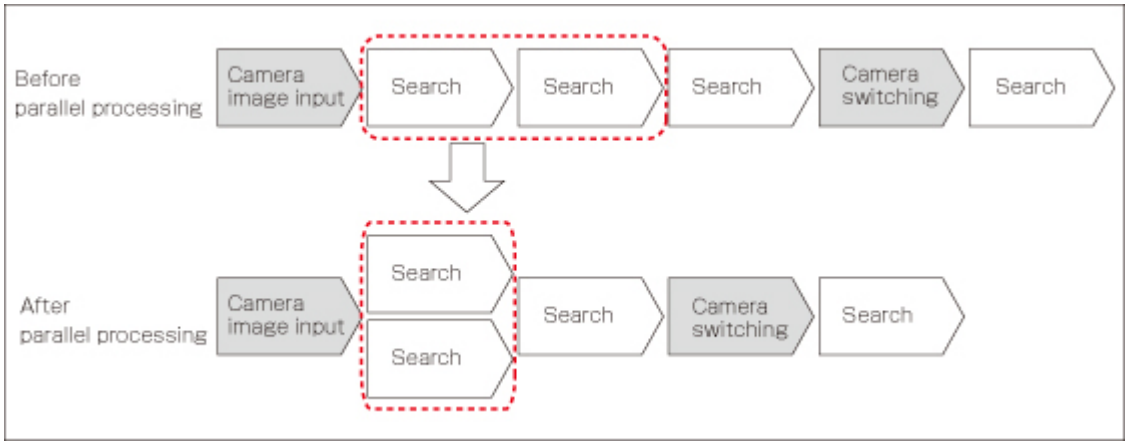
High-speed Logging Mode

Normally one CPU is used to perform measurement, image logging and image display. The FZ4-11 ☐☐ /H11 ☐☐ series performs processing using two CPUs, with one CPU used exclusively for measurement and the other performing non-measurement processing. This ensures maximum measurement performance at all times.

Parallel-operation High-speed Mode

Two CPUs are used to share and process measurement tasks internally. Processing is executed in parallel to shorten the measurement time to maximal 50%.
Parallel processing is performed for each processing unit to shorten the total processing time.





Processing items supporting the aforementioned parallel processing are specified below.
You can improve the takt time effectively by combining the applicable units using an ingenious processing flow.
-: Not supported ○ : Supported

Processing item	Parallel processing	Processing item	Parallel processing	Processing item	Parallel processing
Camera Image Input	-	Barcode+	○	Data Logging	-
Camera Image Input HDR	-	2D Code	-	Elapsed Time	-
Camera Image Input HDR Lite	-	2D Code+	○	Wait	-

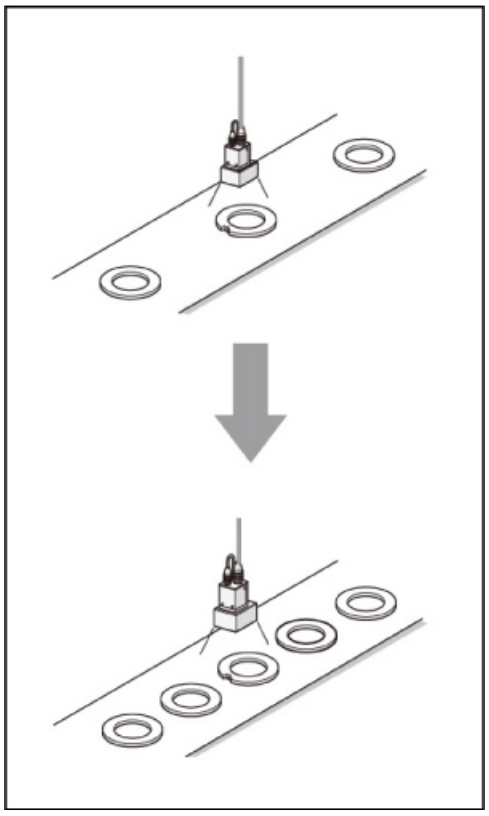
Camera Switching	-	Circle Angle	○	Focus	○
Measurement Image Switching	-	Position Compensation	-	Iris	○
Search	○	Trapezoidal Correction+	-	Conditional Branch	-
Flexible Search	○	Filtering	-	End	-
Sensitive Search	○	Background Suppression	-	DI Branch	-
ECM Search	○	Brightness Correct Filter	-	Data Output	-
EC Circle Search	○	Color Gray Filter	-	Parallel Data Output	-
Shape Search+	○	Extract Color Filter	-	Parallel Judgement Output	-
Shape Search II	○	Anti Color Shading	-	Fieldbus Data Output	-
Classification	○	Stripes Removal Filter+	-	Result Display	-
Edge Position	○	Stripes Removal Filter II	-	Display Image File	-
Edge Pitch	○	Halation Cut+	-	Display Last NG Image	-
Scan Edge Position	○	Panorama+	-		
Scan Edge Width	○	Polar Transformation	-		
Circular Scan Edge Position	○	Calculation	-		
Circular Scan Edge Width	○	Line Regression	-		
Color Data	○	Circle Regression	-		
Gravity and Area	○	Calibration+	-		
Labeling	○	Precise Calibration	-		
Label Data	-	User Data	-		
Labeling+	○	Set Unit Data	-		
Defect	○	Get Unit Data	-		
Precise Defect	○	Set Unit Figure	-		
Fine Matching	○	Get Unit Figure	-		
Character Inspection	○	Trend Monitor	-		
Date Verification	-	Image Logging	-		
Model Dictionary	-	Image Conversion Logging	-		

Reference

- Depending on the processing unit, the processing speed of the unit itself can be raised.

Single-line High-speed Mode

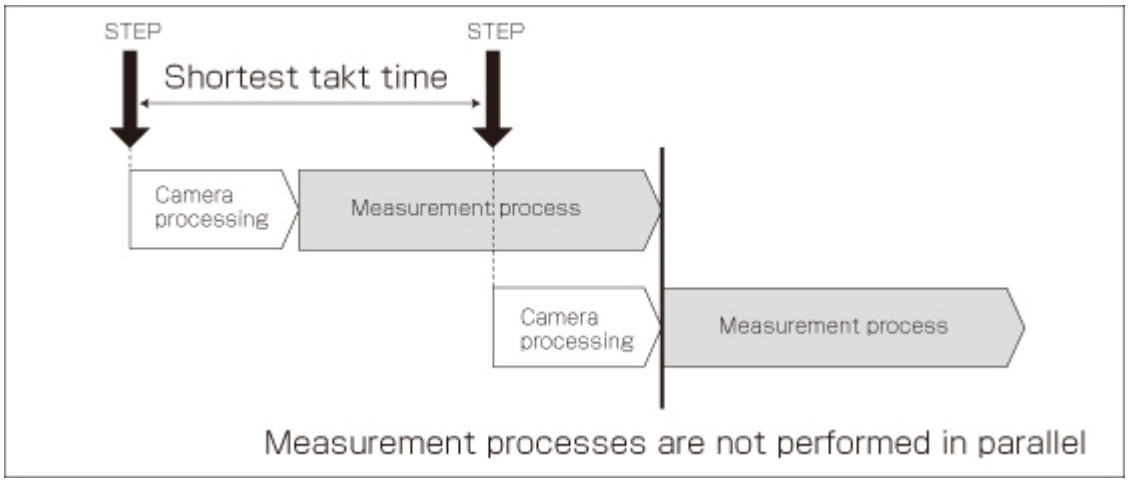
Measurement is performed using 2 CPUs, which means that compared to conventional models twice the number of measurement targets can be inspected in the same time. In this Single-line High-speed Mode, CPU0 and CPU1 execute the same inspection flow alternately for each STEP input, to improve the multiple image input performance and reduce the takt time to as much as one half.
Reference: About Multiple Image Input Function (p.559)



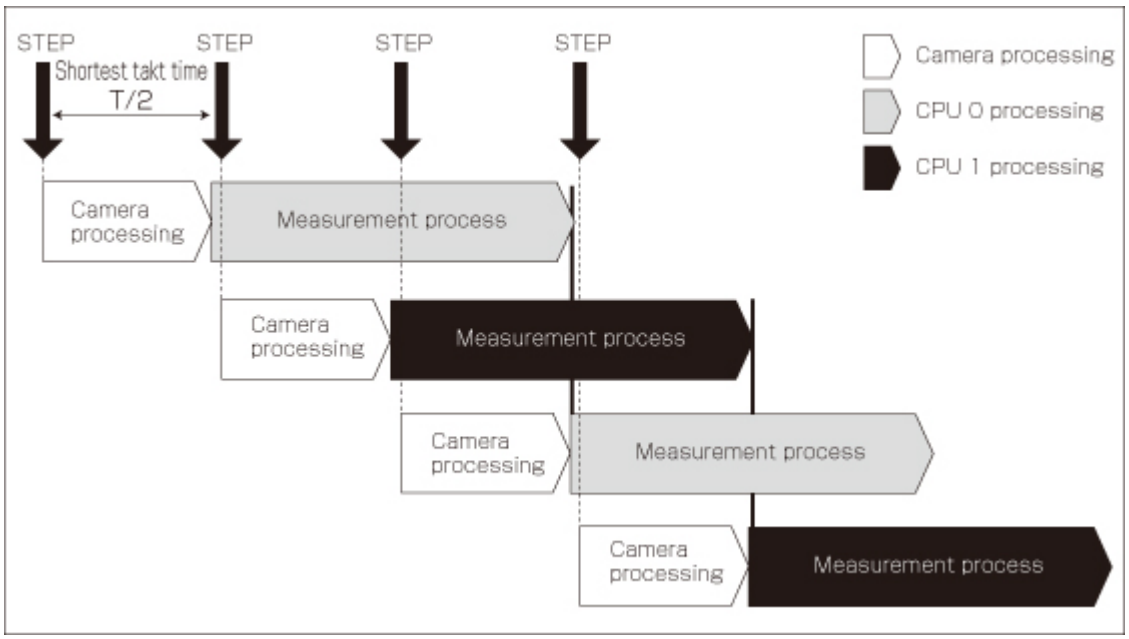
Important

- The time needed to measure one work is shorter when [Parallel-operation High-speed mode] is selected.
- [Single-line High-speed mode] is only effective when the multiple image input function is used. If the multiple image input function cannot be used, consider using [Parallel-operation High-speed mode].
  Reference: About Multiple Image Input Function (p.559)
- Presence of certain processing items such as [Data Output], [Parallel Data Output] and [Parallel Judgement Output] in the first half of the flow may cause the performance to drop when [Single-line High-speed mode] is selected. If the performance drops markedly, consider using [Parallel-operation High-speed mode].
- In the Single-line High-speed Mode, certain processing items such as [Trend Monitor] and [Display Last NG Image] may not function properly. Do not use these items. Also with the processing item [Calculation], calculations that use values in previous steps do not function properly.
- When [Single-line High-speed mode] is selected, [Enter simplified non-stop adj.] cannot be used.
- The functions to set/get measured values using external commands do not operate correctly. Do not use these items.

1 CPU

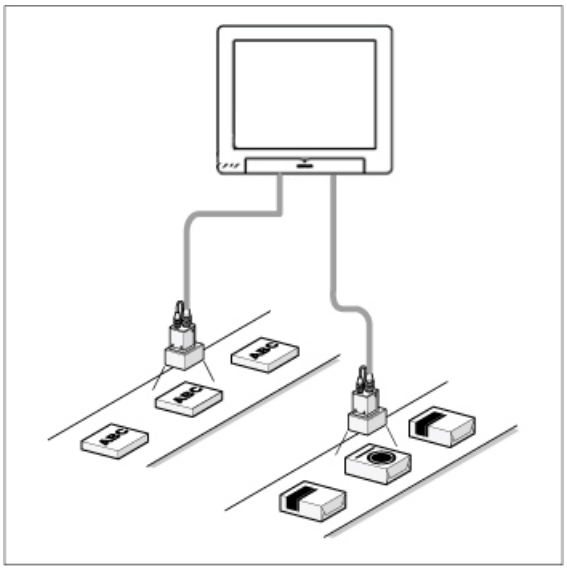


2 CPUs (FZ4-11 □□ /H11 □□ only)

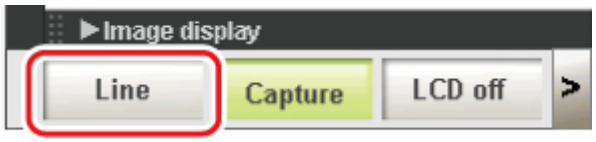


Multi-line Random-trigger Mode

Use this mode if you want to measure 2 lines using 1 controller. Measurement can be performed independently on line 0 and line 1 in response to inputs from different cameras. Scene group data and scene data can be set separately for line 0 and line 1.



You can switch the monitoring target between line 0 and line 1 using the Line button in the Image display setting area.



Camera No.	Recognition in software
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

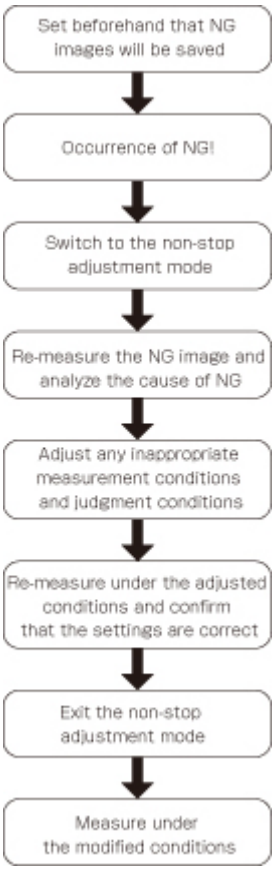
Important

- If Ethernet is used, set a different port number for each line.
- RS-232C/422 can be set at line 0 only.
- If parallel communication is used, the I/O format changes.
  Reference: I/O Format (Parallel Interface) (p.543)
- Parallel communication can only be set at line 0. Line 1 uses the settings of line 0.
- Date-time setting, language setting and operation mode setting can be set at line 0 only.
- If STEP is input to line 0 and line 1 at exactly the same time, measurement on one side may be delayed (approximately by a time corresponding to the camera image input unit).
- Error messages are the same. If an error occurs on either line, an error message is displayed.
- If logging is performed for line 0 and line 1 at the same time, measurement may take a longer time.
- User data of line 1 is saved in the controller.

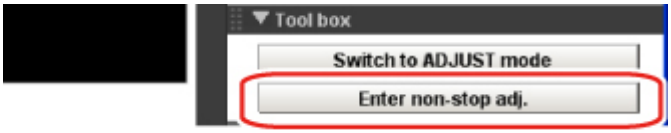
Non-stop Adjustment Mode

The measurement flow can be changed and adjusted during operation without stopping the measurement process.
Set images using saved image files. The modified measurement flow can be reflected during operation.

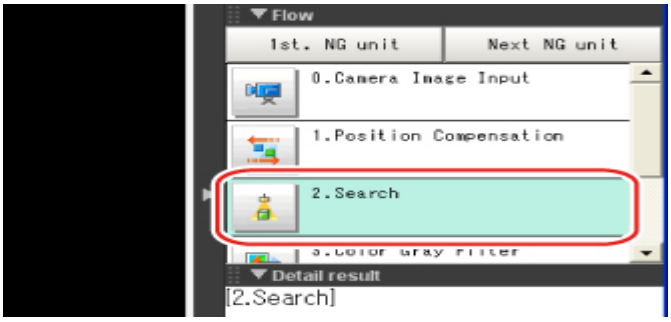
Utilization example of non-stop adjustment



1. In the "Control" area of the Main screen (RUN window), tap [Tool box].
2. Tap [Enter non-stop adj.].
   Transfers to non-stop adjustment mode. Measurement will continue without stopping.

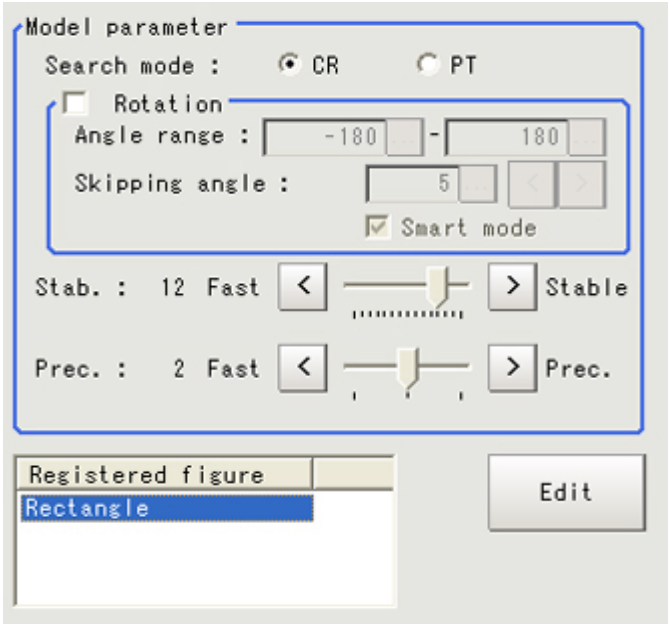


3. Tap the icon of the processing unit to be adjusted.
   To change the flow, do so by selecting [Edit flow] in the toolbar.

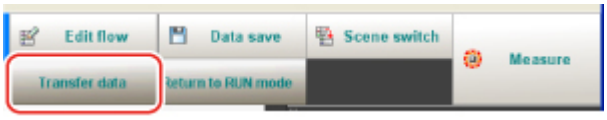


   The setting window for the selected unit appears.

4. Change each processing unit.

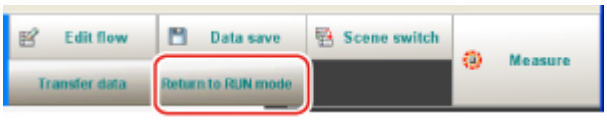


5. Tap [OK].
   The setting window closes, and the screen returns to the Main screen.
   When changing judgement conditions for multiple processing units, repeat steps Reference: ▶ 3 (p.39) to Reference: ▶ 5 (p.39) .
   The changes are not yet reflected at this point.
6. Tap [Transfer data] in the toolbar on the Main screen.
   The changes are reflected.



7. Tap [Return to RUN mode] in the toolbar on the Main screen.

The screen returns to the RUN window.



Important

- When [Transfer data] is executed, the results of [Trend Monitor] and [Expression], etc. are cleared.
- If the scene or scene group was switched or any setting of a processing unit was changed during operation using an external command, the result is not yet reflected when you switch to the non-stop adjustment window.
- If non-stop adjustment is performed after changing the scene group during operation, scene group data may be overwritten against your wish.
- Measurement commands (parallel, non-procedure, PLC link) and continuous measurement commands (parallel only) are the only communication commands that are accepted during data transfer.
- Data transfer takes a longer time when the scene group file size is larger.
- If the RUN window is displayed in the fast view mode, non-stop adjustment cannot be performed.
- Communication settings cannot be changed on the non-stop adjustment window.
- Do not register any new camera image input unit on the non-stop adjustment window.
- If RAMDisk does not have enough free disk capacity, data may not be transferred. Specify an image logging destination other than RAMDisk or otherwise set applicable items to minimize the usage of RAMDisk.
- Performing non-stop adjustment changes the display mode to freeze.
- If image logging is performed in the non-stop adjustment mode, data transfer may be disabled. To prevent this from happening, set the trigger interval longer than the logging time.

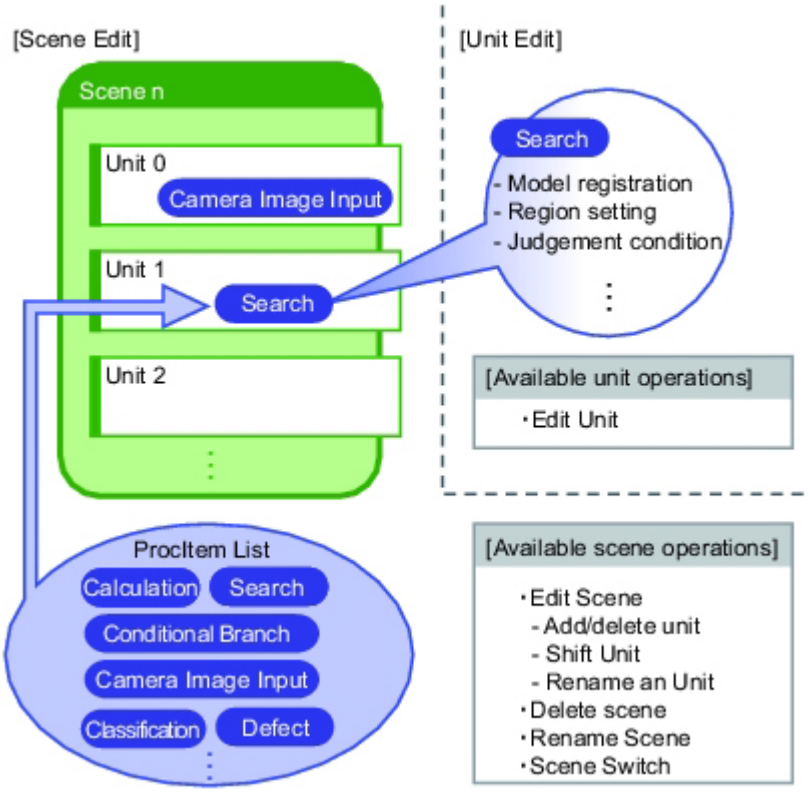
Setting Scenes (Measurement Flow)

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

- Reference: What Is a Scene? (p.42)
- Reference: What Is a Scene Group? (p.46)
- Reference: Creating a Scene (p.47)
- Reference: Processing Item Selection Guidelines (p.49)
- Reference: Editing Processing Units in Scenes (p.63)
- Reference: Switching Scenes and Scene Groups (p.65)
- Reference: Editing Scenes (p.67)
- Reference: Editing Scene Groups (p.70)

What Is a Scene?

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



Changing the set-up using the scene function

Multiple scenes can be created.For example, by creating scenes for each measurement object such as using "Scene 0" to inspect an "ABC" label and "Scene 1" to inspect an "XYZ" label, changing the set-up can be performed smoothly just by changing the scene even when the measurement object and measurement objective have changed.

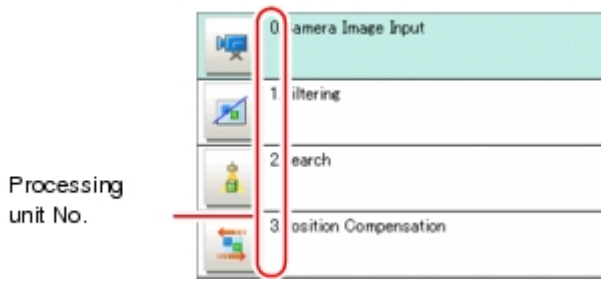
Reference: ▸ Switching Scenes and Scene Groups (p.65)

Up to 32 scenes can be set. In case where over 32 scenes are required, these can be divided into scene groups for easier management.

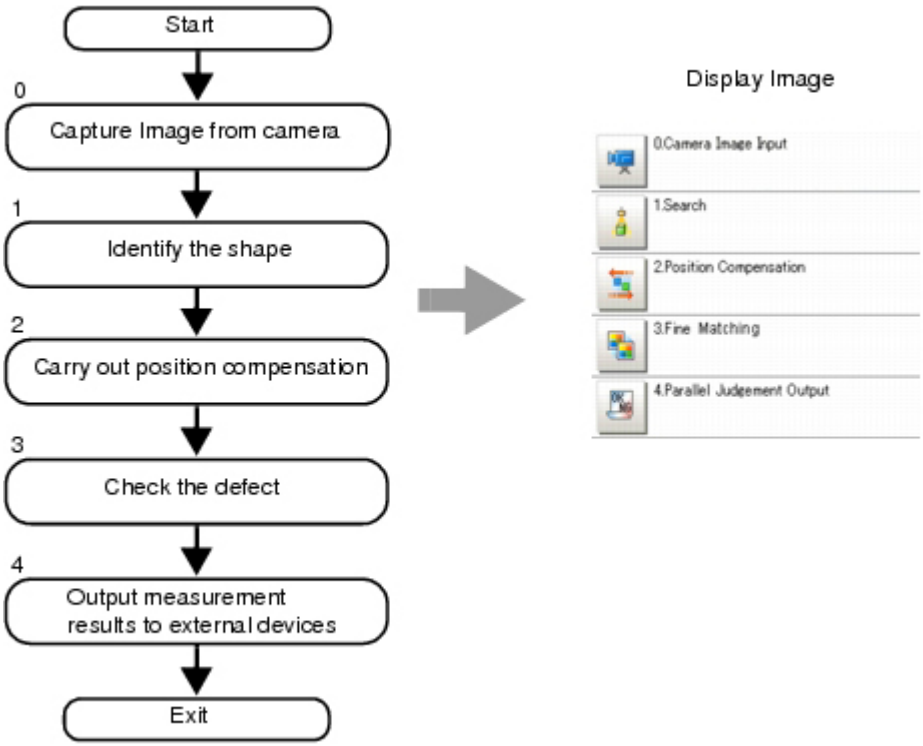
Reference: ▸ What Is a Scene Group? (p.46)

Scene Examples

The processing items registered to the scene are called processing units. In the Edit Flow window where scenes are created, select processing items required for measurement and add them to the flow. The number at the top of the processing unit is called the "Unit No.". If the measurement trigger is activated, processing is executed in the numerical sequence of the processing unit numbers.



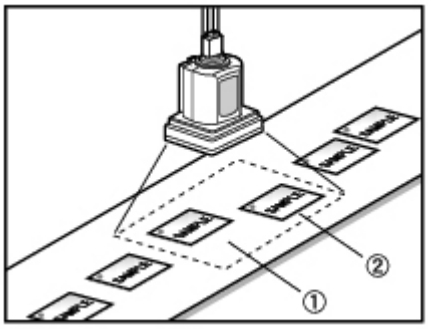
Example) Normal measurement

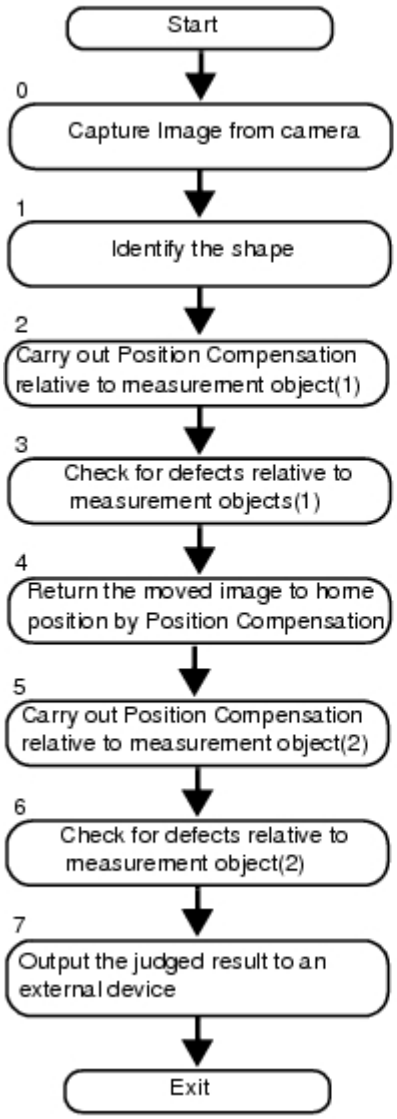


Note

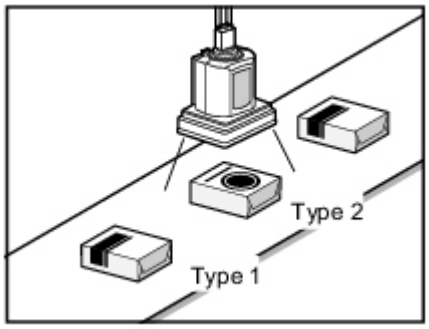
- The processing item "Camera Image Input" is set in processing unit 0 beforehand.

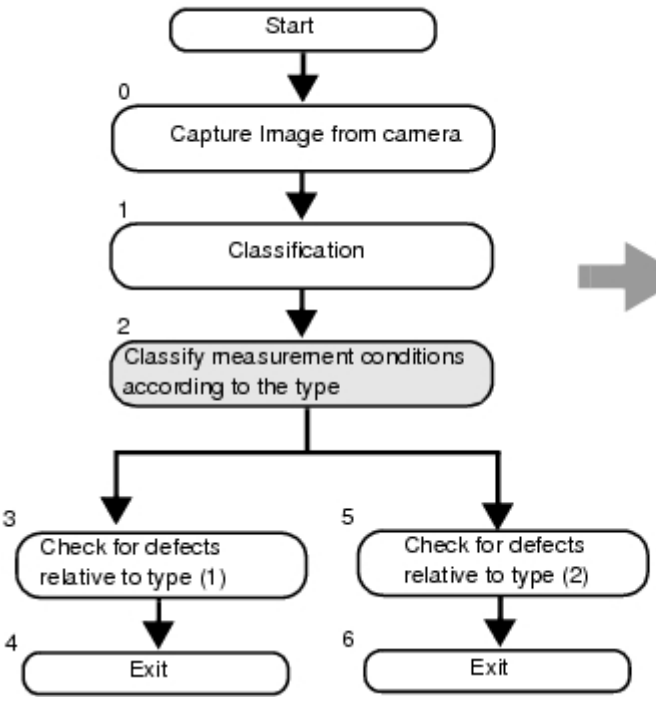
Example) When adding Position Compensation for two measurement objects in the same field of view





Example) When judging type from the image and dividing later inspection conditions according to type (branch processing)

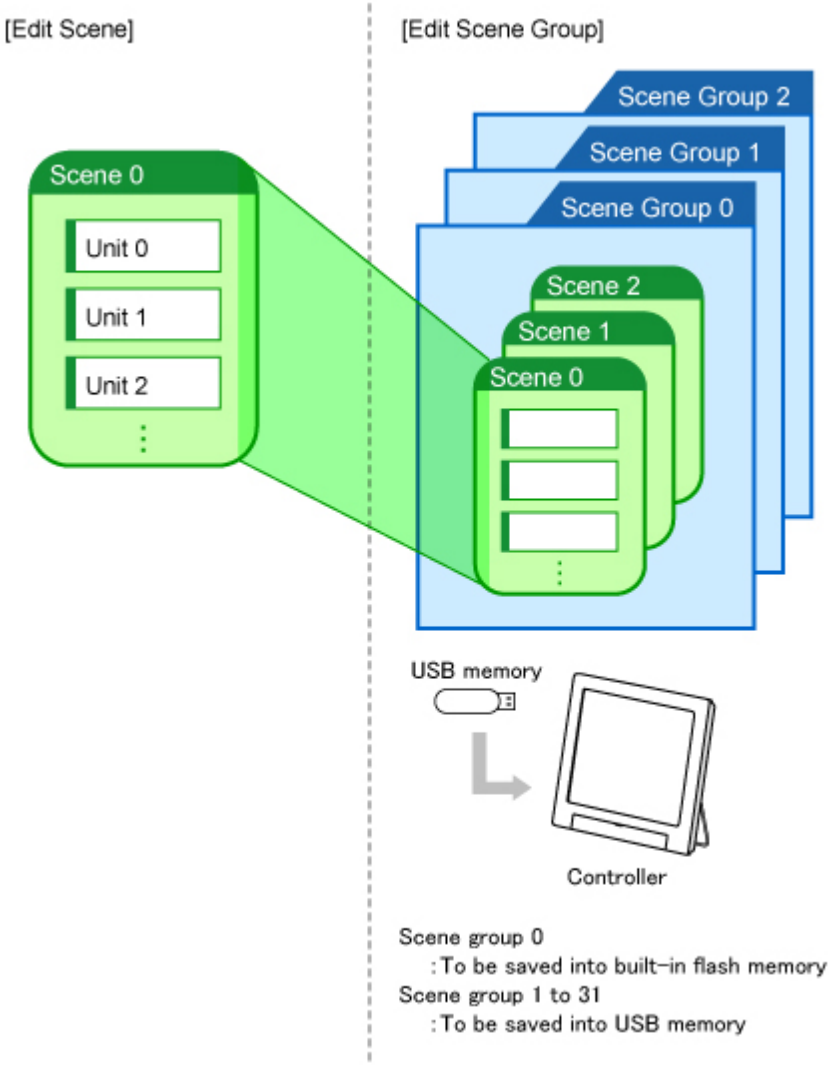




Display Image

What Is a Scene Group?

A "scene group" refers to a grouping of 32 individual scenes. Creating a scene group is convenient when increasing the number of scenes and when managing a number of scenes according to category.
USB memory is required for creating a scene group. Scene group 0 is saved in the controller while scene groups 1 to 31 are saved in USB memory. (For FZ4-11 ☐☐ /H11 ☐☐ , all data are saved in the controller.)



Note

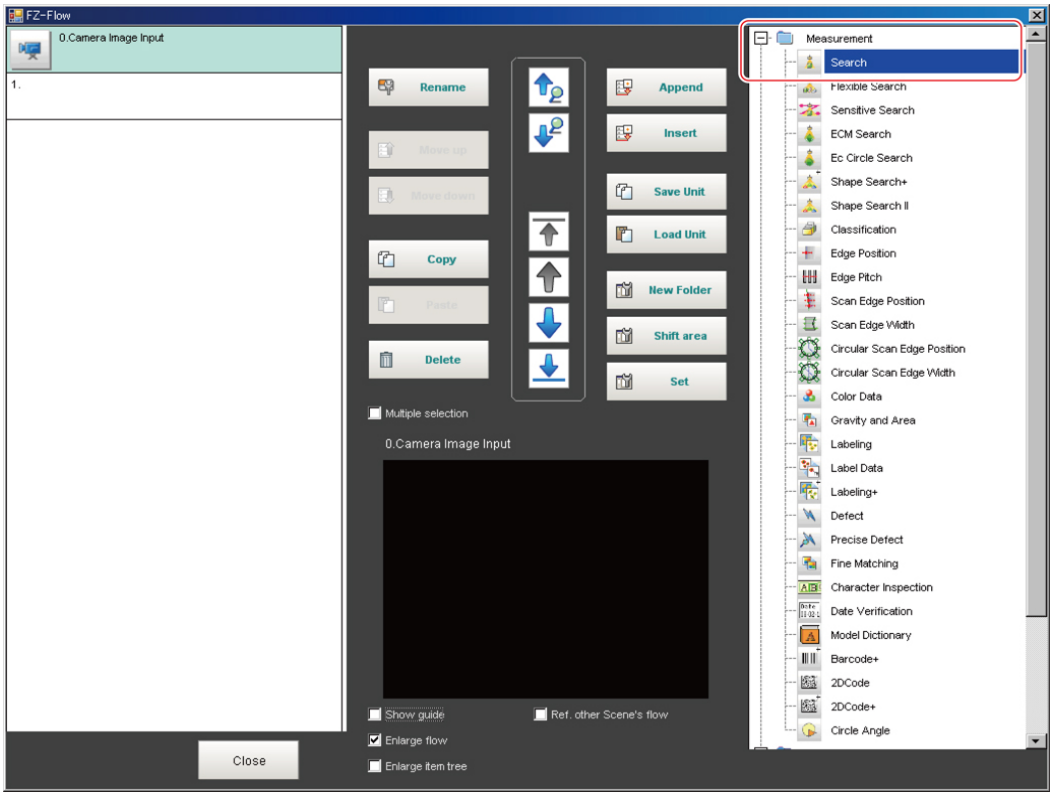
- The maximum number of scenes that can be used is 1024. 32 scenes are handled as 1 scene group, and up to 32 scene groups can be set. In other words, 32 scenes x 32 scene groups = 1,024 scenes, which is the maximum number that can be used.
- There are multiple USB ports on the controller, but it is necessary to assign the drive name "USBDisk" to the USB memory in which the scene group data being used is stored. When other USB memory devices are already inserted, perform this operation after removing all USB memory devices other than the one in which the scene group data is stored.
- If the USB memory capacity is insufficient for the data size, it is possible that the number of scenes can be set is lower than 1,024. The scene data size varies depending on the contents of settings.
- The data size that can be set (available data memory) can be checked in the system menu.
  Reference: Checking System Information [System Information] (p.358)

Creating a Scene

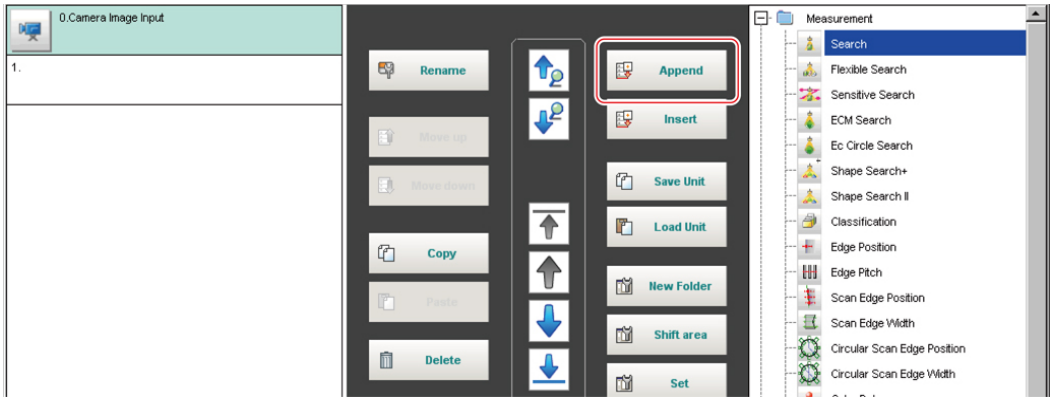
This section explains methods for adding a new processing unit to a scene.

1. Display the scene to edit on the Main screen.
   Reference: ▶ Switching Scenes and Scene Groups (p.65)
2. Tap [Edit flow] in Toolbar.

   The Edit Flow window is displayed.
3. Select a processing item to be added from the processing item tree.



4. Tap [Append].



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

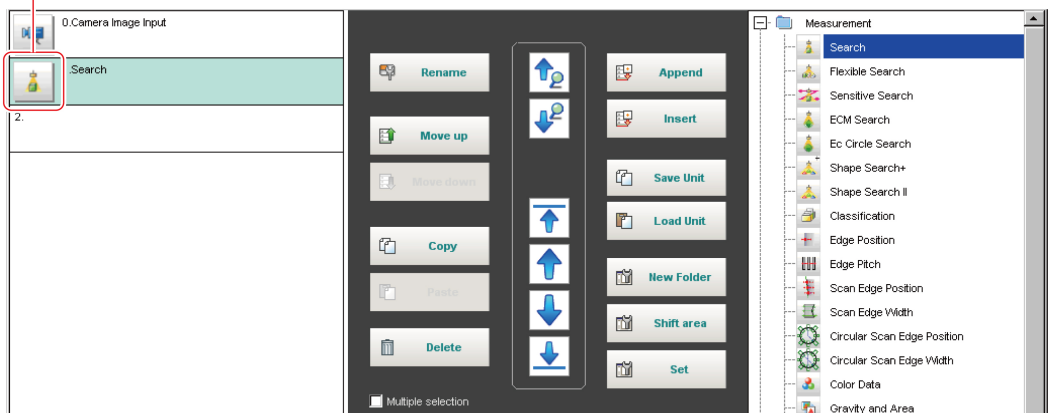
5. Continue to add processing units.Repeat the steps after Reference: ▶ 3 (p.47) .

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.612)

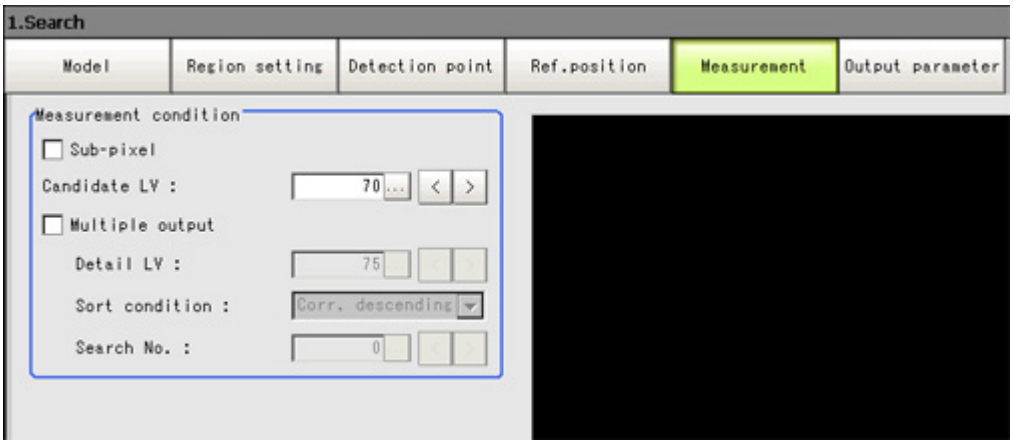
6. Either tap the icon of the processing unit to be set or tap the Set button.

ProcItem setting button



The property setting window is displayed.Set detailed conditions. The displayed contents vary depending on the processing item.

7. Set conditions.
   The displayed contents vary depending on the processing item.



Processing Item Selection Guidelines

Processing items for performing measurement are provided with this product. Application-oriented measurement can be configured by combining processing items or changing the settings of processing items.
The method for searching for processing items appropriate to the target measurement is shown here.

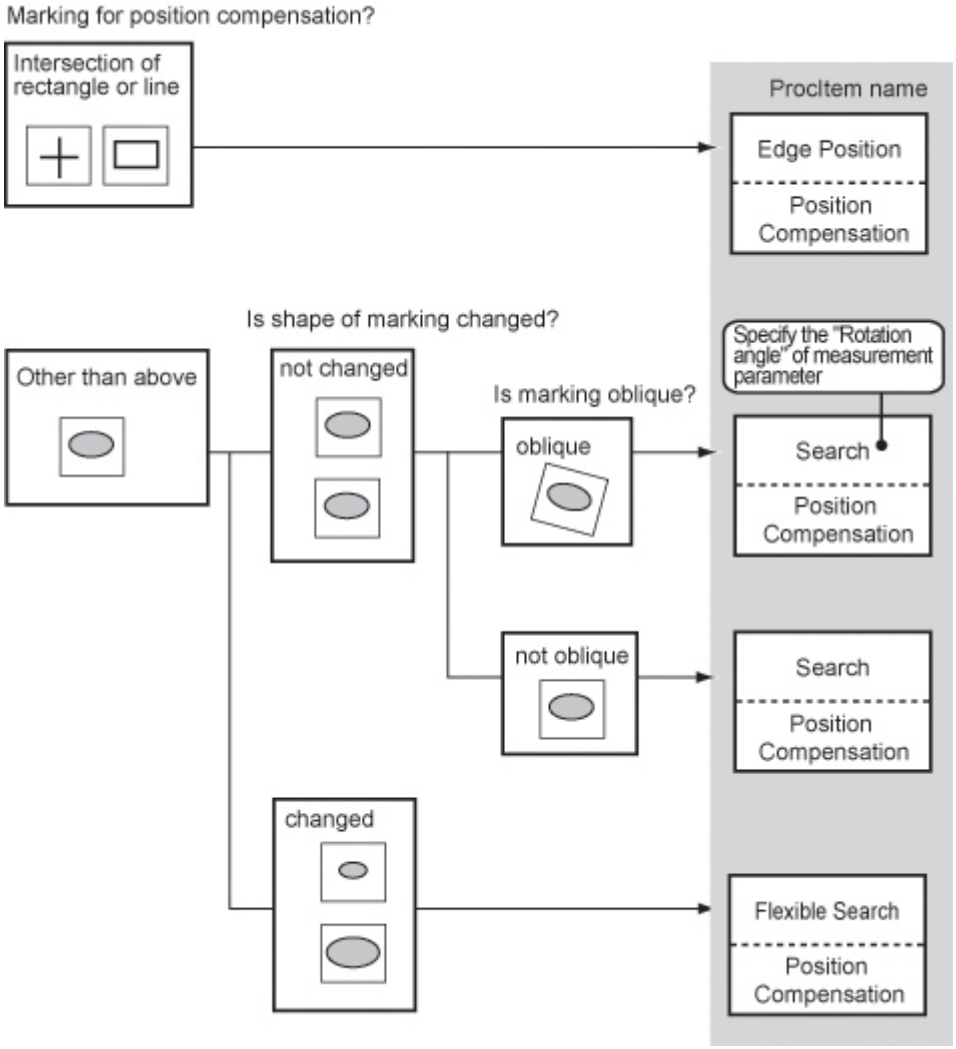
- Reference: Selecting Measurement Processing Items Using a Chart (p.49)
- Reference: Selecting Measurement Processing Items According to the Measurement Method and Purpose (p.56)

Selecting Measurement Processing Items Using a Chart

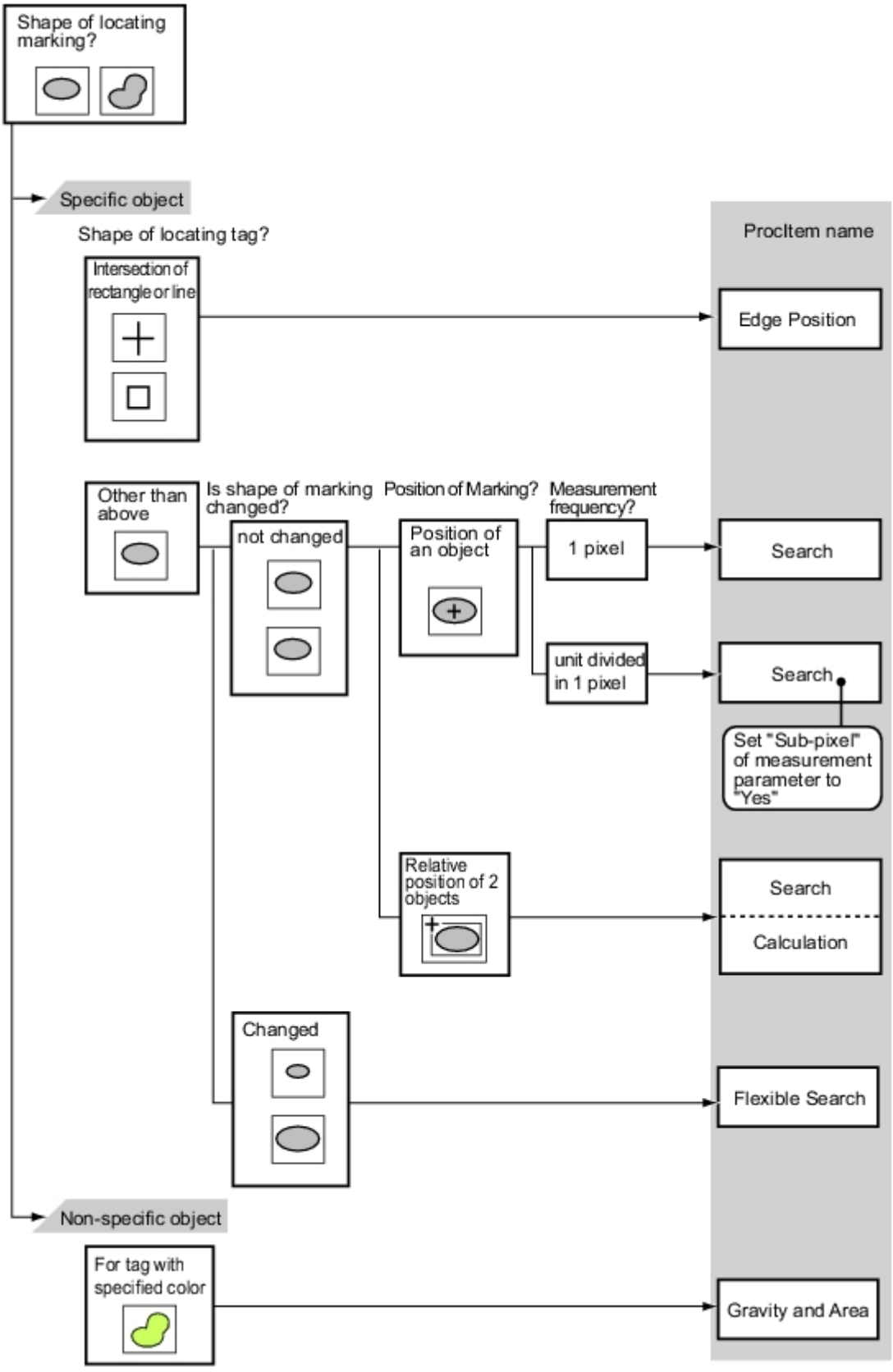
Select processing items appropriate to the target using the chart.

Item	References
Performing position compensation for objects	Reference: Position Compensation (p.50)
Measuring the position of objects	Reference: Locating (Measurement Objects Not Inclined) (p.51) Reference: Locating (Measurement Objects Inclined) (p.52)
Inspecting the status of objects	Reference: Internal and External Inspection (p.52) Reference: Presence Inspection (p.53) Reference: Dimension Inspection/Measurement (p.53) Reference: Text Comparison/Inspection (p.54) Reference: Quantity Inspection/Measurement (p.55)
Inspecting for defective products	Reference: Defect/Contamination Inspection (p.55) Reference: Burr Inspection (p.54) Reference: Inspection for Presence of Different Objects (p.56)

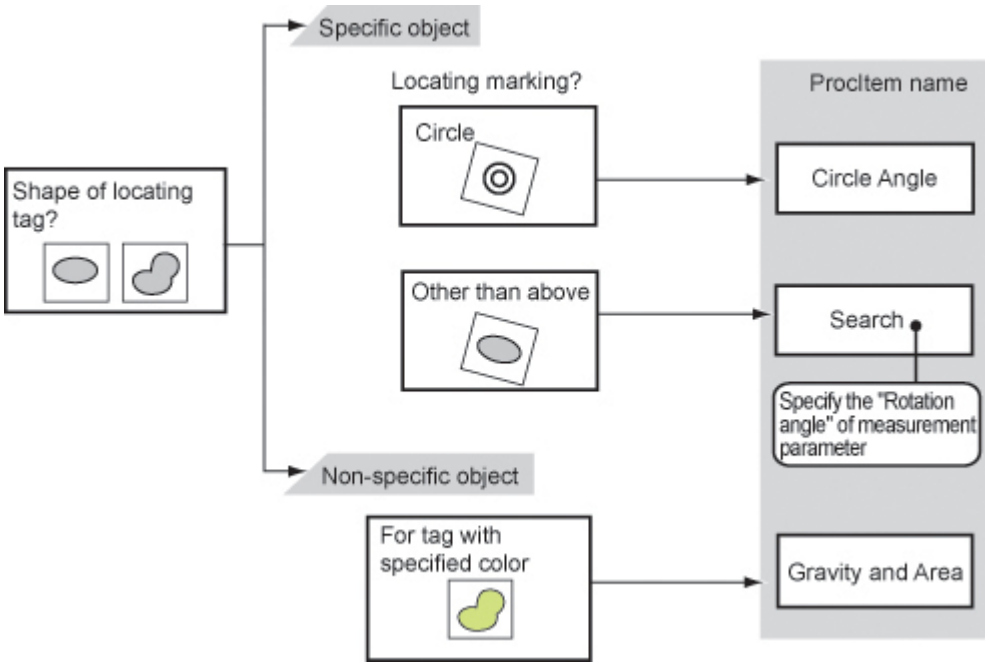
Position Compensation



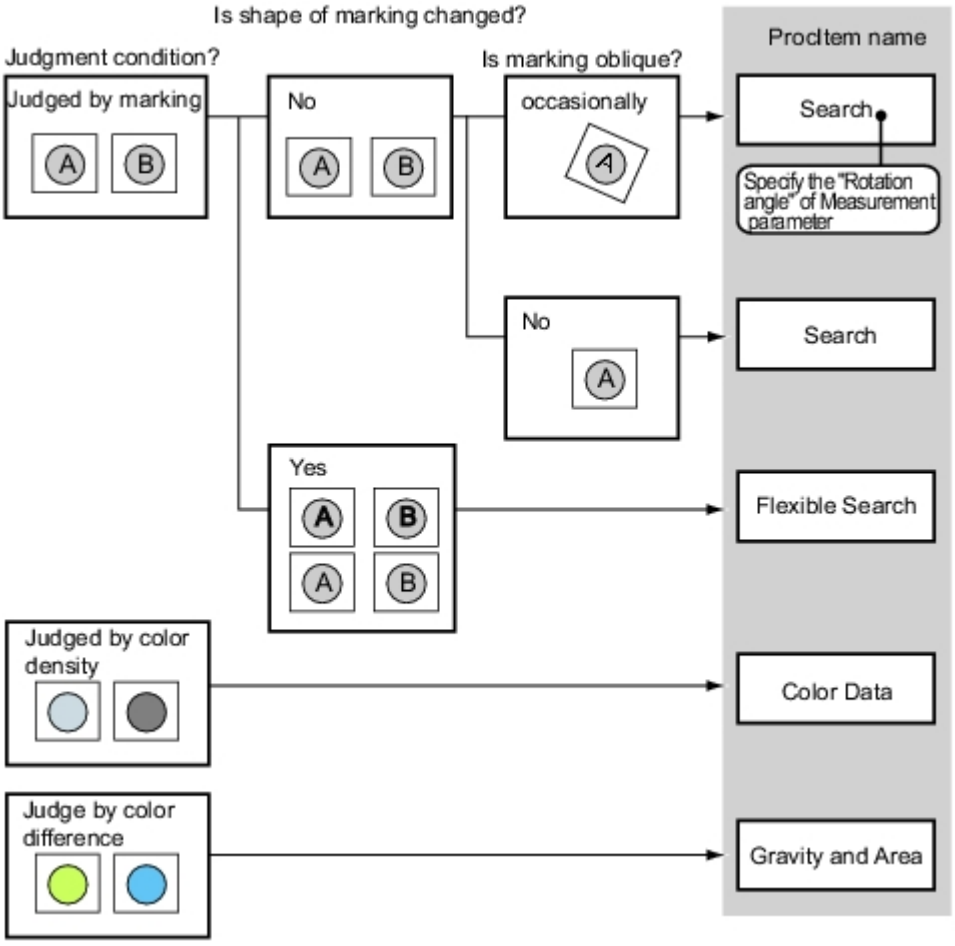
Locating (Measurement Objects Not Inclined)



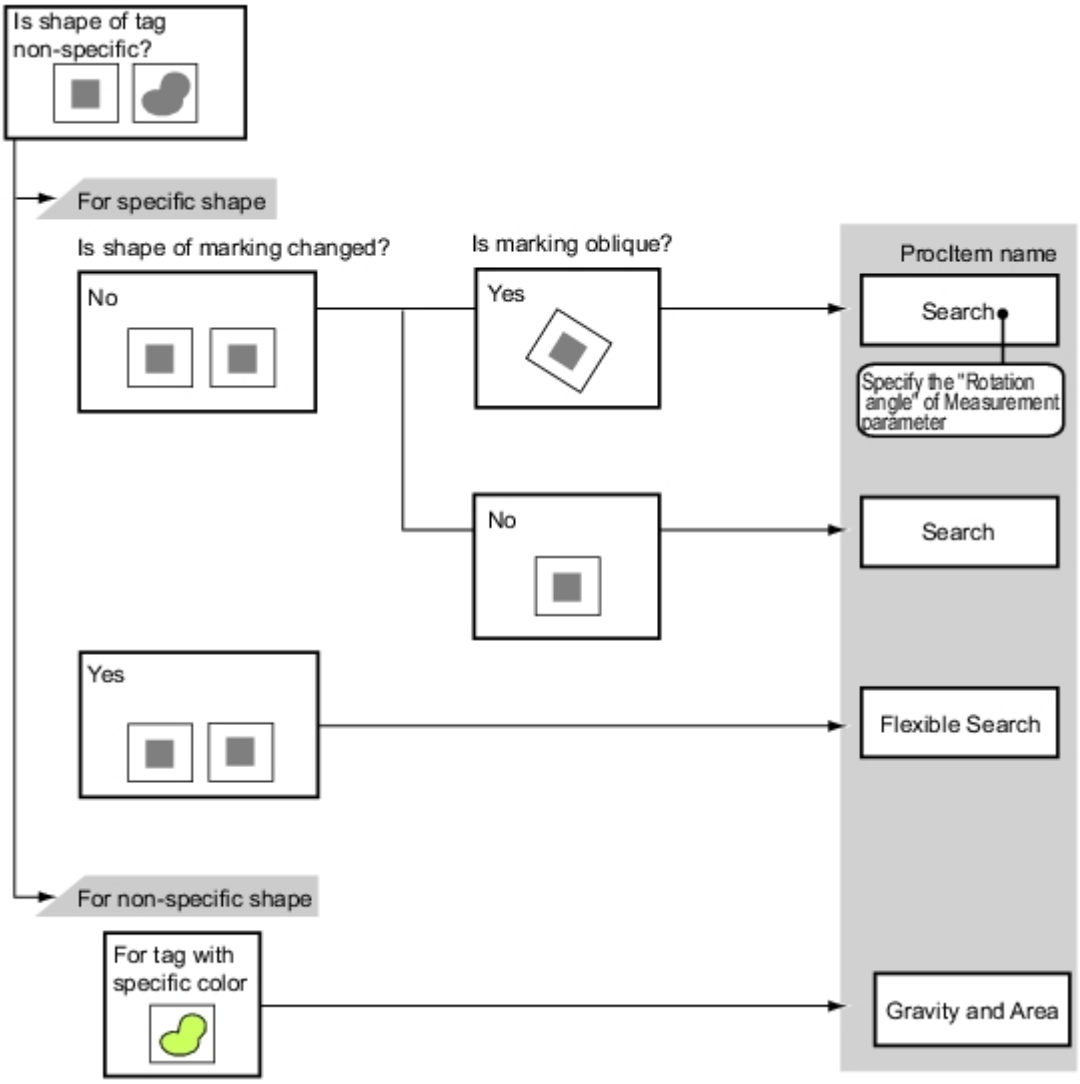
Locating (Measurement Objects Inclined)



Internal and External Inspection



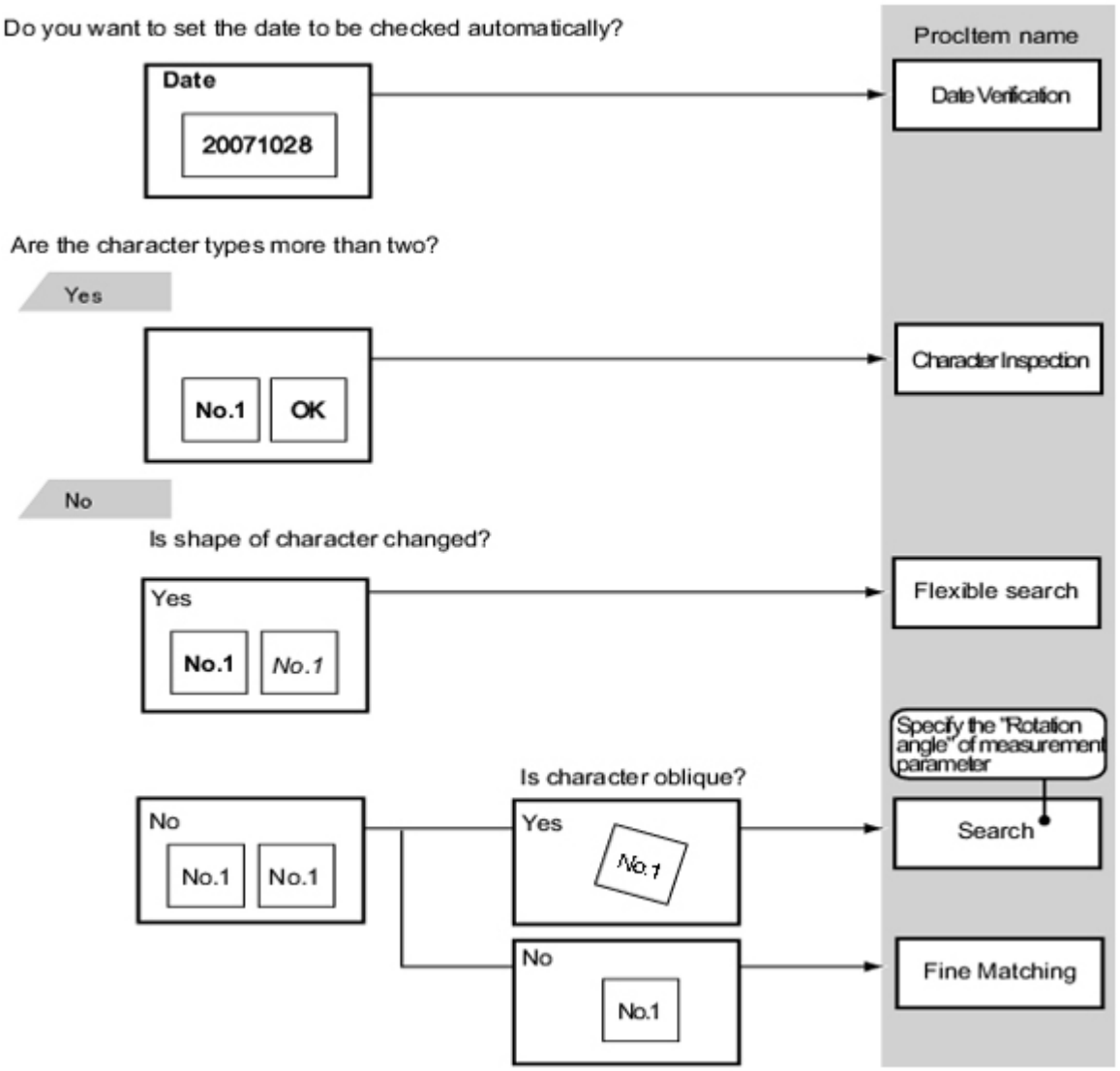
Presence Inspection



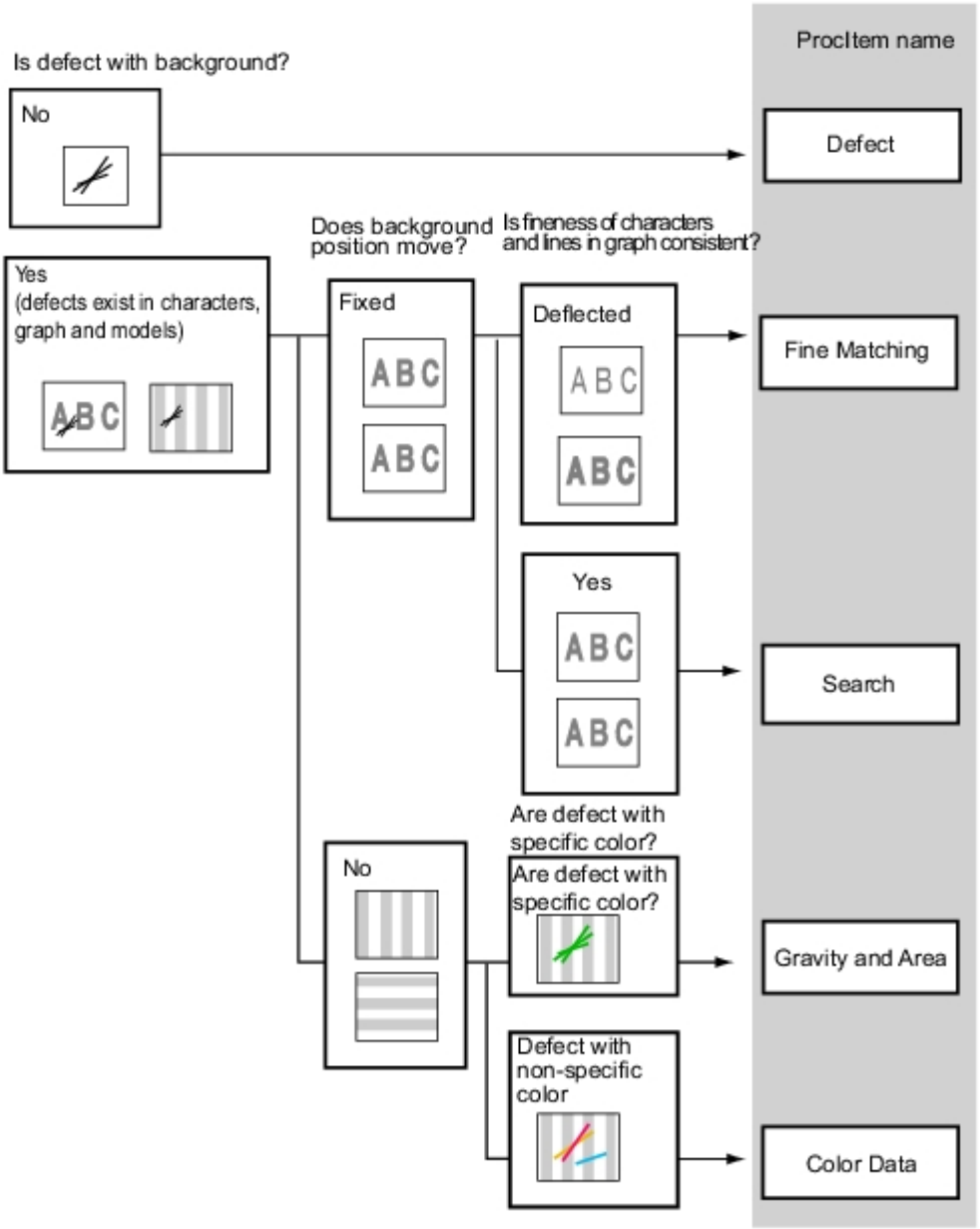
Dimension Inspection/Measurement

Burr Inspection

Text Comparison/Inspection

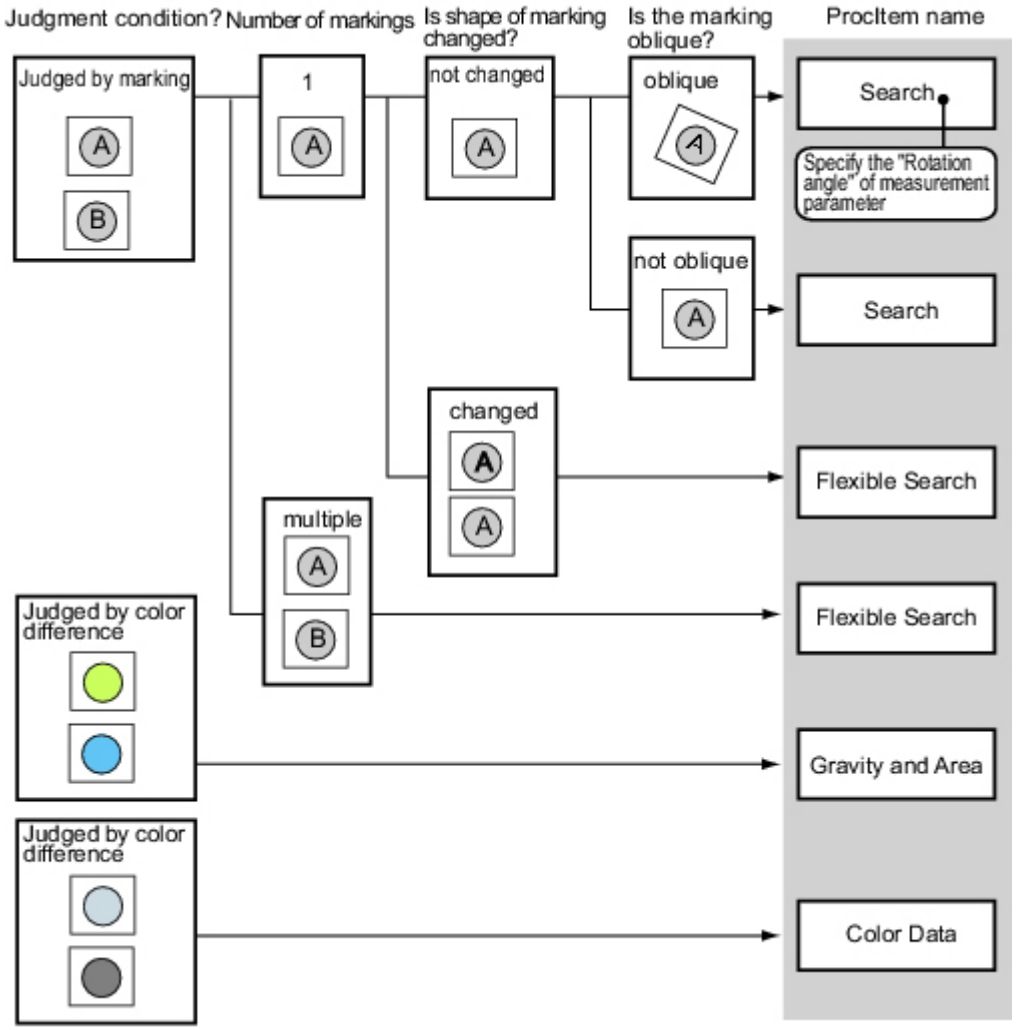


Defect/Contamination Inspection



Quantity Inspection/Measurement

Inspection for Presence of Different Objects



Hole Position Measurement

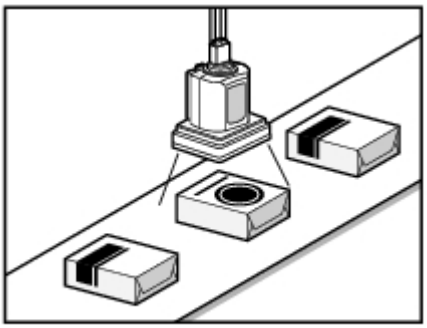
Selecting Measurement Processing Items According to the Measurement Method and Purpose

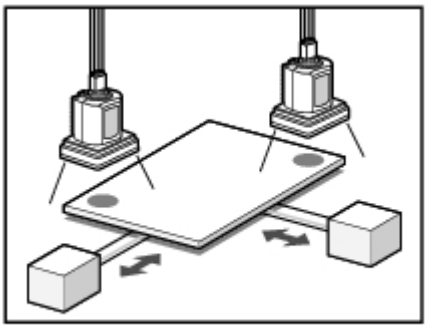
This section describes methods for selecting processing items appropriate to different measurement objectives such as counting quantities, checking for deformation, and checking for contamination.

- Reference: Measuring positions (p.57)
- Reference: Detecting defects and foreign materials (p.58)
- Reference: Count (p.59)
- Reference: Measuring dimensions (p.59)

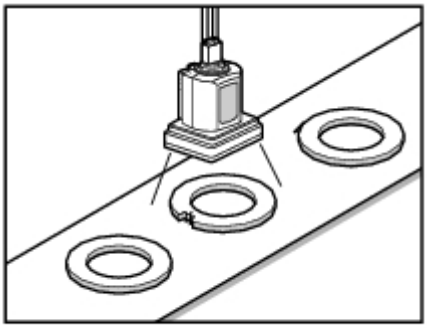
- Reference: Measuring folding of papers and sheets (p.60)
- Reference: Checking the interior/exterior and direction (p.60)
- Reference: Checking for mixing of different objects (p.61)
- Reference: Checking for deformation (p.61)
- Reference: Inspecting characters (p.62)
- Reference: Reading barcodes (p.62)
- Reference: Reading 2D Code (p.62)
- Reference: Increasing camera installation efficiency (p.62)

Measuring positions

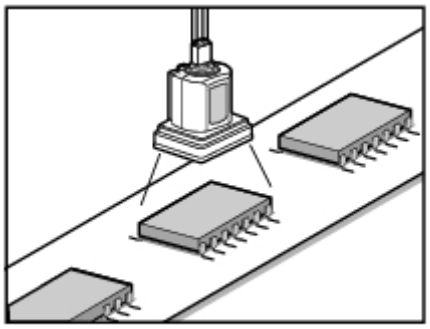
Method, objective	References
Positioning of the measurement objects with low contrast	[ECM Search], [Shape Search II], [Shape Search+ (FZ4-Hxxx series)] Effective for positioning measurement objects, such as LCD substrates, glass substrates, and sheets, which have low contrast and in which color differences at measurement locations are not obvious. Reference: "Processing Item List Manual", "ECM Search" (p.93) Reference: "Processing Item List Manual", "Shape Search II" (p.128) Reference: Processing Item List Manual, "Shape Search+" (p.116)
Label position detection	[Edge Position] Effective for detecting whether the label position is off-center, raised or lowered, and whether the label is affixed on bottles and cans. Reference: "Processing Item List Manual", "Edge Position" (p.151)
Robot arm positioning	[Search] Effective for position measurement that includes tilting of the measurement object due to handling with robot arms. Reference: "Processing Item List Manual", "Search" (p.57)
Position measurement for measurement objects with variations	[Flexible Search] Effective for position measurement of measurement objects in which there are variations in markings or shape such as with inspection of packaging, etc. Reference: "Processing Item List Manual", "Flexible Search" (p.70)  Position measurement
Measurement of the inclination of a circular measurement object	[Circle angle] Effective when measuring bottle caps, etc., after correcting the rotation angle. Reference: "Processing Item List Manual", "Circle Angle" (p.379)

Other positioning	[Search] If the shape and background of the measurement object are constant, a processing item such as one that registers an image as a model and searches for this image is effective. Reference: ▸ "Processing Item List Manual", "Search" (p.57)  Locating of reference mark of base plate

Detecting defects and foreign materials

Method, objective	References
Detection of the defect, stain and spot of plain measurement objects	[Defect] [Precise Defect (FZ4-Hxxx series)] Effective for inspection for contamination or spots on plain backgrounds. Reference: ▸ "Processing Item List Manual", "Defect" (p.290) Reference: ▸ "Processing Item List Manual", "Precise Defect" (p.299)
Scratches, burrs	[Defect] [Precise Defect (FZ4-Hxxx series)] Effective for exterior inspection of scratches and burrs on parts. Reference: ▸ "Processing Item List Manual", "Defect" (p.290)  Defect/Burr measurement Reference: ▸ "Processing Item List Manual", "Precise Defect" (p.299)
Inspection for minor defects, contamination and objects with backgrounds other than plain	[Fine Matching] Effective for detection of minor defects and contamination on labels, etc. Reference: ▸ "Processing Item List Manual", "Fine Matching" (p.308)

Count

Method, objective	References
Inspection for number of pins	[Edge Pitch] Effective when calculating the number of IC or connector pins. Reference: ▶ "Processing Item List Manual", "Edge Pitch" (p.162)  Measuring number of IC pins
Inspection of the number of screws	[EC Circle Search] Effective when inspecting by focusing on circular outline information. Reference: ▶ "Processing Item List Manual", "EC Circle Search" (p.105)
Inspection of the number of labels	[Labeling] [Labeling+ (FZ4-Hxxx series)] Effective when counting the labels and measuring their positions. Reference: ▶ "Processing Item List Manual, "Labeling" (p.245) Reference: ▶ "Processing Item List Manual", "Labeling+" (p.266)

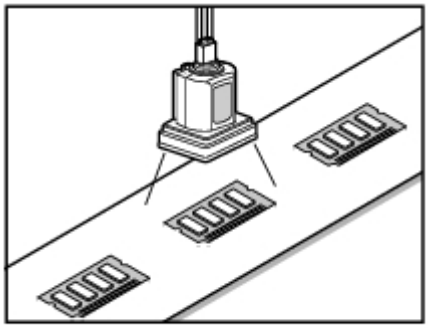
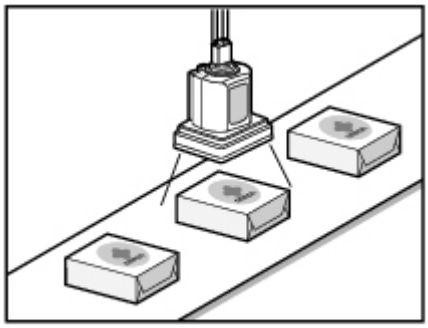
Measuring dimensions

Method, objective	References
Measurement of width of measurement objects	[Edge Position] Effective when measuring the width of measurement objects. Reference: ▶ "Processing Item List Manual", "Edge Position" (p.151)
Dimension inspection of finished products	[Edge Position] [Calculation] To measure the dimensions of finished products, combine [Edge Position] and [Calculation]. Use [Edge Position] to measure position, and [Calculation] to calculate dimensions by calculating the distance between positions. Reference: ▶ "Processing Item List Manual", "Edge Position" (p.151) Reference: ▶ "Processing Item List Manual", "Calculation" (p.452)
Dimension inspection for circular shapes and tilted parts	[Edge Position] [Calculation] [Edge Position] is effective when measuring the dimensions of circular works and tilted measurement objects. Use this processing item to measure position, [Calculation] to calculate the spacing of positions and then the dimensions. Reference: ▶ "Processing Item List Manual", "Edge Position" (p.151) Reference: ▶ "Processing Item List Manual", "Calculation" (p.452)

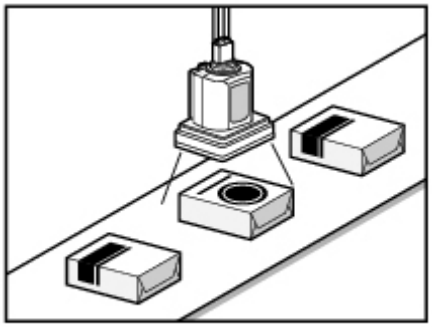
Measuring folding of papers and sheets

Method, objective	References
Check for folding on plain measurement objects	[Defect] [Precise Defect (FZ4-Hxxx series)] Effective when checking for folding on plain works. Reference: ▸ "Processing Item List Manual", "Defect" (p.290)

Checking the interior/exterior and direction

Method, objective	References
Interior/exterior and orientation inspection through presence of markings	[Flexible Search] Effective when there is variation in the size and position of the markings to be checked. Reference: ▸ "Processing Item List Manual", "Flexible Search" (p.70)  Measuring chip components
When precision is required for measurement of markings	[Fine Matching] Effective when there are patterns on the background of markings, markings have a complex shape, or precision is required for measurement of markings. Reference: ▸ "Processing Item List Manual", "Fine Matching" (p.308)  Measuring LOG

Checking for mixing of different objects

Method, objective	References
Inspection for mixing of different measurement objects with variations	[Flexible Search] Effective for inspection of mixing of different objects in which there are variations with markings and the shape of measurement objects. Reference: ▶ "Processing Item List Manual", "Flexible Search" (p.70)  Disparity judge
Inspection for mixing of different objects for objects with plain background	[Search] Effective for inspection of mixing of different objects for packaging that has plain background. Reference: ▶ "Processing Item List Manual", "Search" (p.57)
When accuracy is required for inspection of mixing of different objects	[Fine Matching] Effective when precision is required for inspection of mixing of different objects such as inspection of nameplates and objects other than those with plain backgrounds. Reference: ▶ "Processing Item List Manual", "Fine Matching" (p.308)
When not all characters and markings are the same	[Sensitive Search] Effective when the difference between the model image and measurement image is small. The models are automatically finely divided and matched in detail. Reference: ▶ "Processing Item List Manual", "Sensitive Search" (p.80)
When performing different inspections according to the type	[Classification] Effective for inspections performed on lines where different types of products are manufactured. Reference: ▶ "Processing Item List Manual", "Classification" (p.140)

Checking for deformation

Method, objective	References
Deformation check when there are multiple acceptable shapes	[Flexible Search] Effective when performing inspection for deformation of measurement objects based on multiple acceptable shapes. Reference: ▶ "Processing Item List Manual", "Flexible Search" (p.70)
When measuring the shape more strictly	[Fine Matching] Effective when inspecting the shape of workpieces to a high degree of precision. Reference: ▶ "Processing Item List Manual", "Fine Matching" (p.308)

Inspecting characters

Method, objective	References
Inspection of the date	[Date Verification] Effective when inspecting date character strings that show the production date, etc. The verification date can be set automatically. Reference: ▶ "Processing Item List Manual", "Date Verification" (p.329)
Inspection of arbitrary character strings	[Character Inspection] Effective when inspecting arbitrary character strings. Reference: ▶ "Processing Item List Manual", "Character Inspection" (p.320)
Registration of character strings	[Model Dictionary] To inspect character strings with [Date Verification] or [Character Inspection], register the target character strings with [Model Dictionary]. Reference: ▶ "Processing Item List Manual", "Model Dictionary" (p.339)

Reading barcodes

Method, objective	References
When reading barcodes	[Barcode+ (FZ4-Hxxx series)] Effective when reading barcodes and outputting the information to an external device. Reference: ▶ "Processing Item List Manual", "Barcodes+" (p.348)

Reading 2D Code

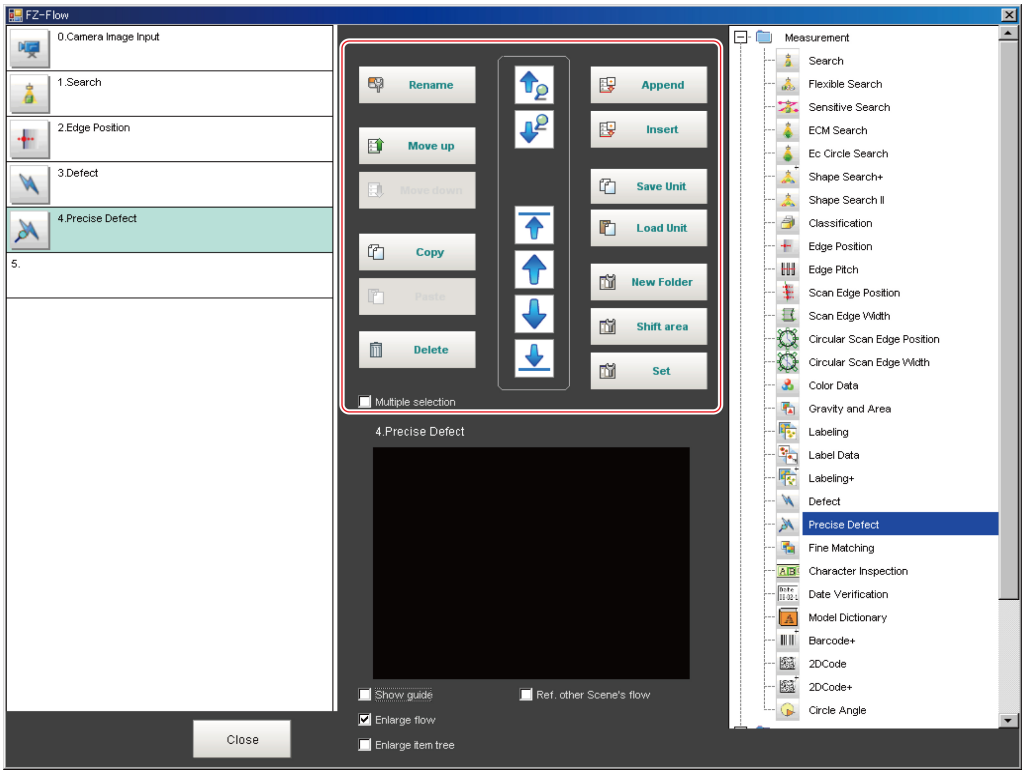
Method, objective	References
When reading 2D Code	[2D Code], [2D Code+ (FZ4-Hxxx series)] Effective when reading 2D Code for classification, etc. Reference: ▶ "Processing Item List Manual", " (p.355) Reference: 2D Code (p.371) Reference: " (p.355) Reference: ▶ "Processing Items List Manual", "2D Code+" (p.371)

Increasing camera installation efficiency

Method, objective	References
When adjusting the focus	[Focus] Effective when the measurement position changes and the camera becomes out of focus. Reference: ▶ "Processing Item List Manual", "Focus" (p.536)
When adjusting the lighting	[Iris] Effective when performing lighting adjustment according to the changing brightness at the measurement site. Reference: ▶ "Processing Item List Manual", "Iris" (p.539)

Editing Processing Units in Scenes

In the Edit Flow window, editing buttons in the window can be used to change the order of processing units within the scene or to delete processing units.



- Searching a processing unit () ()

  Convenient when the processing unit you want to select is not displayed on the screen.

- Selecting a processing unit () () () ()

  In addition to tapping the property setting button icons, the editing buttons can be used to automatically select the processing unit at the top or bottom, or above or below an arbitrarily selected processing unit in the unit list.

- Specifying the position for a processing unit and adding it () ()

  Adds and 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 and changes the processing order.

- Copying and pasting a processing unit () ()

  Copies and pastes a processing unit while maintaining settings data.

- Saving processing unit data to files ()

  This saves the selected processing unit data to a file.

- Reading processing unit data to files ()

  This reads the processing unit data from a file.

- Deleting a processing unit ()

  Deletes processing units within a scene.

- Changing the name of a processing unit ()

  Changes processing unit names within a 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 details of a processing unit ()

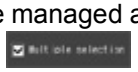
  Sets the properties of any processing unit within a scene.

- Shift area ()

  Changes related figure data in one batch.

- New Folder ()

  Used when multiple processing units are managed as one group.

- Operating processing units as a group ()

  Used when processing units are copied or deleted together. A checkbox is displayed in the processing unit if [Multiple selection] is tapped. Checked processing items can be operated as a group.

- Ref. other Scene's flow ()

  Units of 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.

Note

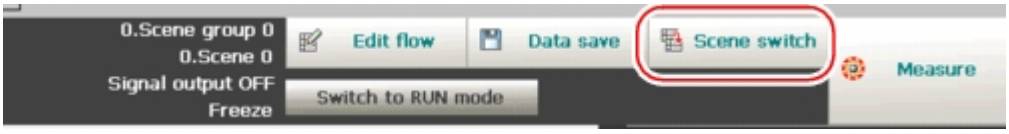
- If a processing unit is inserted, the numbers for the subsequent processing units increase by one. With processing items related to results output or branch control, the numbers for processing units set as references also automatically increase by one.
- If a button other than [Paste] is tapped after pasting a processing unit, continued pasting of the processing 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 make a specific processing unit not display in a flow on the ADJUST window or RUN window, insert a "*" (single byte) at the beginning of the processing unit name.
- The number of units that can be set in a flow depends on the available data memory.

Switching Scenes and Scene Groups

Set-up can be changed by changing the scene. With factory settings, the default display is scene 0 when the power is switched on. In addition, multiple scenes can be created (Scene 1 to 31).
Also, when combined with the scene group function, up to 1024 scenes can be set.
Instructions for switching scene groups and scenes can also be performed from external devices.
Reference: Methods for Connecting and Communicating with External Devices (p.359)

Switching Scenes

1. Tap "Scene switch" in the toolbar on the Main screen.

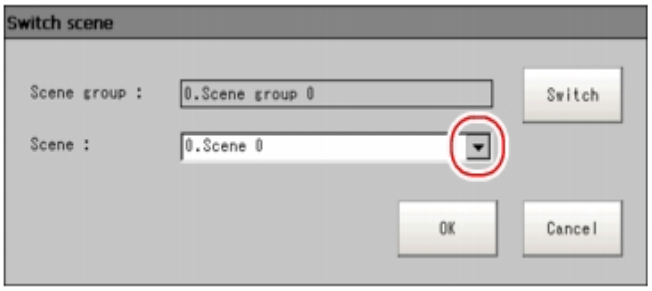


The Switch Scene window is displayed.

Note

- The same operation is available by tapping [Scene] menu - [Scene switch].

2. Tap [▼] to select the scene to switch.



To switch a scene group, tap [Switch], then tap [▼] in the displayed window to select the scene group to switch.

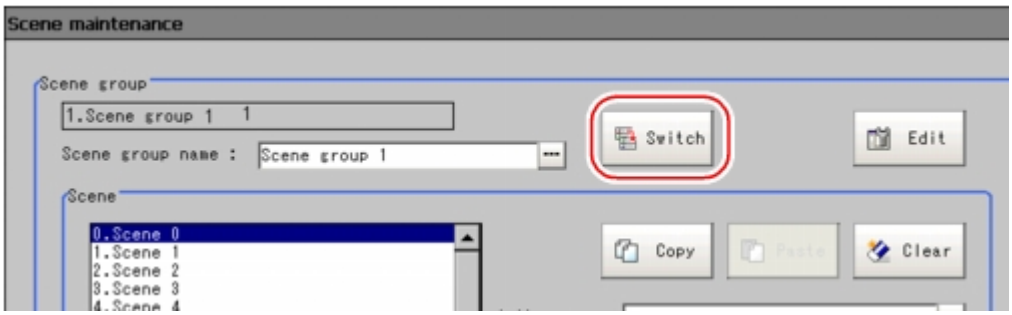
3. Tap [OK].
The scene switches.

Switching Scene Groups

Switches to the scene group in which the scene to be edited is stored.

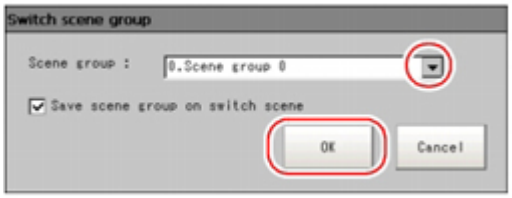
1. On the Main screen, tap [Scene] - [Scene maintenance].
The Scene Maintenance window is displayed.

2. Tap [Switch] for the scene group.



The Switch Scene Group window is displayed.

3. Switch to the scene group to edit.



1. Tap [▼] and select the scene group to edit.
2. Select whether a scene group should be saved when switching to another scene group.

Setting item	Setting value [Factory default]	Description
Save scene group on switch scene	[Checked]	When the scene group is switched, the data of the scene group before switching is saved.
	Unchecked	The scene group data is not saved when switching to another scene group. Therefore, the switching period can be shortened.

Note

- The setting for whether to save a scene group during switching is linked to the settings of the Measurement Setting window.
  Reference: ▶ Setting Conditions Related to Operation during Measurement (p.344)

3. Tap [OK].
   The scene group is switched and the screen returns to the Scene Maintenance window.

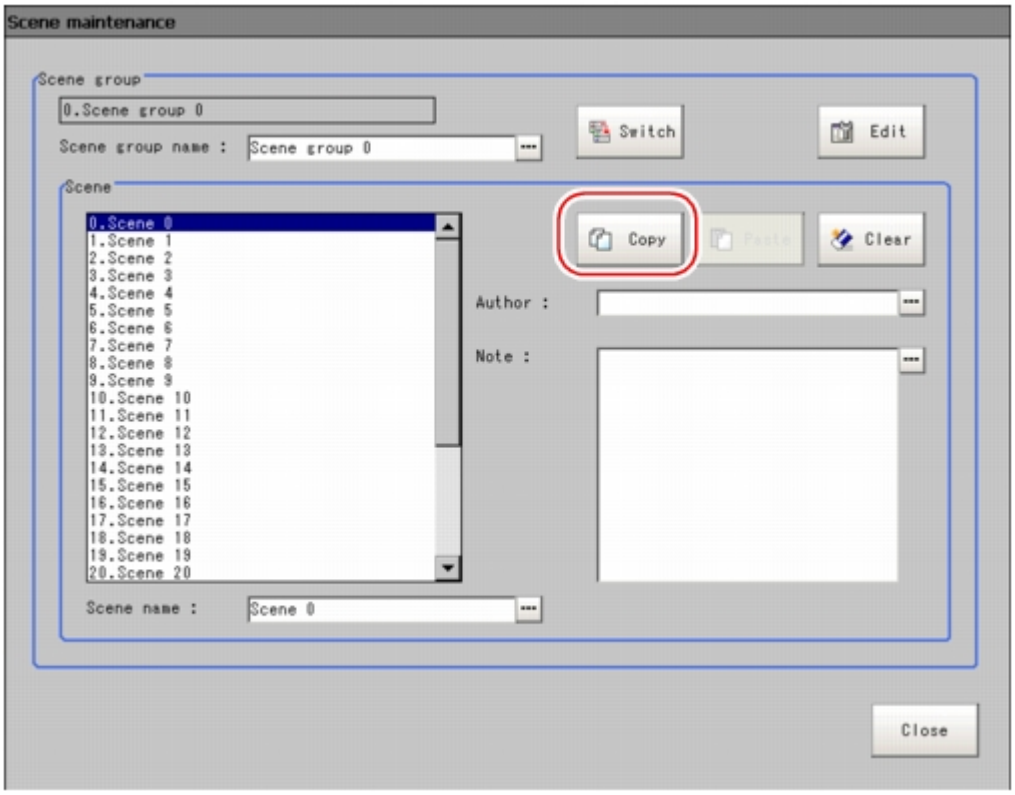
Important

- When a check is inserted in "Save scene group on switch scene", data may be lost if the power is cut off during scene group switching.During scene group switching, make sure that the power is not cut off.
- If the available USB memory is not sufficient to save data when switching a scene group, the data will be initialized if the power is shut down since the scene group data in the USB memory is temporarily cleared during the saving process. To avoid this problem, generate more available USB memory without shutting down the power or reduce the scene group data size, and save the data to the USB memory again.

Copying a Scene

Copies and pastes scenes within a scene group.
This is a convenient function for reusing a created scene with only one portion being changed.

1. On the Main screen, tap [Scene] - [Scene maintenance].
   The Scene Maintenance window is displayed.
2. In the scene list, tap the source scene to copy, and then tap [Copy].



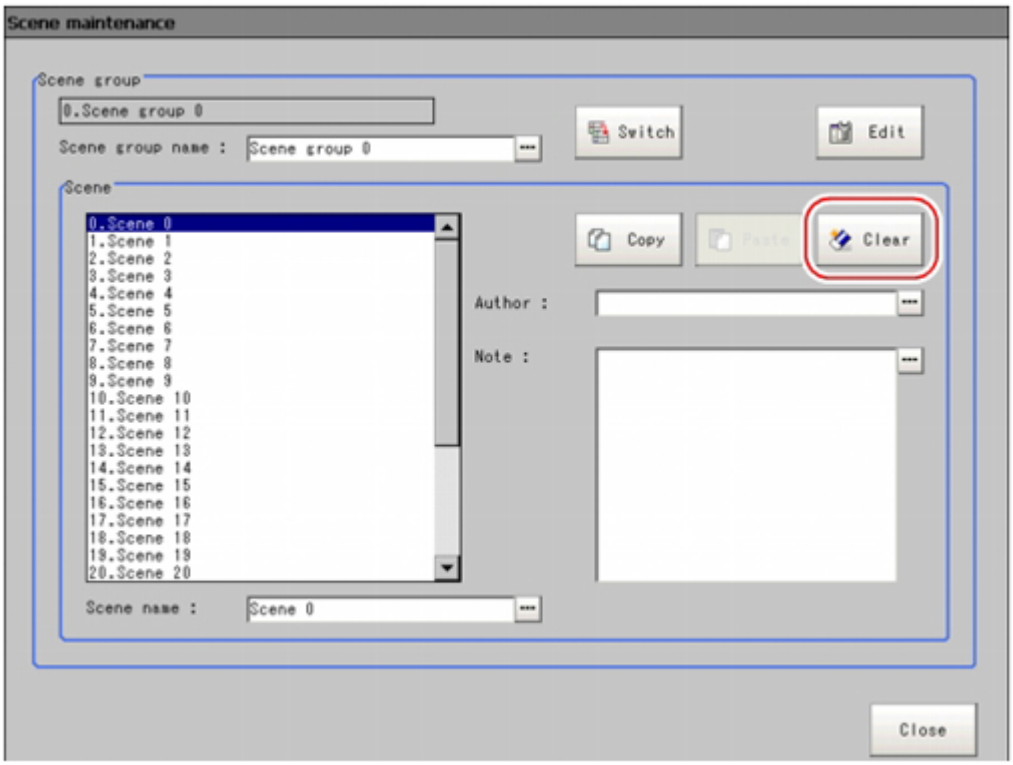
3. In the scene list, tap the scene to which the copy is to be pasted and then tap [Paste].
   The confirmation window for overwriting is displayed.
4. Tap [Yes].
   The copied scene data is written over the scene selected as the destination.
5. Tap [Close].

Clearing a Scene

Clear scene settings and return to factory default values. This section describes how to initialize measurement contents for each scene.

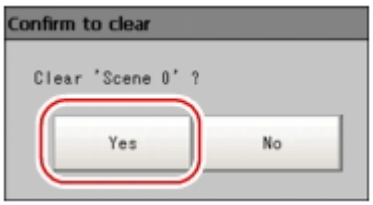
1. On the Main screen, tap [Scene] - [Scene maintenance].
   The Scene Maintenance window is displayed.
2. Tap the scene to be cleared from scene list.

3. Tap [Clear].



A confirmation message is displayed.

4. Tap [Yes].



Scene data is cleared.

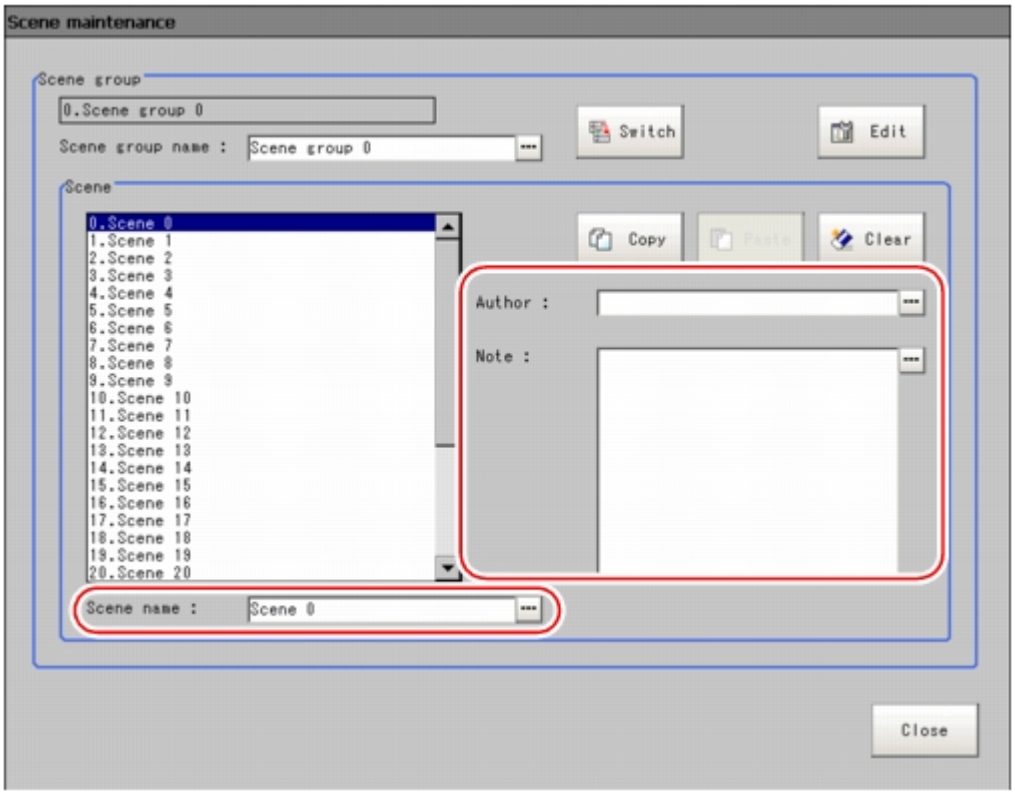
5. Tap [Close].

Renaming a Scene and Adding a Description

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

1. On the Main screen, tap [Scene] - [Scene maintenance].
   The Scene Maintenance window is displayed.
2. Tap the scene to be renamed from scene list.

3. Set "Scene name", "Author" and "Note".



1. Tap [...] for each item.
   The soft keyboard is displayed.
2. Set the name and a description.
   "Scene name" and "Author" cannot be longer than 15 characters, and "Note" cannot be longer than 255 characters.
   ° and " cannot be used alone as a "Scene name".

Note

- When writing "Note", enter a line-break after 32 single-byte characters or 17 double-byte characters. Without a line break, the display of character strings is truncated.

4. Tap [Close].

Editing Scene Groups

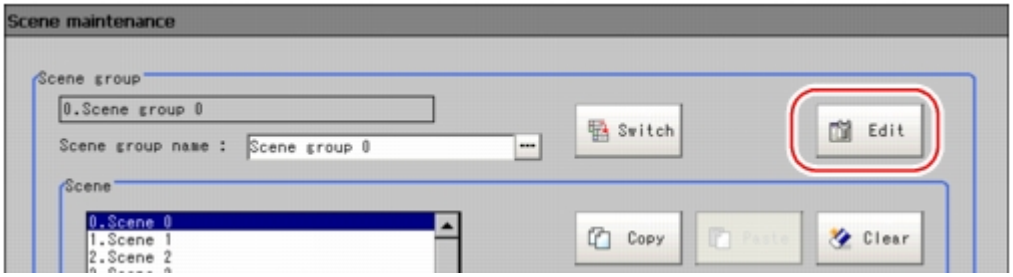
Copying or deleting can be done by scene group and scene groups can be arbitrarily renamed.

Note

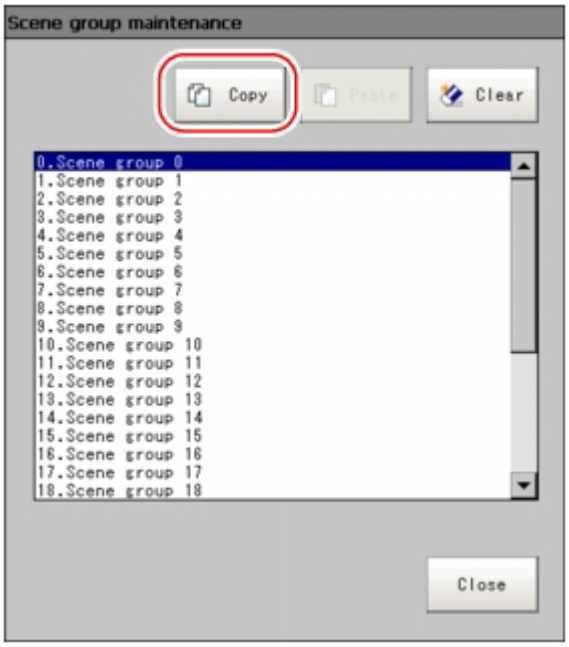
- Make sure to check that a USB memory device has been inserted before performing this operation.

Copying a Scene Group

1. On the Main screen, tap [Scene] - [Scene maintenance].
   The Scene Maintenance window is displayed.
2. Tap [Edit].



   The Scene Group Maintenance window is displayed.
3. Select the scene group to copy and tap [Copy].



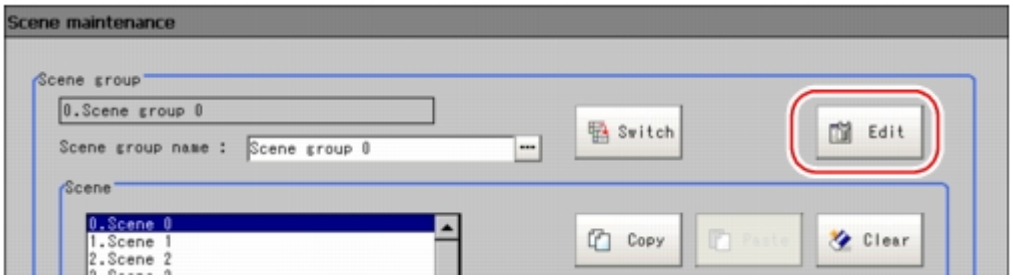
4. Select the copy destination scene group and tap [Paste].
   The confirmation window for overwriting is displayed.
5. Tap [Yes].
   The copied scene group data is written over the scene group selected as the destination.
6. Tap [Close].

Deleting a Scene Group

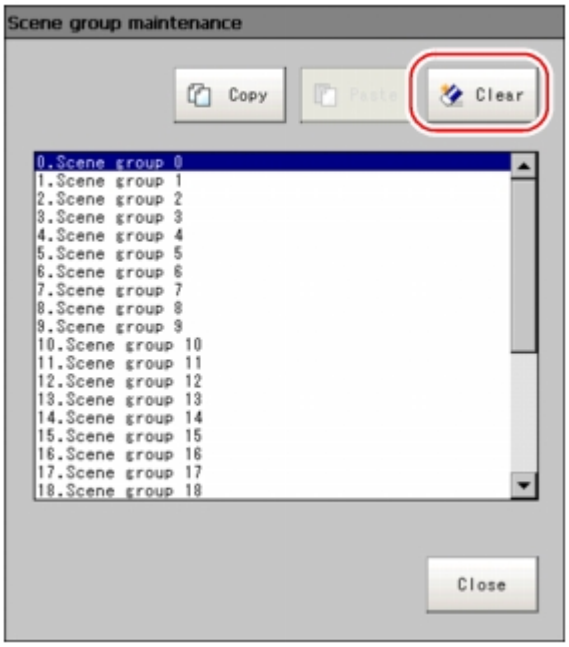
Delete scene group data. The data to be deleted is shown as follows.

- Names set for a scene group
- All scene data within a scene group

1. On the Main screen, tap [Scene] - [Scene maintenance].
   The Scene Maintenance window is displayed.
2. Tap [Edit].



   The Scene Group Maintenance window is displayed.
3. Select the scene group to delete and tap [Clear].



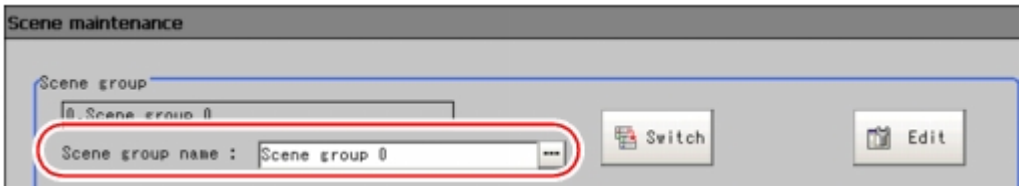
   A confirmation message is displayed.
4. Tap [Yes].
   Scene group data is deleted.
5. Tap [Close].

Renaming a Scene Group

Scene groups can be arbitrarily named. This is convenient for managing more than one scene group.

1. On the Main screen, tap [Scene] - [Scene maintenance].
   The Scene Maintenance window is displayed.

2. Set "Scene group name".



1. Tap [...] for the "Scene group name".
   The soft keyboard is displayed.
2. Enter a new name.
   Use 15 characters or less to Input words.

3. Tap [Close].

Performing Test Measurement /Starting Operation

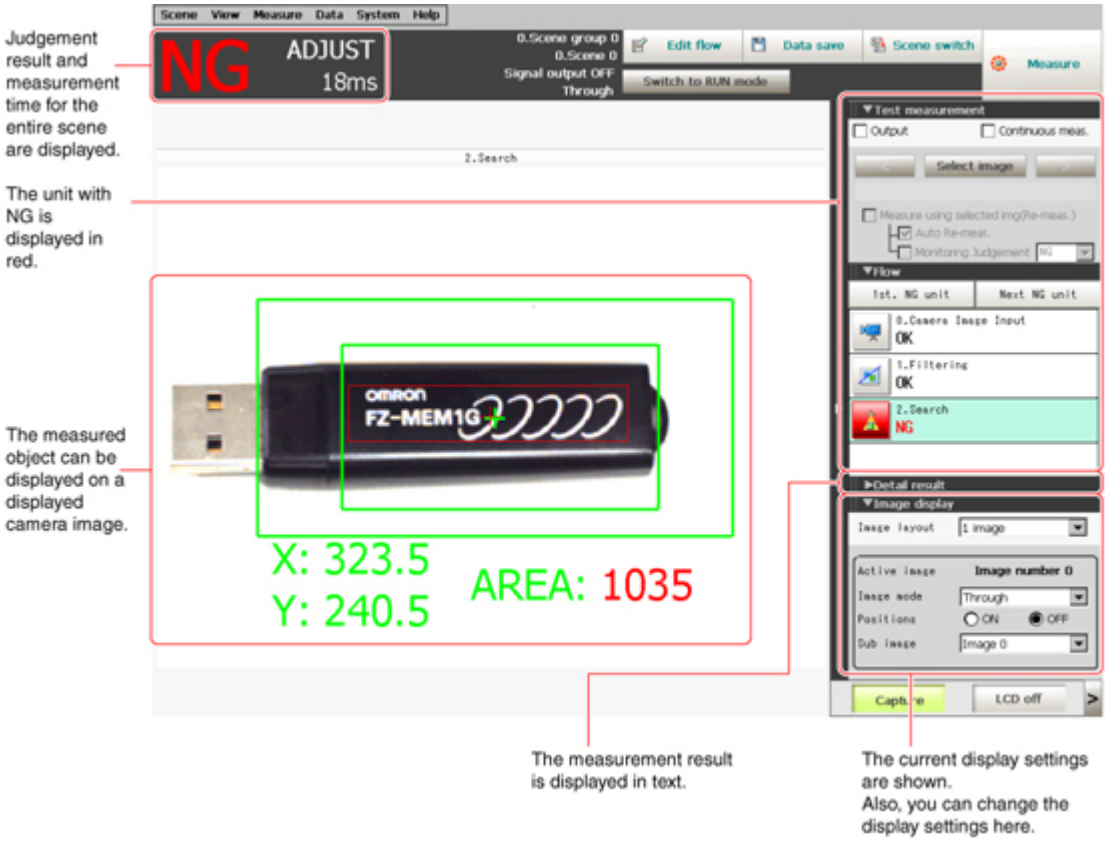
This chapter describes tests methods for checking whether correct measurement can be performed at the set conditions and describes useful functions for operation.

- Reference: ADJUST Window and RUN Window (p.74)
- Reference: Performing Test Measurement (p.77)
- Reference: Key Points for Adjustment (p.79)
- Reference: Arranging the RUN Window (p.82)
- Reference: Useful Functions for Operation (p.88)

ADJUST Window and RUN Window

After test measurement and remeasurement are performed, check the measurement results. If there are problems, adjust the processing item setting values of the processing units.If the measurement results are stable, switch to the RUN window and perform measurement. This section describes the ADJUST window and RUN window.

ADJUST Window



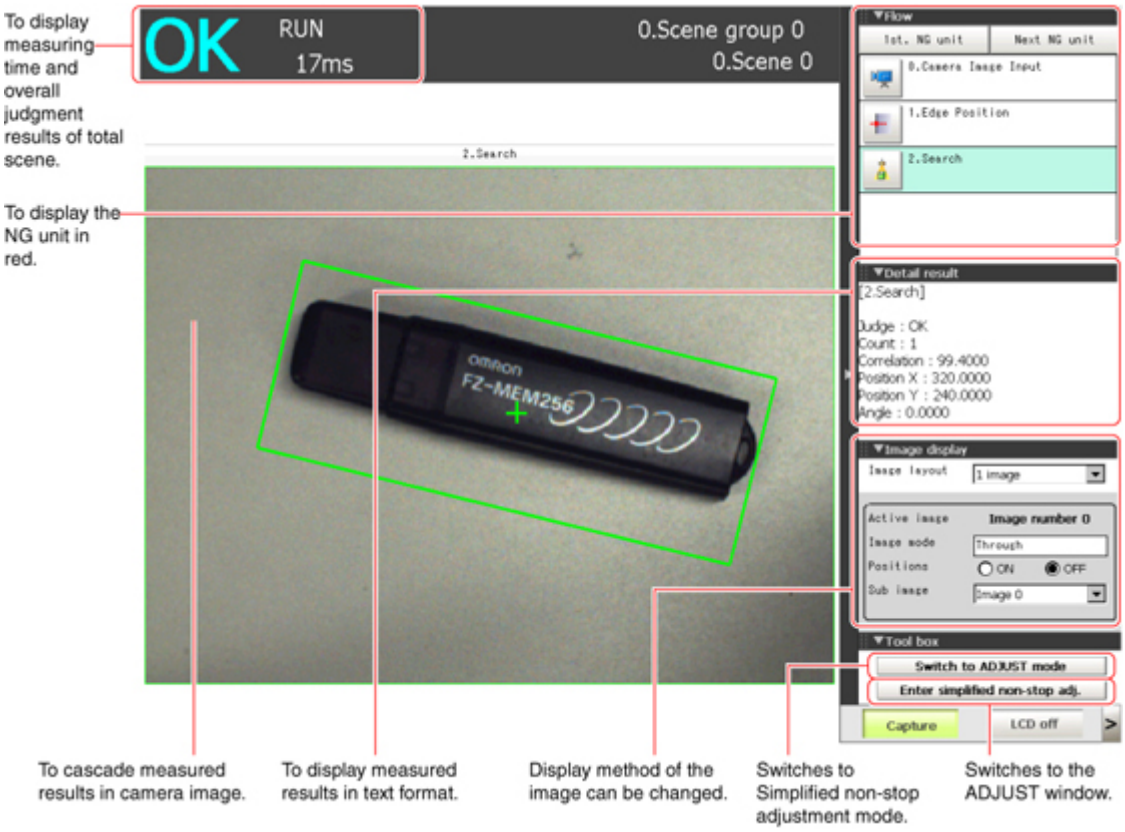
RUN Window

There are two types of RUN windows: Normal mode and fast view mode. Change the display speed according to the intended use.

Note

- Switching method for RUN window normal mode and fast view mode
  Reference: ▶ Switching the RUN Window to Fast View Mode [Select RUN mode] (p.86)
- Method for setting display contents of RUN window
  Reference: ▶ Setting the RUN Window Display [RUN Mode View Setting] (p.352)

Normal Mode RUN Window



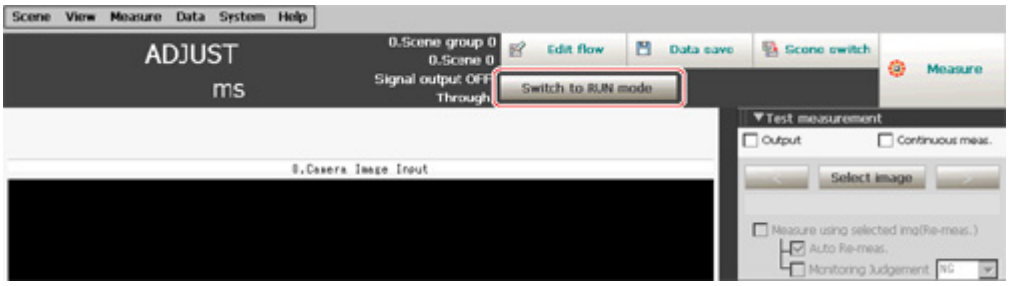
When processing is taking a long time, it is necessary to check processing items and setting values. The time required for measurement is also displayed with the measurement results, so use this for reference.

Fast View Mode RUN Window

Simplifies display items and makes the display speed faster.

Switching to the RUN Window

1. Tap [Switch to RUN mode] in the ADJUST window.



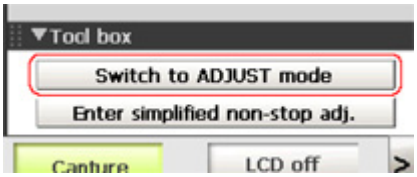
Window switches to the RUN window.

Note

- You can make settings so that the RUN window is displayed whenever power to the controller is turned on.
  Reference: ▸ Setting the Start-up Status [Startup Setting] (p.347)
- Lighting gradually gets darker if it is used for a long time, so adjust judgement conditions periodically.
- Without stopping a measurement in operation, you can change judgement conditions for a processing unit set in a scene.
  Reference: ▸ Changing Judgement Conditions without Stopping Measurement (p.91)

Switching to the ADJUST Window

1. Tap [Switch to ADJUST mode] in the RUN window tool box.

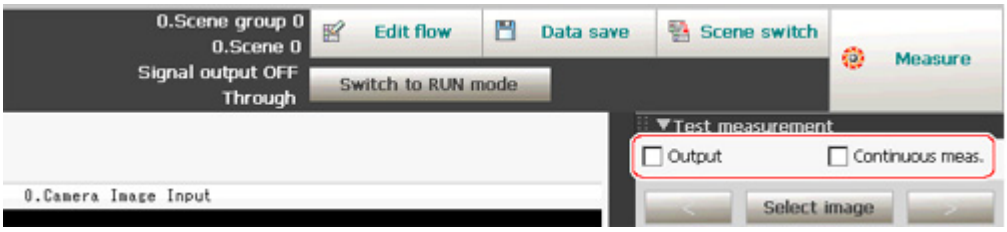


Switches to the ADJUST window.

Performing Test Measurement

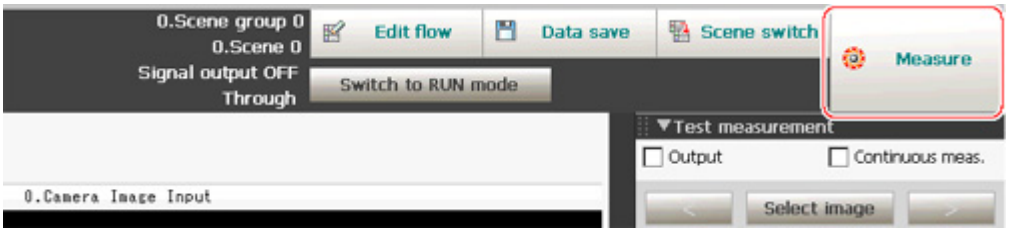
Test whether the intended measurement processing can be performed with the current setting contents.Look at test results and adjust the property settings of each processing unit.
Perform measurement according to the conditions set in the displayed scene.

1. Display the Main screen (ADJUST window).
2. For the test conditions on the ADJUST window, set the following items.



Setting item	Description
Output	Place a check here when the measurement results on the ADJUST window are also to be output.Remove the check when test measurement for the device only is to be performed without results being output.
Continuous meas.	Place a check here when continuous measurement is to be performed. Tapping the [Measure] button starts continuous measurement.

3. Tap [Measure] in the Toolbar.

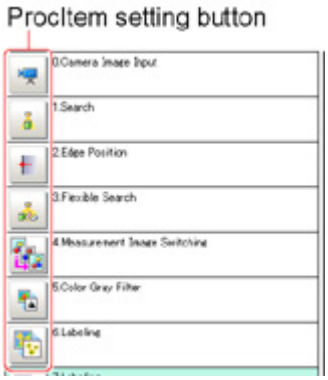


Measurement is performed.

Note

- With continuous measurement, the [Measure] button changes to the [Stop meas.] button during the measurement.To stop continuous measurement, tap [Stop meas.].

4. Check measurement results.
5. If necessary, adjust the setting values for each processing unit again.
   Moving to the property window can be done directly by tapping the button of any processing unit set in the flow.



Note

- Test images can be saved.This function is called the logging function. After setting conditions, these test images can be used in performing test measurement again.
  Reference: Logging Measurement Values and Measurement Images (p.94)

Important

- The measurement interval and display update interval will vary for continuous measurement with test measurement settings and continuous measurement with serial commands/parallel commands.
  Evaluate the measurement interval and display update interval by watching actual operation.

Key Points for Adjustment

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

Stabilizing Measurement

This section describes key points for adjustment when measurement is 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 varies depending on the processing item.
For details, see "Key Points for Adjustment" for each processing item in the Processing Item List Manual.

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. In this case, measurement accuracy can be improved by performing processing of measurement images in advance.
Reference: "Processing Item List Manual", "Filtering" (p.402)

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

The filtering items "Smoothing (strong and weak)" and "Median" are both effective.

- **Smoothing (strong and weak)**
  This processing changes the shade of images so that irregularities are not as easily seen.

[Weak smoothing]

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

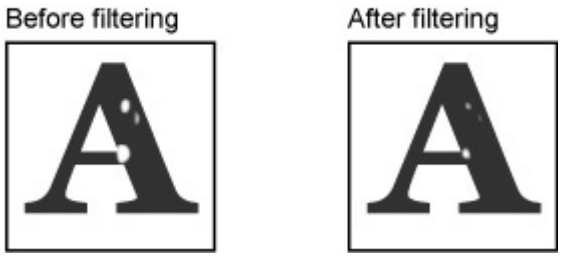
When measurement images contain noise

The filtering items "Dilate" and "Erosion" 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]

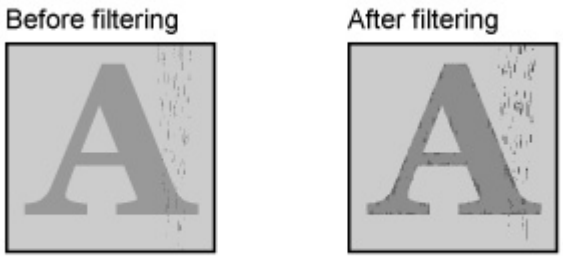


When contrast of measurement images is low (defect inspection is unstable)

The filtering items "Extract vertical edges", "Extract horizontal edges", and "Extract edges" are effective.

- **Extract vertical edges**
  This extracts the vertical edges of an image.

[Extract vertical edges]



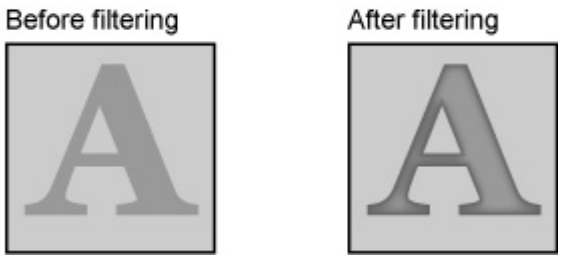
- **Extract horizontal edges**
  This extracts the horizontal edges of an image.
- **Extract edges**
  This extracts the all edges of an image.

When unidentifiable shapes are present

The filtering item "Extract edges" is effective.

- **Extract edges**
  This is used to make the profile clearer and the shape more identifiable.

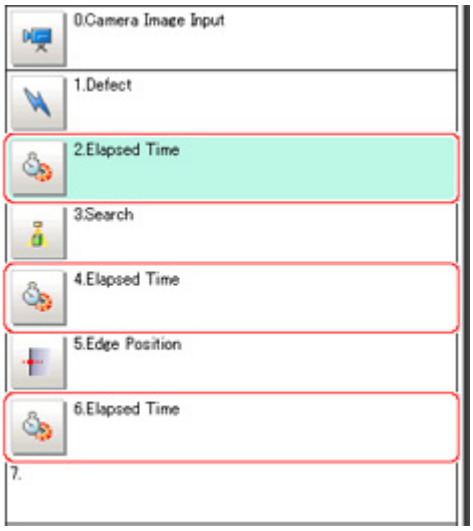
[Extract edges]



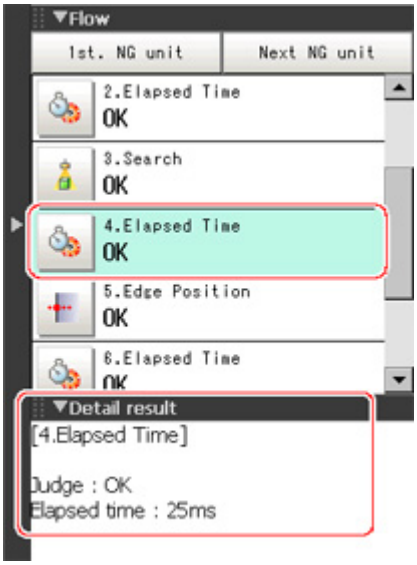
Shortening Processing Time

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

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



2. Execute measurement.
3. After tapping the "Detail result" area, tap 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.

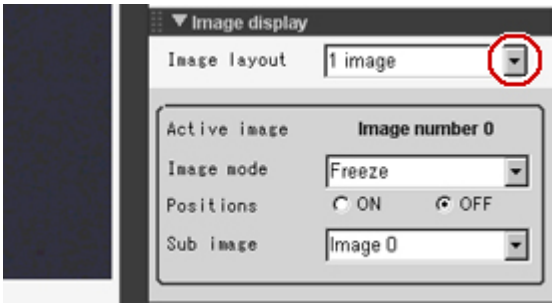


4. Adjust the parameters of the processing units that are taking time.
   For details on adjustment parameters, see "Key Points for Adjustment" for each processing item in the Processing Item List Manual.

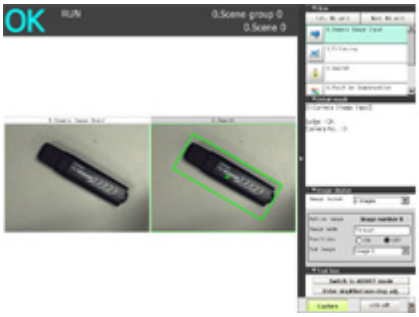
Displaying Multiple Windows Together

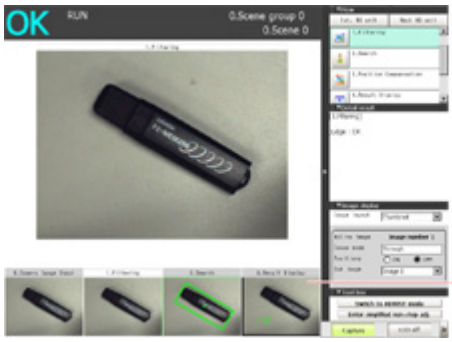
Multiple images can be displayed side by side in the Image Display area.

1. In "Image display" of the Main screen Control area, tap [▼] of the "Image layout" menu and select the number of images to be displayed.
   The camera image view in the Image Display area switches according to the selected contents.



There are the following four image display patterns.

Item	Description
1 image	Displays 1 image. Since images are enlarged, this is ideal for checking details. 
2 images	2 images are displayed side by side. Suitable for when 2 cameras are connected and images are to be checked all at one time. 

4 images	4 images are viewed together with one each at the left, right, upper, and lower positions.  Suitable for when 4 cameras are connected and images are to be checked all at one time.
Thumbnail	Displays four small images at the bottom and also one larger selected image. This view is preferable when you wish to check details of a certain image when four cameras are connected. Thumbnail display is not available in the RUN window (Fast view mode). When using the thumbnail display in the ADJUST window, the display will change to 4 images if you switch to the RUN window (Fast view mode). 

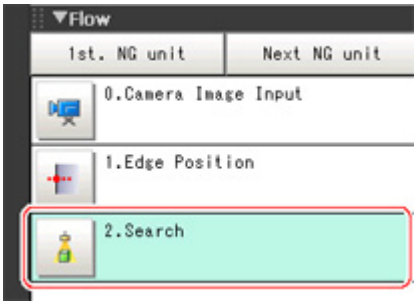
2. Select which processing unit image to display for each image.
   After tapping the display assignment to change, tap the relevant processing unit in the measurement flow.

Changing Display Contents

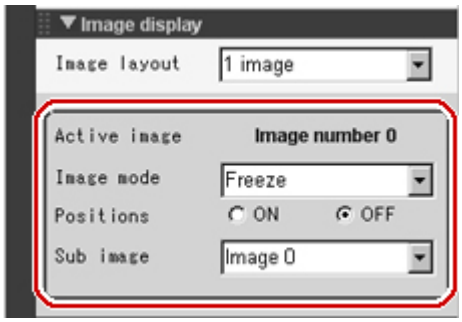
The display contents of the Image Display area can be changed in order to make the measurement status easier to understand.

1. Tap the image to be changed.

2. From the measurement flow, tap the processing unit to be displayed.



3. Set each item in [Image display] of the Control area.



Item	Description
Image mode	This item changes the camera image mode. Reference: ▶ Image Mode List (p.84)
Positions	Measurement results are displayed as a list in the Image Display area. Display contents are classified into "Input image" units such as [Camera Image Input] and [Camera Switching], and "Compensate image" units such as [Filtering] and [Position Compensation]. For example, if "Positions" is turned on with [Position Compensation] selected, a combined positions list for units after [Position Compensation] is displayed. The units in the area before [Position Compensation] are not displayed.
Sub image	Indicates displayable image for the selected processing item. For information on the displayed image, refer to the image items displayed in the image display area. For more details, refer to "Key Points for Test Measurement and Adjustment" for each processing item in the "Processing Item List Manual."

Note

- To check detailed results for each unit when "Positions" is on, select any unit after selecting the "Detail result" area to make detailed results active.To make detailed results inactive, select the Image Display area.

Image Mode List

Changes can be made in the ADJUST window.

Item	Description
Through	The latest image is always loaded from the camera and displayed. When "Through" is selected, saved images cannot be called up for measurement.

Freeze	The image that was scanned in the immediately preceding measurement is displayed. Images can be updated at any time during measurement.
Last NG	The latest NG error image resulting from an overall judgement is displayed. The latest measurement results are always shown in overall judgement and measurement time. In this case, the overall judgement result and measurement time may conflict with the camera images. Also, during continuous measurement, "Last NG" cannot be displayed.

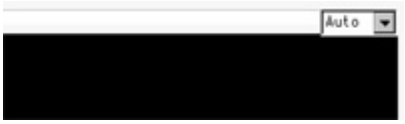
Note

- Tapping the Image Display area or flow when "Last NG" is displayed and made active clears the screen.Be sure to capture "Last NG" before performing any other operation.
- If a measurement trigger is input during multi-input status or immediately after BUSY is turned off (during display update processing, etc.), "Last NG" cannot be displayed.
- [Display Last NG Image] fulfills a similar function as a processing item in which up to 4 NG error images can be saved.If this processing item is used, "Last NG" can be acquired without operation having any effect on acquisition.

Enlarging Measurement Images [Zoom Images]

Set the measurement image zoom status (magnification and display position).During display of multiple images, magnification can be set for each image.

1. On the Main screen, tap [View] - [Zoom images].
   A magnification setting tab is displayed in the top right of the measurement image.



2. Set the magnification as required.

Setting item	Set value [Factory default]	Description
Measurement image magnification setting	・ [Auto] ・ 25% ・ 50% ・ 100% ・ 200% ・ 400% ・ 800% ・ 1600%	Sets magnification.

3. Drag images to specify the display position as required.
4. On the Main screen, tap [View] - [Zoom images].
   The current magnification and display position are saved.

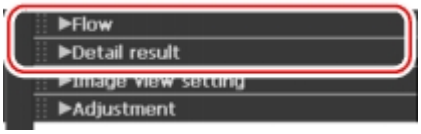
Displaying Flow and Detailed Results

Switches display of [Flow] and [Detail result] on/off of in the Control area.

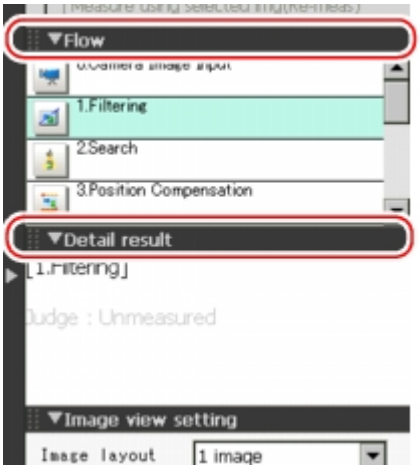
Note

- The same operation is available by tapping [View] - [Flow] or [Detail result].

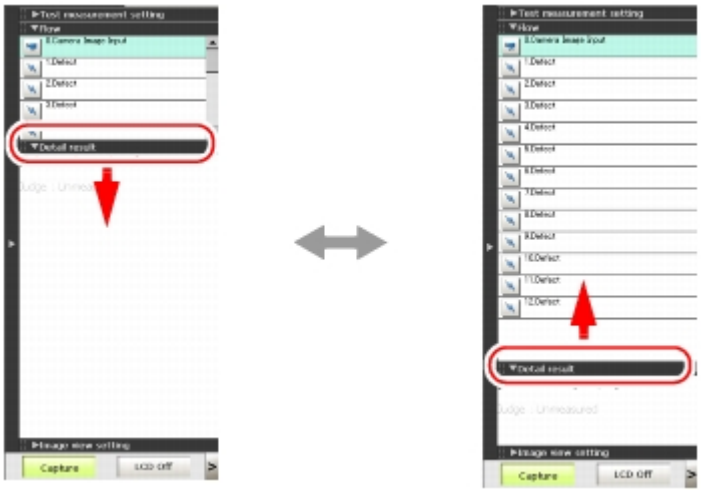
1. Tap [Flow] or [Detail result] in the Control area.



Flow or details of measurement results are displayed. Tapping once again returns the screen to the previous status.



2. When displaying both the flow and detailed results, you can change the size of the Display area of the flow and detailed results by dragging [Detail result].

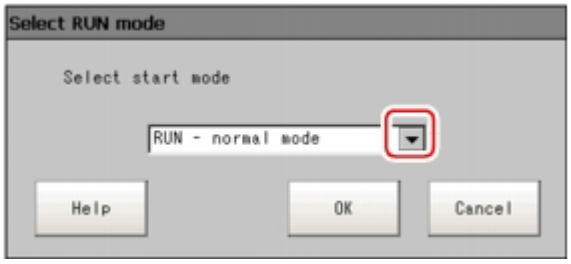


Switching the RUN Window to Fast View Mode [Select RUN Mode]

Switches the mode of the RUN window.Fast view mode simplifies display items and makes the display speed faster.

1. On the Main screen, tap the [System] menu - [Controller] - [Select RUN mode].
   The Select RUN Mode window is displayed.

2. Tap [▼] and select a mode.



Set value [Factory default]	Description
・ [RUN - normal mode] ・ RUN - fast view mode	Selects which mode is used to display the RUN window.

3. Tap [OK].
The Select RUN Mode window closes.

Changing Display Contents on the RUN Window Measurement Information Display Area

The display contents on the RUN window measurement information display area can be changed.
Reference: ▸ Setting the RUN Window Display [RUN Mode View Setting] (p.351)

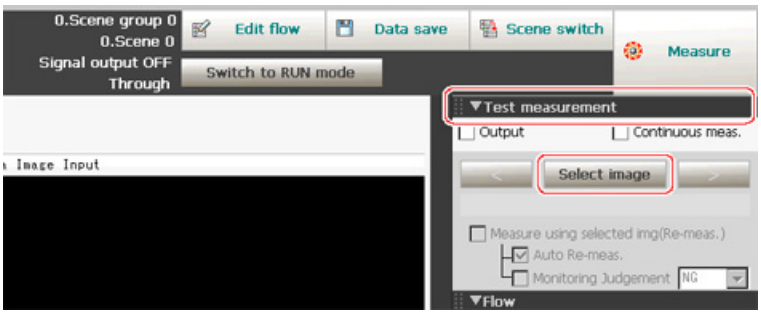
Changing Functions That Can Be Operated from the RUN Window Tool Box

Functions that can be operated from the RUN window tool box can be changed.
Reference: ▸ Setting the RUN Window Shortcut [Create Shortcut] (p.352)

Remeasuring Saved Images

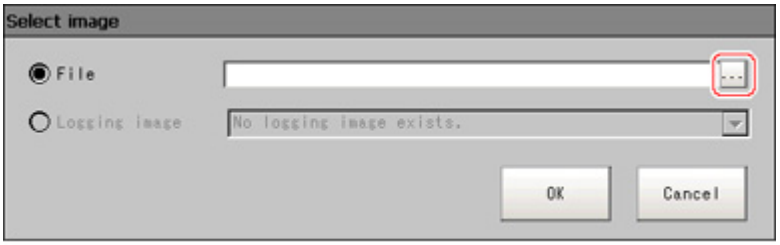
Images from when measurement, including test measurement, was performed can be saved.Remeasurement can be performed with saved images after conditions are adjusted in order to check whether the adjustment is appropriate.
The logging function is used for saving images.
Reference: Setting Logging Conditions [Logging Setting] (p.96)
Images that can be remeasured include images saved in the controller and images saved in USB memory.

1. In the Control area of the Main screen, tap [Test measurement].
2. Tap [Select image].



The Select Image window is displayed.

3. Tap [...] and select the file to display.

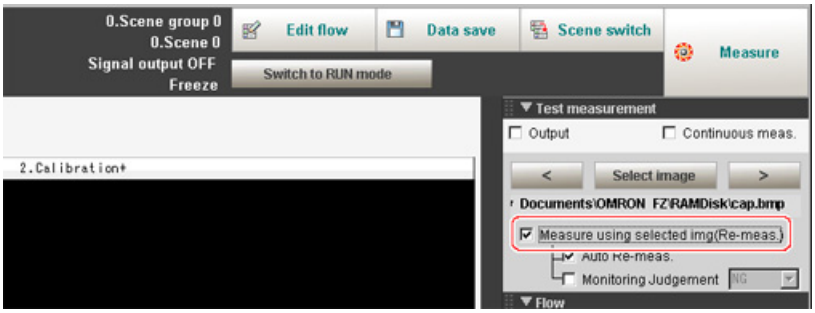


Setting item	Description
File	Specify images saved in the USB memory or in the RAMDisk.
Logging image	Specify images that are logged in the controller memory.

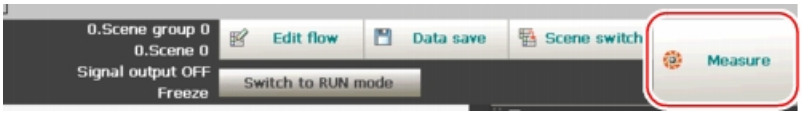
4. The selected image is displayed at the lower left of the FileExplorer screen.
When there are multiple camera images in a file, as for a logging image when multiple cameras are connected, use the "<<" and ">>" buttons to switch images.

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

6. Check "Measure using selected img (Re-meas.)".



7. Tap [Measure] in the toolbar on the Main screen.



Measurement of the selected image is performed.

Note

- About Auto Re-meas.
  Displayed images can be automatically remeasured by placing a check in "Auto Re-meas.".

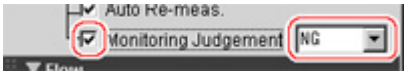
Important

- 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

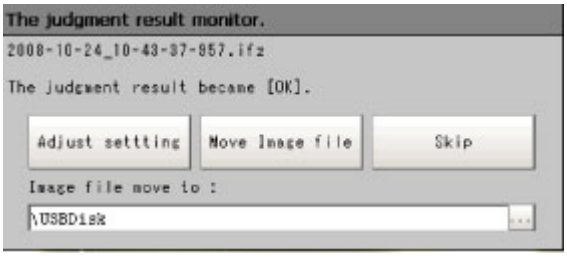
Convenient when measuring a large amount of image samples and classification or adjustment is performed with each judgement.
Files in which NG error files and OK files are mixed can be continuously remeasured automatically, with the system stopping at images with a specified condition (OK/NG) and these files being moved.

1. In the Control area of the Main screen, tap [Test measurement].
2. Place a check next to "Monitoring Judgement" and set the judgement conditions for identification.

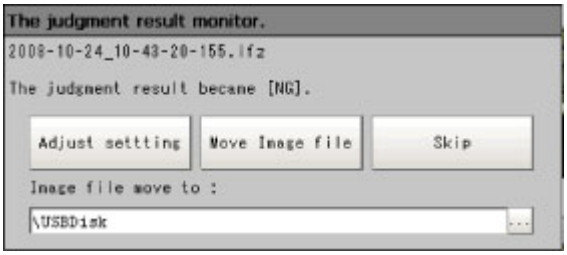


If the specified judgement condition is achieved when continuous measurement is performed, measurement stops and the following message is displayed.

If OK is selected



If NG is selected



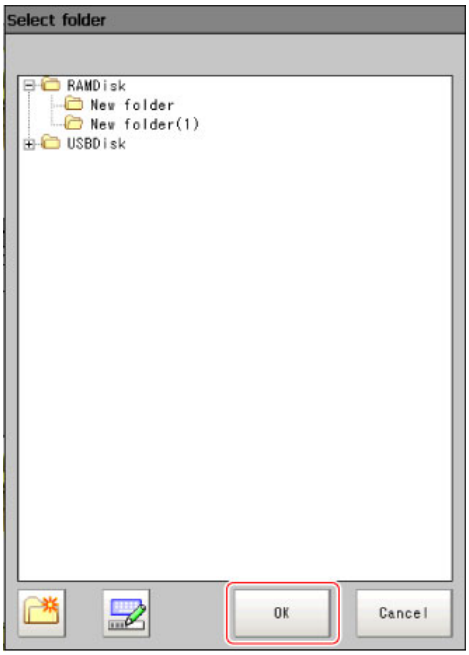
3. Select the processing for the measured image.

For "Adjust setting"

Tap the [Adjust setting] button.

For "Move Image file"

Specify the save destination and tap [OK].



Tap the [Move Image file] button.

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

Changing Judgement Conditions without Stopping Measurement

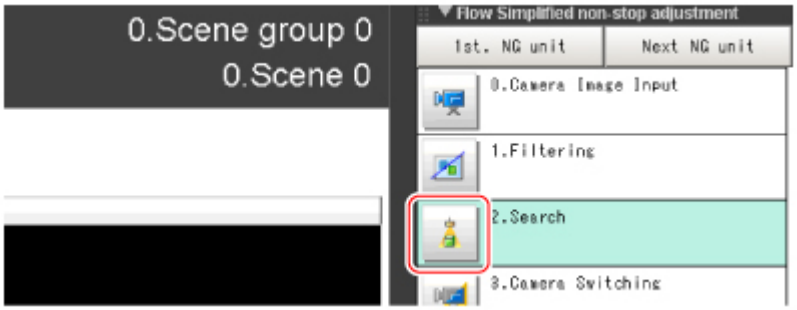
Using the simplified non-stop adjustment function makes it possible to change the judgement conditions of processing units of the currently displayed scene without stopping the measurement processing being executed.

Note

- The simplified non-stop adjustment function can only be used in RUN window normal mode. However, it cannot be used when the operation mode (FZ4-11 □□ /H11 □□ only) is set to [Single-line High-speed mode] [Non-stop adjustment mode]. Also, it cannot be used in the ADJUST window or RUN window fast view mode.
- If the Enter non-stop adj. button is not displayed, the button can be added with the system/controller/RUN window short cut setting.

1. In the "Control" area of the Main screen (RUN window), tap [Tool box].
2. Tap [Enter non-stop adj].
   Transfers to simplified non-stop adjustment mode. "Enter simplified non-stop adj." is displayed at the upper part of the "Control" area flow.
   Measurement will continue without stopping.

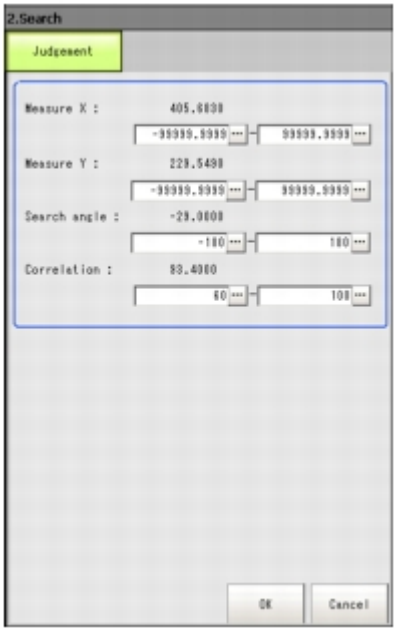
3. Tap the icon of the processing unit with the judgement condition to be adjusted.



   The window for the judgement conditions of the selected processing unit is displayed.

   If you tap the icon of the processing unit that does not have setting item of "Judgement condition", Judgement window is not displayed.

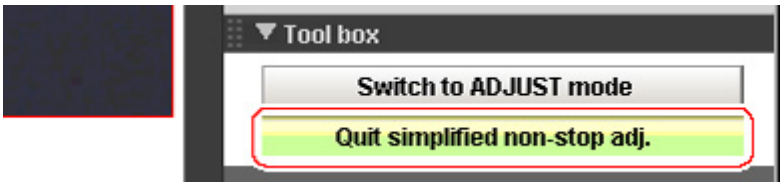
4. Change the judgement conditions of each processing unit.



5. Tap [OK].
   The Judgement window closes, and the screen returns to the Main screen.

   The changed contents are shown in the displayed scene.

   When changing judgement conditions for multiple processing units, repeat steps Reference: ▸ 3 (p.91) to Reference: ▸ 5 (p.92) .
6. In the "Control" area of the Main screen, tap [Quit simplified non-stop adj.].



   The simplified non-stop adjustment mode ends.

Note

- If [Switch to ADJUST mode] is tapped while entering simplified non-stop adjustment, the simplified non-stop adjustment mode is automatically ended and the screen switches to the ADJUST window.

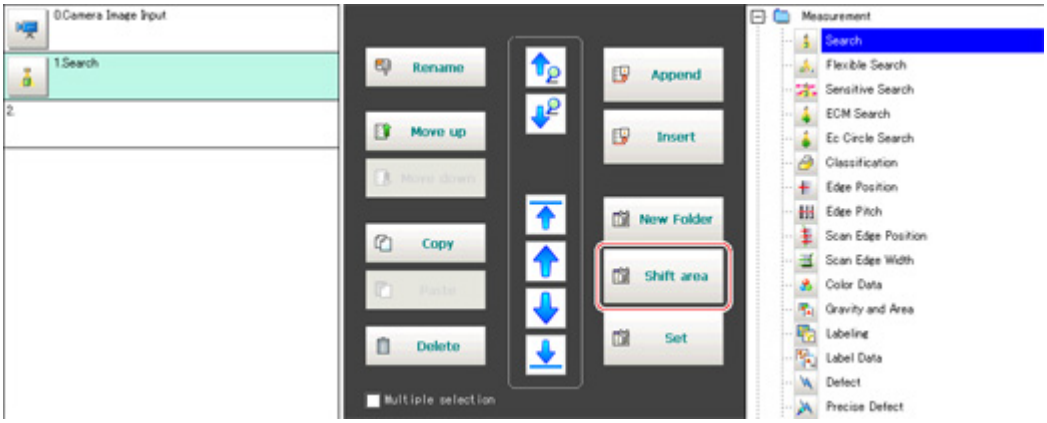
Important

- During simplified non-stop adjustment, do not switch the scene with scene switching or scene group switching.

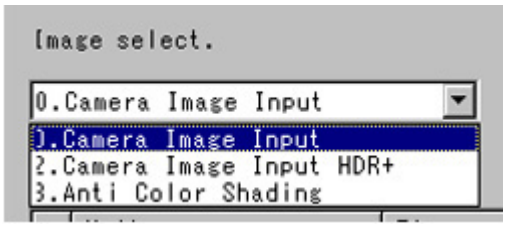
Changing Regions as a Batch [Shift area]

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

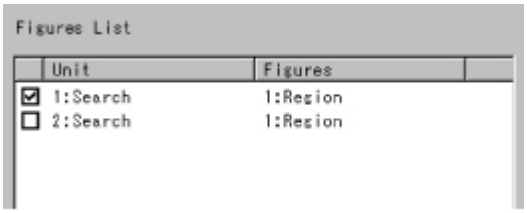
1. Tap [Shift area] in the Edit Flow window.
   The Move Measuring Area at Once window is displayed.



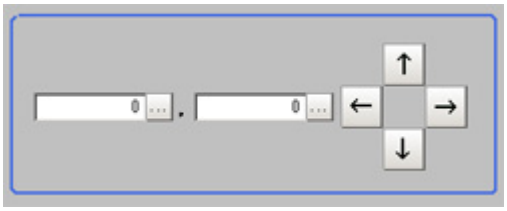
2. Select the processing item in which to change the region.
   Only image setting processing items included in "Input image" and "Compensate image" are displayed.



3. Select the registration region to change.



4. Tap [Move] and input the value or tap the arrows to move the image.
   Images can also be directly dragged and moved.

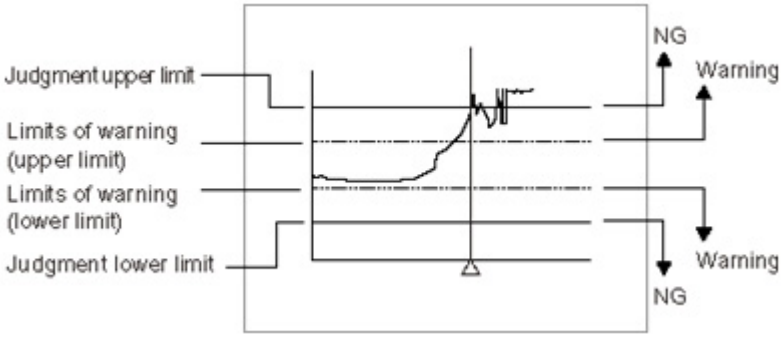


5. Tap [OK].
   The change is registered.

Monitoring Measurement Value Trends

By monitoring the trend 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 processing item [Trend Monitor] to monitor the measurement values.

Reference: ▸ "Processing Item List Manual", "Trend Monitor" (p.506)



Note

- If the measurement value is within the alarm range, the "Warning" message is shown on the screen.
- 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 judgement.

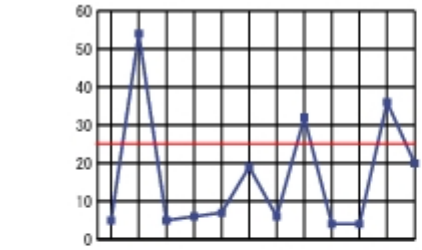
Logging Measurement Values and Measurement Images

Logging is a function for saving camera input images or measurement results when executing measurement.
There are 2 different logging methods.

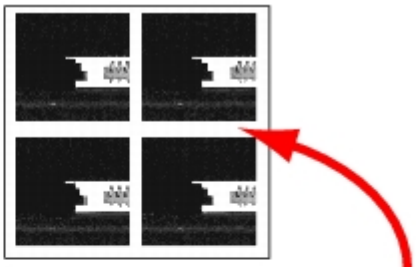
- When logging images that are currently displayed
  Reference: ▸ Logging current image [Save last logging image] (p.95)
- When automatically logging images during measurement
  Reference: ▸ Setting Logging Conditions [Logging setting] (p.96)

Images and measurement data can be saved in USB memory, which makes them useful for the

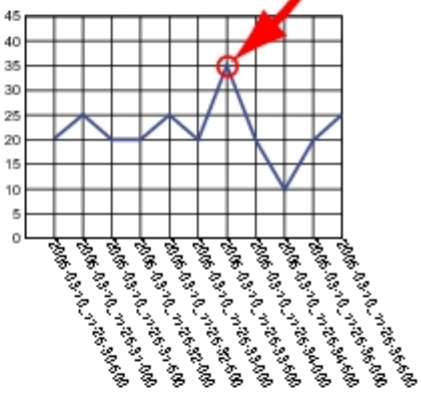
following kinds of adjustment.



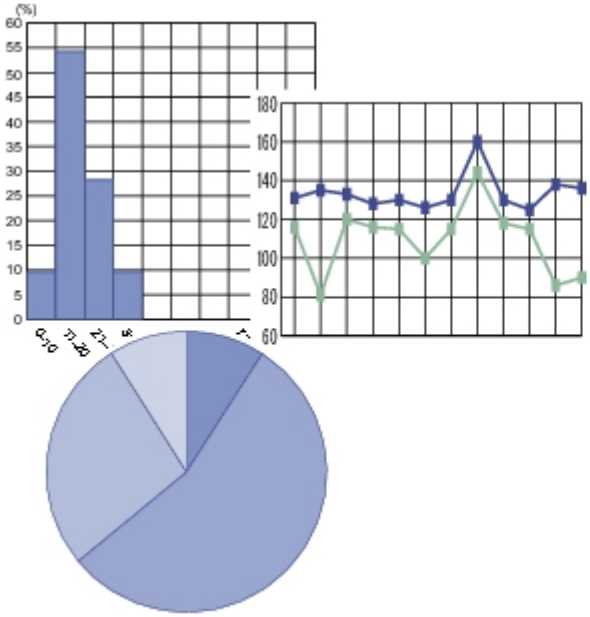
Optimization of thresholds



Verify measured data and NG images



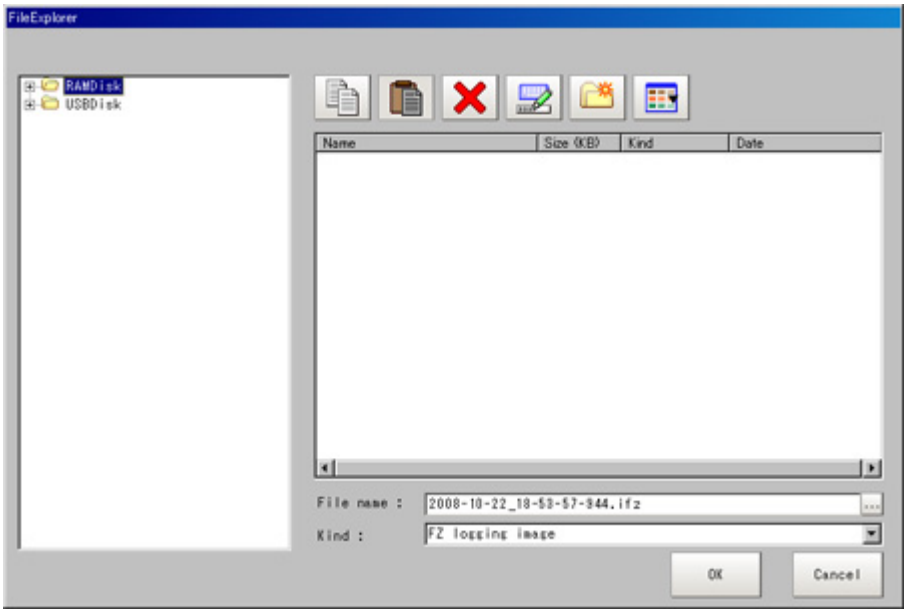
Statistical analysis via Excel



Logging Current Image [Save Last Logging Image]

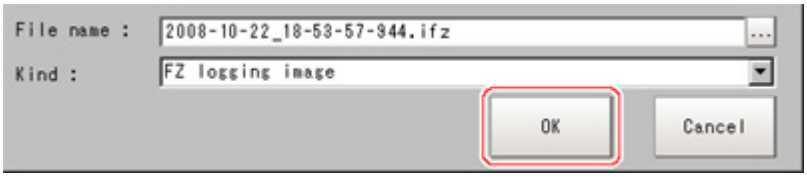
This section explains the method for logging the latest input image being displayed.

1. On the Main screen, tap [Measure] menu - [Save last logging image].
   The Logging Setting window is displayed.



2. Set the logging images save destination.
   Specify the image file save destination (RAMDisk or USB memory).
3. Edit the file name as required.

4. Tap [OK].

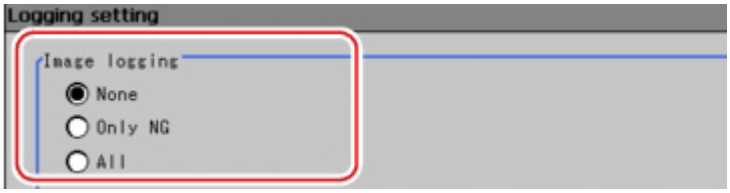


After the logging operation is complete, the Save Last Logging Image window closes.

Setting Logging Conditions [Logging Setting]

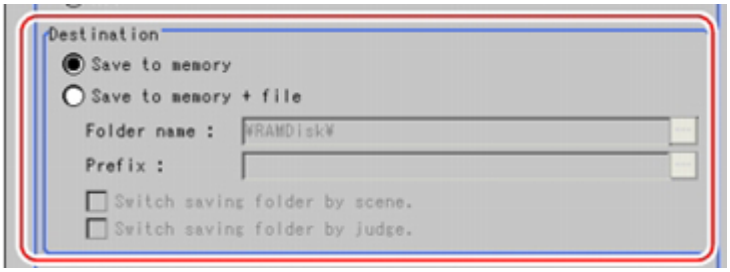
Set the logging timing and the save destination.

1. On the Main screen, tap the [Measure] menu - [Logging setting].
   The Logging Setting window is displayed.
2. Set the logging conditions for images.



Setting item	Setting 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. Note, however, that some images may not be saved if "Measurement" is set in "Logging priority" in step 4.

3. Set the logging images save destination.



Reference

- In order to perform fast logging, image files are first saved in the controller memory. Note, however, that the controller memory for saving images is a ring memory. If the maximum number of save images is reached, images will be overwritten starting with the oldest saved image if further images are saved.
  Reference: About Number of Logging Images (p.611)
  The controller memory is cleared if the power is turned off again.
  To keep images, select "Save to memory + file" and save images to USB memory, etc.

Setting item	Setting value [Factory default]	Description
Destination	[Save to memory]	Saves to the controller memory.
	Save to memory + file	Images saved to the controller memory are saved to a USBDisk or RAMDisk as files.

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

Setting item	Setting value [Factory default]	Description
Folder name	・ [RAMDisk] ・ USBDisk	Specify the image file save destination (RAMDisk or USB memory). Logging images are saved in the specified save destination folder.(Maximum number of characters: 128 single-byte characters)
Prefix	-	Sets the prefix for the save 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.
Switch saving folder by scene	・ Checked ・ [Unchecked]	If checked, folders that correspond to scene numbers are automatically created and image files are divided by scene and saved.

Switch saving folder by judge	・ Checked ・ [Unchecked]	If checked, OK/NG folders are automatically created and image files are divided by scene and saved.

"Save to memory + file" setting example and save destination

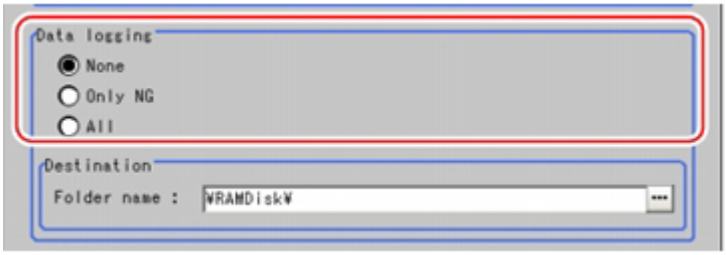
Example of setting	Destination
・ Folder name: USBDisk ・ Prefix: image_ ・ "Switch saving folder by scene": Checked ・ "Switch saving folder by judge": Checked	Saving will be performed as follows for the settings example on the left ・ OK image save destination: \USBDisk\S000-000\OK\image_(Measurement ID).IFZ ・ NG image save destination: \USBDisk\S000-002\NG\image_(Measurement ID).IFZ

4. Set the image logging priority conditions.
This setting is only valid when "Save to memory + file" is selected in the image logging saving conditions.

When the measurement takt time is short, time lag may occur with writing from the controller memory to the RAMDisk or USBDisk and temporary absences of free capacity in the controller memory may occur. Select whether logging or measurement has priority at these times.

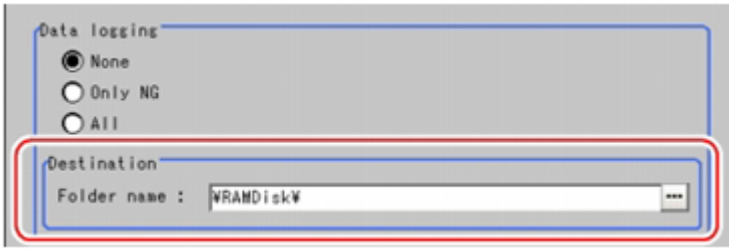
Setting item	Setting value [Factory default]	Description
Logging priority	[Logging]	When there is no free capacity in the controller memory, subsequent measurement cannot be received until free capacity becomes available. All measurement target images are logged, but the measurement takt time becomes longer.
	Measurement	Measurement will continue even if there is no free capacity in the controller memory. New logging is not performed until free capacity becomes available in the controller memory. The measurement takt time is maintained, but some measurement may not be logged.

5. Set the data logging conditions.
The data format is set with the processing item "Data Logging".



Setting item	Setting 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 "Data Logging". If an NG error occurs after the "Data Logging" processing unit, data logging is not performed.
	All	All measurement data is saved.

6. Set the logging data save destination.



Setting item	Setting value [Factory default]	Description
Folder name	・ [RAMDisk] ・ USBDisk	The data is saved in the specified destination folder (RAMDisk or USBDisk). Set the file name with the processing unit [Data Logging]. (Maximum number of characters: 128 single-byte characters)

Important

- If a USB memory or a network drive is specified as the save destination, the processing time may be longer or fluctuate. Be sure to check it thoroughly before starting an operation.
- When image logging or data logging is executed for a network drive, the communication may be disrupted and the logging process may not be executed successfully due to the controller measurement load that becomes too heavy when the multiple image input function is used. In this case, set a reasonable amount of measurement takt time.

Reference

About loading data to a PC

- Factory settings are set so that logging data is saved in the controller RAMDisk.
  When logging data is loaded to a PC, set USBDisk as the save destination.
  Logging data is first saved to the controller RAMDisk and then can be copied from the RAMDisk and saved to the USBDisk using "Copy files" in "Save to file".

7. Tap [OK].

Settings are confirmed and the Logging Setting window closes.

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.611)
- The data saved in the controller memory or RAMDisk is deleted when the controller is restarted.
- If "Camera Image Input" is used several times in a flow, the image from the last "Camera Image Input" is saved.

Reference

About image logging

- When the number of files in the save destination folder increases, the time needed for image saving increases.
- If image transfer is disabled using the camera selection setting for the [Camera Image Input] unit, black images are saved instead of images from the disabled camera.

About number of images that can be saved

- This will vary depending on the size of the images and the resolution of the connected number of the camera.
- The number of images that can be saved on the RAMDisk or USBDisk depends on free capacity.
  - If RAMDisk is selected, this depends on the RAMDisk memory capacity.
  - If USBDisk is selected, this depends on the USBDisk capacity.
- Note that the following restrictions apply to USBDisk. (There is no limit if NTFS-formatted USBDisk is used with the FZ4-11 □ □ /H11 □ □ .)
  - When saving image files directly under the root directory, the number of images that can be saved is about 126.
  - When saving in sub-folders (\USBDisk\SUB, etc.), a maximum of 999 images can be saved in each folder. Change to a different folder to save another 999 images up to the maximum memory capacity.

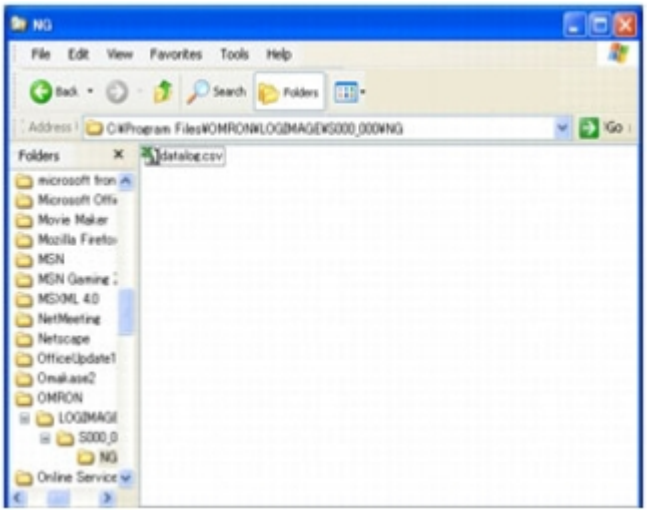
Analyzing Logging Data

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

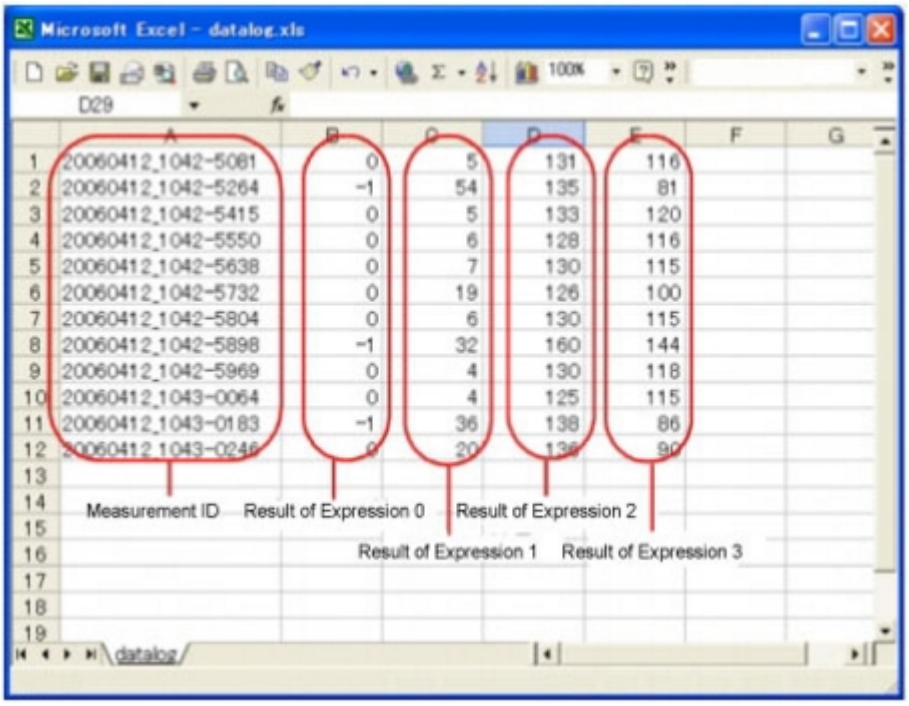
Checking Logging Data with a PC

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

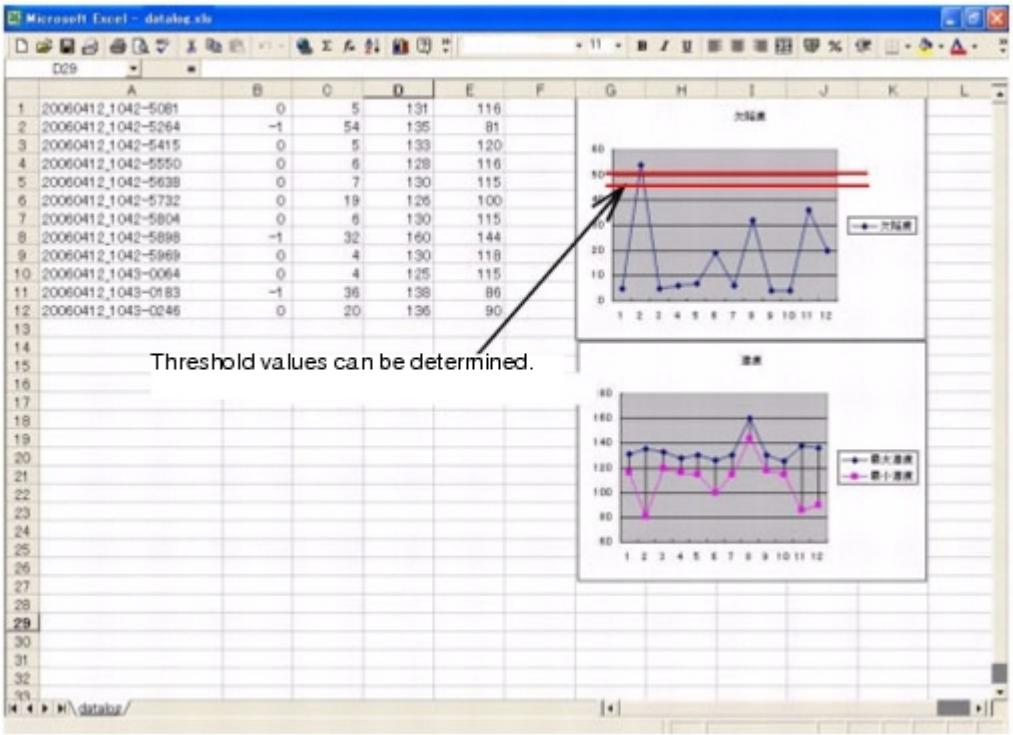
1. Copy logging data saved to the USB memory to the PC.
2. Open folder with copied data.



3. Open using an application associated with the extension (csv).
   Explanation is given here using examples displayed in Excel.



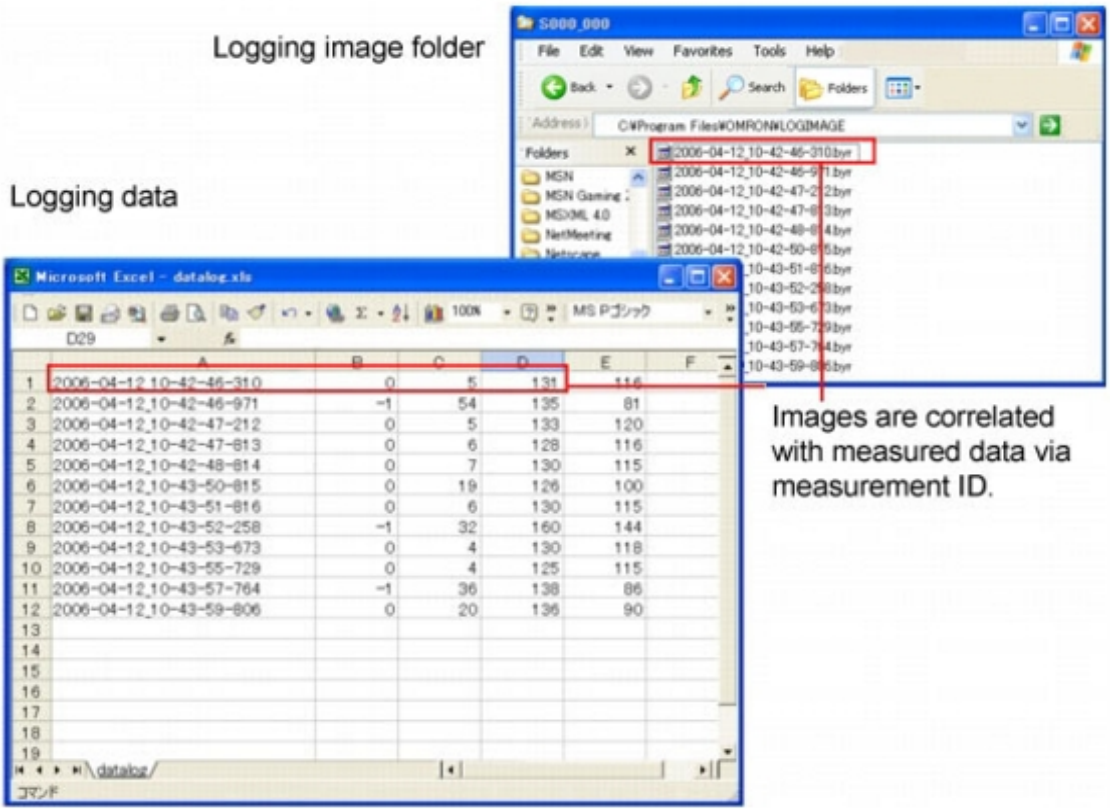
4. Use Excel graphing and functions to process and analyze data.
   For example, the optimum threshold value can be calculated.



Comparing Logging Data and Logging 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 through the logging function is associated through

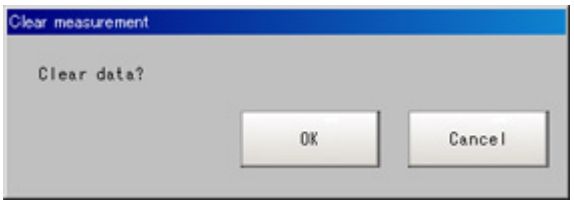
measurement IDs based on the measurement date and time. One image data file contains the camera image data of all the connected units.
In this way, measurement data can be made to always correspond with image data.
Verify data with the measurement ID.



Clearing Measurement Results

Clears 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. On the Main screen, tap [Measure] - [Clear measurement].
   A confirmation window is displayed.
2. Tap [OK].



   The measurement results are deleted.

Clearing Saved Images

Clears all of the logging images that are currently logged in the controller.

1. On the Main screen, tap the [Measure] menu - [Clear logging image].
   A confirmation window is displayed.

2. Tap [OK].

Note

- If you want to keep the logged images as files, save the logged images to the USB memory device by tapping [Data] - [Save to file] - [Logging image] before clearing them.
  Reference: Saving Logging Images to RAMDisk/USB Device (p.336)

Capturing Screens

The contents displayed in the monitor screen can be captured.Saved images can be loaded into the PC and pasted to documents.

Important

- Capture takes a few seconds and measurement cannot be performed at this time.

1. Open the measurement manager bar at the bottom right of the Main screen and tap [Capture].

Note

- The same operation can also be performed by tapping the [System] menu - [Screen capture] - [Screen capture].
- When capture is performed from the measurement manager bar in multi-line random-trigger mode it always saves to the destination set for line 0.

About capture image files

This section explains the format and file names for capture images.
With factory settings, capture images are saved to the RAMDisk.The save destination can be changed.

Item	Description
File format	The file format is BMP.
File name	The file name is the date and time at which 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

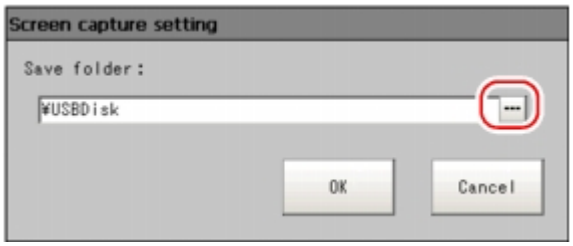
Note

- The following windows cannot be captured.
  - The window to select a file or a folder
  - Confirmation message window when LCD is turned off

Setting the Save Destination for Captured Images

Sets the save destination for the image captured with the screen capture function.

1. On the Main screen, tap the [System] menu - [Screen capture] - [Screen capture setting].
   The Screen Capture Setting window is displayed.
2. Specify the save destination for captured images.



3. Tap [OK].
   The settings are determined and the Screen Capture Setting window closes.

Using the Operation Log Functions

Setting the operation log

This function automatically saves the contents of controller operations and setting changes as a unique file delimited with; (semicolons). Setting content changes are recorded as a time series, which makes change management possible.
Operation log output example:
The time and date, user name, and operation contents are recorded.

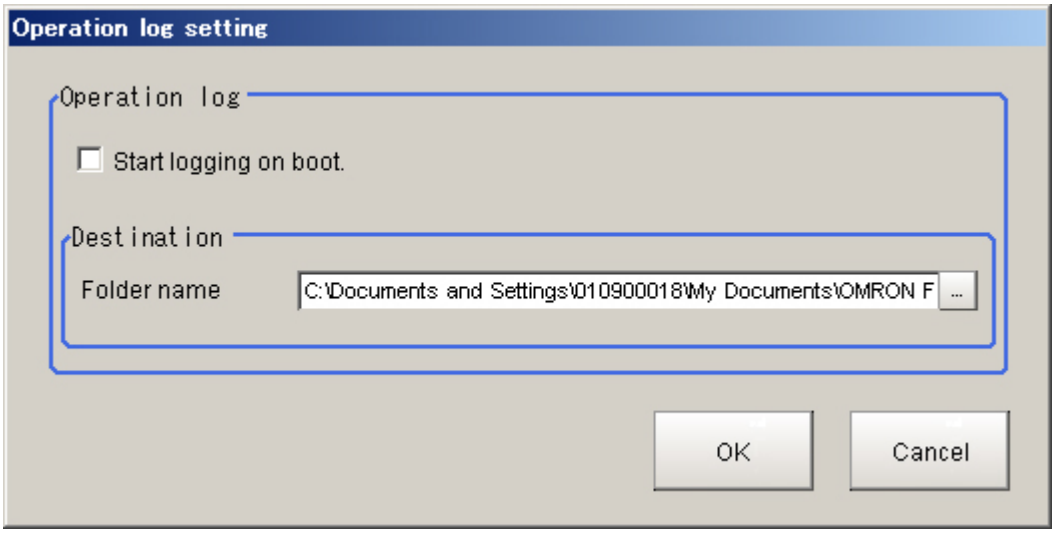
```
2012/09/10 13:08:41;Administrator;SetSystemData,"OperationLog","enabled","1";0
2012/09/10 13:08:41;Administrator;MeasureStart;0
2012/09/10 13:08:41;Administrator;GetSceneGroupNo;0
・・・
```

Important

- The contents of operation log files cannot be checked on the controller. Open with a text editor or change the delimiter characters to; (semicolons) with spreadsheet software.

1. On the Main screen, tap the [Measure] menu -> [Operation log] -> [Operation log setting].
   The operating log setting window is displayed.

2. This item sets the operation log parameters.



Setting item	Description
Start logging on boot	Place a check here to record the operation log from start-up The setting will be reflected from the next time that the system starts up.
Destination folder name	Specify the name of the folder to save the operation log to. The operation log file name is the date and time at which the operation log was started + the "log" extension. Example: 2012-09-29_12-39-04.log ・ When operating in 2-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 This setting only takes effect after you execute a data save and restart the system. ・ When operating in non-stop adjustment mode, the non-stop adjustment side log is saved with the file name "(date and time at which the operation log was started)_Nonstop.log".

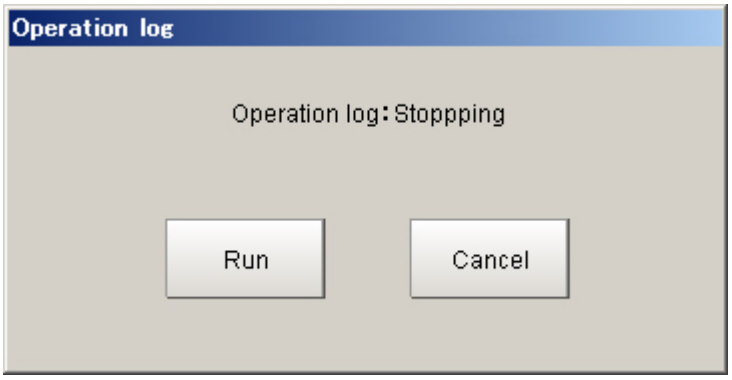
3. Tap [OK].

Checking and changing the operation log status

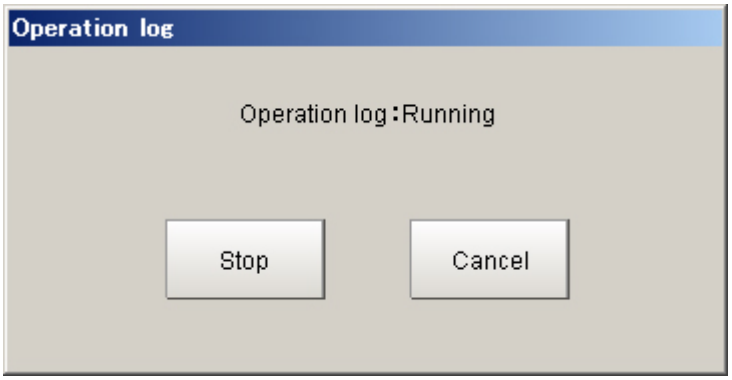
Check the current operation log function status as follows.

1. On the Main screen, tap the [Measure] menu -> [Operation log] -> [Operation log state].
   The current operation log status is displayed.
   To change the current operation log status, tap either [Start] or [Stop].
   To close the window, tap [Cancel].

   (Screen with operation log stopped)



   (Screen with operation log being recorded)

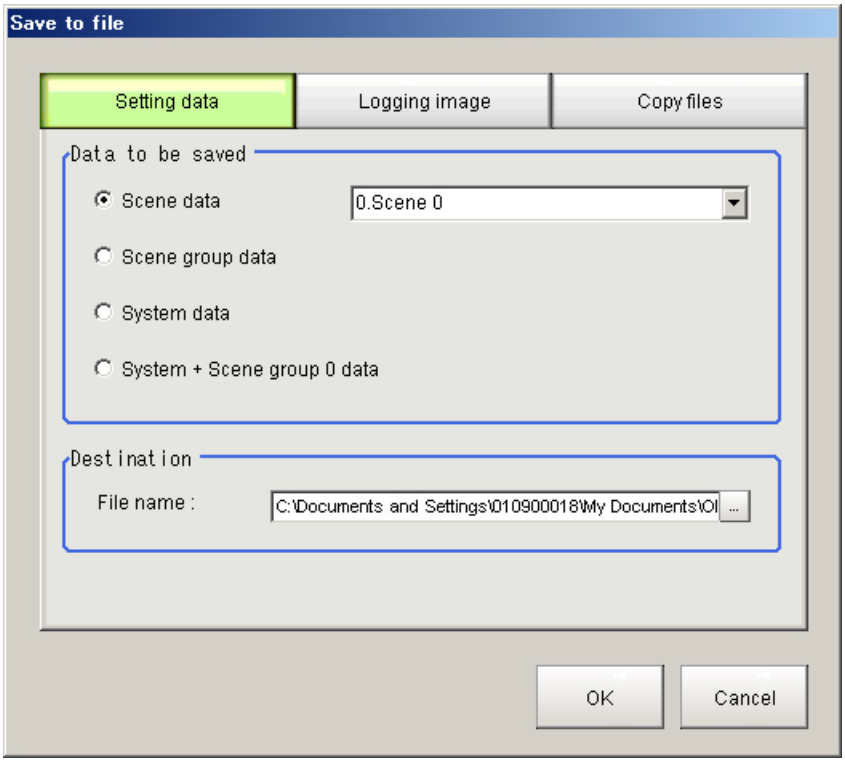


Loading an operation log file

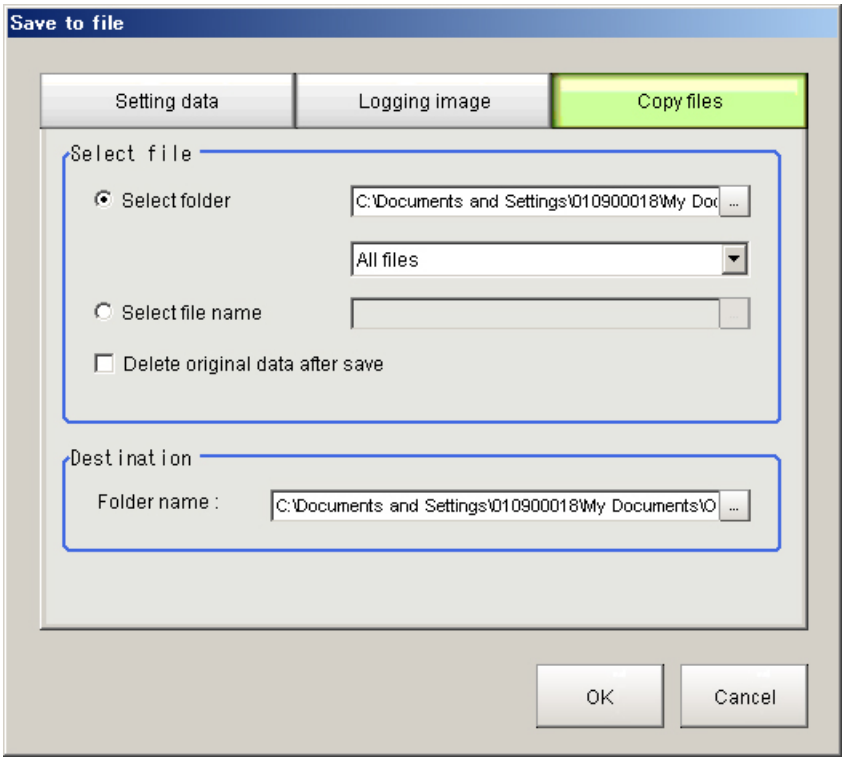
When the log file is set to be saved to the controller, load the file as follows.

1. Plug a USB memory device into the controller.

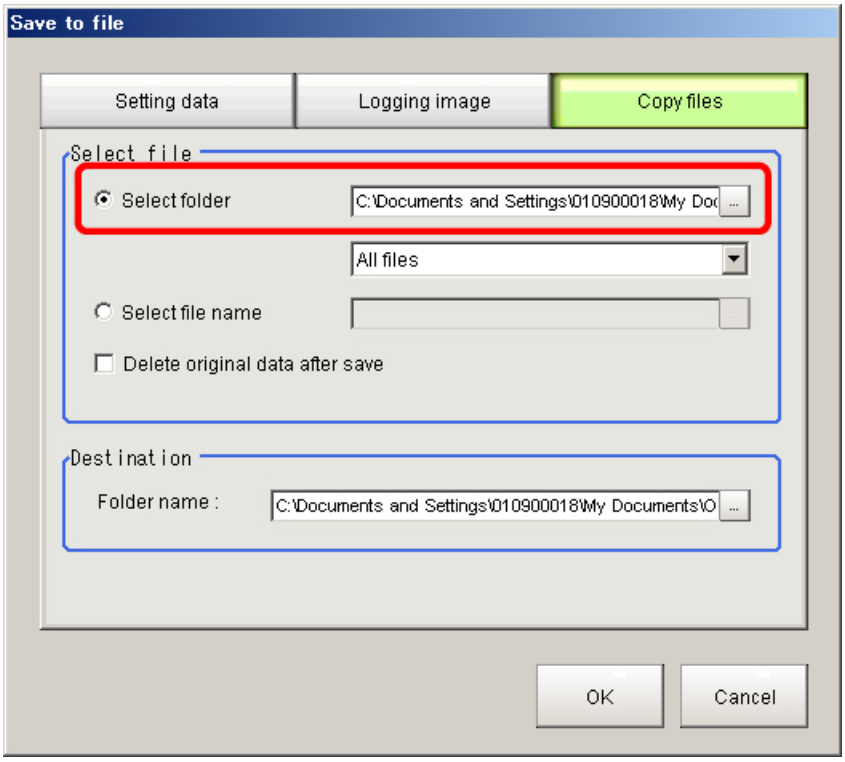
2. On the Main screen, tap [Data] - [Save to file].
   The "Save to File" window is displayed.



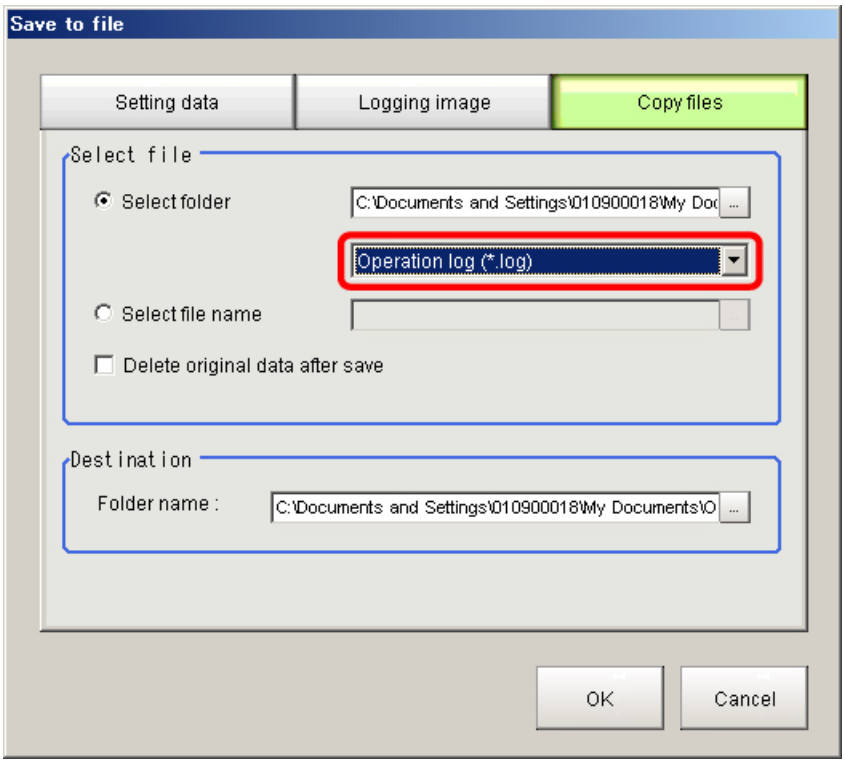
3. Tap the Copy files tab.



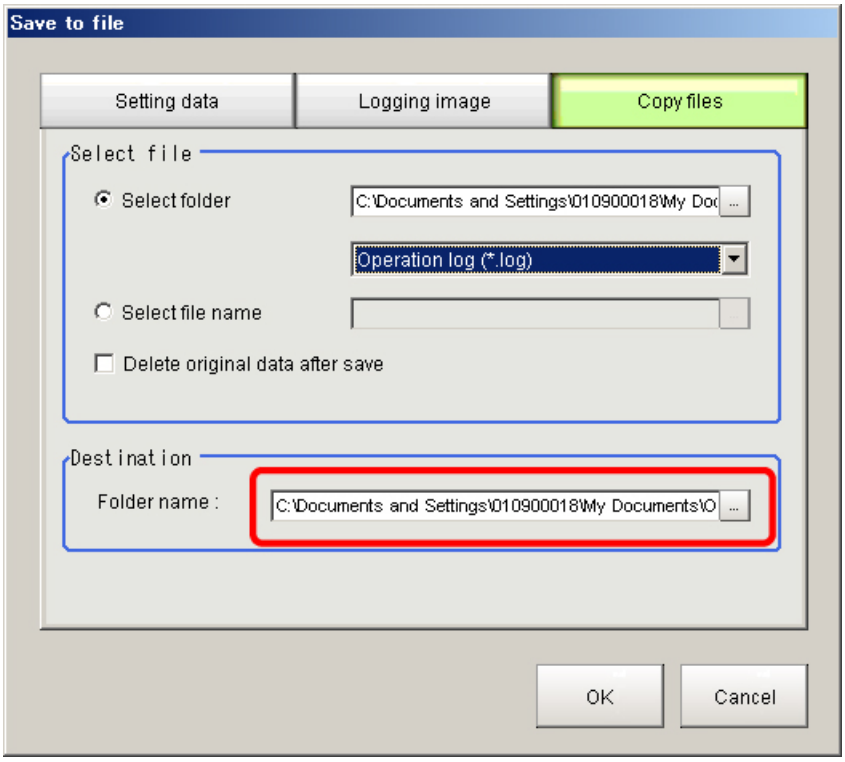
4. Select [Select folder], then tap [...], and specify the folder.



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



6. Specify the destination.



7. Tap [OK].

For details on operation logs, see "Operation log format" in the Appendix.
Reference: Operation log format (p.625)

Using Tool

This section describes adjustments during startup and convenient tools for operations.

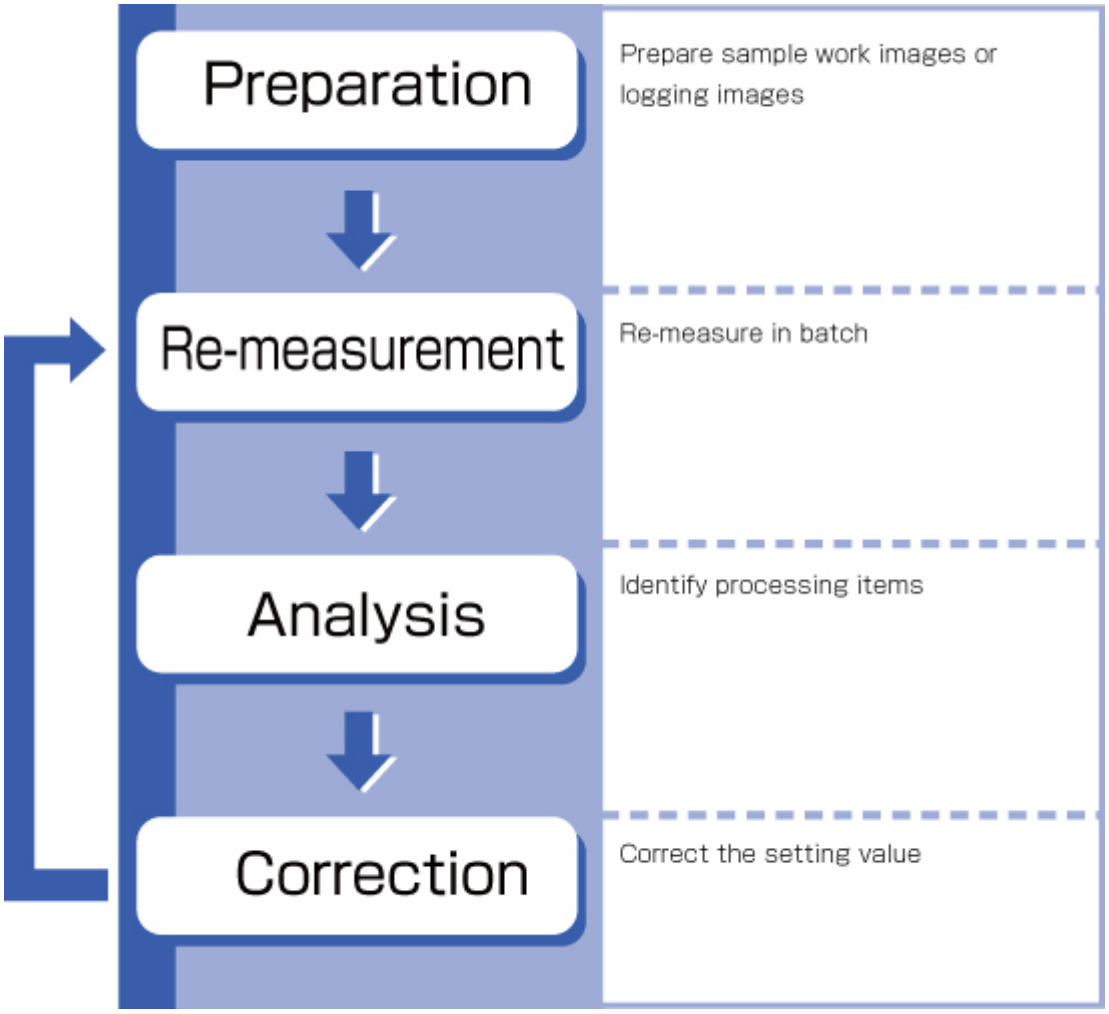
- Reference: Using NG Analyser (p.112)
- Reference: Using User Data Tool (p.119)
- Reference: Outputting a List of Scene Data Setting Values (p.122)
- Reference: Saving Image Files to RAMDisk/USB Device (p.129)
- Reference: Using Registered Image Administration Tool (p.132)
- Reference: Using Account Functions (p.136)
- Reference: Switching the User Account (p.150)
- Reference: Using Custom Command (p.152)
- Reference: Remotely Operating the Controller (Remote Operation) (p.320)

Using NG Analyser

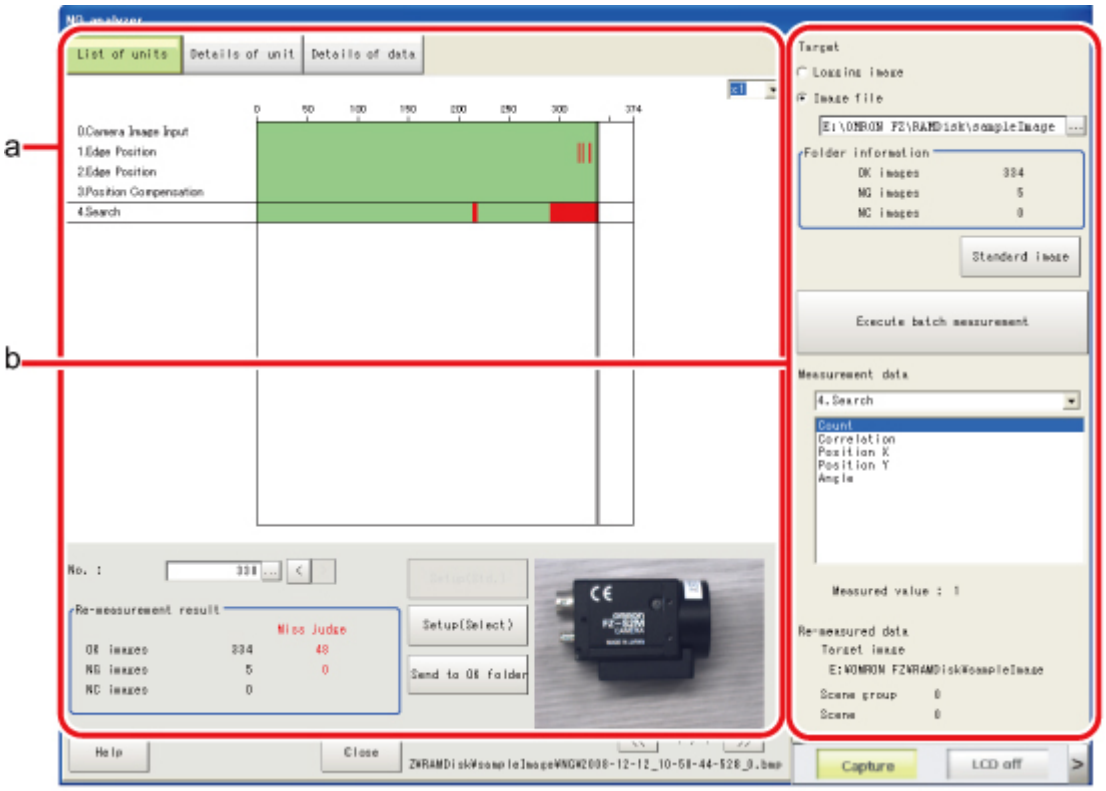
Start the NG analyser by selecting [Tool] - [NG analyser] from the controller menu.
This tool, which analyzes setting flows, is used mainly in 2 ways.

- Adjustment of measurement setting values during start-up
  Use sample work images to analyze optimal setting values for the processing flow.
- Analysis of NG causes during operation
  Use logged images to analyze NG causes.

The operation flow is as follows.

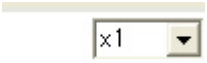


Layouts of NG Analyser Screens

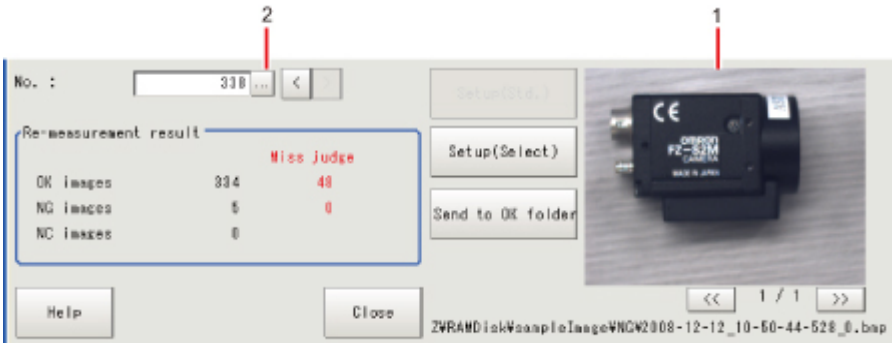


a. Analysis result display area

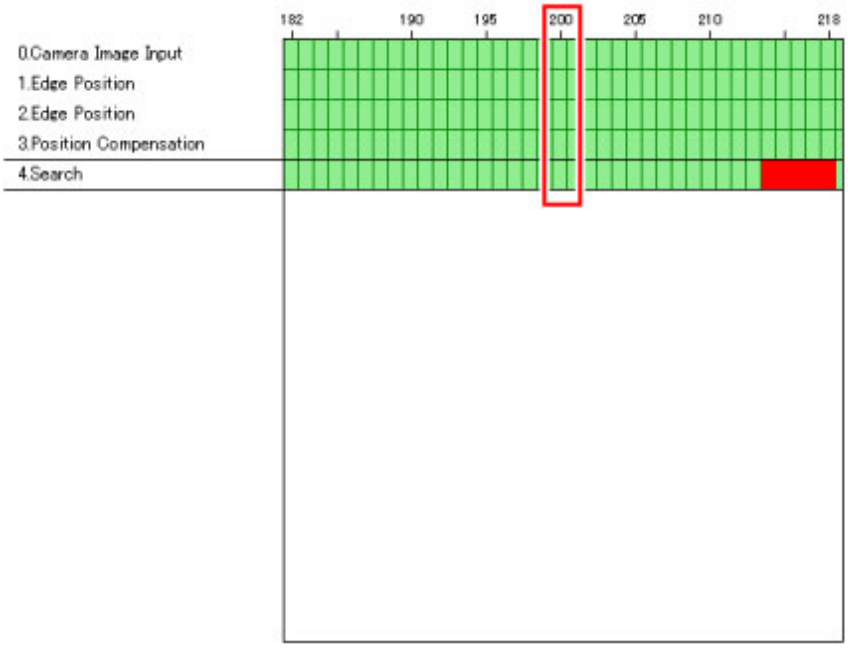
1. List of units
   A list of units currently set is shown together with analysis results.
2. Details of unit
   Detailed analysis results of each unit are shown.
3. Details of data
   Detailed results of analysis data are shown.



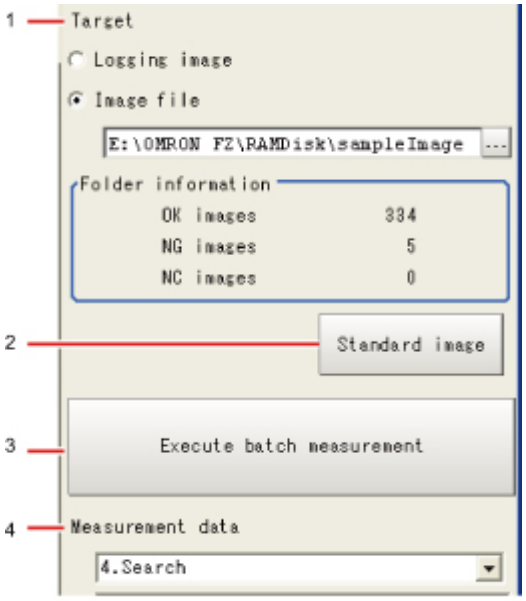
Sets magnification to display.



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 tapping the analysis result window.



b. Control area



1. Target
   Sets images to be measured.
2. Standard image
   Sets the image to be used as a reference for analysis.
3. Execute batch measurement
   All of the specified target images are measured continuously.

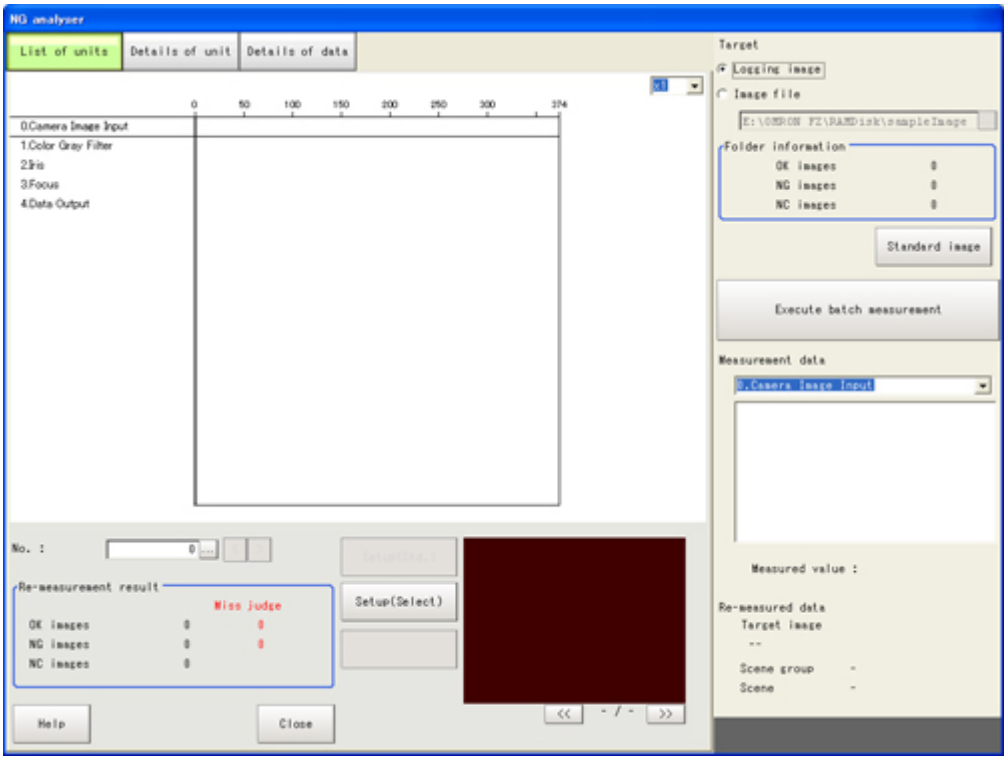
4. Measurement data
   Display the desired unit in the list of units and select the unit based on details of unit and details of data.

Using Method of NG Analyser

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" and "*.BMP".)
- Do not input external commands or STEP signals while the NG analyser is running (excluding during non-stop adjustment).

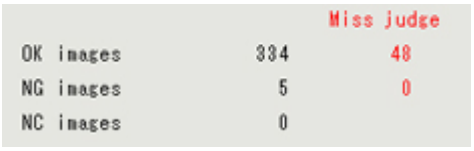
1. On the Main screen, tap [Tool] menu - [NG analyser].
   The analyser screen is displayed.



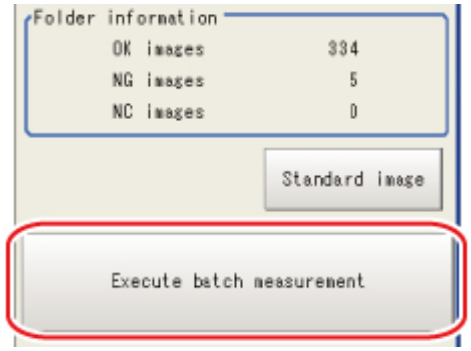
2. Specify the image file.
   Specify the upper rank folder containing the OK and NG folders.
   Although logging images of the controller can be set as the target, all logging images of the controller, if selected, are treated as "Not yet judged."

   You can also set a reference image to perform adjustment.

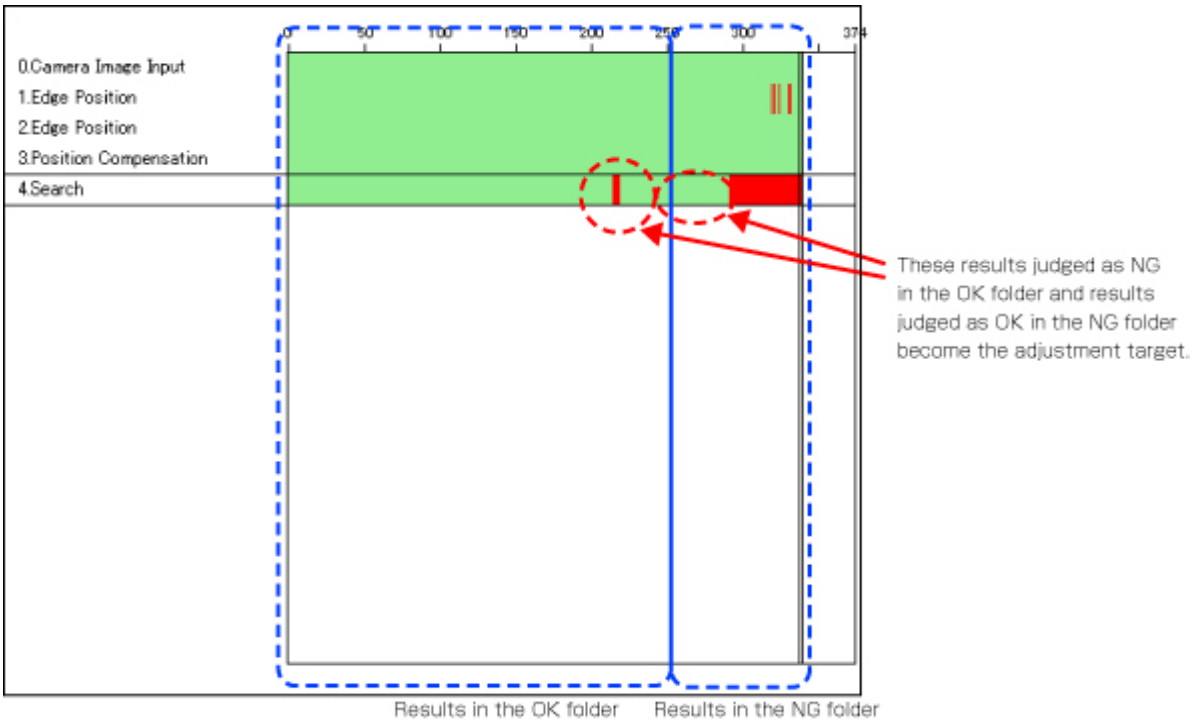
3. The files in the folder are displayed.



4. Tap [Execute batch measurement].
   All images in the folder are measured in batch.



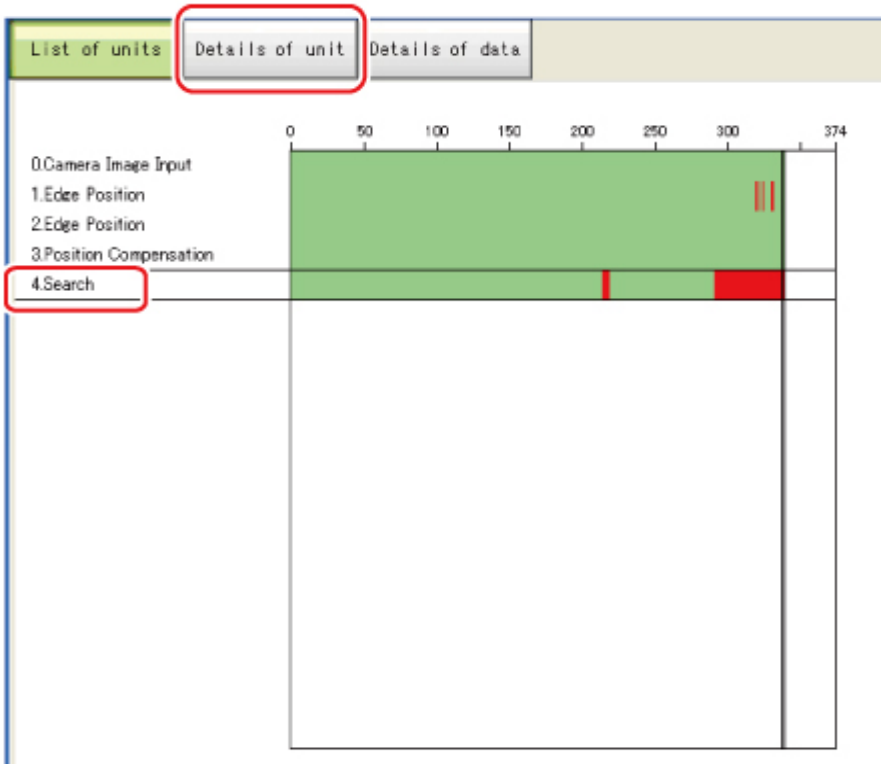
5. Measurement results are displayed.
   The results in the OK folder are shown first, followed by the results in the NG folder.
   Green indicates OK, while red indicates NG.



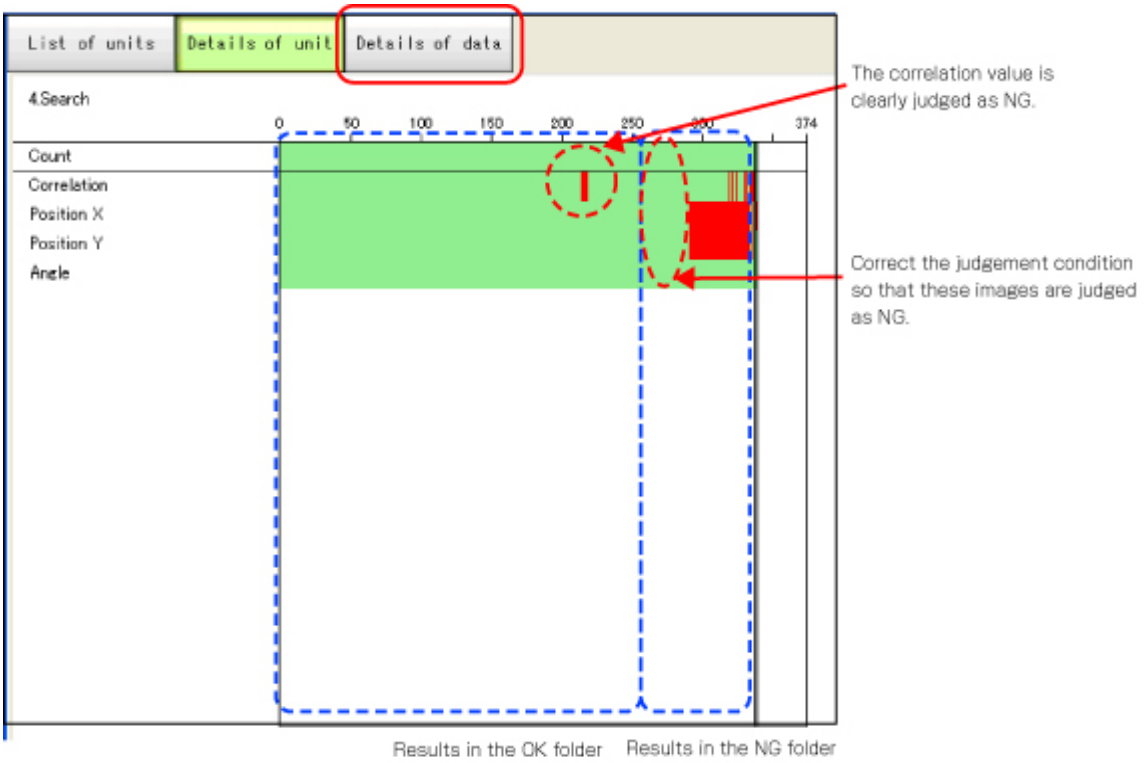
   Adjust the setting values of each unit until no images are falsely judged.

6. Select the processing item to be adjusted, and tap [Details of unit].

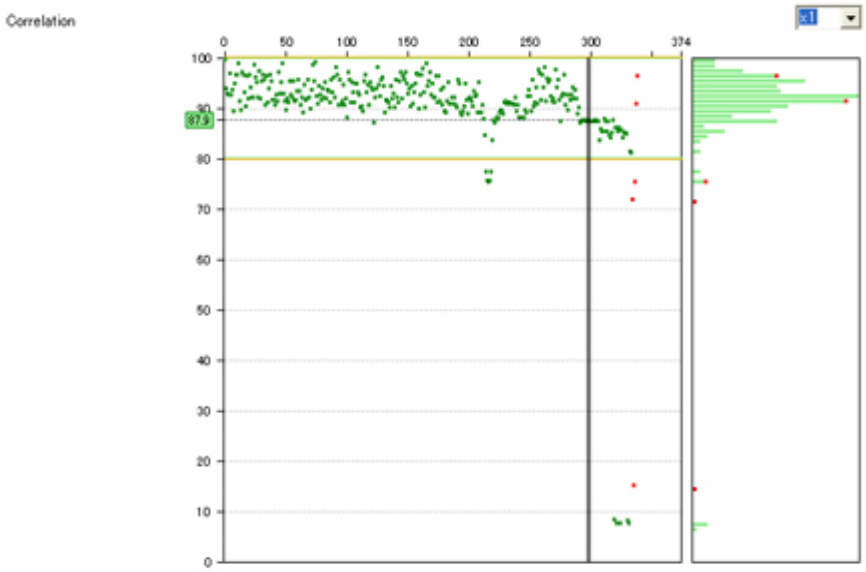
In the above example, [Search] becomes the adjustment target.



7. The cause of NG is displayed. To check the details of values further, tap [Details of data].



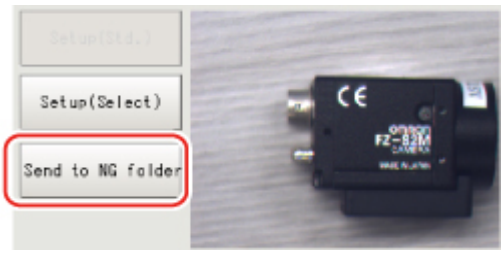
8. Adjust the processing item by referring to the displayed content.
In the following example, Correlation values are clearly lower on some screens.
Based on the revealed cause of false judgement, use the [Set up(Std.)] and [Set up(Select)] buttons to change the setting values of the processing unit.



9. Repeat steps 5 to 8 to correct the setting values corresponding to all causes of false judgement.
10. Select [Execute batch measurement] to confirm that no images are falsely judged.
    If there are still falsely judged images, repeat the same procedure until a re-measurement finds no falsely judged images.

Note

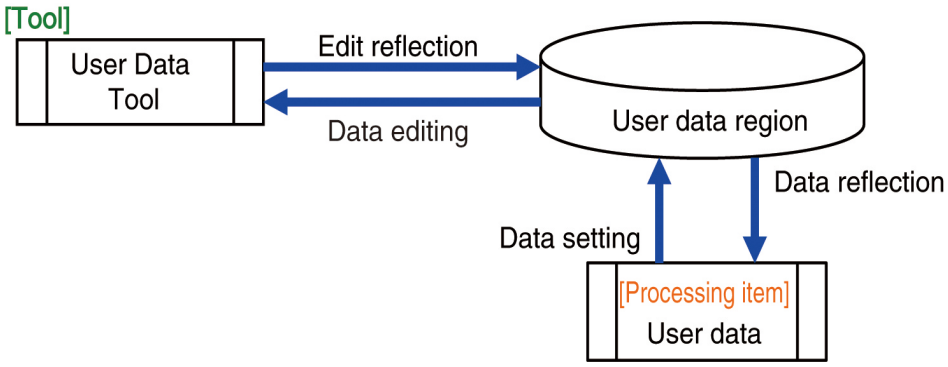
- OK/NG judgements can be changed by using [Send to OK folder] and [Send to NG folder] buttons. In this case, the changes will not be reflected until re-measurement is performed.



Using User Data Tool

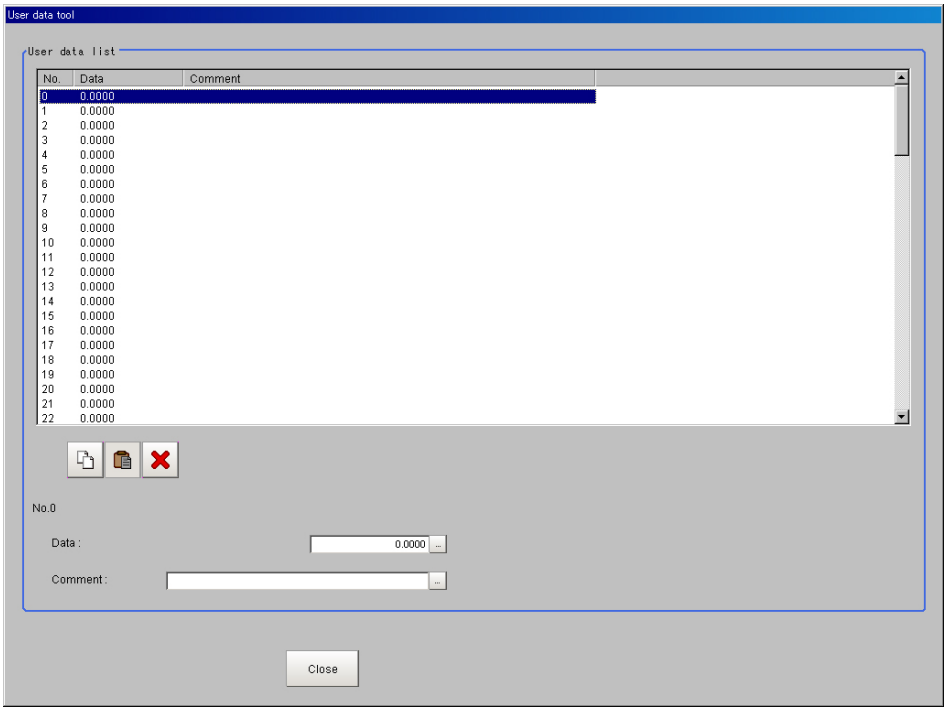
This tool is used to share data within the controller.
The data set in the user data is shared between scenes and scene groups, respectively. In the multi-line random trigger operation mode, however, data cannot be shared beyond the lines.
The data variables created are stored to the user data region on the controller.

Use the User data tool to edit data, specify initial values, and enter data description comments.
Use the processing item user data to set or reference the values in the data set with the user data tool.
Reference: "Processing Item List Manual", "User Data" (p.489)

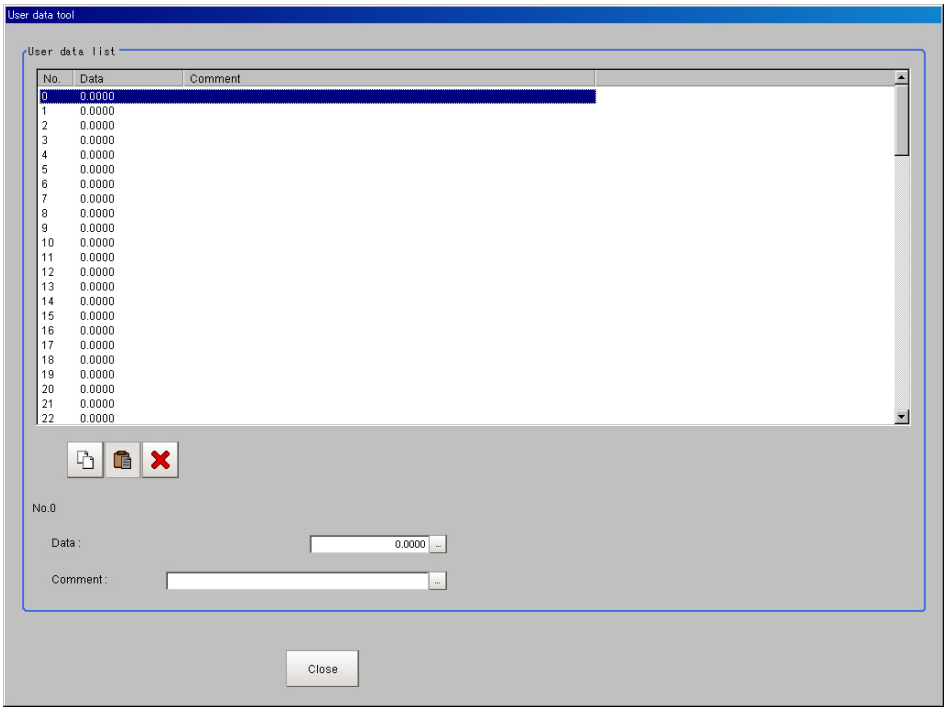


Setting Methods of User Data

1. To set user data, start [Tool] - [User data tool] from the controller menu.
   The user data tool window is displayed.



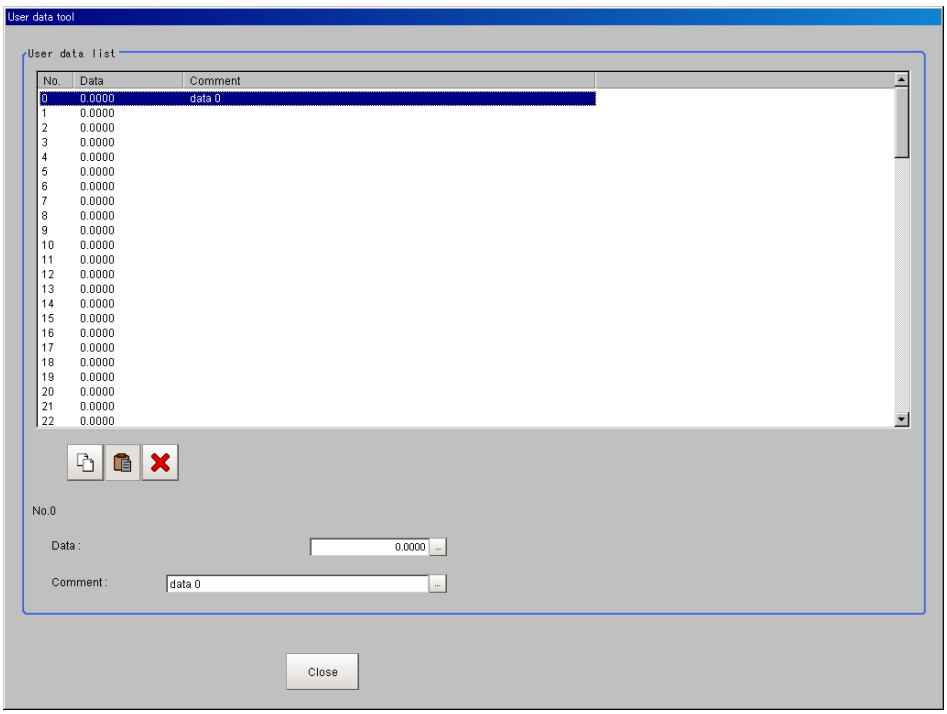
2. Tap the data that is to be set.



3. Specify the initial value for the data.

Item	Setting value [Factory default]	Description
Data	-999999999.9999 to 999999999.9999 [0.000]	Set the specified user data value.

4. Enter the comment for the data.
The entered comment will be displayed in the comment field of the user data processing item.



Item	Setting value [Factory default]	Description
Comment	Up to 64 characters [Space]	Set the comment for the specified user data.

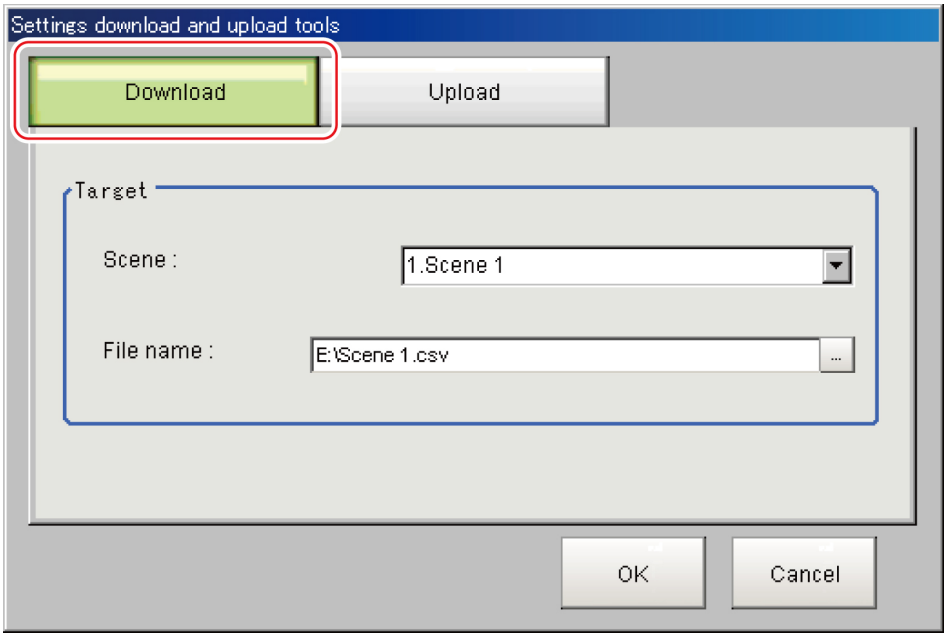
5. Repeat steps 2 to 4, and set the user data.
6. To stop the user data tool, tap [OK].
7. Tap [Data save] to save the specified user data to the controller.

Outputting a List of Scene Data Setting Values

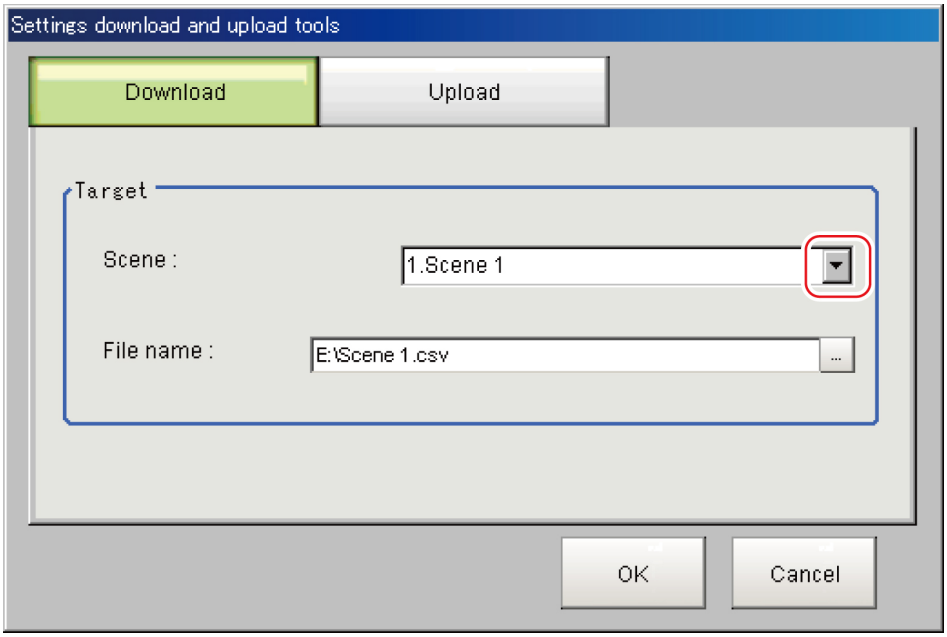
Use the setting values download/upload function to create a list of scene data setting values.
With the setting values download function, the specified scene data setting values can be output to a CSV file. The different setting values of multiple scene data can be easily checked by opening the CSV files in editor. (Only "Get/Set" data can be downloaded.) With the setting values upload function, a CSV file of which the setting values have been checked can be uploaded.

Downloading Setting Values

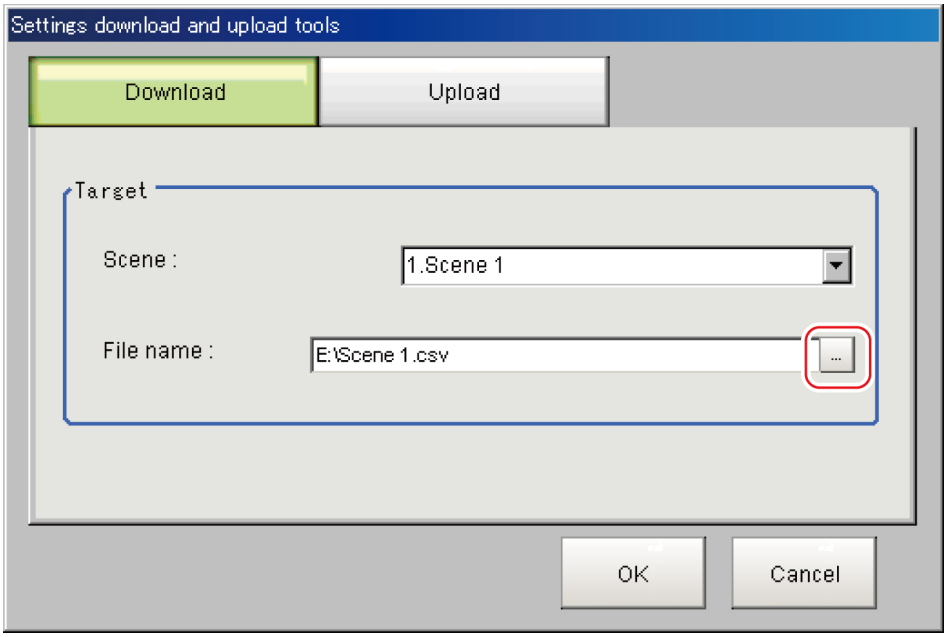
1. Switch to the scene group that contains the scene with the setting values to be downloaded.
2. When saving to USB memory, plug a USB memory device into the controller.
3. On the Menu window, tap [Tool] and then [Settings download and upload tools].
4. Tap [Download].



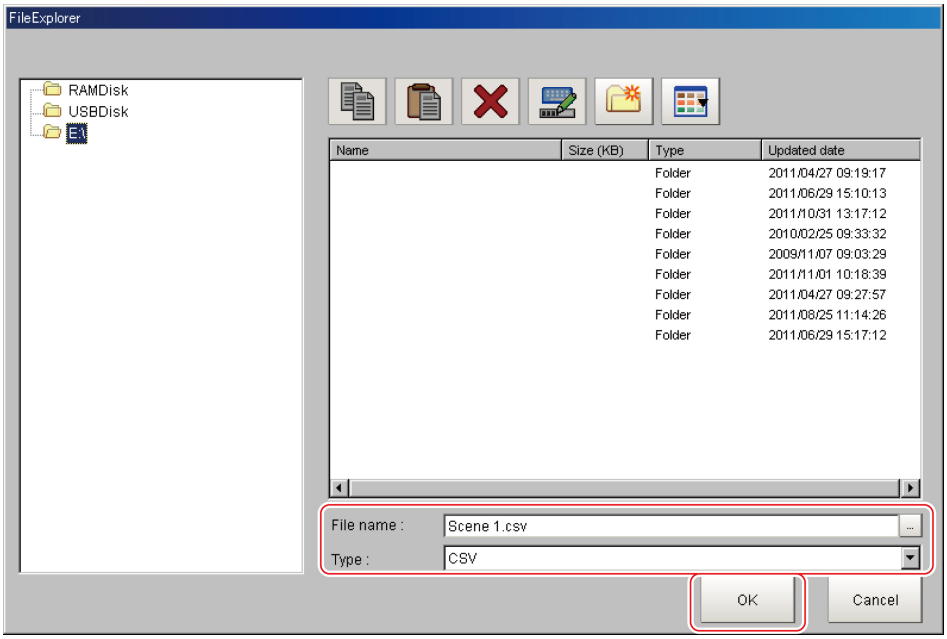
5. Select the scene with the setting values to be downloaded.



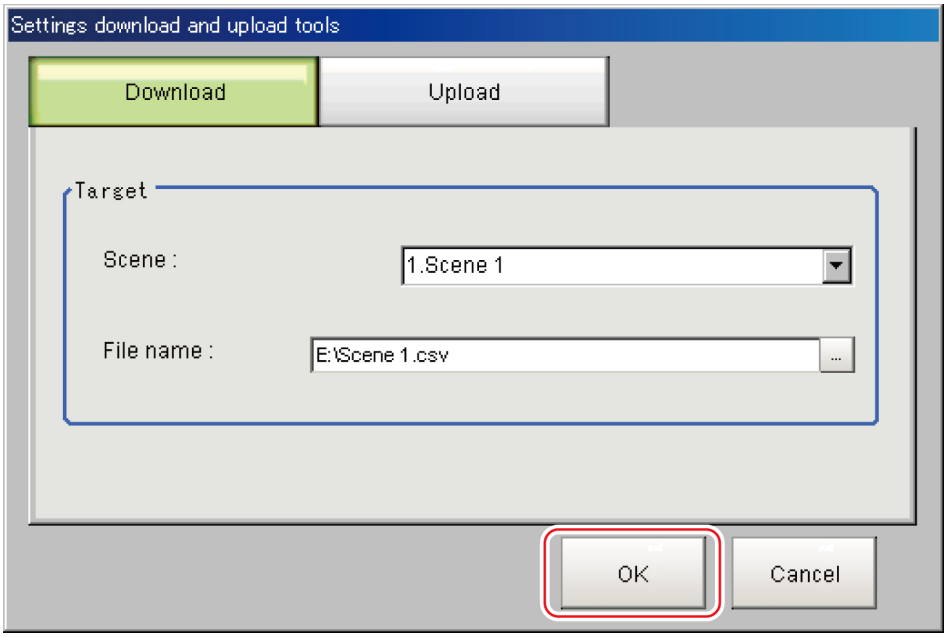
6. Tap [...].



7. Specify the save destination folder and file name, and tap [OK].



8. Tap [OK].



The data will be saved to the save location.

About Downloaded CSV Files

The character code of the downloaded CSV file is Unicode (UTF-8).
The file can be opened with Windows notepad. When using another editor to open the file, set the character code to Unicode (UTF-8).

CSV file formats are as follows:

```
SceneTitle,Scene title name,Author,Note
#Processing item number in the flow,Processing item identifier,Processing unit title name
Identifier,Data title name,Data
```

Double byte characters are enclosed in the double quotation marks (").
Refer to each processing item in the Processing Item List Manual and the external reference tables for each data parameter. Only data that can be "Set/Get" can be downloaded.

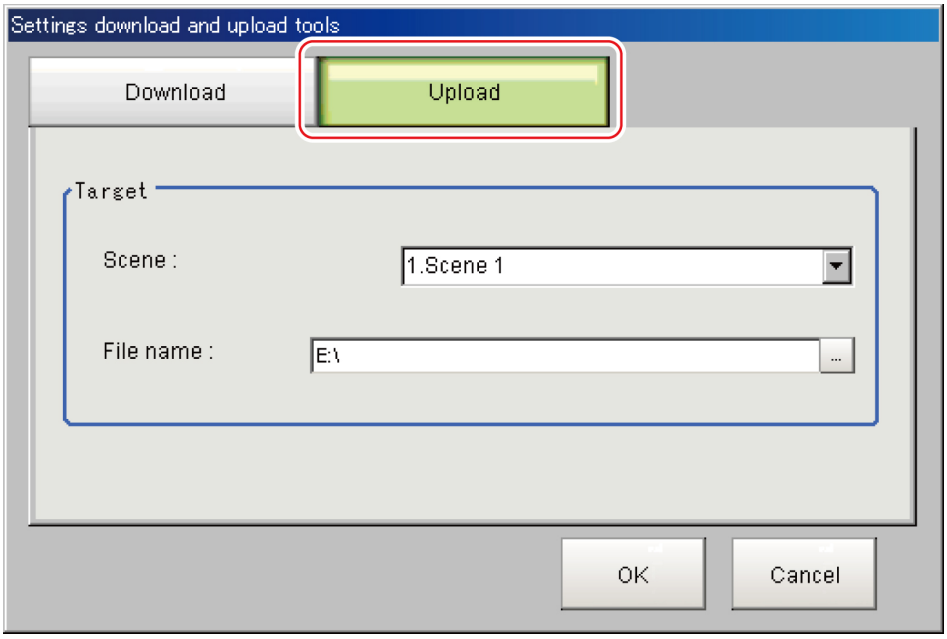
Output example of CSV file:

SceneTitle	Scene 2	
#0	CameraImage	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 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.(SH)	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 the corr.	100
lowerCorrelation	Lower limit of the 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

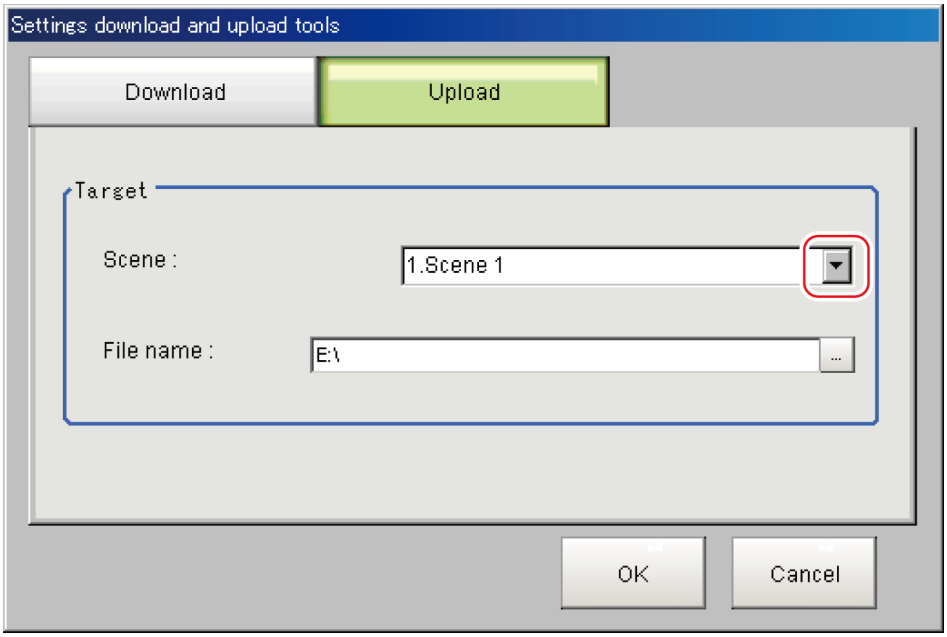
Uploading Setting Values

Upload the CSV file downloaded under "Downloading Setting Values".

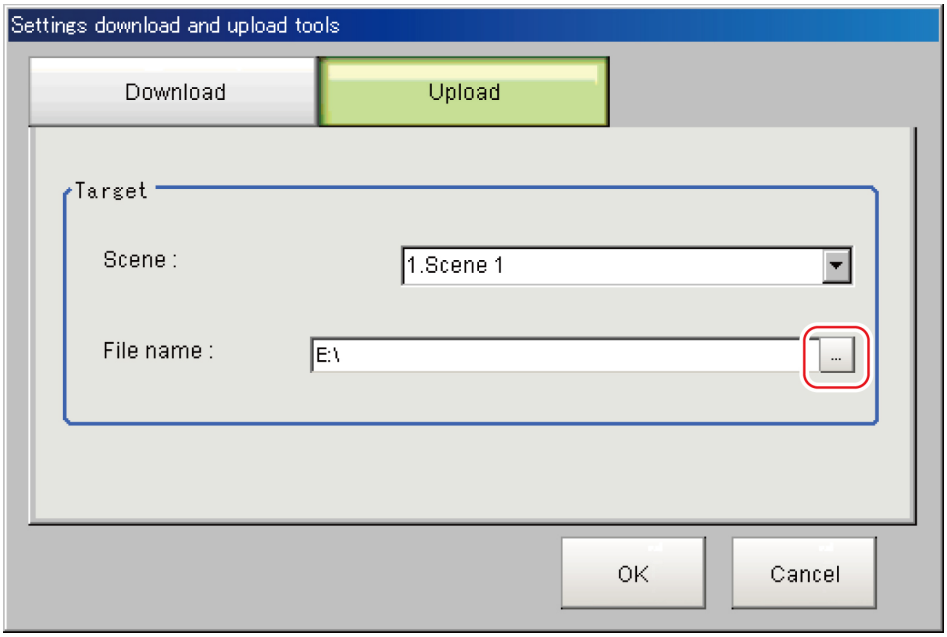
1. Switch to the scene group that contains the scene with the setting values to be uploaded.
2. When reading from USB memory, plug a USB memory device into the controller.
3. On the Menu window, tap [Tool] and then [Settings download and upload tools].
4. Tap [Upload].



5. Select the scene with the setting values to be uploaded.



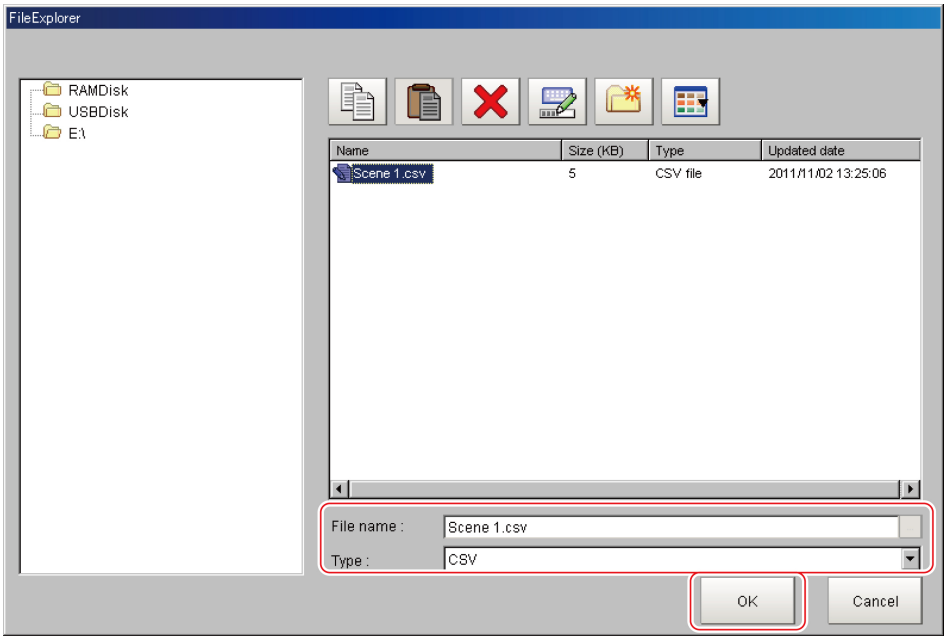
6. Tap [...].



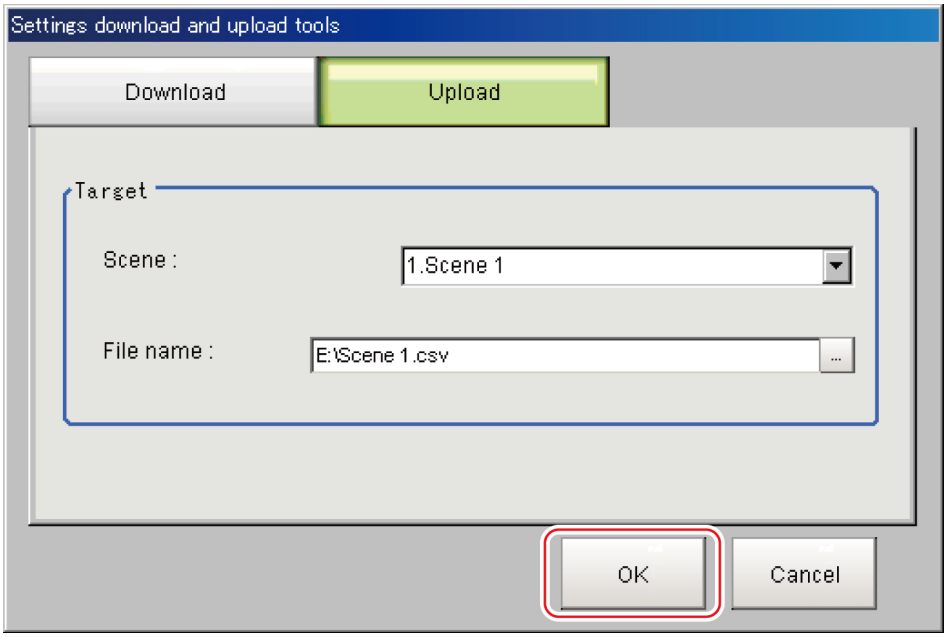
Important

- To upload the file, set the character code to Unicode (UTF-8) with Windows notepad etc., then save the file in CSV format.

7. Specify the folder and the name of the file to be loaded, and tap [OK].



8. Tap [OK].



The data will be 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)

CSV file
0. Camera Image Input
1. Search
2. Defect

Upload

Flow before overwriting
0. Camera Image Input
1. Search
2. Camera Image Input
3. Search
4. Calculation

After changing the flow
0. Camera Image Input
1. Search
2. Defect
3. Search
4. Calculation

In such a case, the processing item for Unit 3 will be changed from Camera image input to Defects/ Contamination. 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 RAMDisk/USB Device

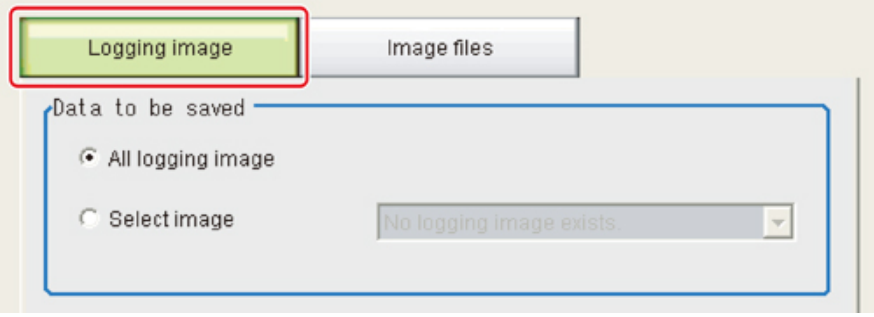
This saves logging images and image files saved in the controller to the RAMDisk or USB memory. The storage format (Bitmap or Jpeg) can be specified when they are saved.

Important

- During saving, do not restart, turn off power or remove the USB memory. The data can be corrupted.

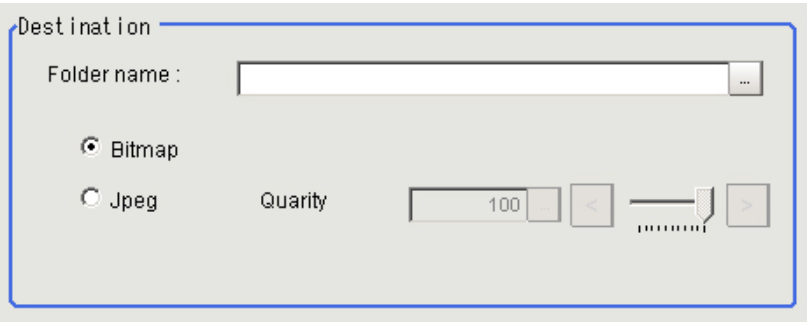
Saving Logging Images

1. When saving to USB memory, plug a USB memory device into the controller.
2. On the Main screen, tap [Tool] - [Image file save].
   The image file save window is displayed.
3. Tap [Logging image] and select the logging image to save.



Setting item	Setting value [Factory default]	Description
Data to be saved	[All logging image]	Saves all the logging images.
	Selects image	Saves the selected logging image. Tap [▼] and select the image to save. When [Latest measurement - logging image] is selected, the save file name will be LoggingImage000.ifz.

4. Specify the save destination folder name and the format.

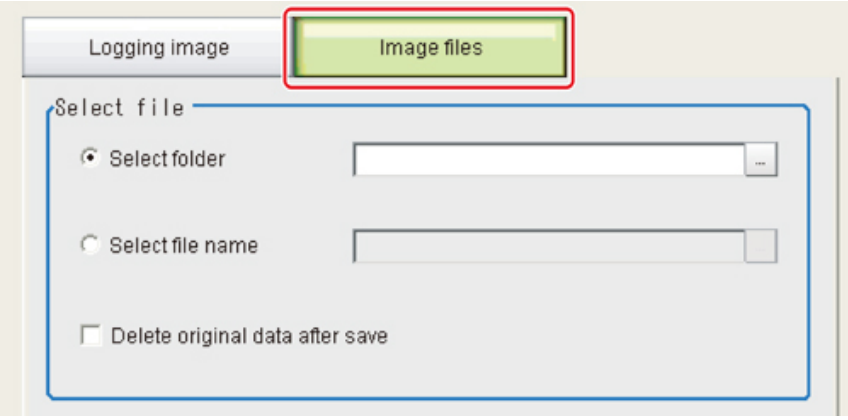


Setting item	Setting value [Factory default]	Description
Folder name	-	Specify the save destination folder name.
Format	・ [Bitmap] ・ Jpeg	Select the image format to be saved.
Quarity	0 to 100 [100]	Set the quality when the image is to be saved in Jpeg format.

5. Tap [OK].
   The logging image is saved to the selected destination. If a file with the same name already exists in the destination folder, the newly saved file is written over that old one.

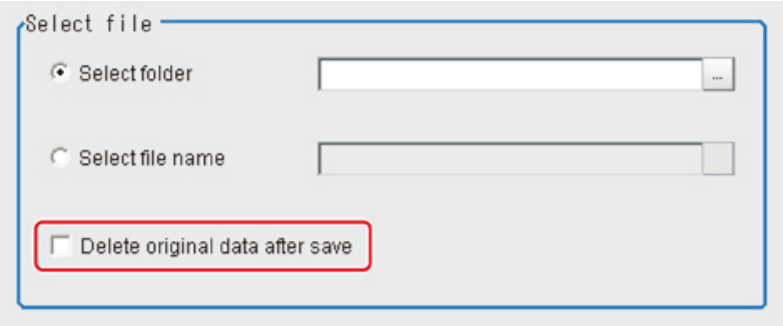
Saving image files

1. When saving to USB memory, plug a USB memory device into the controller.
2. On the Main screen, tap [Tool] - [Image file save].
   The image file save window is displayed.
3. Tap [Image files] and select the image file to save.

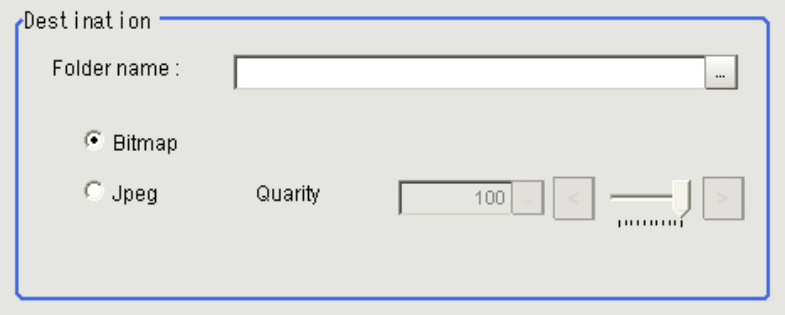


Setting item	Setting value [Factory default]	Description
Select file	[Select folder]	Saves multiple files in a folder. ・ Tap [...] and specify the source folder to copy/move. ・ Tap [▼] and select the file format. If [All files] is selected, you can save all the image files in the folder. When a file format is selected, you can only save image files in the folder that have the specified file format (extension).
	Select file name	Saves the selected image file. Tap [...] and specify a file name.

4. If you wish to delete the source file after saving a copy to USB memory, check "Delete original data after save".



5. Specify the save destination folder name and the format.



Setting item	Setting value [Factory default]	Description
Folder name	-	Specify the save destination folder name.
Format	・ [Bitmap] ・ Jpeg	Select the image format to be saved.
Quarity	0 to 100 [100]	Set the quality when the image is to be saved in Jpeg format.

6. Tap [OK].
The logging image is saved to the selected destination. If a file with the same name already exists in the destination folder, the newly saved file is written over that old one.

Using Registered Image Administration Tool

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 etc..
You can register the "Latest logging Image", "Logging Image", and "Image File".

Important

- USB memory is required for using this function.
- The registered image is saved to the USB memory.
- Do not change the configuration of files in USB memory. Changing it makes it impossible to read the files.

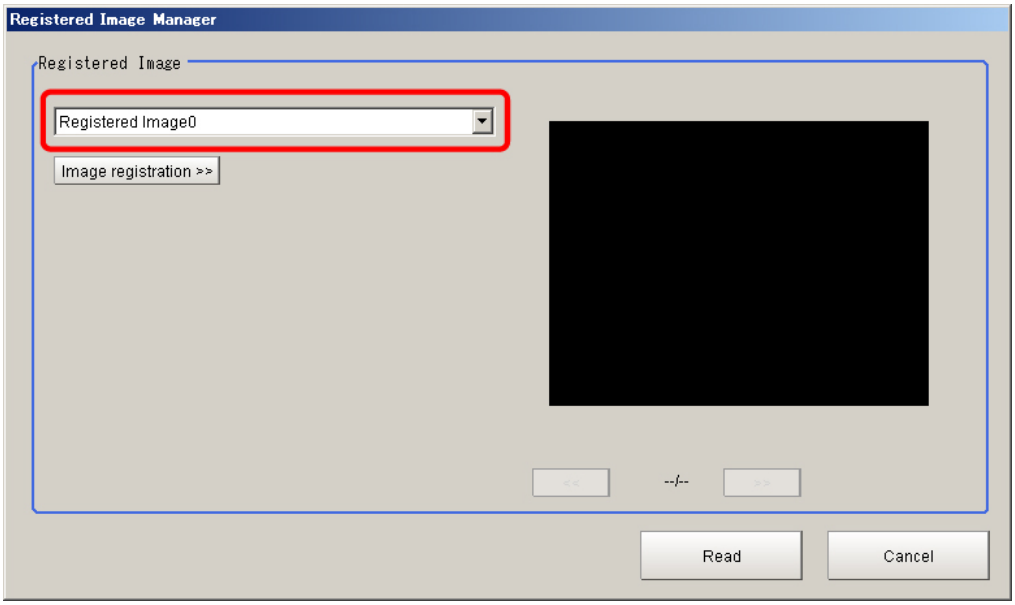
Registering Image

This section describes how to register, load or delete a image.

Registering Images

Register images as follows. The system can accommodate up to 1,000 images.

1. Insert USB memory into the controller.
2. On the Main screen, tap [Tool] menu -> Registered Image Administration Tool.
   The [Registered Image Manager] screen is displayed.
3. Select an index number of the image to register.
   The number can be selected from 0 to 999.

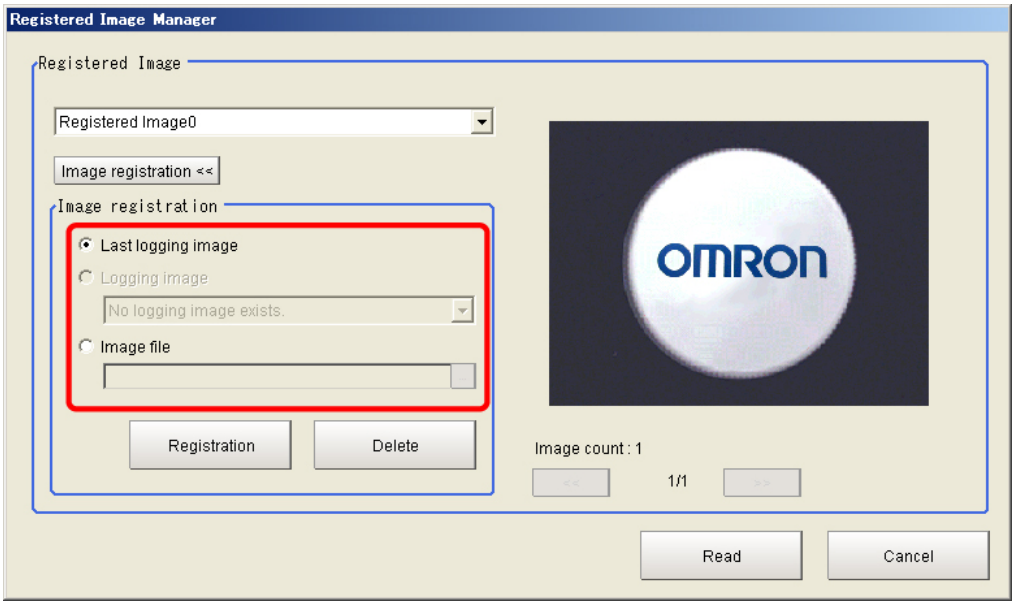


Note

- If an image already exists in the system, it will be displayed.
- If the number, which 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. Tap [Register Image>>].

5. Select the image to register.



Setting item	Setting value	Description
Registered Image	Last logging image	This registers the image logged last and being used for measurements.
	Image registration	This registers the logging image saved in the main memory. Tap [▼] to select an image to save.
	Image File	This registers an existing image file.

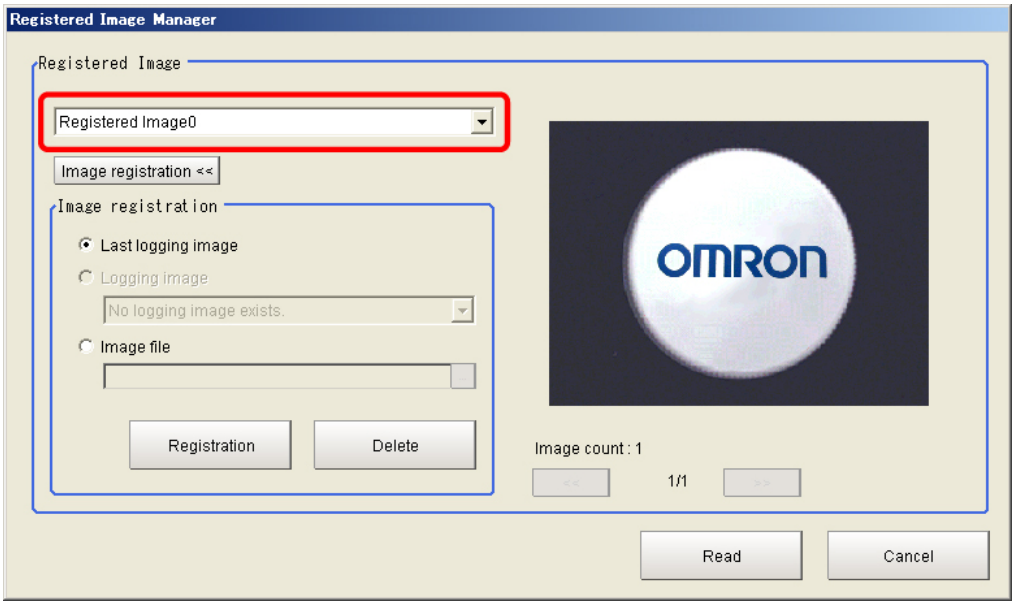
6. Tap [Registration].
   In Step 3, if you have selected a number that has been assigned to an existing image, the screen that prompts you to confirm whether to overwrite the existing image with a new image is displayed. If you want to replace the existing image with a new image, tap [Yes].
7. Tap [Image registration<<].

Deleting an Image

Delete a registered image as follows.

1. On the Main screen, tap [Tool] menu -> [Registered Image Manager].
   The [Registered Image Administration Tool] screen is displayed.
2. Tap [Image registration>>].

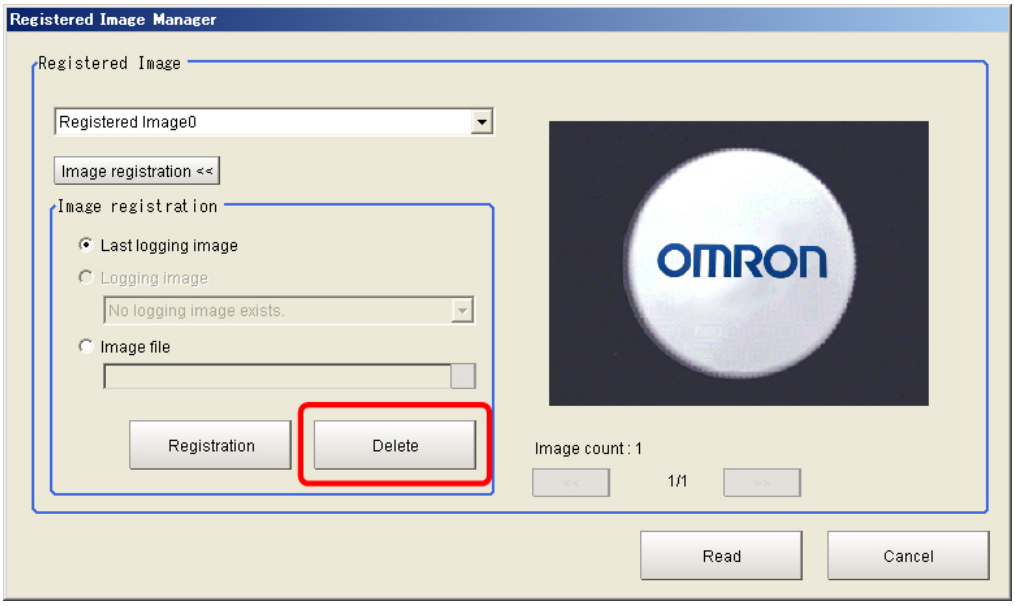
3. Select the index number of the image to delete.



Note

- When more than one image is included in the registration images, tap the [<<] or [>>] symbol under the preview window as necessary to move forward or back to the desired image.

4. Tap [Delete].
The screen that prompts you to confirm whether to delete the image.

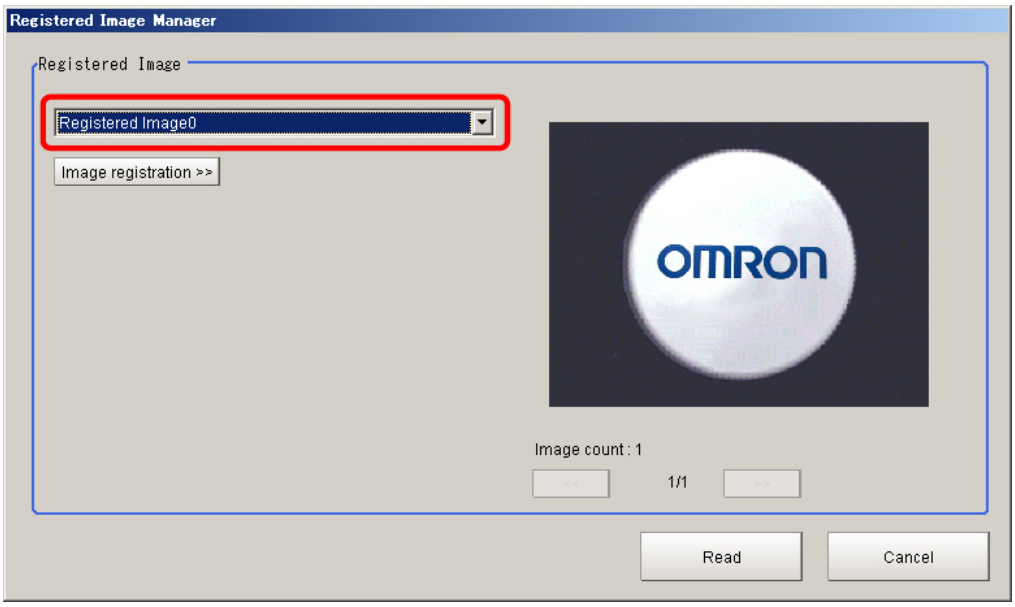


5. Tap [Yes].
The selected image is deleted.
6. Tap [Image registration<<].

Loading an Image

A registered image can be loaded as a measurement image.

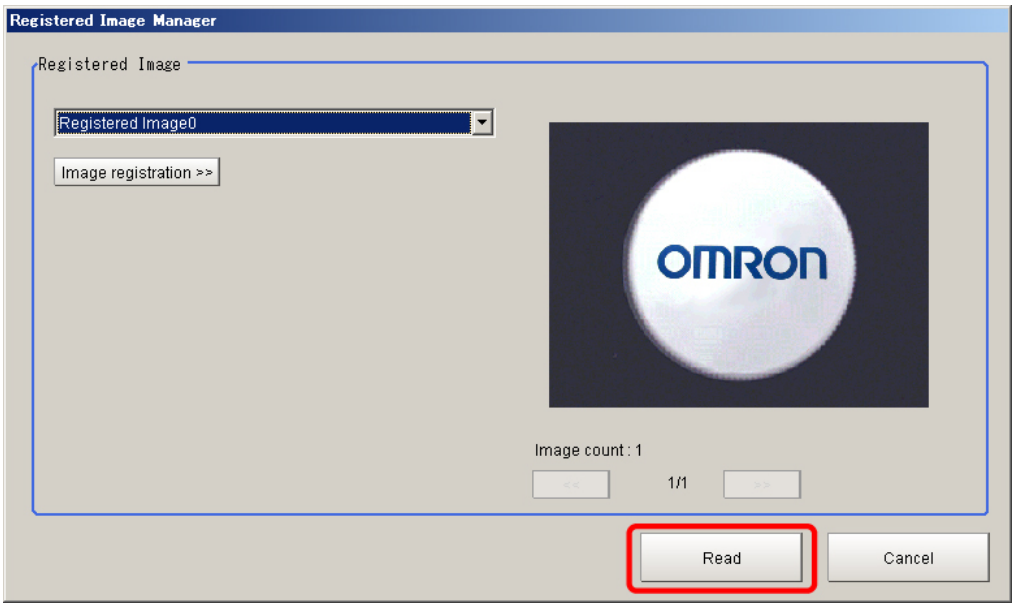
1. On the Main screen, tap [Tool] menu -> [Registered Image Administration Tool].
   The [Registered Image Administration Tool] screen is displayed.
2. Select an index number of the reference image to load.



Note:

- When more than one image is included in the registration images, tap the [<<] or [>>] symbol under the preview window as necessary to move forward or back to the desired image.

3. Tap [Read].
   The selected image is loaded as a measurement image.
   The [Registered Image Manager] window is closed and the display returns to the main screen.



Using Account Functions

You can restrict access to the controller by specific users and affiliated user groups. Because you can set a password for each user and can enable/disable operations for each user group, you can flexibly manage users to match the way they use the system, for example system administrators, managers at the actual operation sites, operators actually using the system, etc.
It is also possible to link with the operation log and get operation records for currently logged-in users.

Setting Accounts (Account List)

This explains how to add, edit, and delete user accounts.

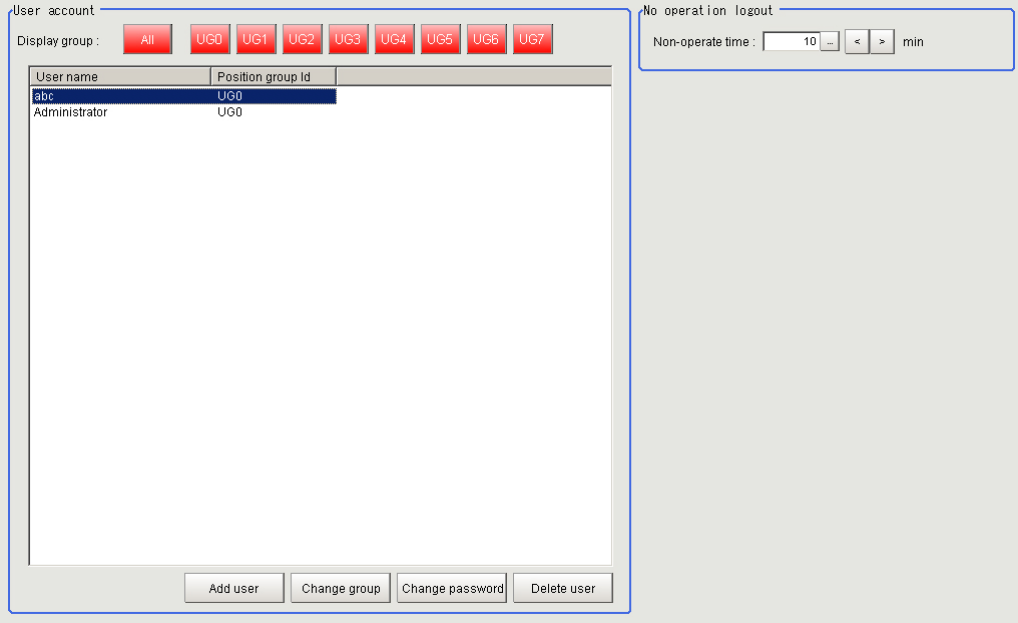
Important

- 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 "Administrator".

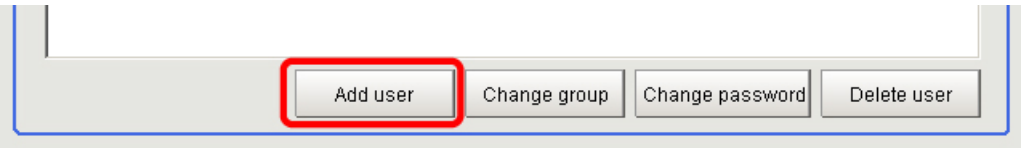
Adding an account

Add a user account as follows.

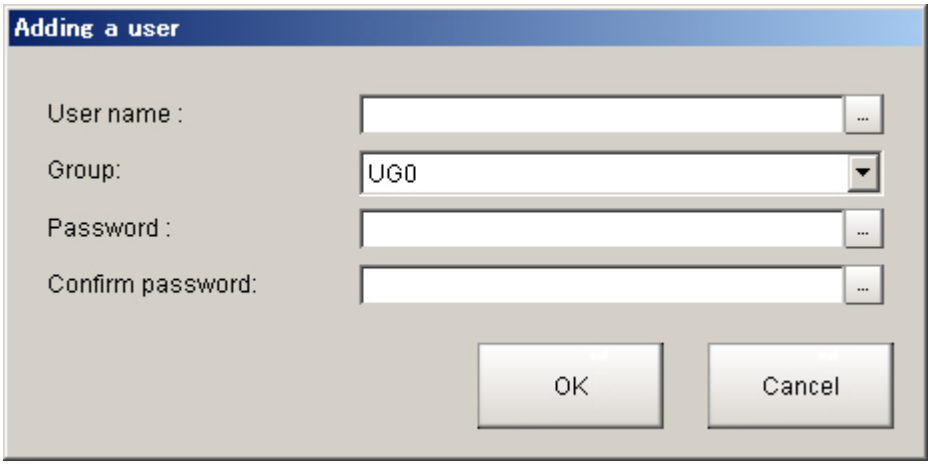
1. On the Main screen, tap the [Tool] menu - [Security Settings].
   The security settings window is displayed.
2. Tap [Account list] in the item tab area.



3. Tap [Add user].



4. Set the user information.



Setting item	Description
User name	Enter a user name of 2 to 20 single-byte alphanumerics. Uppercase and lowercase characters are recognized as different characters.
Group	Select the user group (UG0-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.141)
Password	Enter the login password for the user being added. The password for the new user must have 1 or more characters. The password for a transferred user may also be 0 characters.
Confirm password	Enter the login password again.

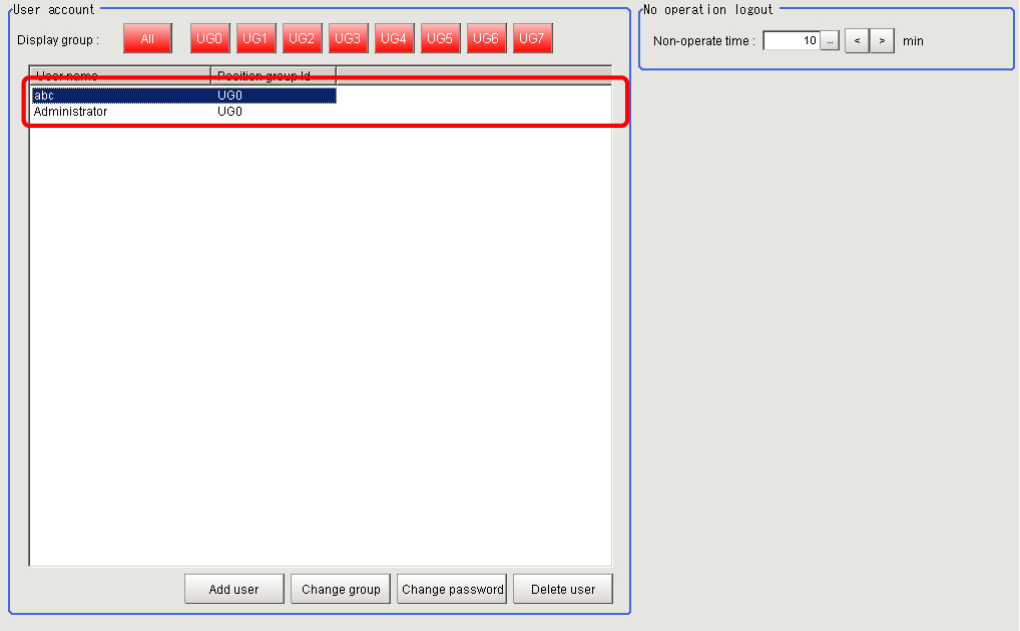
5. Tap [OK].
   The user account is added and displayed in the user account list.

Editing an account

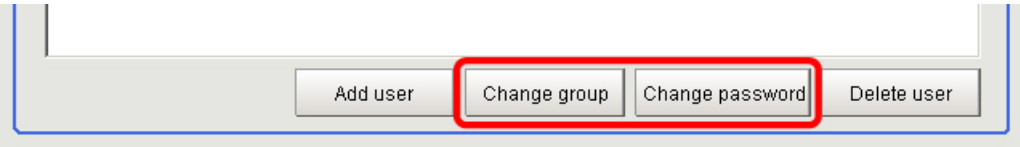
Change the affiliated group or password for the user account as follows.

1. On the Main screen, tap the [Tool] menu - [Security Settings].
   The security settings window is displayed.
2. Tap [Account list] in the item tab area.

3. Tap the user to change the affiliated group or password for.



4. Tap [Change group] or [Change password].



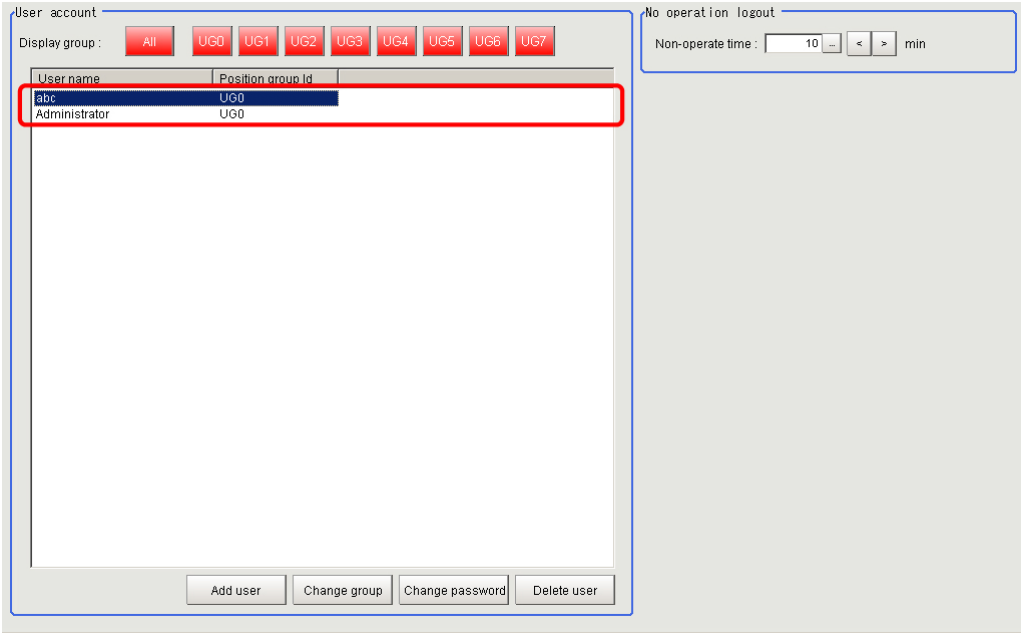
5. Change the affiliated group or password.
6. Tap [OK].
   The user information is changed.

Deleting an account

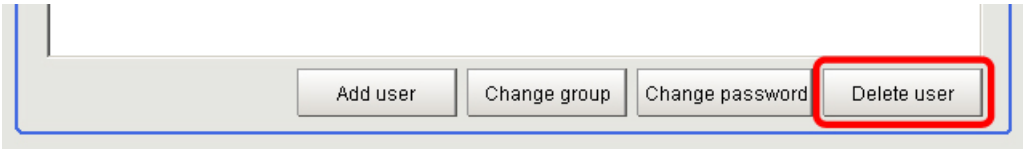
Delete a user account as follows.

1. On the Main screen, tap the [Tool] menu - [Security Settings].
   The security settings window is displayed.
2. Tap [Account list] in the item tab area.

3. Tap the user to be deleted.



4. Tap [Delete user].
   A confirmation message is displayed.

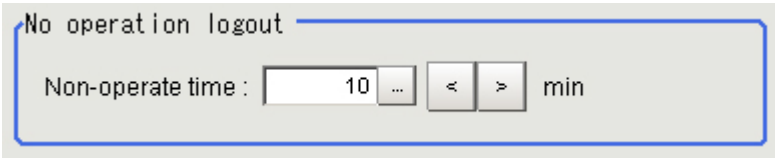


5. Tap [Yes].
   The user account is deleted.

Setting automatic logout

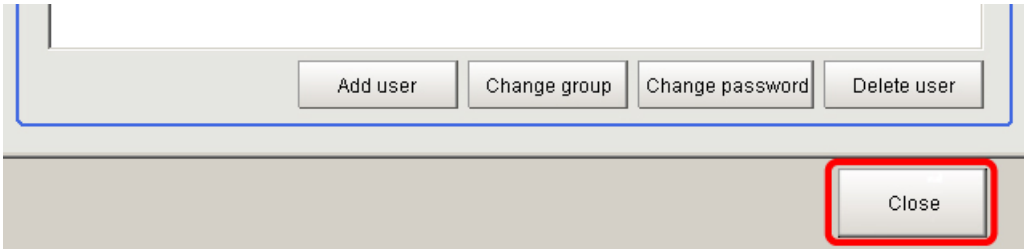
Set the length of time before an account is automatically logged out when no operation is performed as follows.

1. On the Main screen, tap the [Tool] menu - [Security Settings].
   The security settings window is displayed.
2. Tap [Account list] in the item tab area.
3. In the "No operation logout" area, set the no-operation time.



Setting item	Setting value [Factory default]	Description
Non-operation time	1 to 999 [10]	Set the length of time before an account is automatically logged out when no operation is performed as follows. The unit is minutes.

4. Tap [Close].



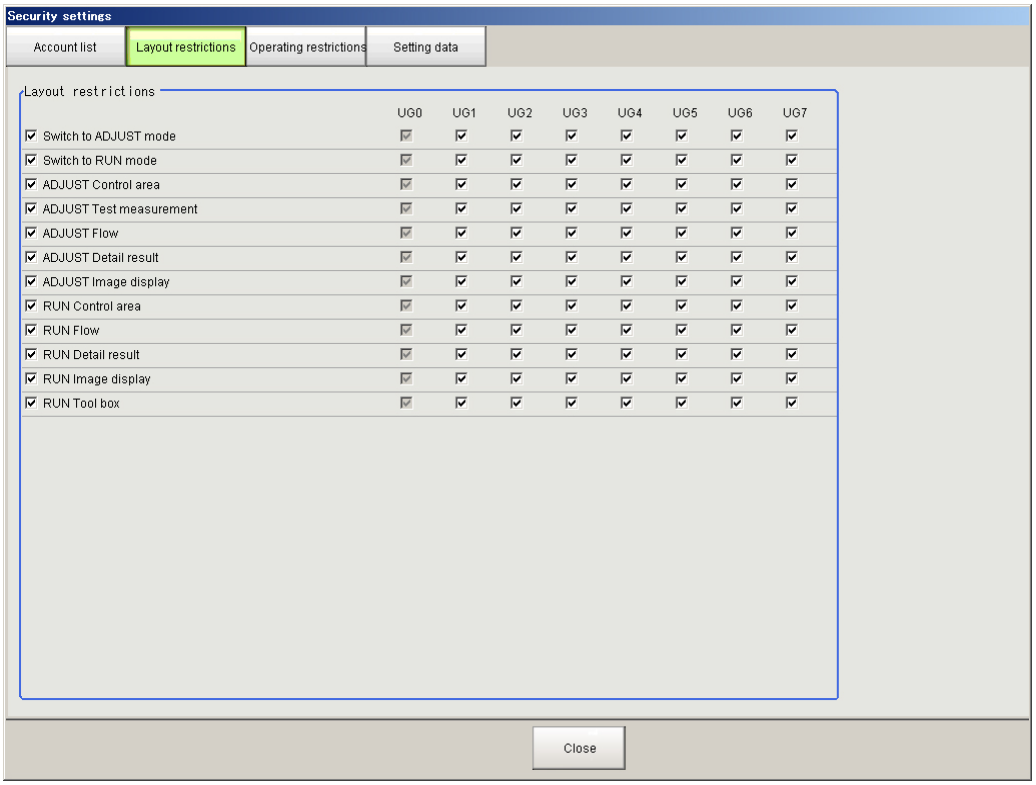
Sets the layout restrictions

Set the rights to change the layout for each user group.
You can restrict the functions that can be operated by each user group.
The layouts that can be restricted are as follows.

Security setting items	ADJUST Window		RUN	Other
	Menu bar	Other		
Switch to ADJUST mode				
Switch to RUN mode				
ADJUST Control area	Display > Control area display	Panel click		
ADJUST Test measurement	Display > Test Measure setting display	Panel click		
ADJUST flow	Display > Flow display	Panel click		
ADJUST Detail result	Display > Detail result display	Panel click		
ADJUST Image display	Display > Image display setting	Panel click		
RUN Control area			Panel click	
RUN flow			Panel click	
RUN Detail result			Panel click	
RUN Image display			Panel click	
RUN Tool box			Panel click	

1. On the Main screen, tap the [Tool] menu - [Security settings].
   The security settings window is displayed.

2. In the Item tab area, tap [Layout restrictions].



3. Change the layout restriction settings.
4. Tap [Close].

Setting User Group Operation Restrictions

You can restrict the functions that can be operated by each user group.
The operations that can be restricted are as follows.

Security setting items	ADJUST Window		RUN	Other
	Menu bar	Other		
Edit flow	Scene > Edit flow	Edit Flow buttons		
Scene switch	Scene > Scene switch	Scene switch button	Tool box > Scene switch	
Scene group switch	Scene > Scene switch > Switch			
Scene maintenance	Scene > Scene maintenance			
Unit setting	Scene > Unit setting	Flow display unit click	Flow display unit click	Open setting window on Edit Flow window
Measurement flow display size change	Display > Display the enlarged flow			

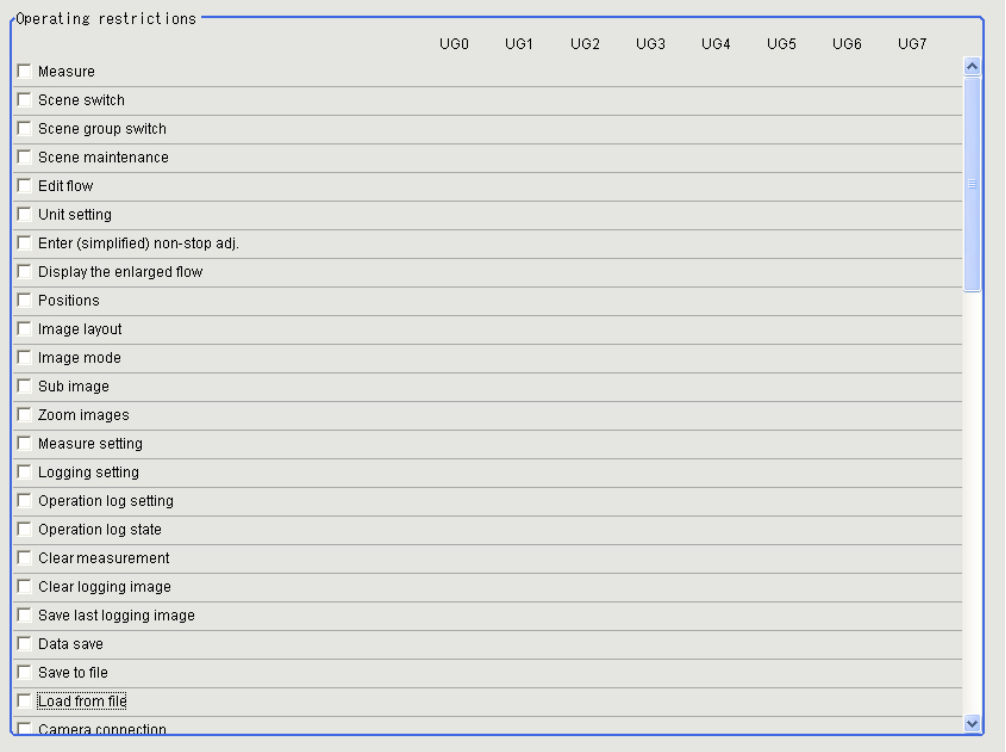
Positions	Display > Positions	Image display setting panel > Positions	Image display setting panel > Positions	
Image layout	Display > Image layout > 1 screen	Image display setting panel > Image layout	Image display setting panel > Image layout	
	Display > Image layout > 2 screens			
	Display > Image layout > 4 screens			
	Display > Image layout > Thumbnail display			
Image mode	Display > Image mode	Image display setting panel > Image mode	Image display setting panel > Image mode	
Image selection	Display > Image selection > Select images	Test measure setting panel > Image selection	Test measure setting panel > Image selection	
	Display > Image selection > Next image	Test measure setting panel > ">"		
	Display > Image selection > Previous image	Test measure setting panel > "<"		
Zoom images	Display > Zoom images		Tool box > Zoom images	
Executing measurement	Measurement > Measure	Test measure setting panel > Measure	Tool box > Measure	
Continuous measurement		Test measure setting panel > Execute continuous measurement	Tool box > Execute continuous measurement	
Measure setting	Measurement > Measure setting			
Logging setting	Measurement > Logging setting			
Operation logging setting	Measurement > Operation logging > Operation logging setting			
Start operation logging	Measurement > Operation logging > Operation logging state			
Clear measurement	Measurement > Clear measurement		Tool box > Clear measurement	

Logging image clear	Measurement > Clear logging image		Tool box > Clear logging image	
Save last logging image	Measurement >Save last logging image		Tool box > Save last logging image	
Data save	Data > Data save	Data save button	Tool box > Data save	
Save to file	Data > Save to file			
Load from file	Data > Load from file			
Camera connection	System >Camera >Camera connection			
camera settings	System > Camera > Inter-camera setting			
Standard parallel I/O	System > Communication > Standard Parallel I/O			
Ethernet: Normal (TCP)	System > Communication > Ethernet: Normal (TCP)			
Ethernet: Normal (TCP Client)	System > Communication > Ethernet: Normal (TCP Client)			
Ethernet: Normal (UDP)	System > Communication > Ethernet: Normal (UDP)			
Ethernet:PLC Link(SYSMAC CS/CJ/CP/One)	System > Communication > PLC Link(SYSMAC CS/CJ/CP/One)			
Ethernet:PLC Link(MELSEC QnU/Q/QnAS)	System > Communication > Ethernet:PLC Link(MELSEC QnU/Q/QnAS)			
RS-232C/422:Normal	System > Communication > RS-232C/422:Normal			
RS-232C/422:PLC Link (SYSMAC CS/CJ/CP/One)	System > Communication > RS-232C/422:PLC Link(SYSMAC CS/CJ/CP/One)			
RS-232C/422:PLC Link(MELSEC QnU/Q/QnAS)	System > Communication > RS-232C/422:PLC Link(MELSEC QnU/Q/QnAS)			
EtherNet/IP	System > Communication > RS-232C/422:PLC Link(MELSEC QnU/Q/QnAS)			
EtherCAT	System > Communication > EtherCAT			
Date-time setting	System > Controller > Date-time setting			
Language setting	System > Controller > Langage setting			
Fan control setting	System > Controller > Fan control setting			
Startup setting	System > Controller > Startup setting			
RUN window selection	System > Controller > Select RUN mode			
RUN window display selection	System > Controller > RUN mode view setting			
Short cut function setting at run mode	System > Controller > Create shortcut			

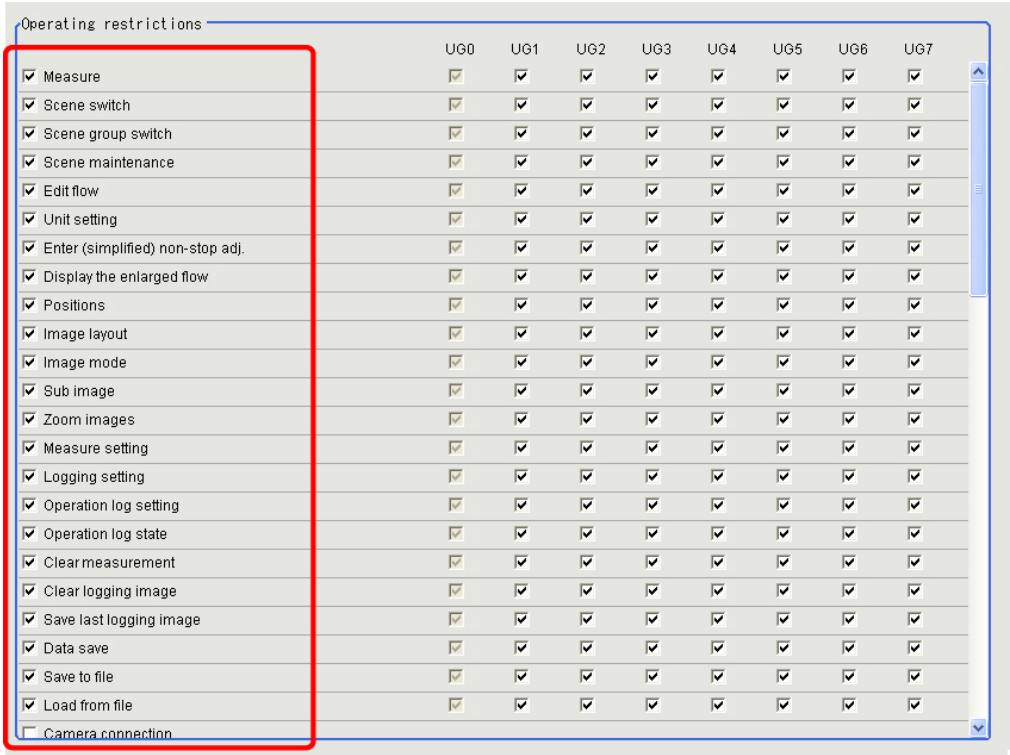
STEP signal filter setting	System > Controller > STEP setting			
Encoder trigger setting	System > Controller > Encoder trigger setting			
Network drive setting	System > Controller > Network drive setting			
System initialization	System > Controller > System initialization			
System restart	System > Controller > System restart		Tool box > System restart	
Screen capture	System > Controller > Screen capture			
Screen capture setting	System > Controller > Screen capture setting			
NG analyser	Tool > NG analyser			
User Data Tool	Tool > User data tool			
Settings download and upload tools	Tool > Settings download and upload tools			
Image file save	Tool > Image file save			
Customize I/O command	Tool > Customize I/O command			
Registered Image Manager	Tool > Registered Image Manager			
System information	Others > System information		Tool box > System information	
Data transfer		Data transfer button		
Return to RUN mode		Return to RUN mode button		
Clear Error signal			Tool box > Clear Error signal	
Clear Parallel OR+DO			Tool box > Clear Parallel OR+DO	
(Simplified) Non-stop adjustment			Tool box > Simplified non-stop adjustment	
			Tool box > Non-stop adjustment	

1. On the Main screen, tap the [Tool] menu - [Security Settings].
   The security settings window is displayed.

2. In the item tab area, tap [Operating restrictions].

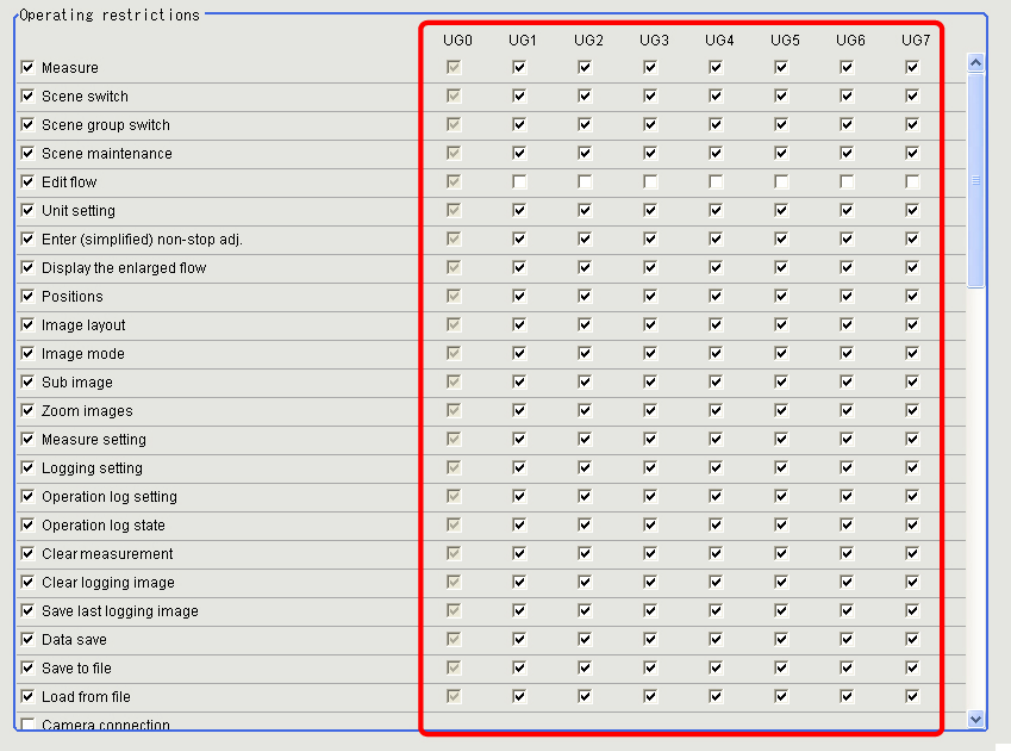


3. Check the operations to be restricted.
Operations that are not checked are not restricted.



4. Check the operations to be permitted in units of right side user groups (UG1 - UG7).

Operations that are not checked cannot be operated by users belonging to that group.



5. Tap [Close].
   Operation restrictions are set for user groups.

Saving/Loading/Deleting the Contents of 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 contents of security settings

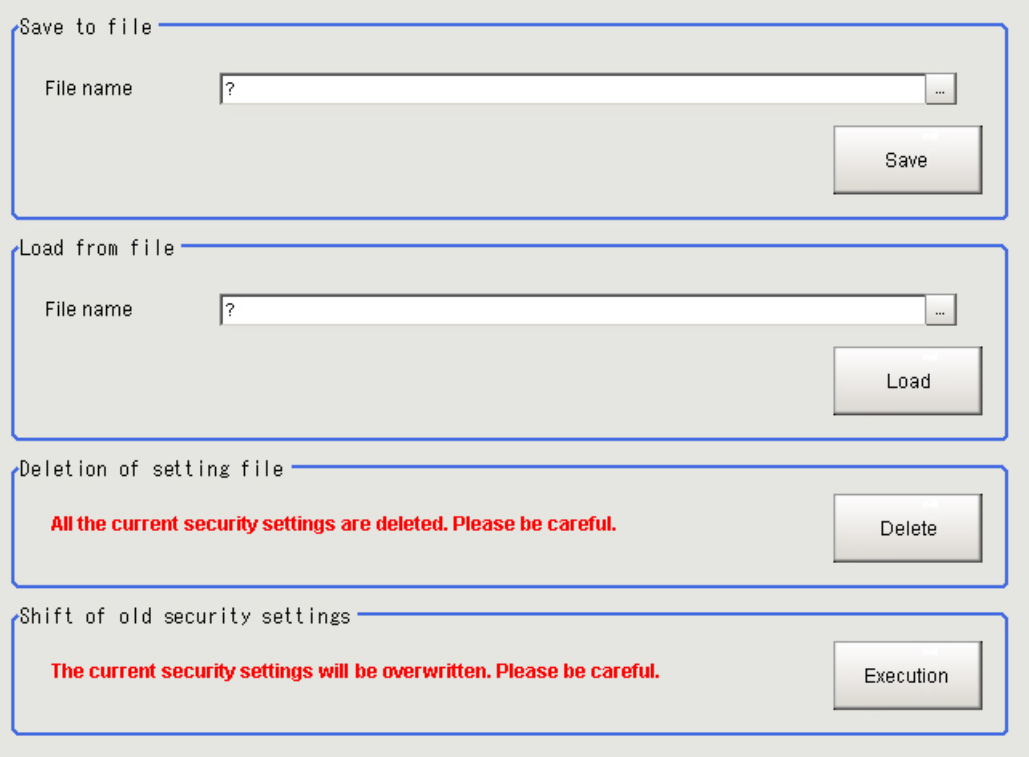
You can save user account and user group settings to the RAM Disk or USB memory.

Important

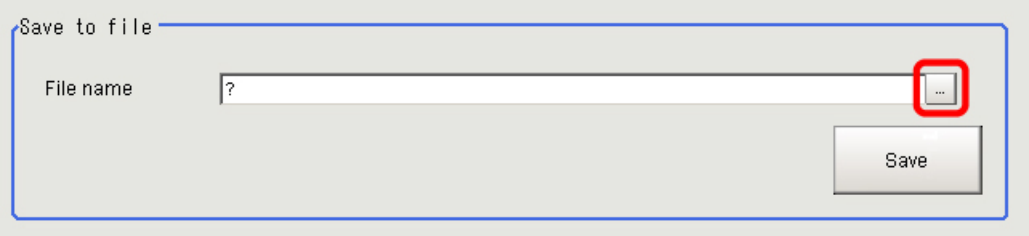
- During data transfer to USB memory, do not remove the USB memory device until transfer is completed. Data and/or the USB memory may corrupt.
- Timing for saving in controller
  Data is only saved to the Controller when the security setting window is closed with the [Close] button.
  When the login window is ended by selecting cancel, data is not saved to the Controller. The set contents or loaded contents are cleared by a restart.
- 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 to USB memory, plug a USB memory device into the controller.
2. On the Main screen, tap the [Tool] menu - [Security Settings].
   The security settings window is displayed.

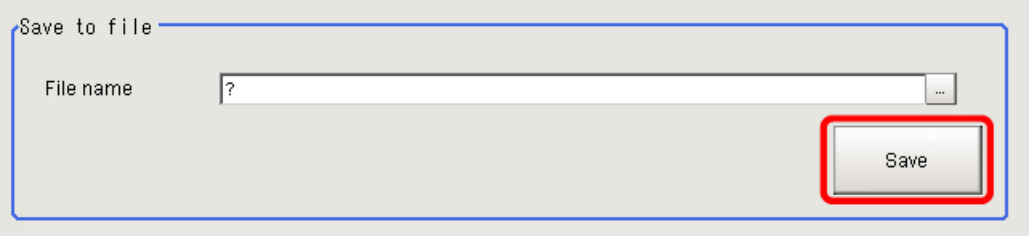
3. In the Item Tab area, tap [Setting Data].



4. Specify the save destination folder and file name.



5. Tap [Save].

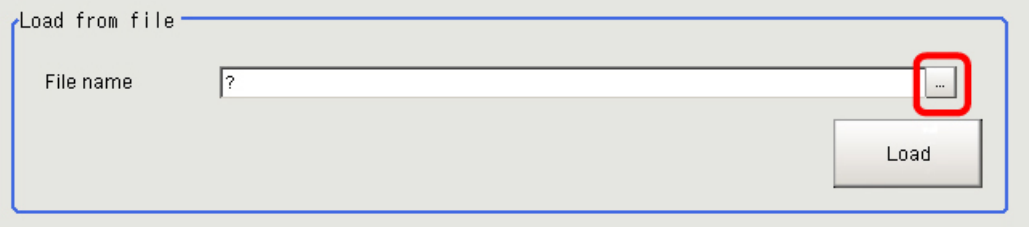


Loading the contents of security settings

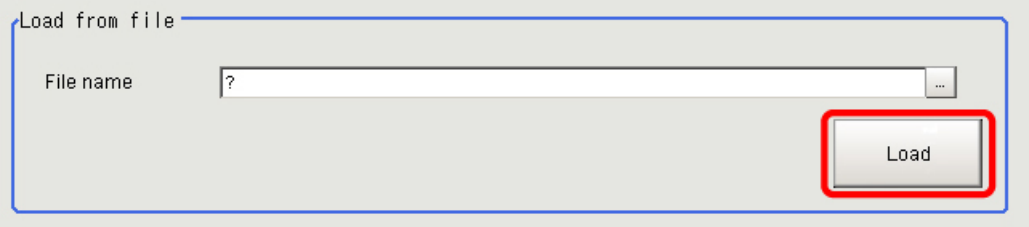
Load the saved user account and user group settings into the controller as follows.

1. If the settings were stored to USB memory, insert the USB memory containing the security settings to load into the controller.
2. On the Main screen, tap the [Tool] menu - [Security Settings].
   The security settings window is displayed.
3. In the Item Tab area, tap [Setting Data].

4. Select the file to load.



5. Tap [Load].



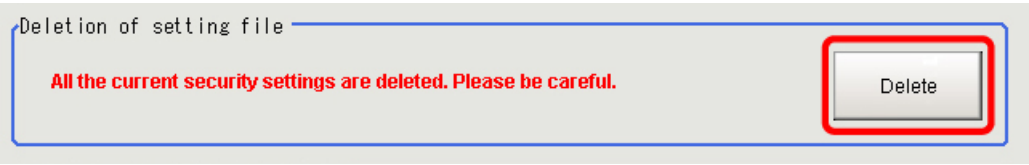
Deleting security settings

Delete saved user account and user group settings as follows.

Important

- Note that the current security settings are all deleted.

1. On the Main screen, tap the [Tool] menu - [Security Settings].
   The security settings window is displayed.
2. In the Item Tab area, tap [Setting Data].
3. Tap [Delete].



   The security settings are deleted and the following message is displayed.
   "User info logging in was changed now. Please log in again."
4. Tap [OK].
   The login window is displayed.
   Enter the default user/password "Administrator".
   If the login window is canceled, the security setting window is closed.

Moving from old security settings

Password settings made in FZ4 Ver4.12 and earlier can be inherited.

Important

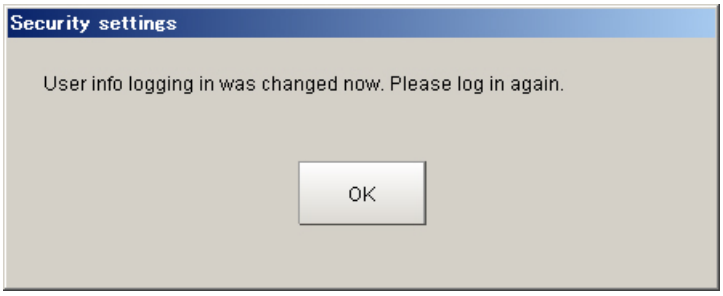
- Note that the inherited security settings overwrite the current ones.

1. If the settings were stored to USB memory, insert the USB memory containing the security settings to load into the controller.
2. On the Main screen, tap the [Tool] menu - [Security Settings].
   The security settings window is displayed.

3. In the Item Tab area, tap [Setting Data].
4. Tap [Execution].

The "After the migration is finished, saved console. OK?"confirmation message is displayed.

5. Tap [Yes].
The old security settings are changed.



6. Tap [OK].
Enter the user name and password to log in again.

Switching the User Account

Once a user account is set up, you can log in and log out with the registered user account. The login screen is also displayed even though you are already logged in, if you try to execute an operation you do not have the right to use. In that case, log in with a user account that does have the right to execute that operation.

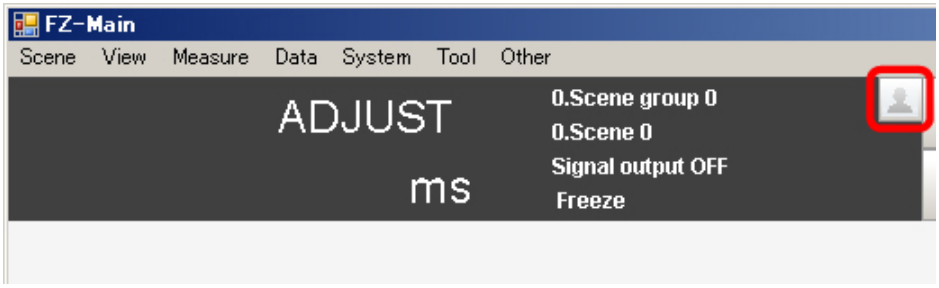
Logging in

When you log in, you can execute those operations that the user account you logged into has the right to execute.


Logout state

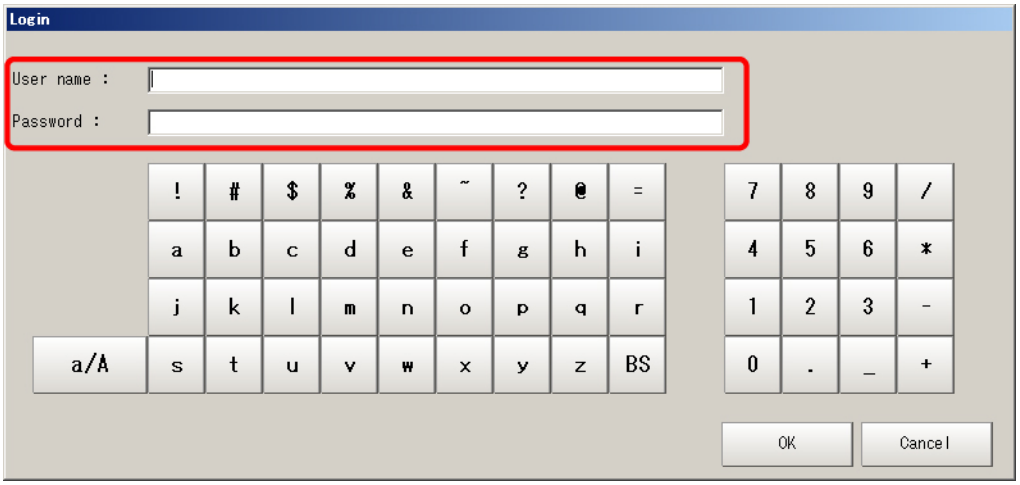

Login state

1. Tap [Login Icon] in the Measurement Information Display area.



The login window 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.

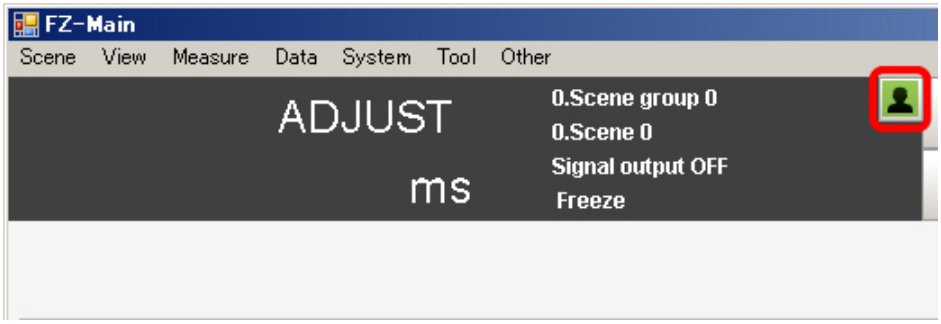
3. Tap [OK].
The login icon switches to the logged-in state.

Logging out

Note

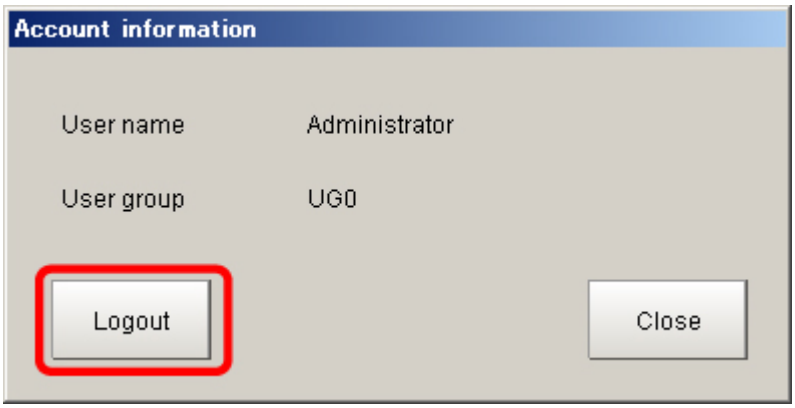
- If an automatic logout time is set, when you do not perform any operations at all for the set time period, you are automatically logged out.

1. Tap [Login Icon] in the Measurement Information Display area.

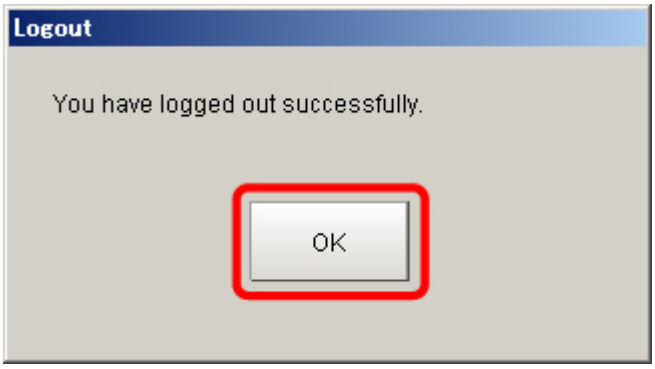


The login window is displayed.

2. Tap [Logout].



3. Tap [OK].



The login icon switches to the logged-out state.

Using Custom Command

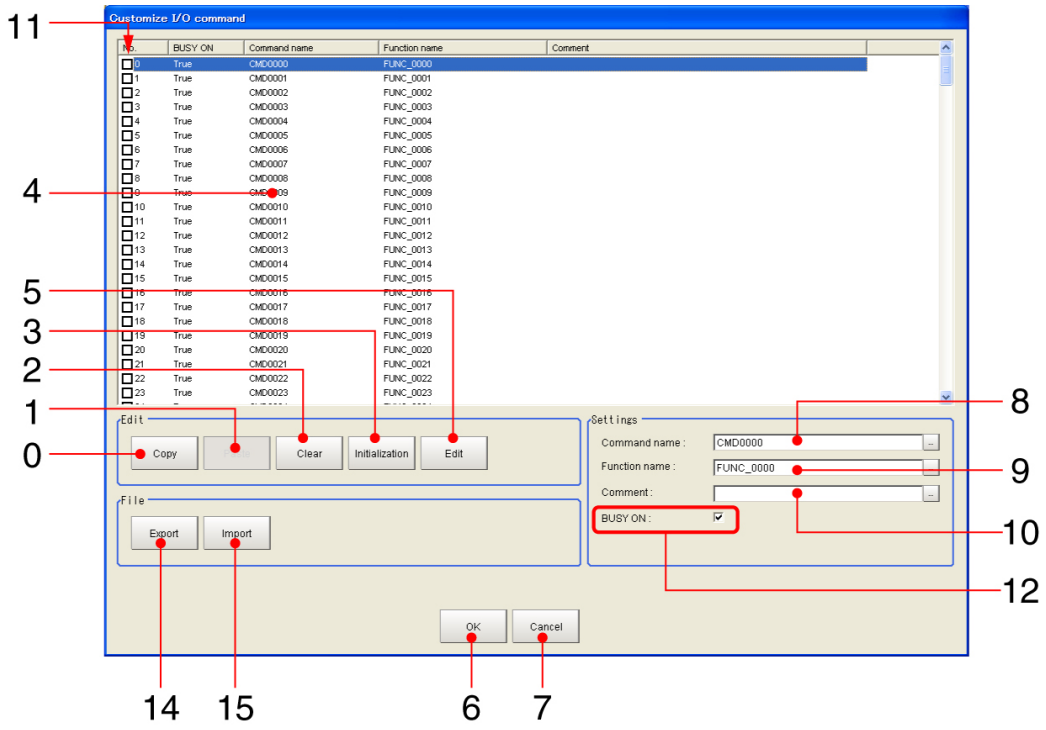
Besides the commands that are available as standard, it is also possible to define and use individual commands.

Startup the I/O command customize tool

Important

- For remote operation, the I/O command customize is disabled.

1. On the Main screen, tap [Tool]-[Customize I/O command].

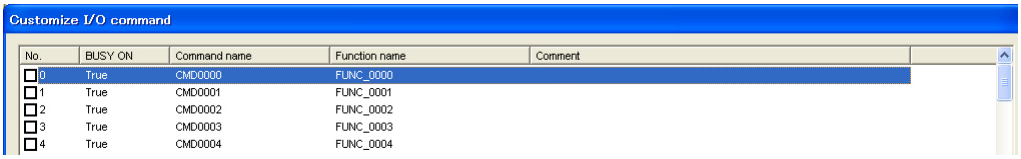


Description of display elements are as below.

No.	Name	Description
0	Copy	Copy the selected command in the command list.
1	Paste	The selected command is overwritten by the copied information. Paste targets are "comments" and "processing details." If nothing is copied, this is disabled.
2	Clear	The information of selected command, such as "Command name" "Function Name" "Comment" and "Program" is initialized.
3	Initialization	The information of all of the commands, such as "Command name" "Function Name" "Comment" and "Program" is initialized.
4	Command list	Display the list of the commands.
5	Edit	Launch the Macro program editor for selected command.
6	OK	Save change and return to Main window.
7	Cancel	Return to Main window without saving.
8	Command name	Display and edit command name for selected comand.

9	Function name	Display and edit function name for selected comand.
10	Comment	Display and edit comment for selected comand.
11	Enable/ Disable	Set/display whether custom command is enabled. If defined but not checked, it is not executed.
12	Busy On	Set/display whether to change to measurement stop state (MeasureStop) before executing command. If checked, BUSY is turned ON while command is executing, and then after execution of command has finished, measurement stop state is released (MeasureStart). Afterwards, a MeasureInit event is raised.
14	Export	Export the macro program to file.
15	Import	Import the macro program from file. The existing data will be overwritten.

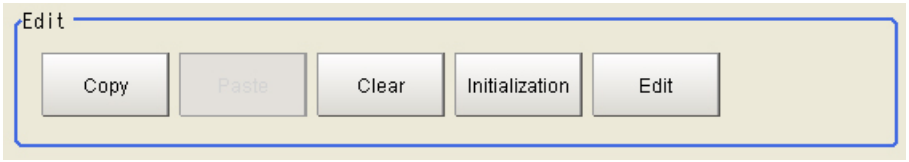
2. Select the command number to be registered.



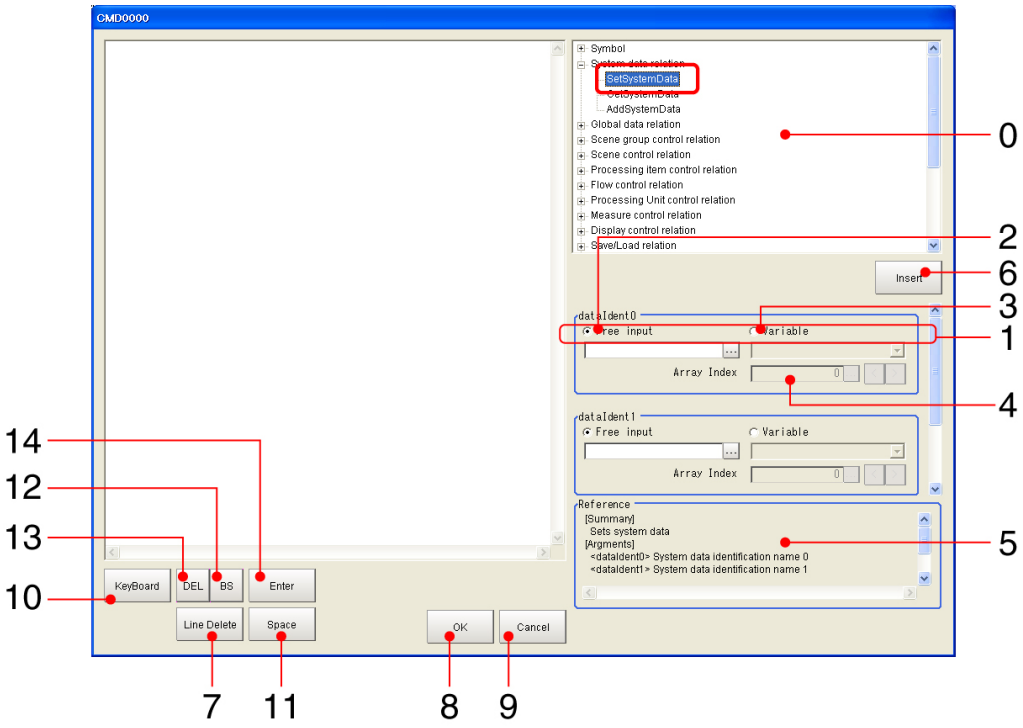
3. Enter the command name, function name and comment.

Setting item	Description
Command name	Specify Non-procedure command identification name.
Function name	Set when using created command as function in other command.
Comment	Maximum 256 characters
Busy On	Set whether to change to measurement stop state (MeasureStop) before executing command. If checked, BUSY is turned ON while command is executing, and then after execution of command has finished, a MeasureInit event is raised.

4. Tap the [Edit] button.



5. Selecting a macro command in the Command Reference Window displays the Command Input Window and the Command Reference.



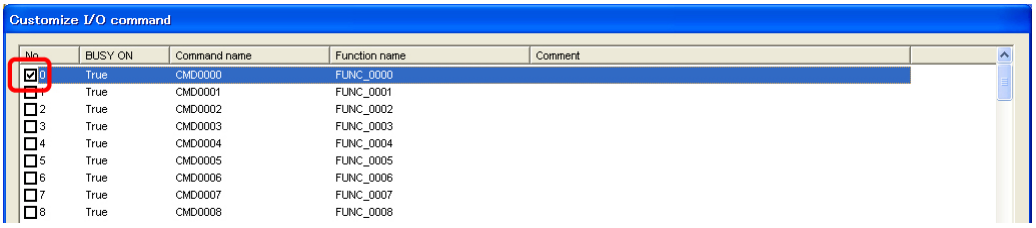
Define the command.
Using macro program rules, the command reference, the system data list, and the IO module list as reference, define the command.

Description of display elements are as below.

No.	Name	Description
0	List of functions	Show the list of macro functions. Here we can select the function to input.
1	Type of parameter input	Select the input method of parameter (Free input or Variable select).
2	Free input	Input the value for selected parameter directly. This is enabled when "Free input" is selected on "Type of parameter input"
3	Variable	Select the variable for selected parameter. This is enabled when "Variable" is selected on "Type of parameter input"
4	Array Index	Input the index for array type variable. When -1 are set, it means no index. This is enabled when "Variable" is selected on "Type of parameter input", and array type variable is selected.
5	Reference	Show the function reference.
6	Insert	Insert the settings of function input menu on current position of Macro edit window as program line.
7	Line Delete	Delete the current line of Macro edit window.
8	OK	Save change and return to Customize command list.
9	Cancel	Return to Customize command list without saving.
10	KeyBoard	Switch showing / hiding software keyboard.

11	Space	Insert blank character on current position of Macro edit window.
12	BS	Delete previous character of the current position of Macro edit window.
13	DEL	Delete next character of the current position of Macro edit window.
14	Enter	Insert new line on current position of Macro edit window.

6. Tap [OK].
7. To enable the created command, place a check in the [No] checkbox.



8. Tap [OK], and close the communication custom command screen.
   Before closing the screen, the created command is saved in the file.

Common behavior of customize IO command

Basic sequence

Normally, each of IO commands are processed in the sequence as below :
1.Check input command and parameters are valid (range or type)
2.Body of the procedure
3.Output the result or response
The way of input/output command, parameters and response depends on the type of IO modules.
For detail, please refer the pages shown below.

Reference: ▸ Normal command (p.157)
Reference: ▸ Parallel IO command (p.157)
Reference: ▸ PLC link command (p.158)
Reference: ▸ Field bus command (p.158)

Control BUSY signal

Basically the BUSY flag on Customize I/O command list window should be ON.

Important

- Executing measurement (Measure command) with BUSY flag set to ON causes error.
  If you need to combine measure command with the command which is necessary to set BUSY ON (For example, switching scene and executing measurement), please set BUSY flag OFF and write the program like this way:

```
MeasureStop                    ' Set BUSY ON (Forbid measurement)
ChangeScene ArgmentValue#(0)   ' Execute the command which can be used with BUSY ON condition
MeasureStart                   ' Set BUSY OFF (Permit measurement) before measurement
Measure                        ' Execute measurement
```

Standard IO commands

When the same command name / command id of standard IO commands are used for customize IO commands,
customize IO command has the priority and the standard IO commands are not executed.
If you execute the standard IO commands after execution of customize IO commands, please add the line as below.

```
CommandExecute&=False
```

In this case, standard IO commands is executed just after executing customize IO command.

Calling the procedure defined on the other commands

It is possible to call the procedure defined on the other commands during the command execution.
Each command has "Function name", and it is used to call the procedure.

Example) When command is defined as the table below and we intend to call procedure of CMD0 from CMD1,

Command No.	Command name	Busy	Function name
0	CMD0	False	FUNC0
1	CMD1	True	FUNC1

the codes for CMD1 should be like this:

```
Gosub *FUNC0
```

This case, the behavior of the command like BUSY depends on the caller (CMD1), and BUSY stays ON until the end of the procedure.

Important

- Please be careful not to make the commands calling each other (In the case above, CMD0 also calls FUNC1), because it makes infinite loop.

Define the different procedure according to I/O module

The variable IoIdent$ stores the IO module identification name, which received the current I/O command.
When you define the different procedure for each I/O modules, please make branch by the value of IoIdent$.

Example) The command which receives "Serial" for serial command, and "Ethernet" for UDP normal

```
If IoIdent$ = "SerialNormal" Then
   Response$ = "Serial"
Elseif IoIdent$ = "UdpNormal" Then
   Response$ = "Ethernet"
Endif
```

Creating serial command

Command parameters

Received text string is split by space character(" ") into command and parameters, and stored in the predefined variables shown below:

Variable name	Type	Content
ArgmentsLength&	Integer	Number of parameters
ArgmentString$()	Array of text string	Array of parameters (string)
ArgmentValue#()	Array of real numbers	Array of parameters converted to number (*)If conversion failes, set to 0.

"AAA param0 param1 param2"

When the system redeived the string as above, parameters are set like this :

ArgmentsLength&: 3 (number of parameters)

ArgmentString$(0): param0 (String type)
ArgmentString$(1): param1 (String type)
ArgmentString$(2): param2 (String type)

ArgmentValue#(0): numeric value converted from param0 (0 when conversion failed)
ArgmentValue#(1): numeric value converted from param1 (0 when conversion failed)
ArgmentValue#(2): numeric value converted from param2 (0 when conversion failed)

Example) The command "SC 1" that switches scene 1

ScaneChange ArgmentValue#(0)

Response output

Result of the command procedure can be returned to the system by setting the value on these variables.

Variable name	Type	Content
ResponseString$	Text string	Output data
ResponseCode&	Integer	Result of command 0 : success (returns "OK") non 0 : fail (returns "ER")

Example) The command "TEST"

ResponseString$ = "TestString"

Command and response will be like this :

-> TEST
<- TestString
<- OK

Creating Parallel Command

Response output

Result of the command procedure can be returned to the system by setting the value on these variables.

Variable name	Type	Content
CommandResponse&	Integer	Command execution result 0 : Command processing successful Other than 0 : Command processing failed (The ERROR signal turns on.)

Creating PLC Link Command

Command parameters

The command parameters are stored on the predefined variables as below.

Variable name	Type	Content
ArgmentsLength&	Integer	Number of parameters
ArgmentValue#()	Array of real numbers	Array of parameters (*)integer type of data for 2 channels

Response output

Result of the command procedure can be returned to the system by setting the value on these variables.

Variable name	Type	Content
ResponseValue&()	Array of Integers	Output data
ResponseCode&	Array of real numbers	Command execution result 0 : Command processing successful -1 : Command processing failed

Creating Field Bus command

Command parameters

The command parameters are stored on the predefined variables as below.

Variable name	Type	Content
ArgmentsLength&	Integer	Number of parameters
ArgmentValue#()	Array of real numbers	Array of parameters (*)integer type of data for 2 channels

Response output

Result of the command procedure can be returned to the system by setting the value on these variables.

Variable name	Type	Content
ResponseValue&()	Array of Integers	Output data
ResponseCode&	Array of real numbers	Command execution result 0 : Command processing successful -1 : Command processing failed

Common rules for Macro

Grammar of program approximately conform basic BASIC grammar, it also contains part contents that Macro program specially has.
Please see each item for details.
Reference: Calculation (p.159)
Reference: Character (p.160)
Reference: Comment (p.161)
Reference: Constant (p.161)
Reference: Convert Type (p.161)
Reference: Expression (p.161)
Reference: Label (p.162)
Reference: Line Number (p.162)
Reference: Line (p.162)
Reference: Reserved Word (p.162)
Reference: Reserved Word List (p.163)
Reference: Statement (p.166)
Reference: Subroutine (p.166)
Reference: Variable (p.166)
Reference: Wildcard (p.168)

Calculation

Calculation can be divided into arithmetic calculation, relative calculation and logic calculation.
Arithmetic calculation includes four fundamental calculation, index calculation and getting-remainder calculation. Following is various kinds of calculation.

Arithmetic Calculation	Calculation Content	Example	Mathematics Expression
+	Addition Calculation	A+B	A+B
-	Subtraction Calculation	A-B	A-B
*	Multiplication Calculation	A*B	A × B or AB
/	Division Calculation	A/B	A ÷ B or A/B
^	Exponent Calculation	A^B	A^B
Mod	Mod Calculation	A mod B	A-[A/B] × B []is Gauss symbol

Division 0 calculation will be wrong.
Do addition calculation, subtraction calculation and multiplication calculation. If result overstep -1.0e30 to 1.0e30, then it will be wrong.
Relative calculation is comparatively calculation of two numerical data or two character data. If comparatively result is true, return -1, else return 0.
Following is all kinds of relative calculation.

Relative Calculation	Content	Example
=	Equal	A=B
<>, ><	Not Equal	A<>B, A><B
<	Less Than	A<B
>	More Than	A>B
<=, =<	Less Than or Equal	A<=B, A=<B
>=, =>	More Than or Equal	A>=B, A=>B

Relational calculation is used in comparing between two values. If result is true, returns -1, otherwise returns 0.
Logic calculation can be used to check more than one condition or operate with bit to designated value. Following is all kinds of logic calculation.

Logic Calculation	Content	Example
Not	Non	not A
And	Logic And	A and B
Or	Logic Or	A or B
Xor	Xor	A xor B

Logic calculation can be used to check more than one condition or operate with bit to designated value. We can use "or" calculation to make special bit 1. We also can use "and" calculation to make special bit 0.
The priority of calculation is as follows.

1	Parenthesis()
2	Function
3	Exponent arithmetic(^)
4	Minus(-)
5	Multiplication or Division(*,/)
6	Mod Calculation(Mod)
7	Addition or Subtraction(+,-)
8	Relative Calculation(<,>,=and so on)
9	Not
10	And
11	Or
12	Xor

Character

Only when English lowercase letter of character constant and character variable is enclosed by two quotation marks, it is case sensitive.We also can use following special notation.

Colon(:)	Separate more than two sentences in a line.
Comma(,)	Separate parameter.
Semicolon(;)	Separate output parameter.
Apostrophe(')	Same as Rem, it is used to annotate sentence.
Asterisk(*)	Prefix of label name.
Space( )	It must be separated by space between command parameter and succeed parameter. It is possible to put it between other command, the variable identifier, and the numerical value if necessary.
Double Quotation Marks(")	Substitute string variable with string.
Ampersand(&)	Use it in integer variable or array.
Pound Sign(#)	Use it in double variable or array.
Dollar Mark($)	Use it in string variable or array.

Comment

We can add the comment arbitrarily in the Macro program if necessary.
It is considered as comment from single quotation mark or rem command to the end of this line.

Constant

It can be classified to integer constant, double constant and character constant. The range of value is as follows:

Integer Constant	-2147483648 to 2147483647
Double Constant	-1.0E30 to 1.0E30
Character Constant	255 Characters

Integer constant can be indicated by decimal, it also can be indicated by hexadecimal, octal and binary. The method is as follows.

Hexadecimal:&h (Example:&hff,&h7fff)
Octal:&o (Example:&o77,&o3447)
Binary:&b (Example:&b1111,&b01100111)

In the "A&=&hff" condition, if we uselist command to show procedure, the result will be expressed using decimal such as A&=255.

Convert Type

Calculate

When calculation between integer and double, integer is converted into double.
When doing logic calculation, all digits are operated as integer, and the result is integer.
When division calculation between integer, the result will be to round up to the nearest integer. Example:
A&=5/2
print A&
→ Result 3

Variable assignment

If double variable is endowed with integer, decimal digit part will discard four, but treat five as whole.
If integer variable is not endowed in -2147483648 to 2147483647, the result will be overflow error.
If double variable is not endowed in -1.0E30 to 1.0E30, the result will be overflow error.

Expression

The following contents are collectively called expression.

- The expression is composed by numerical constant and numerical variable using calculation sign.
- The expression is composed by character constant and character variable using plus sign.
- The expression only have constant.
- The expression only have variable.
- Function as so on.

The mathematical expression that return value is numerical.
Numerical constant, numerical variable and function of return value compose the mathematic expression

by arithmetic calculation and logic calculation.
Composition of mathematic expressions is contained by brackets. Two mathematic expressions combine a relative expression by relative calculation sign.
Character constant, character variable and function of return string compose the mathematic expression by plus sign.
It can be the composition of many mathematic expression by brackets. Numerical constant, numerical variable and function of return value compose the mathematic expression by arithmetic calculation and logic calculation.
Character constant, character variable and function of return string compose the mathematic expression by relative calculation. Logic expression that is composed with logic calculation sign by a few relative expression.
Using logic calculation to compose a few relative expressions. It can be used to operate bit, calculate binary and determine compound condition.
Logic expression can be applicable to any place because its result is mathematic expression of numerical.
If logic expression is false, return 0, otherwise return -1.
Logic expression use "not" calculation, logic "or", logic "and" and "xor" calculation to calculate logically.
To designated value(parameter), repeat to define calculation, let the result to return, this kind of code is called as function.
Function is used as the style of expression. It is different with calculation's mathematic expression, character expression, relative expression and logic expression. Function can save result itself.

Label

Label name need make a descriptive record of following format.

- It must begin with asterisk(*).
- The second character must be English letter.
- The third character and next is letter, numerical and period(.).

Label name must begin with asterisk(*). It is a string that its length less than 25 characters.
Using goto <label>command and gosub <label>command to go to the position of label.

Line Number

Line number is added automatically when control device load Macro program.
Not make a descriptive record of line number as Macro program.

Line

It is composed by line number and written language.
Macro program may only be composed by empty line and annotation.
A line can make a descriptive record of a few sentences. We can use colon to separate sentences.

Reserved Word

Reserved word is a kind of string that be defined in the systems of command, function and calculation.
User can not use this strings to be variable name.

Reserved Word List

Initial Character	Reserved Word
A	abs
A	AddGlobalData
A	AddSystemData
A	and
A	ApproximationCircle
A	asc
A	atn
B	BusyOut
C	Case
C	Catch
C	chr$
C	ClearMeasureData
C	close
C	cont
C	CopyMeasureImage
C	CopyUnitImage
C	cos
C	crspoint
D	date$
D	debug
D	dim
D	DisplaySubNo
D	Do
D	dposline
D	DrawArc
D	DrawArcW
D	DrawBox
D	DrawCircle
D	DrawCircleW
D	DrawCursor
D	DrawEllipse
D	DrawFigure
D	DrawFillImage
D	DrawJudgeText
D	DrawLine
D	DrawLineW
D	DrawMeasureImage
D	DrawPoint
D	DrawPolygon
D	DrawSearchFigure
D	DrawText
D	DrawTextG
D	DrawUnitImage

D	dskf
E	ElapsedTime
E	Else
E	Elseif
E	End Select
E	End Try
E	EndIf
E	eof
E	erase
E	errcmnd$
E	errno
E	ExecuteImageLogging
E	exit do
E	exit for
E	exp
F	fcopy
F	fix
F	For
G	GetAll
G	GetGlobalData
G	GetImageSize
G	GetImageWindow
G	GetPort
G	GetSystemData
G	GetUnitData
G	GetUnitFigure
G	gosub
G	goto
H	hex$
I	If
I	ImageFormat
I	input #
I	input$
I	int
I	isfile
J	JudgeOut
K	kill
L	left$
L	len
L	line input #
L	list
L	load
L	log
L	Loop While
L	lsqumeth
M	MeasureDispG

M	MeasureId$
M	MeasureProc
M	mid$
M	mkdir
M	mod
N	new
N	Next
N	not
O	on
O	open
O	or
P	ParallelExecute
P	piece$
P	print
P	print #
P	PutAll
P	PutPort
R	ReceiveData
R	rem
R	RenumUnitNo
R	RGB
R	right$
R	rmdir
R	RunOut
S	Select
S	SendData
S	SendString
S	SetDrawStyle
S	SetGlobalData
S	SetImageWindow
S	SetMeasureImage
S	SetSystemData
S	SetTextStyle
S	SetUnitData
S	SetUnitFigure
S	SetUnitJudge
S	SetUnitTitle
S	sin
S	sqr
S	StartTimer
S	Step
S	stop
S	str$
S	str2$
T	tan
T	time$

T	Timer
T	TotalJudge
T	TransformAngle
T	TransformArea
T	TransformDist
T	TransformLine
T	TransformXY
T	Try
U	UnitData
U	UnitData$
U	UnitData2
U	UnitInfo
U	UnitItemIdent$
U	UnitJudge
U	UnitNo
U	UnitTitle$
V	val
V	varpop
V	varpush
W	wait
W	Wait
X	xor

Statement

As command to deal with minimum unit, a statement can't have more than 245 characters.
If a statement have more than 245 characters, there will be wrong. And program will suspend.
Statement has following three types.

- Executable statement that make a descriptive record of command treatment and function description.
- Unexecutable statement that make a descriptive record of annotation and so on that not deal with.
- Label that define branch target of program.

Subroutine

<Label> Return enclose part, make a descriptive record of single procession.
We can run gosub <Label>command to use kinds of subroutine.
Make a descriptive record of all kinds of single treatments by subroutine. It increases readability of program.
Reference: Calling the procedure defined on the other commands (p.156)

Variable

The space that storages numerical and string, it is called value.
Initial value of numerical variable is 0, initial value of character variable is empty string("").
User can define variable type and variable name.

Variable Name

The first character of variable is english character, not digital. Others of digital part are also be discerned. It can not use special symbol. To sum up as follow:

- First position:must be letter('A' to 'Z', 'a' to 'z')
- Middle:letter/numeral('0' to '9')
- Last:'&'/'&&'/'#'/'##'/'$'/'$$'

(Example)NUMBER&, CHARA$, POS##

Note

- Variable name can't begin with numeral. It can't use special symbol in the variable name.
- We can't use the same variable name with reservedword, it can contain reservedword.
- Lowcase is the same with uppercase in character treatment.
  (Example) Variable A& and variable a&...is the same. Both of them are considered as uppercase.

Variable Type

- It can be divided into integral variable, double variable and string variable.
- After variable name, please add all kind of identifications. The same variable name with different type is different.
- It must be defined only when use array variable.

Integer Variable

We can use integer from -2147483648 to 2147483647.
Add "&" or "&&" after variable name.
"&" can't be neglected.
(Example)

```
A&=1
B1&&=-123
CX&=12E2
```

Double Variable

We can use real number from -1.0E30 to 1.0E30.
Add "#" or "##" after variable name.
"#" can't be neglected.
(Example)

```
A#=12.34
BB##=-.987
C3#=-12.3E12
```

Character Variable

We can use " " to enclose string.
Add "$" or "$$" after variable name.
The most length of string is 255 characters.
"$® can't be neglect.
(Example)

```
AA$="OMRON"
B$$="OMRON"+"TATEISI"
```

Array Variable

We can use not more than 4 dimensions array variable.
We can use dim command to define array variable.
Additional numbers begin with 0. The number of element is "Additional number add 1".
(Example)

```
dim A&(100)     one dimension array, the number of element is 101
dim B&&(100, 100)     two dimensions array
dim C&(100, 100, 100)     three dimension
```

Though array variable name is same with general variable name, they are different.
If different dim have same variable name. it is also considered to be same array. Then last defined array is seen as to be valid.
(Example)Following variables are different with each other.
A& A&& AA# A$ A&(0) A#(0) A##(0) A$(0)

Variable Space

Use space of variable divides fix length space and variable length space.
The capacity of fix length space is 8KB. It can save integer and double variable.
The capacity of variable length space is no limited(memory permit), it can store string and array variable.

Wildcard

Wildcard can use * (string mode) and ? (one character).
Wildcard only apply to kill (delete of document) and fcopy (copy of document) command.
We can't use wildcard in the catalog. (Can't appoint to"/c0/*/*.bmp"such form)
We needn't take note of catalog that to be in wildcard object. (Appoint to kill "/c0/img/*", "/c0/img/capture/ "catalog will not be deleted)

.	All Document with Extension
*	All Document
???.*	Document name with extension, ask 3 characters
???????	Document+Document that extension have 7 characters(contains ".")
A*.*	Document that has extension and begins with A
A*A*A	Document that contains no less than 3 characters(contains extension)
????*	Document that contains more than 4 characters' extension
????*.*	Document that document name have more than 4 characters and have extension
*.??	Document that extension have two characters

Debugging Macro program

Overview

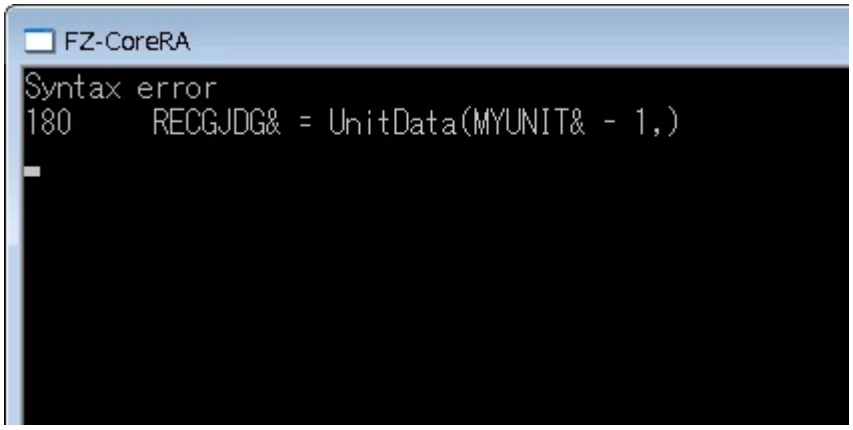
Macro program may cause error while it is working, by illegal command call or incorrect value of parameters.
Debugging support function will help you to find out the cause of the error and fix the problem.

System behavior on error

When error happened, system behaves as below :

Show error on macro console

The error information is shown on macro console.



Interrupt of Macro

When error occurs in macro program, execution of macro subroutine will be automatically terminated.However, the rest of the system, for example measurement flow, continues working.

Check error information

Error information is shown on macro console.
The error information contains these data :

- Error message
- Line number
- Error statement

Error message shows the cause of the error.
Reference: ▸ List of macro error messages (p.170)
Line number is a number to indicate each lines of the program, and automatically added when macro program is saved. The program with line number is shown by executing list command from macro console.
Error statement is a statement causing error.
Reference: ▸ Macro command reference (p.172)

List of macro error messages

List of error No.

If an error occurs during the execution of the command, the error number is displayed.

Error No.	Error message
1	NEXT without FOR
2	Syntax error
3	RETURN without GOSUB
5	Illegal function call
6	Overflow
7	Out of memory
8	Undefined line number
9	Subscript out of range
11	Division by Zero
13	Type missmatch0
15	String too long
18	Undefined array
23	Line buffer overflow
26	FOR without NEXT
32	Undefined label
121	CASE without SELECT
122	END SELECT without SELECT
123	SELECT without END SELECT
124	CASE without END SELECT
125	ELSEIF without IF
126	ELSE without IF
127	ENDIF without IF
128	IF without ENDIF
129	ELSEIF without ENDIF
130	ELSE without ENDIF
135	DO without LOOP
136	LOOP without DO
140	EXIT without FOR
141	EXIT without DO

List of macro error messages

Error message	Description of error	To correct this error
CASE without END SELECT	**Case** statement occurs without a corresponding **End select** statement.	Check if there is a correct **End select** statement corresponding **Case** statement.
CASE without SELECT	**Case** statement occurs without a corresponding **Select** statement.	Check if there is a correct **Select** statement corresponding **Case** statement.
Division by zero	Division by zero occurs.	Add checking statement to avoid zero division.

Do without LOOP	**Do** statement occurs without a corresponding **Loop** statement.	Check if there is a correct **Loop** statement corresponding **Do** statement.
ELSE without ENDIF	**Else** statement occurs without a corresponding **Endif** statement.	Check if there is a correct **Endif** statement corresponding **Else** statement.
ELSE without IF	**ELSE** statement occurs without a corresponding **If** statement.	Check if there is a correct **If** statement corresponding **Else** statement.
ELSEIF without ENDIF	**Elseif** statement occurs without a corresponding Endif statement.	Check if there is a correct **Endif** statement corresponding **Elseif** statement.
ELSEIF without IF	**Elseif** statement occurs without a corresponding **If** statement.	Check if there is a correct **If** statement corresponding **Elseif** statement.
END SELECT without SELECT	**End** Select statement occurs without a corresponding **Select** statement.	Check if there is a correct **Select** statement corresponding **End** Select statement.
ENDIF without IF	**Endif** statement occurs without a corresponding **If** statement.	Check if there is a correct **If** statement corresponding **Endif** statement.
EXIT without DO	**exit do** statement occurs without a corresponding **do** statement.	Check if there is a correct **do** statement corresponding **exit do** statement.
EXIT without FOR	**exit for** statement occurs without a corresponding **for** statement.	Check if there is a correct **for** statement corresponding **exit for** statement.
FOR without NEXT	**for** statement occurs without a corresponding **next** statement.	Check if there is a correct **next** statement corresponding **for** statement.
IF without ENDIF	**if** statement occurs without a corresponding **endif** statement.	Check if there is a correct **endif** statement corresponding **if** statement.
Illegal function call	Parameters for command or function is out of acceptable range. Or problem happened on execution of command.	Check the calling format and description of command or function using command reference. Check correct parameters are specified.
Line buffer overflow	Input statements in one line is out of acceptable range (255 bytes).	In many cases, this error occurs when data in one line is received via serial interface or memory card. Use input$ function, and input necessary bytes.
LOOP without DO	**loop** statement occurs without a corresponding **do** statement.	Check if there is a correct **do** statement corresponding **loop** statement.
NEXT without FOR	**next** statement occurs without a corresponding **for** statement.	Check if there is a correct **for** statement corresponding **next** statement.
Out of memory	There is no enough free memory. Or nest of the loop is too deep.	Check if macro program is using strings or array data too many. Check the depth of the nested loop.
Overflow	Calculation result or numerical input data exceeds acceptable range of double precision real type data. Or a string data exceeds acceptable length.	Check if calculation result or numerical input data does not exceed range of double precision real type data. Check if the length of the string type variable does not exceed acceptable length.
RETURN without GOSUB	**return** statement occurs without a corresponding **gosub** statement.	Check if there is a correct **gosub** statement corresponding **return** statement.
SELECT without END SELECT	**end select** statement occurs without a corresponding **select** statement.	Check if there is a correct **end select** statement corresponding **select** statement.
Subscript out of range	You accessed array with index which is over declared maximum index.	Check the currently accessing index number and maximum index of the array. Array must be declared with the sufficient number of elements.

Syntax error	Wrong format or spelling of command or function. Or command or function is used not following the rule.	Check the calling format and description of command or function using command reference. Check how to use variables or arrays using Programming rules. Reference: ▶ Common rules for Macro (p.159)
Type mismatch	Type of variables mismatch, such as left-right side of expression, or parameters of functions.	Please set variables or arrays in correct type. Check if assigning a string data to a variable for numerical data, or correct array is used.
Undefined array	An undefined array is used.	Arrays must be declared before use.
Undefined label	Referring to an undefined label.	Check correct name of label is specified.
Undefined line number	Branching to an undefined line number.	Please check if the specified line number exists. Line number is automatically assigned, therefore use <Label> as destination position for goto command.

Macro Command Reference

Classified Order

General instruction

Function	Command name	References
Definition of the array variables is carried out.	Dim	Reference: ▶ Details (p.199)
The execution of the statements between Do and Loop are repeated as long as the conditions continue to be fulfilled.	Do - Loop While	Reference: ▶ Details (p.201)
Free the array variable memory region that was defined by the Dim command.	Erase	Reference: ▶ Details (p.203)
Gets the Error occurrence commands during exception handling.	Errcmnd$ (Function)	Reference: ▶ Details (p.204)
Gets the error class during exception handling.	Errno (Function)	Reference: ▶ Details (p.205)
Repeats and executes the statements between the For statement and the Next statement.	For...To...Step - Next	Reference: ▶ Details (p.209)
Moves the processing to the specified subroutine.	Gosub	Reference: ▶ Details (p.218)
Moves the processing to the line of the specified Label.	Goto	Reference: ▶ Details (p.219)
Controls the flow of processing in accordance with the judgement conditions of the logical expression.	If...Then - Elseif - Else - Endif	Reference: ▶ Details (p.221)
Controls the flow of processing in accordance with specified conditions.	If...Then - Else	Reference: ▶ Details (p.220)
Branches in accordance with the specified condition.	On Gosub	Reference: ▶ Details (p.244)
Branches processing in accordance with the specified condition.	On Goto	Reference: ▶ Details (p.245)
Inserts comments into the program.	Rem	Reference: ▶ Details (p.255)
Controls the branching of processing in accordance with the expression results.	Select ... Case - Case Else - End Select	Reference: ▶ Details (p.266)
Carries out exception handling.	Try - Catch - End Try	Reference: ▶ Details (p.285)
Returns saved variables.	Varpop	Reference: ▶ Details (p.292)
Temporarily saves the value of a variable.	Varpush	Reference: ▶ Details (p.294)

Arithmetic calculation

Function	Command name	References
Get the absolute value of the expression specified.	Abs(Function)	Reference: ▶ Details (p.182)
Get the logical product (AND) of 2 specified expressions.	And (Function)	Reference: ▶ Details (p.184)
Get approximate circle	ApproximationCircle	Reference: ▶ Details (p.185)
Get the arc tangent of the expression specified.	Atn (Function)	Reference: ▶ Details (p.187)
Gets the cosine of the specified expression.	Cos (Function)	Reference: ▶ Details (p.196)
Gets the intersection between 2 straight lines.	Crspoint	Reference: ▶ Details (p.196)
Get the shortest distance between the specified line and 2 points.	Dposline(Function)	Reference: ▶ Details (p.201)
Calculate exponential function.	Exp(Function)	Reference: ▶ Details (p.207)
Truncates everything after the radix point and gets the integer value.	Fix(Function)	Reference: ▶ Details (p.208)
Converts the numeric value given into an integer value.	Int(Function)	Reference: ▶ Details (p.225)
Gets the natural logarithm value.	Log (Function)	Reference: ▶ Details (p.237)
Gets the approximate line from multiple point coordinates using the method of least squares.	Lsqumeth	Reference: ▶ Details (p.238)
Gives the remainder.	Mod (Function)	Reference: ▶ Details (p.242)
Gets the negation result of the expression.	Not (Function)	Reference: ▶ Details (p.243)
Gets the logical sum of 2 expressions.	Or (Function)	Reference: ▶ Details (p.247)
Gets the sine of the specified expression.	Sin (Function)	Reference: ▶ Details (p.278)
Gets the square root.	Sqr(Function)	Reference: ▶ Details (p.279)
Gets the tangent of the specified expression.	Tan (Function)	Reference: ▶ Details (p.283)
Gets the exclusive disjunction (exclusive-OR) of 2 expressions.	Xor(Function)	Reference: ▶ Details (p.297)

String operation

Function	Command name	References
Get the value of the character code for the specified character.	Asc (Function)	Reference: ▶ Details (p.186)
Gets the character corresponding to the character code.	Chr$ (Function)	Reference: ▶ Details (p.190)
Converts the value of the expression to a character string hexadecimal expression.	Hex$(Function)	Reference: ▶ Details (p.219)
Convert the capital letter into a small letter	LCase$ (Function)	Reference: ▶ Details (p.231)
Fetches the specified character string length from the left of the character string.	Left$ (Function)	Reference: ▶ Details (p.232)
Gets the length of the specified character string.	Len (Function)	Reference: ▶ Details (p.232)
Fetches a part of the character string.	Mid$(Function)	Reference: ▶ Details (p.240)
Fetches the specified part separated by the specified character from the character string.	Piece$ (Function)	Reference: ▶ Details (p.247)
Fetches the specified character string length from the right of the character string.	Right$ (Function)	Reference: ▶ Details (p.256)
Converts a numeric value into a numeric character string.	Str$(Function)	Reference: ▶ Details (p.281)
Converts to a numeric character string with the numeric value format specified.	Str2$(Function)	Reference: ▶ Details (p.281)
Convert a small letter into a capital letter	UCase$ (Function)	Reference: ▶ Details (p.286)
Converts the number of a character string notation into a numeric value.	Val (Function)	Reference: ▶ Details (p.291)

File control

Function	Command name	References
Closes the specified file	Close	Reference: Details (p.192)
Get the available space of the drive.	Dskf(Function)	Reference: Details (p.202)
Checks for the end of file.	Eof(Function)	Reference: Details (p.203)
Copies a file within the memory card.	Fcopy	Reference: Details (p.208)
Reads in the specified number of bytes of binary data.	Input$ (Function)	Reference: Details (p.223)
Reads in data and assigns it to a variable.	Input#	Reference: Details (p.224)
Checks for the existence of a file and its attributes.	Isfile(Function)	Reference: Details (p.226)
Deletes a file	Kill	Reference: Details (p.230)
Reads data of one line from a file	Line Input#	Reference: Details (p.233)
Creates a directory in the Memory Card.	Mkdir	Reference: Details (p.241)
Opens a file.	Open	Reference: Details (p.246)
Output data to the file	Print#	Reference: Details (p.248)
Deletes a directory within the memory card.	Rmdir	Reference: Details (p.257)

Measurement control

Function	Command name	References
Clear processing unit measure data	ClearMeasureData	Reference: Details (p.190)
Gets measurement result the Output presence	GetMeasureOut (Function)	Reference: Details (p.213)
Update image	ImageUpdate	Reference: Details (p.223)
Permit the measurement execution	MeasureStart	Reference: Details (p.239)
Forbid the measurement execution	MeasureStop	Reference: Details (p.240)
Carry out The measurement	Measure	Reference: Details (p.239)
Carry out The measurement	Remeasure	Reference: Details (p.255)
Set the output mode of the measurement result	SetMeasureOut	Reference: Details (p.271)

IO module control

Function	Command name	References
Output BUSY state	BusyOut	Reference: Details (p.188)
Input terminal all point input	GetAll (Function)	Reference: Details (p.210)
Gets PLC the read data	GetPlcData	Reference: Details (p.213)
Input terminal a point input	GetPort (Function)	Reference: Details (p.214)
Judge result output	JudgeOut	Reference: Details (p.230)
Output terminal all point output	PutAll	Reference: Details (p.249)
Output terminal a point output	PutPort	Reference: Details (p.250)
Begin to read data from designated memory of the PLC	ReadPlcMemory	Reference: Details (p.251)
Receive data	ReceiveData	Reference: Details (p.252)
Output RUN state	RunOut	Reference: Details (p.257)
Send data	SendData	Reference: Details (p.267)
Sends string	SendString	Reference: Details (p.268)
Set PLC the write data	SetPlcData	Reference: Details (p.271)
Write in data at designated storage device of the PLC	WritePlcMemory	Reference: Details (p.296)

Display control

Function	Command name	References
Gets image/text Display the processing unit number	DisplayUnitNo (Function)	Reference: Details (p.200)
Gets information about the Image Display window setting	GetImageWindow	Reference: Details (p.212)
Gets information about the text Display window setting	GetTextWindow	Reference: Details (p.216)
Update the indication of the image display window	RefreshImageWindow	Reference: Details (p.253)
Update the indication of the judgement result display window	RefreshJudgeWindow	Reference: Details (p.253)
Update the indication of the text display window	RefreshTextWindow	Reference: Details (p.254)
Update the indication of the measurement processing time display window	RefreshTimeWindow	Reference: Details (p.254)
Set the processing unit number of image / text window	SetDisplayUnitNo	Reference: Details (p.269)
Set the attribute of the image window	SetImageWindow	Reference: Details (p.270)
Set the attribute of the Text Window	SetTextWindow	Reference: Details (p.275)

Save/Load

Function	Command name	References
Load the System + Scene group data	LoadBackupData	Reference: Details (p.235)
Load the Scene group data	LoadSceneGroup	Reference: Details (p.236)
Load the scene data	LoadScene	Reference: Details (p.235)
Load the System data	LoadSystemData	Reference: Details (p.236)
Load the Processing unit data	LoadUnitData	Reference: Details (p.237)
Save the System + Scene group data	SaveBackupData	Reference: Details (p.258)
Saves data to a controller	SaveData	Reference: Details (p.258)
Save the scene group data	SaveSceneGroup	Reference: Details (p.260)
Save the scene data	SaveScene	Reference: Details (p.259)
Save the System data	SaveSystemData	Reference: Details (p.260)
Save image data	SaveImage	Reference: Details (p.259)
Save the Processing unit data	SaveUnitData	Reference: Details (p.261)

Control global data

Function	Command name	References
Adds global data	AddGlobalData	Reference: Details (p.183)
Get global data	GetGlobalData	Reference: Details (p.211)
Sets global data	SetGlobalData	Reference: Details (p.269)

Control system data

Function	Command name	References
Adds system data	AddSystemData	Reference: Details (p.184)
Gets system data	GetSystemData	Reference: Details (p.215)
Sets system data	SetSystemData	Reference: Details (p.274)

Control scene

Function	Command name	References
Change scene number	ChangeScene	Reference: Details (p.188)

Clear the scene number	ClearScene	Reference: Details (p.191)
Copy the scene data	CopyScene	Reference: Details (p.193)
Gets the available scene number	SceneCount (Function)	Reference: Details (p.261)
Gets the explanation of the scene	SceneDescription$ (Function)	Reference: Details (p.262)
Gets the scene creator name	SceneMaker$ (Function)	Reference: Details (p.264)
Get the current scene number	SceneNo (Function)	Reference: Details (p.265)
Gets the scene title name	SceneTitle$ (Function)	Reference: Details (p.265)
Set the explanation of the scene	SetSceneDescription	Reference: Details (p.272)
Set the scene maker name	SetSceneMaker	Reference: Details (p.273)
Set the scene title name	SetSceneTitle	Reference: Details (p.274)

Control scene group

Function	Command name	References
Change scene group number	ChangeSceneGroup	Reference: Details (p.189)
Clear the specified scene group	ClearSceneGroup	Reference: Details (p.191)
Copy the scene group data	CopySceneGroup	Reference: Details (p.194)
Gets the number of available scene groups	SceneGroupCount	Reference: Details (p.263)
Gets the current scene group number	SceneGroupNo	Reference: Details (p.263)
Gets the scene group title name	SceneGroupTitle$ (Function)	Reference: Details (p.264)
Set the scene group title name	SetSceneGroupTitle	Reference: Details (p.273)

Flow control

Function	Command name	References
Register a processing unit.	AssignUnit	Reference: Details (p.186)
Check a registration state of the processing unit	CheckUnit (Function)	Reference: Details (p.189)
Copy the processing unit	CopyUnit	Reference: Details (p.194)
Delete the processing unit	DeleteUnit	Reference: Details (p.199)
Insert the processing unit	InsertUnit	Reference: Details (p.225)
Move the processing unit	MoveUnit	Reference: Details (p.242)
Gets the enrollment number of the processing unit	UnitCount (Function)	Reference: Details (p.287)

Control processing item

Function	Command name	References
Gets the number of the available processing items	ItemCount (Function)	Reference: Details (p.227)
Gets the Distinguished Name of the processing item	ItemIdent$ (Function)	Reference: Details (p.227)
Gets the information of the processing item	ItemInfo (Function)	Reference: Details (p.228)
Gets a title name of the processing item	ItemTitle$ (Function)	Reference: Details (p.229)

Control processing unit

Function	Command name	References
Copy the processing unit figure data	CopyUnitFigure	Reference: Details (p.195)
Copy the processing unit model data	CopyUnitModel	Reference: Details (p.195)
Gets processing unit image size	GetImageSize	Reference: Details (p.211)
Gets processing unit data	GetUnitData	Reference: Details (p.216)

Gets processing unit figure data	GetUnitFigure	Reference: ▶ Details (p.217)
Gets processing unit figure format	ImageFormat (Function)	Reference: ▶ Details (p.222)
Sets processing unit data	SetUnitData	Reference: ▶ Details (p.276)
Sets processing unit figure data	SetUnitFigure	Reference: ▶ Details (p.276)
Sets the processing unit title name	SetUnitTitle	Reference: ▶ Details (p.278)
Gets processing unit data(character string)	UnitData$ (Function)	Reference: ▶ Details (p.288)
Gets processing unit data(numeric value)	UnitData (Function)	Reference: ▶ Details (p.287)
Gets processing unit information	UnitInfo (Function)	Reference: ▶ Details (p.289)
Gets the processing item ident name of processing unit	UnitItemIdent$ (Function)	Reference: ▶ Details (p.289)
Gets the judgement value of the processing unit	UnitJudge (Function)	Reference: ▶ Details (p.290)
Gets the processing unit title name	UnitTitle$ (Function)	Reference: ▶ Details (p.291)

Debug command

Function	Command name	References
Continues the execution of a program halted by a stop statement.	Cont	Reference: ▶ Details (p.192)
Sets the debugging mode.	Debug	Reference: ▶ Details (p.198)
Outputs all or a part of the program content to the macro console.	List	Reference: ▶ Details (p.234)
Loads the Program into the Controller memory.	Load	Reference: ▶ Details (p.234)
Delete the program from memory.	New	Reference: ▶ Details (p.243)
Writes data (macro console).	Print	Reference: ▶ Details (p.249)
Stops the execution of the program.	Stop	Reference: ▶ Details (p.280)

Others

Function	Command name	References
Reads in the date from the internal clock	Date$ (Function)	Reference: ▶ Details (p.197)
Terminate the controller	ExitFzProcess	Reference: ▶ Details (p.207)
Publish the optional event	RaiseOptionEvent	Reference: ▶ Details (p.251)
Save the capture of the screen	ScreenCapture	Reference: ▶ Details (p.266)
Time of starting a measurement processing	StartTimer (Function)	Reference: ▶ Details (p.279)
Reboot the controller	SystemReset	Reference: ▶ Details (p.283)
Reads out the time from the internal clock.	Time$ (Function)	Reference: ▶ Details (p.284)
Gets a processing time	Timer (Function)	Reference: ▶ Details (p.285)
Standby at specified time	Wait	Reference: ▶ Details (p.296)

Alphabetical order

Function	Command name	Classification	References
Get the absolute value of the expression specified.	Abs(Function)	Arithmetic calculation	Reference: ▶ Details (p.182)
Adds global data	AddGlobalData	Control global data	Reference: ▶ Details (p.183)
Adds system data	AddSystemData	Control system data	Reference: ▶ Details (p.184)
Get the logical product (AND) of 2 specified expressions.	And (Function)	Arithmetic calculation	Reference: ▶ Details (p.184)
Get approximate circle	ApproximationCircle	Arithmetic calculation	Reference: ▶ Details (p.185)
Get the value of the character code for the specified character.	Asc (Function)	String operation	Reference: ▶ Details (p.186)
Register a processing unit.	AssignUnit	Flow control	Reference: ▶ Details (p.186)

Get the arc tangent of the expression specified.	Atn (Function)	Arithmetic calculation	Reference: Details (p.187)
Output BUSY state	BusyOut	IO module control	Reference: Details (p.188)
Change scene group number	ChangeSceneGroup	Control scene group	Reference: Details (p.189)
Change scene number	ChangeScene	Control scene	Reference: Details (p.188)
Check a registration state of the processing unit	CheckUnit (Function)	Flow control	Reference: Details (p.189)
Gets the character corresponding to the character code.	Chr$ (Function)	String operation	Reference: Details (p.190)
Clear processing unit measure data	ClearMeasureData	Measurement control	Reference: Details (p.190)
Clear the scene number	ClearScene	Control scene	Reference: Details (p.191)
Clear the specified scene group	ClearSceneGroup	Control scene group	Reference: Details (p.191)
Closes the specified file	Close	File control	Reference: Details (p.192)
Continues the execution of a program halted by a stop statement.	Cont	Debug command	Reference: Details (p.192)
Copy the scene group data	CopySceneGroup	Control scene group	Reference: Details (p.194)
Copy the scene data	CopyScene	Control scene	Reference: Details (p.193)
Copy the processing unit figure data	CopyUnitFigure	Control processing unit	Reference: Details (p.195)
Copy the processing unit model data	CopyUnitModel	Control processing unit	Reference: Details (p.195)
Copy the processing unit	CopyUnit	Flow control	Reference: Details (p.194)
Gets the cosine of the specified expression.	Cos (Function)	Arithmetic calculation	Reference: Details (p.196)
Gets the intersection between 2 straight lines.	Crspoint	Arithmetic calculation	Reference: Details (p.196)
Reads in the date from the internal clock	Date$ (Function)	Others	Reference: Details (p.197)
Sets the debugging mode.	Debug	Debug command	Reference: Details (p.198)
Delete the processing unit	DeleteUnit	Flow control	Reference: Details (p.199)
Definition of the array variables is carried out.	Dim	General instruction	Reference: Details (p.199)
Gets image/text Display the processing unit number	DisplayUnitNo (Function)	Display control	Reference: Details (p.200)
The execution of the statements between Do and Loop are repeated as long as the conditions continue to be fulfilled.	Do - Loop While	General instruction	Reference: Details (p.201)
Get the shortest distance between the specified line and 2 points.	Dposline(Function)	Arithmetic calculation	Reference: Details (p.201)
Get the available space of the drive.	Dskf(Function)	File control	Reference: Details (p.202)
Checks for the end of file.	Eof(Function)	File control	Reference: Details (p.203)
Free the array variable memory region that was defined by the Dim command.	Erase	General instruction	Reference: Details (p.203)
Gets the Error occurrence commands during exception handling.	Errcmnd$ (Function)	General instruction	Reference: Details (p.204)
Gets the error class during exception handling.	Errno (Function)	General instruction	Reference: Details (p.205)
Terminate the controller	ExitFzProcess	Others	Reference: Details (p.207)
Calculate exponential function.	Exp(Function)	Arithmetic calculation	Reference: Details (p.207)
Copies a file within the memory card.	Fcopy	File control	Reference: Details (p.208)
Truncates everything after the radix point and gets the integer value.	Fix(Function)	Arithmetic calculation	Reference: Details (p.208)
Repeats and executes the statements between the For statement and the Next statement.	For...To...Step - Next	General instruction	Reference: Details (p.209)
Input terminal all point input	GetAll (Function)	IO module control	Reference: Details (p.210)
Get global data	GetGlobalData	Control global data	Reference: Details (p.211)

Gets processing unit image size	GetImageSize	Control processing unit	Reference: Details (p.211)
Set information about the Image Display window setting	GetImageWindow	Display control	Reference: Details (p.212)
Gets measurement result the Output presence	GetMeasureOut (Function)	Measurement control	Reference: Details (p.213)
Gets PLC the read data	GetPlcData	IO module control	Reference: Details (p.213)
Input terminal a point input	GetPort (Function)	IO module control	Reference: Details (p.214)
Gets system data	GetSystemData	Control system data	Reference: Details (p.215)
Gets information about the text Display window setting	GetTextWindow	Display control	Reference: Details (p.216)
Gets processing unit data	GetUnitData	Control processing unit	Reference: Details (p.216)
Gets processing unit figure data	GetUnitFigure	Control processing unit	Reference: Details (p.217)
Moves the processing to the specified subroutine.	Gosub	General instruction	Reference: Details (p.218)
Moves the processing to the line of the specified Label.	Goto	General instruction	Reference: Details (p.219)
Converts the value of the expression to a character string hexadecimal expression.	Hex$(Function)	String operation	Reference: Details (p.219)
Controls the flow of processing in accordance with the judgement conditions of the logical expression.	If...Then - Elseif - Else - Endif	General instruction	Reference: Details (p.221)
Controls the flow of processing in accordance with specified conditions.	If...Then - Else	General instruction	Reference: Details (p.220)
Gets processing unit figure format	ImageFormat (Function)	Control processing unit	Reference: Details (p.222)
Update image	ImageUpdate	Measurement control	Reference: Details (p.223)
Reads in the specified number of bytes of binary data.	Input$ (Function)	File control	Reference: Details (p.223)
Reads in data and assigns it to a variable.	Input#	File control	Reference: Details (p.224)
Insert the processing unit	InsertUnit	Flow control	Reference: Details (p.225)
Converts the numeric value given into an integer value.	Int(Function)	Arithmetic calculation	Reference: Details (p.225)
Checks for the existence of a file and its attributes.	Isfile(Function)	File control	Reference: Details (p.226)
Gets the number of the available processing items	ItemCount (Function)	Control processing item	Reference: Details (p.227)
Gets the Distinguished Name of the processing item	ItemIdent$ (Function)	Control processing item	Reference: Details (p.227)
Gets the information of the processing item	ItemInfo (Function)	Control processing item	Reference: Details (p.228)
Gets a title name of the processing item	ItemTitle$ (Function)	Control processing item	Reference: Details (p.229)
Judge result output	JudgeOut	IO module control	Reference: Details (p.230)
Deletes a file	Kill	File control	Reference: Details (p.230)
Convert the capital letter into a small letter	LCase$ (Function)	String operation	Reference: Details (p.231)
Fetches the specified character string length from the left of the character string.	Left$ (Function)	String operation	Reference: Details (p.232)
Gets the length of the specified character string.	Len (Function)	String operation	Reference: Details (p.232)
Reads data of one line from a file	Line Input#	File control	Reference: Details (p.233)
Outputs all or a part of the program content to the macro console.	List	Debug command	Reference: Details (p.234)
Load the System + Scene group data	LoadBackupData	Save/Load	Reference: Details (p.235)

Load the Scene group data	LoadSceneGroup	Save/Load	Reference: ▶ Details (p.236)
Load the scene data	LoadScene	Save/Load	Reference: ▶ Details (p.235)
Load the System data	LoadSystemData	Save/Load	Reference: ▶ Details (p.236)
Load the Processing unit data	LoadUnitData	Save/Load	Reference: ▶ Details (p.237)
Loads the Program into the Controller memory.	Load	Debug command	Reference: ▶ Details (p.234)
Gets the natural logarithm value.	Log (Function)	Arithmetic calculation	Reference: ▶ Details (p.237)
Gets the approximate line from multiple point coordinates using the method of least squares.	Lsqumeth	Arithmetic calculation	Reference: ▶ Details (p.238)
Permit the measurement execution	MeasureStart	Measurement control	Reference: ▶ Details (p.239)
Forbid the measurement execution	MeasureStop	Measurement control	Reference: ▶ Details (p.240)
Carry out The measurement	Measure	Measurement control	Reference: ▶ Details (p.239)
Fetches a part of the character string.	Mid$(Function)	String operation	Reference: ▶ Details (p.240)
Creates a directory in the Memory Card.	Mkdir	File control	Reference: ▶ Details (p.241)
Gives the remainder.	Mod (Function)	Arithmetic calculation	Reference: ▶ Details (p.242)
Move the processing unit	MoveUnit	Flow control	Reference: ▶ Details (p.242)
Delete the program from memory.	New	Debug command	Reference: ▶ Details (p.243)
Gets the negation result of the expression.	Not (Function)	Arithmetic calculation	Reference: ▶ Details (p.243)
Branches in accordance with the specified condition.	On Gosub	General instruction	Reference: ▶ Details (p.244)
Branches processing in accordance with the specified condition.	On Goto	General instruction	Reference: ▶ Details (p.245)
Opens a file.	Open	File control	Reference: ▶ Details (p.246)
Gets the logical sum of 2 expressions.	Or (Function)	Arithmetic calculation	Reference: ▶ Details (p.247)
Fetches the specified part separated by the specified character from the character string.	Piece$ (Function)	String operation	Reference: ▶ Details (p.247)
Output data to the file	Print#	File control	Reference: ▶ Details (p.248)
Writes data (macro console).	Print	Debug command	Reference: ▶ Details (p.249)
Output terminal all point output	PutAll	IO module control	Reference: ▶ Details (p.249)
Output terminal a point output	PutPort	IO module control	Reference: ▶ Details (p.250)
Publish the optional event	RaiseOptionEvent	Others	Reference: ▶ Details (p.251)
Begin to read data from designated memory of the PLC	ReadPlcMemory	IO module control	Reference: ▶ Details (p.251)
Receive data	ReceiveData	IO module control	Reference: ▶ Details (p.252)
Update the indication of the image display window	RefreshImageWindow	Display control	Reference: ▶ Details (p.253)
Update the indication of the judgement result display window	RefreshJudgeWindow	Display control	Reference: ▶ Details (p.253)
Update the indication of the text display window	RefreshTextWindow	Display control	Reference: ▶ Details (p.254)
Update the indication of the measurement processing time display window	RefreshTimeWindow	Display control	Reference: ▶ Details (p.254)
Carry out The measurement	Remeasure	Measurement control	Reference: ▶ Details (p.255)
Inserts comments into the program.	Rem	General instruction	Reference: ▶ Details (p.255)
Fetches the specified character string length from the right of the character string.	Right$ (Function)	String operation	Reference: ▶ Details (p.256)
Deletes a directory within the memory card.	Rmdir	File control	Reference: ▶ Details (p.257)
Output RUN state	RunOut	IO module control	Reference: ▶ Details (p.257)
Save the System + Scene group data	SaveBackupData	Save/Load	Reference: ▶ Details (p.258)
Saves data to a controller	SaveData	Save/Load	Reference: ▶ Details (p.258)
Save image data	SaveImage	Measurement control	Reference: ▶ Details (p.259)
Save the scene group data	SaveSceneGroup	Save/Load	Reference: ▶ Details (p.260)

Save the scene data	SaveScene	Save/Load	Reference: ▶ Details (p.259)
Save the System data	SaveSystemData	Save/Load	Reference: ▶ Details (p.260)
Save the Processing unit data	SaveUnitData	Save/Load	Reference: ▶ Details (p.261)
Gets the available scene number	SceneCount (Function)	Control scene	Reference: ▶ Details (p.261)
Gets the explanation of the scene	SceneDescription$ (Function)	Control scene	Reference: ▶ Details (p.262)
Gets the number of available scene groups	SceneGroupCount	Control scene group	Reference: ▶ Details (p.263)
Gets the current scene group number	SceneGroupNo	Control scene group	Reference: ▶ Details (p.263)
Gets the scene group title name	SceneGroupTitle$ (Function)	Control scene group	Reference: ▶ Details (p.264)
Gets the scene creator name	SceneMaker$ (Function)	Control scene	Reference: ▶ Details (p.264)
Get the current scene number	SceneNo (Function)	Control scene	Reference: ▶ Details (p.265)
Gets the scene title name	SceneTitle$ (Function)	Control scene	Reference: ▶ Details (p.265)
Save the capture of the screen	ScreenCapture	Others	Reference: ▶ Details (p.266)
Controls the branching of processing in accordance with the expression results.	Select ... Case - Case Else - End Select	General instruction	Reference: ▶ Details (p.266)
Send data	SendData	IO module control	Reference: ▶ Details (p.267)
Sends string	SendString	IO module control	Reference: ▶ Details (p.268)
Set the processing unit number of image / text window	SetDisplayUnitNo	Display control	Reference: ▶ Details (p.269)
Sets global data	SetGlobalData	Control global data	Reference: ▶ Details (p.269)
Set the attribute of the image window	SetImageWindow	Display control	Reference: ▶ Details (p.270)
Set the output mode of the measurement result	SetMeasureOut	Measurement control	Reference: ▶ Details (p.271)
Set PLC the write data	SetPlcData	IO module control	Reference: ▶ Details (p.271)
Set the explanation of the scene	SetSceneDescription	Control scene	Reference: ▶ Details (p.272)
Set the scene group title name	SetSceneGroupTitle	Control scene group	Reference: ▶ Details (p.273)
Set the scene maker name	SetSceneMaker	Control scene	Reference: ▶ Details (p.273)
Set the scene title name	SetSceneTitle	Control scene	Reference: ▶ Details (p.274)
Sets system data	SetSystemData	Control system data	Reference: ▶ Details (p.274)
Set the attribute of the Text Window	SetTextWindow	Display control	Reference: ▶ Details (p.275)
Sets processing unit data	SetUnitData	Control processing unit	Reference: ▶ Details (p.276)
Sets processing unit figure data	SetUnitFigure	Control processing unit	Reference: ▶ Details (p.276)
Sets judge value of a processing unit	SetUnitJudge	Control processing unit	Reference: ▶ Details (p.277)
Sets the processing unit title name	SetUnitTitle	Control processing unit	Reference: ▶ Details (p.278)
Gets the sine of the specified expression.	Sin (Function)	Arithmetic calculation	Reference: ▶ Details (p.278)
Gets the square root.	Sqr(Function)	Arithmetic calculation	Reference: ▶ Details (p.279)
Time of starting a measurement processing	StartTimer (Function)	Others	Reference: ▶ Details (p.279)
Stops the execution of the program.	Stop	Debug command	Reference: ▶ Details (p.280)
Converts a numeric value into a numeric character string.	Str$(Function)	String operation	Reference: ▶ Details (p.281)

Converts to a numeric character string with the numeric value format specified.	Str2$(Function)	String operation	Reference: Details (p.281)
Reboot the controller	SystemReset	Others	Reference: Details (p.283)
Gets the tangent of the specified expression.	Tan (Function)	Arithmetic calculation	Reference: Details (p.283)
Reads out the time from the internal clock.	Time$ (Function)	Others	Reference: Details (p.284)
Gets a processing time	Timer (Function)	Others	Reference: Details (p.285)
Carries out exception handling.	Try - Catch - End Try	General instruction	Reference: Details (p.285)
Convert a small letter into a capital letter	UCase$ (Function)	String operation	Reference: Details (p.286)
Gets the enrollment number of the processing unit	UnitCount (Function)	Flow control	Reference: Details (p.287)
Gets processing unit data(character string)	UnitData$ (Function)	Control processing unit	Reference: Details (p.288)
Gets processing unit data(numeric value)	UnitData (Function)	Control processing unit	Reference: Details (p.287)
Gets processing unit information	UnitInfo (Function)	Control processing unit	Reference: Details (p.289)
Gets the processing item ident name of processing unit	UnitItemIdent$ (Function)	Control processing unit	Reference: Details (p.289)
Gets the judgement value of the processing unit	UnitJudge (Function)	Control processing unit	Reference: Details (p.290)
Gets the processing unit title name	UnitTitle$ (Function)	Control processing unit	Reference: Details (p.291)
Converts the number of a character string notation into a numeric value.	Val (Function)	String operation	Reference: Details (p.291)
Returns saved variables.	Varpop	General instruction	Reference: Details (p.292)
Temporarily saves the value of a variable.	Varpush	General instruction	Reference: Details (p.294)
Standby at specified time	Wait	Others	Reference: Details (p.296)
Write in data at designated storage device of the PLC	WritePlcMemory	IO module control	Reference: Details (p.296)
Gets the exclusive disjunction (exclusive-OR) of 2 expressions.	Xor(Function)	Arithmetic calculation	Reference: Details (p.297)

Get the absolute value of the expression specified.

Abs (<expression>)

Parameters

<Expression>	The expression that calculates the absolute value (integer type or double-precision type real numbers)

Return Value

Returns the value of the double-precision type real number.
The content of the value is the absolute value of the specified expression.

Description

It is possible to specify an integer type or double-precision type as the storage destination for the return value.
When an integet type has been specified, a rounded integer value is stored.

Example

Gets the difference between each coordinate of 2 points (X1,Y1)(X2,Y2).

```
X1#=100
Y1#=200
X2#=200
Y2#=100
DX#=Abs(X1#-X2#)
DY#=Abs(Y1#-Y2#)
```

The results are as follows:

```
DX#=100
DY#=100
```

Adds global data

AddGlobalData <dataIdent>, <data>

Parameters

<dataIdent>	Data ident that is to be add
<data>	Data to be add

Return Value

None.

Description

Adds global data.
Difference with system data addition.
・GlobalData : It must be initialized when being start next time.(The value would not be saved.)
・SystemData : If "Data save" is done, the value when "Data save" was done is set when being start next time.

Example

information of "GsetData, 10" to global data.

```
AddGlobalData "GsetData", 10
```

Adds system data

AddSystemData <dataIdent0>, <dataIdent1>, <data>

Parameters

<dataIdent0>	Set data ident 0 (character string type) Fixed to "PanDA"
<dataIdent1>	Set data ident name 1 (character string type)
<data>	Setting information (integer type/double-precision real type/character string type)

Return Value

None.

Description

Adds the system data of data ident1 and setting data in the data ident 0.
Reference: List of system data (p.297)

Example

Add set data identifier name 1 (LogingCount) to set data identifier name 0 (PanDA) in system data.
Set 20 for set data.

```
AddSystemData "Logging" , "LogingCount" , 20
```

Get the logical product (AND) of 2 specified expressions.

<expression1> And <expression2>

Parameters

<expression1>	The expression (integer type) that requests the logical product.
<expression2>	The expression (integer type) that requests the logical product.

Return Value

Returns the value of the integer.
The content of the value is the logical product of the 2 specified expressions.

Description

Values from -2147483648 to 2147483647 can be specified for <Expression 1> and <Expression 2>.
When the values of <Expression 1> and <Expression 2> are double-precision type, the fractional part is handled as a rounded value.
It can also be used in an If statement as an And condition. Refer to Calculation for details on logical expressions.
Reference: Calculation (p.159)

Example

Get the logical product of 2 values X and Y.

```
X&=15

Y&=8
DATA&=X& And Y&
```

The result is as follows:

```
DATA&=8
```


Get approximate circle

ApproximationCircle <count>, <x()>, <y()>, <centerX>, <centerY>, <radius>

Parameters

<count>	The number of coordinates that will be calculated for the approximate circle
<x()>	X coordinate array of the point for calculating the approximate circle (integer or double-precision array)
<y()>	Y coordinate array of the point for calculating the approximate circle (integer or double-precision array)
<centerX>	X coordinate of approximate circle
<centerY>	Y coordinate of approximate circle
<radius>	radius of approximate circle

Return Value

None.

Description

Calculate approximate circle from multiple coordinates.
<count> is the number of coordinates that will be calculated for the approximate circle.
The integer type or double-precision type array variables of one dimension that stores the coordinates of the point for calculating the approximate circle are specified for the argument <x()> and <y()> in shape to add only () without specifying the element number like X&().
<centerX>, <centerY>, and <radius> are center X, Y coordinate, and radius of the approximate circle.

Example

Generate the approximation circle from three coordinate (X1,Y1)(X2,Y2)(X3,Y3) and acquire a central coordinate and radius.

```
Dim X&(3),Y&(3)
X&(0)=50
Y&(0)=50
X&(1)=100
Y&(1)=100
X&(2)=150
Y&(2)=50

ApproximationCircle 3, x&(), y&(), centerX#, centerY#, radius#
```


Get the value of the character code for the specified character.

Asc (<Character String>)

Parameters

<Character String>	The character string (character type) that requests the character code.

Return Value

Returns the value of the integer.
The content of the value is the character code of the specified character. Character code is ASCII.

Description

The character code of the head character of the of the character string specified by <Character String> is returned in decimal.
There is chr$ as the reverse function of Asc. The chr$ function returns the character that corresponds to the specified character code.

Example

Get the character code for 'A'.

```
CHARA$="A"
CODE&=Asc(CHARA$)
```

The result is as follows:

```
CODE&=65
```

Register a processing unit.

AssignUnit <unitNo>, <itemIdent>

Parameters

<unitNo>	Unit number indicating the registration position (integer type)
<itemIdent>	Identifier of the processing item to register (character type)

Return Value

None.

Description

Register a processing item appointed with a <itemIdent> processing items with the position appointed with an <unitNo>.
When a processing item has been already registered with the position of the <unitNo>, overwrite.

Example

Add a handling of search unit to the last of the flow.

```
'Acquire the number of the processing units.
unitNo& = UnitCount

'Set the identifier of the processing item.
Ident$ = "Search"

'Add a handling of search unit to the last of the flow.
AssignUnit unitNo& , Ident$
```

Get the arc tangent of the expression specified.

Atn (<expression>)

Parameters

<expression>	The expression that gets the arc tangent (integer type or double-precision type real numbers)

Return Value

Returns the value of the double-precision type number.
The content of the value is the arc tangent of the specified expression.This is returned within the radian range from -pi/2 to pi/2.

Description

In order to convert the value returned to degree notation, it is multiplied by 180/pi.
Specify either an integer type or double-precision type real number in the <Expression>.

Example

Get the arc tangent of Variable X#.

```
X#=1

XX#=Atn(X#)*180/3.141592
```

The result is as follows:(The fractional part is rounded up at the 4th place)

```
XX#=45.000
```

Output BUSY state

BusyOut <ioIdent>, <state>

Parameters

<ioIdent>	Identification name(string) of I/O module that executes send processing
<state>	State 0:OFF,1 ON(integer type)

Return Value

None.

Description

Identification name(string) of I/O module that executes send processing is specified in argument<ioIdent>.
The content of operation depends on the specification of the I/O module.

Example

Output BUSY ON to Parallel interface.

```
BusyOut "ParallelIo", 1
```

Change scene number

ChangeScene <sceneNo>

Parameters

<sceneNo>	Scene number to change(integer type)

Return Value

None.

Description

During scene change, do not come by STEP input.
Cannot change to the scene number that is bigger than maximum scene number.

Example

Change to scene 2.

```
ChangeScene 2
```

Change scene group number

ChangeSceneGroup <sceneGroupNo> , <sceneNo>

Parameters

<sceneGroupNo>	Scene group number to change(integer type)
<sceneNo>	Scene number to change(integer type)

Return Value

None.

Description

Change the scene group and the scene appointed with a <sceneGroupNo> and a <sceneNo>.

Example

Change to scene group 10.

```
ChangeSceneGroup 10 , 0
```

Check a registration state of the processing unit

CheckUnit (<unitNo>)

Parameters

<unitNo>	Unit number to check (integer type)

Return Value

Returns the value of the integer type.
The content of the value is the registration state.
0:Non-registration.
1:Registered

Description

Check whether is registered at the position where a processing item was appointed with an <unitNo>.

Example

When a processing unit is registered in unit 3, rearrange it for a processing item search.

```
if CheckUnit (3) = 1 then
Ident$ = "Search"
AssignUnit 3 , Ident$
endif
```

Gets the character corresponding to the character code.

Chr$ (<Expression>)

Parameters

<Expression>	The expression (integer type) that requests the character code.

Return Value

Returns the character type string.
The content of the value is ASCII code.

Description

Specify an integer from 0 to 255 in the <Expression>.
When the value of the <Expression> is a double-precision type real number, the fractional part is handled as a rounded value.
When the control code is used, output by inputting the corresponding value is possible.(For example, if Chr$(13) is used, "CR" (ctrl+M) is output)
There is the reverse function asc in relation to Chr$ and the character code that corresponds to the character is returned as a decimal.

Example

Change the numerical value "48" to its character code.

```
CHARA$=Chr$(48)
```

The result is as follows:

```
CHARA$="0"
```

Clear processing unit measure data

ClearMeasureData <unitNo>
ClearMeasureData

Parameters

<unitNo>	Processing unit number (integer type)

Return Value

None.

Description

Clear the measurement data of a processing unit registered with the position appointed with an <unitNo>.
When an <unitNo> is omitted, Clear the measurement data of all processing units registered with a flow.

Example

Clear measurement data of processing unit 3.

```
ClearMeasureData 3
```

Clear the scene number

ClearScene <sceneNo>

Parameters

<sceneNo>	scene number(integer type)

Return Value

None.

Description

The following processing is carried out in the scene clear for the scene.
・Clear the title of the scene.
・Delete all processing units in the scene.
When clear the current scene, the screen display is cleared.
Cannot clear the scene number that is bigger than maximum scene number.

Example

Clear scene 2.

```
ClearScene 2
```

Clear the specified scene group

ClearSceneGroup <sceneGroupNo>

Parameters

<sceneGroupNo>	Scene group No. to clear (integer type)

Return Value

None.

Description

Clear the scene group data specified by the scene group number <sceneGroupNo>.

Example

Clear a scene group 1.

```
ClearSceneGroup 1
```

Closes the specified file

Close [#<File No.>[,#<File No.>]...]

Parameters

<File No.>	The file number (integer) of the file to be closed.

Return Value

None.

Description

This closes a file that has been opened for data I/O processing.
In <File No.>, specify the <File No.> that was specified when the file was opened using the Open command.
A file closed using the Close command cannot be used for I/O processing until it is opened again using the Open command.
The <File No.> specified in Close can be specified with a later Open command for I/O processing of other files.In addition, files that have been freed from the <File No.> specified by Close can be opened again using the same <File No.>.
Multiple files can be closed at one time with a single Close command by specifying multiple File Numbers.
Omitting the <File No.> will result in all open files being closed.
When a file that has been opened for output is closed, closing is done only after all of the data remaining in the file buffer has been written out.Always execute the Close command in order to ensure the correct end of a file writing operation.

Example

Open a file and then Close it after writing data to it.

```
Open "C:\input.dat" for output as #1
Print #1 DATA&
Close #1
```

Continues the execution of a program halted by a stop statement.

Cont

Parameters

None.

Return Value

None.

Description

This command is a direct command intented to start execution from the same location when the program is halted with the Stop command.
While the program is stopped you can print the variable name, etc., however, if the content of the program is changed, there may be cases where it cannot be continued.

Example

When the stop statement is executed in the program, execution of the process of Macro Program is suspended; however, the Macro Program processing is not exited.Thus, the processing of the menu will not be continued.
In addition, the following prompt will be displayed to the macro console.
MACRO>
While the prompt shown above is displayed, it is possible to directly input Macro Commands.
Example:MACRO> Print A&[ENT]
When the Cont command is input, program processing halted by the Stop statement is continued.
Example:MACRO> Cont[ENT]

Copy the scene data

CopyScene <srcSceneNo> , <destSceneNo>

Parameters

<srcSceneNo>	Scene number of the origin of copy (integer type)
<destSceneNo>	Scene number of the copying (integer type)

Return Value

None.

Description

Copy the data of the scene appointed with an <srcSceneNo> to scene appointed with a <destSceneNo>.
When appoint scene number not to exist, it becomes error (Illegal function call).
When there is not the space work memory capacity that only copy, it becomes error (Illegal function call).

Example

Copy scene 2 to scene 3.

```
CopyScene 2 , 3
```

Copy the scene group data

CopySceneGroup <srcSceneGroupNo> , <destSceneGroupNo>

Parameters

<srcSceneGroupNo>	Scene group number of the origin of copy (integer type)
<destSceneGroupNo>	Scene group number of the copying (integer type)

Return Value

None.

Description

Copy the data of the scene group appointed with an <srcSceneGroupNo> to scene group appointed with a <destSceneGroupNo>.
When appoint scene group number not to exist, it becomes error (Illegal function call).
When there is not the space work memory capacity that only copy, it becomes error (Illegal function call).

Example

Copy scene group 0 to scene group 1.

```
CopySceneGroup 0 , 1
```

Copy the processing unit

CopyUnit <srcSceneNo> , <srcUnitNo> , <destUnitNo> , <mode>
CopyUnit <srcUnitNo> , <destUnitNo> , <mode>

Parameters

<srcSceneNo>	Scene number of the origin of copy (integer type)
<srcUnitNo>	Processing unit number of the origin of copy (integer type)
<destUnitNo>	Unit number of the copying (integer type)
<mode>	Processing mode (integer type) 0:Overwrite copy, 1:Insertion copy

Return Value

None.

Description

Copy a processing item registered with the <srcUnitNo> position of the scene appointed with a <srcSceneNo> at the <destUnitNo> position of the current scene.
When a <srcSceneNo> is omitted, Copy it from current scene.

Example

Insert processing unit 3 of scene 2 before processing unit 4.

```
CopyUnit 2 , 3 , 4 , 1
```

Copy the processing unit figure data

CopyUnitFigure <srcSceneNo>, <srcUnitNo>, <srcFigureNo>, <destUnitNo>, <destFigureNo>

Parameters

<srcSceneNo>	The scene number that is to be copied (integer type)
<srcUnitNo>	The processing unit number that is to be copied (integer type)
<srcFigureNo>	The figure number that is to be copied (integer type)
<destUnitNo>	The copy destination processing unit number (integer type)
<destFigureNo>	The copy destination figure number (integer type)

Return Value

None.

Description

Copy the processing unit figure data.

Example

Copy the domain graphic data 0 of processing unit 3 for scene 2 to domain graphic data 0 of processing unit 5.

```
CopyUnitFigure 2, 3, 0, 5, 0
```

Copy the processing unit model data

CopyUnitModel <srcSceneNo>, <srcUnitNo>, <srcModelNo>, <destUnitNo>, <destModelNo>

Parameters

<srcSceneNo>	The scene number that is to be copied
<srcUnitNo>	The processing unit number that is to be copied
<srcModelNo>	The modle number that is to be copied
<destUnitNo>	The copy destination processing unit number
<destModelNo>	The copy destination modle number

Return Value

None.

Description

Copy the processing unit modle data.

Example

Copy the model 0 of processing unit 3 for scene 2 to model 0 of processing unit 5.

```
CopyUnitModel 2, 3, 0, 5, 0
```


Gets the cosine of the specified expression.

Cos (<expression>)

Parameters

<expression>	The expression that gets the cosine (integer type or double-precision type real numbers)

Return Value

Returns the value of the double-precision type number.
The content of the value is the cosine of the specified expression.This is returned as a numeric value within the range of -1 to 1.

Description

Specify the angle in the <Expression> as a radian. In the case of angle notation (X degrees), it is necessary to convert to a radian by multiplying pi/180.
Specify either an integer type or double-precision type real number in the <Expression>.

Example

Get the cosine of 60 degrees.

```
DATA#=Cos(60/180*3.141592)
```

The result is as follows:

```
DATA#=0.5
```

Gets the intersection between 2 straight lines.

Crspoint <Straight Line 1st Component>,<Straight Line 2nd Component>,<X Coordinate>,<Y Coordinate>

Parameters

<Straight Line 1st Component>	The parameter of Straight Line 1 for getting the intersection (double-precision type array)

<Straight Line 2nd Component>	The parameter of Straight Line 2 for getting the intersection (double-precision type array)
<X Coordinate>	X coordinate storage region for the intersection that was gotten (double-precision).
<Y Coordinate>	Y coordinate storage region for the intersection that was gotten (double-precision).

Return Value

None.

Description

Store the a, b, c parameters that meet the conditions of the straight line equation: ax+by=c in the <Straight Line 1st Component> and <Straight Line 2nd Component>.These parameters are the same type of array that is gotten using the Lsqumeth command to get <Line Components>.
This is mainly used to get the intersection of lines gotten by the Lsqumeth command.
Reference: Lsqumeth command (p.238)

Example

Get the intersection coordinates between the 2 straight lines that were gotten. Each of the 2 straight lines will be gotten using Units 1 to 4 and Units 5 to 8.

```
Dim POS1X#(3),POS1Y#(3),POS2X#(3),POS2Y#(3),PARM1#(2),PARM2#(2)

For I&=0 To 3
      GetUnitData I&+1,"X",POS1X#(I&)
      GetUnitData I&+1,"Y",POS1Y#(I&)
Next
Lsqumeth 4,POS1X#(),POS1Y#(),PARM1#()

For I&=0 To 3
      GetUnitData I&+5,"X",POS2X#(I&)
      GetUnitData I&+5,"Y",POS2Y#(I&)
Next
Lsqumeth 4,POS2X#(),POS2Y#(),PARM2#()

Crspoint PARM1#(),PARM2#(),CRSX#,CRSY#
Erase POS1X#(),POS1Y#(),POS2X#(),POS2Y#(),PARM1#(),PARM2#()
```

Reads in the date from the internal clock

Date$

Parameters

None.

Return Value

Returns the value of the character type string.
The content of the value is the character string in which the date from the internal clock is given as Year (YY), Month (MM) and Day (DD), separated by slashes (/).
The range of the date returned is as follows.
Year (YY): 00 - 80
Month (MM): 01 - 12
Day (DD): 01 - 31

Description

The values of Year (YY) from 2000 to 2080 are expressed as 00 to 80.
The internal clock setting is done using [System Settings] -> [Date/Time].

Example

Read in the date from the internal clock and output it to the macro console.

```
TODAY$=Date$
print "20";TODAY$
```

This is output as described below:

```
2011/03/10
```

Sets the debugging mode.

Debug <Mode No.>

Parameters

<Mode No.>	The number of the debugging mode (integer).

Return Value

None.

Description

Sets the action for when a Macro Error is generated.
The mode numbers are as listed below.
0: None message is output always.
1: An error message is output to the macro console when an error occurs.
2: Execute trace (output processing line to the macro console).
Refer to Debugging Macro Programs for details on debugging.
Reference: ▸ Debugging Macro program (p.169)

Example

Set the debugging mode to 0.

```
Debug 0
```

Delete the processing unit

DeleteUnit <unitNo>

Parameters

<unitNo>	Processing unit number (integer type)

Return Value

None.

Description

Delete the processing unit registered with the position appointed with an <unitNo>.

Example

Delete the processing unit 2.

```
DeleteUnit 2
```

Definition of the array variables is carried out.

Dim <Array Variable Name> (<Maximum Value of Subscript>[, <Maximum Value of Subscript>[, <Maximum Value of Subscript>[, <Maximum Value of Subscript>]]])

Parameters

<Array Variable Name>	Variable name to be used as the array (Array Variable Name)
<Maximum Value of Subscript>	The maximum value of the 1st dimension subscript (integer)
<Maximum Value of Subscript>	The maximum value of the 2nd dimension subscript (integer)
<Maximum Value of Subscript>	The maximum value of the 3rd dimension subscript (integer)
<Maximum Value of Subscript>	The maximum value of the 4th dimension subscript (integer)

Return Value

None.

Description

Specify the variable name to be used as the array in <Array Array Variable Name>.
The array will be secured in the range from 0 to ... <Maximum Value of Subscript>.Thus, the number of array elements will be the <Maximum Value of Subscript> +1.
Declare the array variable for the maximum 4th dimension.
Even if arrays and variables have the same names, they are handled as separate entities.
Even if the dimensions are different, if the variable names are the same, they will be recognized as the same array.
Defined arrays are freed using the Erase command.
When a declared, existing array is re-defined without freeing it, the array defined the most recently will be valid.In this case, the array defined before will be freed and re-defined.
Multiple arrays can be declared at one time.
Example: Dim A&(100),B&(100),C#(200)

Example

Declare an array.

```
Dim XY&(3)
Dim XY#(7,15)
Dim CHARA$(31,63,127,255)
```

Gets image/text Display the processing unit number

DisplayUnitNo

Parameters

None.

Return Value

Returns the value of the integer type.
The content of the value is unit number set to image/text indication window.

Description

Acquire processing unit number set to a current image/text display window.

Example

Acquire processing unit number set to a image display window.

```
windowNo& = DisplayUnitNo
```

The execution of the statements between Do and Loop are repeated as long as the conditions continue to be fulfilled.

Do <Do statement within the block>
Loop While <Logical Expression>

Parameters

<Logical Expression>	The logical expression (Boolean expression) for controlling processing.
<Do statement within the block>	Statement to be repeatedly executed (statement).

Return Value

None.

Description

While the <Logical Expression> is true (not 0), the <Do statement within the block> is repeatedly executed.Refer to Calculation for details on logical expressions and Boolean values.
Reference: Calculation (p.159)
The Exit Do command is used to forcefully exit the Do - Loop While command.
Control is moved from outside the Do block to within using the Goto command, etc. Moving control from inside the block to outside it cannot be done.

Example

```
NUM&=0

Do
NUM&=NUM&+1
Loop While NUM<100
Print NUM&
```

The result is as follows:

```
100
```

Get the shortest distance between the specified line and 2 points.

Dposline(<X Coordinate>, <Y Coordinate>, <Straight Line Component>)

Parameters

<X Coordinate>	X coordinate of the points to get the distance (double-precision).
<Y Coordinate>	Y coordinate of the points to get the distance (double-precision).
<Straight Line Component>	Parameter array of the straight line to get the distance (double-precision type array).

Return Value

Returns the value of the double-precision type number.
The content of the value is the shortest distance between the points and straight line.

Description

Specify the points to get the distance in <X Coordinate> and <Y Coordinate>.
The parameters a, b and c that make up the straight line ax+by+c=0 are stored in <Straight Line Component>."a" to "c" are each stored in array elements 0 to 2.
This is mainly used to get the variance and deviation of the basic points with regard to lines gotten by the Lsqumeth command.
Reference: ▸ Lsqumeth command (p.238)

Example

Get the variance and deviation with respect to the straight lines gotten from the 4 points.(Please refer to the Lsqumeth command for the method of determining a straight line).

```
Dim POSX#(3),POSY#(3),PARM#(2),DIST#(3)

'Initialize the line
For I&=0 To 3
    GetUnitData I&+1,"X",POSX#(I&)
    GetUnitData I&+1,"Y",POSY#(I&)
Next
'Calculate the component of line
Lsqumeth 4,POSX#(),POSY#(),PARM#()

SUMDIST#=0
For I&=0 To 3
    'Calculate the shortest distance between the straight line and point.
    DIST#(I&)=Dposline(POSX#(I&),POSY#(I&),PARM#())
    SUMDIST#=SUMDIST#+DIST#(I&)
Next

Erase POSX#(),POSY#(),PARM#(),DIST#()
```

Get the available space of the drive.

Dskf(<Drive Name>)

Parameters

<Drive Name>	The drive name (character string) to get the available space.

Return Value

Returns the value of the integer.
The content of the value is the byte expression of the amount of free space available on the drive.

Description

When a drive that does not exist has been specified, -1 is returned as the return value.
Specify the <Drive Name> in a manner similar to the following: "C:\".

Example

When the remaining available space on the drive is less than 1KB turn ON the ERROR signal.

```
if Dskf("C:\")<1024 then putport "Parallello",103,1
```


Checks for the end of file.

Eof (<File No.>)

Parameters

<File No.>	The file number (integer) of the file opened by the Open command.

Return Value

Returns the value of the integer.
The content of the value is as listed below.
0: The end of the file has not been reached
-1: The end of the file has been reached

Description

Check to see if the end of file has been reached for the file specified by <File No.>.

Example

Read in data until the end of the file.

```
Open "C:\input.dat" FOR INPUT As #1
For I&=0 To 255
    DATA$ = Input$(6,#1)
    DATA$(I&)=DATA$
    If Eof(1)<>0 Then Exit For
Next
Close #1
Erase DATA$()
```

Free the array variable memory region that was defined by the Dim command.

Erase <Array>[,<Array>...]

Parameters

<Array>	The array variable (array) whose memory is to be freed.

Return Value

None.

Description

Multiple arrays can be freed at one time.
Use this command to free array variables that are used only temporarily. Doing so will allow the most effective use of memory space.
An array that has been freed can be defined again under the same name.
When an array is re-defined with the same name without freeing it, the array defined the most recently will be valid. In this case, the array defined before will be freed and re-defined.

Example

Free a defined array.

```
Dim ARRAY1&(100),ARRAY2&(200),ARRAY3&(300)
:
Erase ARRAY1&(),ARRAY2&(),ARRAY3&()
```

Gets the Error occurrence commands during exception handling.

Errcmnd$

Parameters

None.

Return Value

Returns the value of the character string.
The content of the value is the command character string generated by the error.

Description

Gets the error command character string when a Macro Error is generated.
The command character string gotten will be an alphabetic upper case character string.
When no error has occurred a null string ("") is returned.
In cases where an error occurs somewhere other than in command processing (i.e. an error such as that caused by dividing by zero in calculation), a null string ("") is returned.
This is used between the catch~end try of try ~ catch ~ end try.

Example

Writing data to a file.

```
Writing data to a file.
*DATAWRITE

    Try
        Open "/C0/DATA.DAT" for OUTPUT as #1
        Print #1, DATA$
        Close
    Catch

        ' In the case where the error is generated by the "open" command.

        If ERRCMND$ = "Open" Then
        Print "Unable to open file"

        ' In the case where the error is generated by the "print" command.

        Elseif ERRCMND$ = "Print" Then
        Close
        Print "Writing failed"
        Endif
    End try
Return
```

Gets the error class during exception handling.

Errno

Parameters

None.

Return Value

Returns the value of the integer.
The content of the value is the Error No. that is fetched.

Description

Gets the Error No. when a Macro Error occurs.
The respective Macro Error error numbers are listed below.
Error No.

1	NEXT without FOR
2	Syntax error
3	RETURN without GOSUB
5	Illegal function call
6	Overflow
7	Out of memory
8	Undefined line number
9	Subscript out of range
11	Division by Zero

13	Type missmatch0
15	String too long
18	Undefined array
23	Line buffer overflow
26	FOR without NEXT
32	Undefined label
121	CASE without SELECT
122	END SELECT without SELECT
123	SELECT without END SELECT
124	CASE without END SELECT
125	ELSEIF without IF
126	ELSE without IF
127	ENDIF without IF
128	IF without ENDIF
129	ELSEIF without ENDIF
130	ELSE without ENDIF
135	DO without LOOP
136	LOOP without DO
140	EXIT without FOR
141	EXIT without DO

This is used between the catch - end try of try - catch - end try.

Example

Writing data to a file.

```
*DATAWRITE

    Try
        Open "/C0/DATA.DAT" for OUTPUT as #1
        Print #1, DATA$
        Close
    Catch

        ' In the case where the error is generated by the "open" command.

        If ERRCMND$ = "Open" Then
        print "Unable to open file"

        ' In the case where the error is generated by the "print" command.

        Elseif ERRCMND$ = "Print" Then
        Close
        print "Writing failed"
        Endif
    End try

Return
```

Terminate the controller

ExitFzProcess

Parameters

None.

Return Value

None.

Description

When is carried out on a controller, the power off of controller.

Example

Save the data to the controller, and then power off the controller.

```
SaveData
ExitFzProcess
```

Calculate exponential function.

Exp <Expression>

Parameters

<Expression>	The expression that gets the exponential value (integer type or double-precision type)

Return Value

Return double-precision type value.
The return value is the value of mathematical constant(e) raised to the value of <Expression>.

Description

The value of <Expression> must be less than 70.
The inverse function of Exp (Function) is Log (Function).
Exp (Function) can lead other mathematical functions like hyperbolic function (sinhX).

Example

Get the values of sine hyperbolic (sinh) and cosine hyperbolic (cosh) of variable TH.

```
SINH& = (Exp(TH&) - Exp(-TH&) / 2
COSH& = (Exp(TH&) + Exp(-TH&) / 2
```

Copies a file within the memory card.

Fcopy <Original to be Copied>,<Copy Destination>

Parameters

<Original to be Copied>	The path of the original that will be copied (character string type).
<Copy Destination>	The path for the copy destination file (character string type).

Return Value

None.

Description

Always specify an absolute path with the drive name included for the <Original to be Copied> and <Copy Destination>.
Wild Cards cannot be used in the <File Path Name>.Refer to Wild Cards for details on Wild Cards.
Reference: Wildcard (p.168)
When the destination file already exists, that file is overwritten. When no file exists, it is created.
When the File Name for the copy destination has been omitted (when only the directory name and path have been specified), it is copied using the same name as the original file.
Files will not be copied in the cases stated below.
The original file to copy from does not exist.
The destination directory does not exist.
No Memory Card has been attached.
There is insufficient memory on the Memory Card.

Example

Copy the 1280-720.bmp file below from directory "C:\" to directory "D:\".

```
Fcopy "C:\1280-720.bmp","D:\1280-720.bmp"
```

Truncates everything after the radix point and gets the integer value.

Fix (<expression>)

Parameters

<expression>	The expression that truncates everything after the radix point (double-precision type)

Return Value

Returns the value of the integer.
The content of the value is the truncated value of the specified expression.

Description

Truncates everything after the radix point for the specified value and return the value of the integer part. For example, Fix(-1.5) would return -1.Fix(1.5) returns 1.
When an argument has been given a negative value, the int function returns an integer that does not exceed the maximum negative of the argument and in relation to this, Fix returns the minimum negative integer exceeding the argument.For example, if -7.2 is specified as the argument, the int function returns -8 and the Fix function returns -7.

Example

Truncate the measurement results after the radix point and output them.

```
NUMBER1&=Fix(9.7)
NUMBER2&=Fix(-9.7)
NUMBER3&=Fix(-9.2)
```

The results are as follows:

```
NUMBER1&=9
NUMBER2&=-9
NUMBER3&=-9
```

Repeats and executes the statements between the For statement and the Next statement.

For <Variable Name>=<Initial Value> To <Ending Value>[Step <Increment>]
-
Next [<Variable Name>]

Parameters

<Variable Name>	Loop control counter variable name (integer).
<Variable Name>	The initial value of the loop control counter variable (integer).
<Ending Value>	The ending value of the loop control counter variable (integer).
<Increment>	The increment of the loop control counter variable (integer).

Return Value

None.

Description

The commands between For and Next are repeated and executed while changing from the initial value of the variable to the ending value.
The commands between For and Next are repeated and executed while changing from the initial value of the variable to the ending value.
The Step statement and <Increment> can be omitted, and when omitted, the Increment is set to +1.
The <Variable Name> after Next can be omitted.In this case it becomes equivalent to the <Variable Name> after For.
For each time the For-Next loop is executed, the value specified by the initial value is added to and assigned to the numeric variable.
The Exit For command is executed to forcefully exit the loop while the For ... To ... Step - Next is executing.
Control is moved from outside the For block to within using the Goto command, etc. Moving control from inside the block to outside it cannot be done.

Example

Output the Judgement Result of each processing unit(unit1-unit4).

```
DATA&=0

For I&=1 To 4
    DATA&=UnitJudge(I&)
    If DATA&=1 Then
    DrawTextG "Unit"+Str$(I&)+" Result: OK",100,I&*100,0
    Else
    DrawTextG "Unit"+Str$(I&)+" Result: NG",100,I&*100,0
    EndIf
Next
```

Input terminal all point input

GetAll(<ioIdent>)

Parameters

<ioIdent>	Identification name (string) of I/O module

Return Value

Returns the value of the integer.
The content of the value is the input binary data.

Description

Identification name (string) of I/O module that executes received processing is specified in argument<ioIdent>.
The content of operation depends on the specification of the I/O module.
Reference: ▸ List of IO modules (p.299)

Example

Performs a batch input of the state of terminals such as the parallel I/Os

```
AA& = GetAll("ParallelIo")
```

Get global data

GetGlobalData <dataIdent>, <data>

Parameters

<dataIdent>	Data ident that is to be get
<data>	Data that is to be get

Return Value

None.

Description

Variable that stores acquired data is specified by the argument <data>(element of array variable is available)
The acquired data is stored in the variable specified after it converts into the type of the specified variable.

Example

Gets the value of global data "GsetData".

```
GetGlobalData "GsetData", gdata&
```

Gets processing unit image size

GetImageSize <unitNo>, <measureImageNo>, <sizeX>, <sizeY>

Parameters

<unitNo>	Processing unit number (integer type)
<measureImageNo>	Image number of image at the time of register for processing (integer type)
<sizeX>	Obtained X size of the measured image (integer type)
<sizeY>	Obtained Y size of the measured image (integer type)

Return Value

None.

Description

Gets processing unit image size.

Example

Gets the size of the image of image number 0 of processing unit number 2.

```
GetImageSize 2, 0, sizeX&, sizeY&
```


Gets information about the Image Display window setting

GetImageWindow <windowNo>, <locationX>, <locationY>, <width>, <height>, <unitNo>, <subNo>, <magnification>, <originX>, <originY>, <update>, <visible>

Parameters

<windowNo>	Window number (integer type)
<locationX>	Upper left X coordinate value of the window (integer type)
<locationY>	Upper left Y coordinate value of the window (integer type)
<width>	Window width (integer type)
<height>	Window height (integer type)
<unitNo>	Processing unit number (integer type)
<subNo>	Sub number to be displayed (integer type)
<magnification>	Display magnification (Real number type)
<originX>	Upper left X coordinate of a display image relative to the window upper left coordinate (integer type)
<originY>	Upper left Y coordinate of a display image relative to the window upper left coordinate (integer type)
<update>	Update timing (integer type) 0: Every measurement 1: Only when an overall judgement result is NG at the time of measurement 2: Only when a target processing unit is NG at the time of measurement 3: Always updated (through display)
<visible>	Display (integer type) 0: Window invisible 1: Window visible

Return Value

None.

Description

Gets setting information about the Image Display Window.
Variable that store acquired data is specified by each argument (element of array variable is available)Variable that stores acquired data is specified by the argument <data>(element of array variable is available).

Example

Gets the setting information of image display window 3.

```
GetImageWindow 3, locationX&, locationY&, width&, height&, unitNo&, subNo&, magnification#, originX&,
originY&, update&, visible&
```

Gets measurement result the Output presence

GetMeasureOut

Parameters

Return Value

Returns the value of the integer type.
The content of the value is Output presence measurement result. (0: no output, 1: output)

Description

Gets measurement and the Output presence.
If an acquisition value carries out the serial data output in the case of 0, the data are not output to the outside.
If an acquisition value carries out the serial data output in the case of 1, the data are output to the outside.

Example

An acquisition value sets an initial value for output data at the time of 0.

```
*outputsub
    output& = GetMeasureOut
    If output& = 0 Then
        outdataA& = 0
        outdataB& = 0
        outdataC& = 0
    Else
        outdataA& = 100
        outdataB& = 200
        outdataC& = 300
    Endif
End sub
```

Gets PLC the read data

GetPlcData <ioIdent>, <readData()>, <offset>, <size>, <data>

Parameters

<ioIdent>	Identification name of I/O module (character type)

<readData()>	Read data (integer type sequence)
<offset>	Offset value (integer type)
<size>	Size of Read data (integer type)
<data>	Variable in output data (any type)

Return Value

None.

Description

Gets data from the <readData()> which began to read from the memory area of the PLC.
Use it to extract data of numerical value and the character string from the data which performed read by ReadPlcMemory commands.
Set a identification Name Identification name in an <ioIdent>.
The data to be gets PLC the read data argument <readData()> by one dimension integer type array variable, do not specify it with the number of element like X&() but like () only with the type.
To an <offset> and a <size>, appoint an offset position and size of the <readData()> sequence with the number of bytes.
The <data> is variable in output data.
The value that an <size> can appoint is 2/4/8 byte. The data acquisition is each carried out for 2 bytes integer /4 byte integer /8 byte real number.
Appoint the variable of the character string type, the data acquisition is performed as character string of the character string length that appoint a character string length to acquire in an <size> (NULL of the end does not include it) and appointed.
Appoint -1 in an <size>, acquire character string before NULL emerging from the offset position that appointed with a <offset>.
Reference: ▸ List of IO modules (p.299)

Example

Acquire five integer data of 4 bytes in a variable <data> from the eighth byte of the data <readData()> which I began to read from PLC.

```
Dim data&(5)
offset& = 8

For I&=0 to 4
    GetPlcData "SerialPlcLink", readData&(), offset&, 4, data&(I&)
    offset& = offset& + 4
Next
```

Input terminal a point input

GetPort(<ioIdent>, <portNo>)

Parameters

<ioIdent>	Identification name (string) of I/O module
<portNo>	Port number (integer type)

Return Value

Returns the value of the integer.
The content of the value is the bit data that is fetched.
0:Bit OFF
1:Bit ON

Description

Identification name(string) of I/O module that executes received processing is specified in argument<ioIdent>.
The content of operation depends on the specification of the I/O module.
Reference: List of IO modules (p.299)

Example

If DI3 is ON, carry out processing.

```
pno3& = GetPort("ParallelIo", 3)
If pno3& = 1 Then
    'Carry out processing
Endif
```

Gets system data

GetSystemData <dataIdent0>, <dataIdent1>, <data>

Parameters

<dataIdent0>	Data ident 0 to be get
<dataIdent1>	Data ident 1 to be get
<data>	Data to be get

Return Value

None.

Description

Gets system data.
Reference: List of system data (p.297)

Example

Gets the information of the save capture directory. Perform copying of Sample.bmp file to "C:\temp\bmp".

```
GetSystemData "Measure", "captureDirectory", dirName$
file$ = dirName$+"\Sample.bmp"
Fcopy file$ , "C:\temp\bmp\Sample.bmp"
```

Gets information about the text Display window setting

GetTextWindow <unitNo>, <subNo>, <update>, <visible>

Parameters

<unitNo>	Processing unit number (integer type)
<subNo>	Sub number to be displayed (integer type)
<update>	Update mode (always 0) (integer type)
<visible>	Indication mode (integer type) 0:Window non-indication 1:Window indication

Return Value

None.

Description

Gets information about the text Display window setting.

Example

Acquire the setting of the text indication window, and, in the case of "non-indication", a <visible> sets it in "indication".

```
GetTextWindow unitNo&, subNo&, update&, visible&
If visible& = 0 Then
    SetTextWindow unitNo&, subNo&, update&, 1
Endif
```

Gets processing unit data

GetUnitData <unitNo>, <dataNo>, <data<
GetUnitData <unitNo>, <dataIdent>, <data>

Parameters

<unitNo>	Processing unit number
<dataNo>	Data number
<dataIdent>	Data identification name
<data>	Obtained data

Return Value

None.

Description

Gets processing unit data.
Variable that stores acquired data is specified by the argument <data> (element of array variable is available)
The acquired data is stored in the variable specified after it converts into the type of the specified variable.

Example

Gets the judgement result of processing unit 2.

```
GetUnitData 2, 0, JUDGE&
or
GetUnitData 2, "JG", JUDGE&
```

Gets processing unit figure data

GetUnitFigure <unitNo>, <figureNo>, <figure()>

Parameters

<unitNo>	Processing unit number
<figureNo>	The figure number to be set
<figure()>	The figure data to be set

Return Value

None.

Description

The integer type array variable of one dimension that stores the set graphic data is specified for the argument <figure()> in shape to add only () without specifying the element number like XX&().
It is necessary to define a number of elements enough to store the acquired graphic data in the specified array variable beforehand. (*There is no mechanism enhanced automatically when the number of elements is insufficient now.

Example

If figure number 1 of processing unit 2 is an wide arc, switch to the wide circle.

```
dim figure&(10)
'Gets the figure data of processing unit 2
GetUnitFigure 2, 1, figure&()

'A figure is an wide arc
If figure&(0) = 256 Then

    'Switch to the wide circle.
    figure&(0) = 64
    figure&(4) = figure&(6)
    SetUnitFigure 2, 1, figure&()
Endif
```


Moves the processing to the specified subroutine.

Gosub <Label>

Parameters

<Label>	Label (Label) for the movement destination.

Return Value

None.

Description

After processing has been moved to the specified subroutine, it is returned using the Return command and the processing is moved to the next line after the line the Gosub command had moved processing to.
Specify the Label name to attach to the starting line of the subroutine to be called in <Label>.
When processing is moved using the Gosub command, always be sure to allow it to return using Return.
In processing where Return is not used, use the Goto statement.

Example

Define a Subroutine (*INITPROC) that will be executed at Macro Program load time.

```
*MCRINIT
    Gosub *INITPROC
Return
*INITPROC
    ' Initialization processing
Return
```

Moves the processing to the line of the specified Label.

Goto <Label>

Parameters

<Label>	Label name (Label) for the movement destination.

Return Value

None.

Description

Moves the processing to the line where the specified Label is.
This differs from the Gosub command in that there is no return to the origin of the call using the Return statement. In cases where return is needed, use the Gosub command.

Example

Move to Label *PROC1.

```
Goto *PROC1
```

Converts the value of the expression to a character string hexadecimal expression.

Hex$ (<Expression>)

Parameters

<Expression>	The expression to be converted to a character string (integer).

Return Value

Returns the value of the character type string.
The content of the value is the character string which converts the specified expression to hexadecimal expression.

Description

The & representing hexadecimal is not attached.
Specify a numeric value of 4 bytes or less in <Expression>.
Specify a numeric value in decimal as an integer as either a numeric constant or numeric variable in the <Expression>.
Negative numbers are expressed using a complement of 2.
In the case where the numeric value specified in <Expression> has a fractional part, it is rounded up to an integer at the first place after the radix point and then converted into a hexadecimal character string.

Example

Output the "A" result as a hexadecimal.

```
CHAR1$="A"
CODE&=Asc(CHAR1$)
CHAR2$=Hex$(CODE&)
```

The result is as follows:

```
CODE&=65
CHAR2$=41
```


Controls the flow of processing in accordance with specified conditions.

If <Logical Expression> Then <Statement>|<Label> [Else <Statement>|<Label>]

Parameters

<Logical Expression>	The logical expression (Boolean expression) for controlling processing.
<Statement>	The command statement to be processed (statement).
<Label>	Label (Label) for the movement destination.

Return Value

None.

Description

Controls the flow of processing in accordance with the Logical Expression.
While the <Logical Expression> value is true (not 0), either the statement below the Then <statement> is executed or the processing is moved to the line specified by the <Label>.Refer to Calculation for details on logical expressions and Boolean values.
Reference: ▸ Calculation (p.159)
Specifying a <Label> after Then will move the processing to the Label.
Specifying a statement after Then will execute that statement.
When the <Logical Expression> value is true (not 0), processing is moved to the line after the Else <statement> or to the line specified by the<Label>.
The Else statement can be omitted.
The Else statement may not be written on the next line.Describe the If - Else all in one statement.

Example

Output the judge result of Camera Image Input.

```
If UnitJudge(0)=1 Then Gosub *OKOUT Else Gosub *NGOUT
Return

*OKOUT
Print "OK"
Return

*NGOUT
Print "NG"
Return

Stop
```

Controls the flow of processing in accordance with the judgement conditions of the logical expressi

```
If <Logical Expression> Then
    <Then statement within the block>
[Elseif <Logical Expression> Then
    <Elseif statement within the block>
    -]
[Else
    <Else statement within the block>]
Endif
```

Parameters

<Logical Expression>	The logical expression (Boolean expression) for controlling processing.
<Then statement within the block>	The statement to be executed (statement) when the result of the <Expression> after If is true.
<Elseif statement within the block>	The statement to be executed (statement) when the result of the <Expression> after Elseif is true.
<Else statement within the block>	The statement to be executed (statement) when all the <Expressions> are false.

Return Value

None.

Description

Controls the flow of processing in accordance with the Logical Expression.
If the condition of the <Logical Expression after If is true (other than 0), the <Then statement within the block> right after it is executed.Refer to Calculation for details on logical expressions and Boolean values.
Reference: Calculation (p.159)
If the condition of the <Logical Expression after Elseif is true (other than 0), the <elseifstatement within the block> right after it is executed.
When all of the <Logical Expressions> are false, the elsestatement within the block> is executed.
Multiple Elseif clauses can be used. It is also possible to omit it.
The Else clause can be omitted.
The Endif statement cannot be omitted.
When multiple <Logical Expressions> are true, the statement within the block of the first <Logical Expression> that is true is executed.
Moving control from outside the select block to the inside or moving control from inside it to the outside using statements such as the goto statement is not possible.

Example

Reference the correlation value and change the message to be displayed on the monitor.

```
GetUnitData 1,"CR",RESULT&
If RESULT>=80 Then
DrawTextG "Excellent",100,100,0
Elseif RESULT>=60 Then
DrawTextG "Good",100,100,0
Else
DrawTextG "Bad",100,100,0
EndIf
```


Gets processing unit figure format

ImageFormat(<unitNo>, <measureImageNo>)

Parameters

<unitNo>	Processing unit number (integer type)
<measureImageNo>	Image number of image at the time of register for processing (integer type)

Return Value

Returns the value of the integer.
The content of the value is the processing unit figure format of the specified image.
0Binary image
1Monochrome image
2RGB color image
100User-defined image
101User-defined data
-1invalid image

Description

Gets processing unit figure format.

Example

Get the image format of image number 0 of processing unit 2 and display character string according to an image.

```
'Gets the image format
Image& = ImageFormat(2, 0)

If Image& = 2 Then
    'RGB color image
    DrawText "Object", 1, 1
Elseif Image& = 1 Then
    'Monochrome image
    DrawText "Non-object", 1, 1
Endif
```

Update image

ImageUpdate

Parameters

None.

Return Value

None.

Description

During the measurement flow execution, acquire the image from camera and update measurement image.

Example

When return an image and want to measure it, use it.
Camera Image Input
Color Gray Filter
Serch

```
'Make the input image from a camera
ImageUpdate
```

Serch
Serch

Reads in the specified number of bytes of binary data.

Input$(<No. of Characters>[,#<File No.>])

Parameters

<No. of Characters>	The number (integer) of bytes of data to be input.
<File No.>	The file number (integer) of the file with the data to be read in.

Return Value

Returns the value of the character type string.
The content of the value is the binary data that has been read in.

Description

The maximum that can be specified as the No. of Characters is 255 characters.
Waits until the length of data specified in No. of Characters has been input.
If the File No. is omitted, data is read in from the macro console.
When the number of characters read into the macro console communications buffer exceeds the specified No. of Characters, the excess is read in at the next Input$ function. This also applies to files.
When character strings are enclosed within double quotation marks (" "), the double quotation marks are also recognized as characters.

Example

Read in 6 bytes of binary data from the file.

```
Open "C:\input.dat" FOR INPUT As #1
DATA$ = Input$(6,#1)
Close #1
```

The result is as follows:

```
DATA$="BINDATA" (The data input from the file)
```

Reads in data and assigns it to a variable.

Input# <File No.>,<Variable>[,<Variable>...]

Parameters

<File No.>	The file number (integer) of the file with the data to be read in.
<Variable>	The variable that will store the value that is read in (integer, double-precision, character string, array).

Return Value

None.

Description

Reads in the comma separated data that exists within the line separated by the line feed code and assigns it to a variable.
The number of the blocks of data separated by commas and the number of Variables must be equal. When they differ, it becomes an "Illegal function call".
Specify the file number of the file with the data to be read in in <File No.>.
When an integer or double-precision data type has been specified for the <Variable> data type and non-numeric character data is input, "0" is input into the <Variable>. This does not generate an error.
When character strings are enclosed within double quotation marks (" "), the double quotation marks are also recognized as characters.

Example

Read in data until the end of the file.

```
dim DATA$(255)
open "/c0/input.dat" for Input as #1

for I&=0 to 255
    Input #1,TEMP$
    DATA$(I&)=TEMP$
    if eof(1)<>0 then exit for
next

close #1
```


Insert the processing unit

InsertUnit <unitNo>, <itemIdent>

Parameters

<unitNo>	processing unit number (integer type)
<itemIdent>	Processing item identifier (character type)

Return Value

None.

Description

Insert a processing item appointed with a <itemIdent> in the position appointed with an <unitNo>.

Example

Between processing unit number 2 and processing unit number 3, insert a search processing item.

```
InsertUnit 3, "Search"
```

Converts the numeric value given into an integer value.

Int (<expression>)

Parameters

<expression>	The expression (double-precision type) that requests the integer.

Return Value

Returns the value of the integer.
The content of the value is the integer that does not exceed the maximum of the specified expression.

Description

Discards everything after the radix point for the specified value and returns the integer that does not exceed the maximum of the specified numeric value.For example, Int(-1.23) would become -2 after execution and Int(1.23) would become 1 after execution.
Specify either an integer type or double-precision type real number in the <Expression>
When an argument has been given a negative value, Fix returns the minimum negative integer exceeding the argument as opposed to the Int argument, which returns an integer that does not exceed the maximum negative of the argument.For example, if -7.2 is specified as the argument, the Int function returns -8 and the Fix function returns -7.

Example

Truncate the measurement results after the radix point and output them.

```
NUMBER1&=Int(9.7)
NUMBER2&=Int(-9.7)
NUMBER3&=Int(-9.2)
```

The results are as follows:

```
NUMBER1&=9
NUMBER2&=-10
NUMBER3&=-10
```

Checks for the existence of a file and its attributes.

Isfile(<File Path Name>)

Parameters

<File Path Name>	The file path to be checked (character string type).

Return Value

Returns the value of the integer.
The content of the value is as listed below.
0: The file does not exist.
1: It is a file.
2: It is a directory.

Description

<File Path Name>: Always specify an absolute path with the drive name included.
Returns 0 when the Memory Card has not been attached.(This is the same as when no file exists)
When a file specified by open, etc. does not exist, it becomes an error so the presence of a file should be checked first by using isfile.

Example

Confirm the presence or absence of [/c0/input.dat] and read in data.

```
if Isfile("/c0/input.dat") <> 1 then
    print "No file"
endif
```

Gets the number of the available processing items

ItemCount

Parameters

None.

Return Value

Returns the value of the integer type.
The content of the value is available processing item numbers.

Description

Gets the number of the available processing items.

Example

Acquire the number of the available processing items and search a search processing item and acquire graphic data biggest number information of the search processing item.

```
    'Gets the number of the processing items
    Inum& = ItemCount

    'Search of search item.
    For I&=0 To Inum&-1
        If ItemIdent$(I&) = "Search" Then
            Goto *GetInfo
        Endif
    Next
    .
    .
    .
*GetInfo
    'Gets graphic data biggest number information of the search processing item.
    figMax& = ItemInfo (I& , 4)
```

Gets the Distinguished Name of the processing item

ItemIdent$ (<itemNo>)

Parameters

<itemNo>	Processing item number (integer type)

Return Value

Returns the value of the character type.
The content of the values is a identifier of the processing item.

Description

Gets the Distinguished Name of the processing item.

Example

Acquire the number of the available processing items and search a search processing item and acquire graphic data biggest number information of the search processing item.

```
    'Gets the number of the processing items
    Inum& = ItemCount

    'Search of search item.
    For I&=0 To Inum&-1
        If ItemIdent$(I&) = "Search" Then
            Goto *GetInfo
        Endif
    Next
    .
    .
    .
*GetInfo
    'Gets graphic data biggest number information of the search processing item.
    figMax& = ItemInfo (I& , 4)
```

Gets the information of the processing item

ItemInfo (<itemNo> , <kind>)

Parameters

<itemNo>	Processing item number (integer type)
<kind>	Kind number (integer type) 0:Processing item Kind 1:Setup data structure body size 2:Measurement data structure body size 3:Control data structure body size 4:Graphic data maximum number 5:Model data maximum number 6:Imege data maximum number 7:Innner unit maximum number 8:Imaging camera setting

Return Value

Returns the value of the integer type.
The content of the values is a information of the processing item.

Description

Gets the information of the processing item.

Example

Acquire the number of the available processing items and search a search processing item and acquire graphic data biggest number information of the search processing item.

```
    'Gets the number of the processing items
    Inum& = ItemCount

    'Search of search item.
    For I&=0 To Inum&-1
        If ItemIdent$(I&) = "Search" Then
            Goto *GetInfo
        Endif
    Next
    .
    .
    .
*GetInfo
    'Gets graphic data biggest number information of the search processing item.
    figMax& = ItemInfo (I& , 4)
```

Gets a title name of the processing item

ItemTitle$ (<itemNo>)

Parameters

<itemNo>	processing item number (integer type)

Return Value

Returns the value of the character type.
The contents of the value are title names of the processing item.

Description

Gets a title name of the processing item.
The title name varies according to language.

Example

Acquire the number of the available processing items and output a processing item number and a title name to a file.

```
'Gets the number of the processing items
Inum& = ItemCount

'Output only the number of the processing items.
For I&=0 To Inum&-1
        title$ = ItemTitle$ (i&)
                .
                .
                .
Next
```


Judge result output

JudgeOut <ioIdent>, <judge>

Parameters

<ioIdent>	Identification name (string) of I/O module that executes send processing
<judge>	Judgement result to be set (integer type)

Return Value

None.

Description

Identification name (string) of I/O module that executes send processing is specified in argument<ioIdent>.
The content of operation depends on the specification of the I/O module.
Reference: List of IO modules (p.299)

Example

Output the total judgement result in parallel interface.

```
'Gets the total judgement result
judge& = TotalJudge

JudgeOut "ParallelIo", judge&
```

Deletes a file

Kill <File Path Name>

Parameters

<File Path Name>	The file path of the file to be deleted (character string type).

Return Value

None.

Description

<File Path Name>: Always specify an absolute path with the drive name included.
Wild Cards cannot be used in the <File Path Name>.Refer to Wild Cards for details on Wild Cards.
Reference: ▸ Wildcard (p.168)
Files will not be deleted in the cases stated below.
The file specified for deletion does not exist.
The desk drive is not connected.

Example

Delete file "1280-720.bmp" in Drive C.

```
Kill "C:\1280-720.bmp"
```

Convert the capital letter into a small letter

LCase$(<character>)

Parameters

<character>	Conversion former character string (character type)

Return Value

Returns the value of the character type.
The contents of the value are character string after the conversion.

Description

Convert the capital letter into a small letter.

Example

Convert the capital letter into a small letter.

```
CHARA1$="AbcdEFGhI"
CHARA2$=LCase$(CHARA1$)
```

The results are as follows:

```
CHARA2$="abcdefghi"
```

Fetches the specified character string length from the left of the character string.

Left$(<Character String>,<Length of Characters>)

Parameters

<Character String>	The Character String to be extracted (character string).
<Length of Characters>	The length of the character string to be extracted (integer).

Return Value

Returns the value of the character type string.
The content of the value is the extracted character string.

Description

Fetches the arbitrary character string length from the left (head) of the <Character String>.
Specify a character constant or a character variable for the eligible character string in <Character String>.
Specify the number of bytes to extract from the character string in <Length of Characters>. Specify the number of bytes in the range from 1 to the number of bytes eligible for extraction in the character string.
When the <Length of Characters> exceeds the number of bytes eligible for extraction of the character string, all of the bytes eligible for extraction are returned.

Example

Extract 8 bytes from the character string and set them to the Scene Title.

```
CHARA$="ABCDEFGHIJKLMNOPQRSTUVWXYZ"
TITLE$=Left$(CHARA$,8)
```

The results are as follows:

```
TITLE$="ABCDEFGH"
```

Gets the length of the specified character string.

Len (<Character String>)

Parameters

<Character String>	The character string for which the length is to be gotten (character string).

Return Value

Returns the value of the integer.
The content of the value is the number of bytes of the character string gotten.

Description

Because the length is equal to the number of bytes, a 2-byte character is calculated as 2.

Example

Gets the length of the character string, "OMRON".

```
CHRLEN&=Len("OMRON")
```

The results are as follows:

```
CHRLEN&=5
```

Reads data of one line from a file

Line Input# <File No.>,<Character Variable>

Parameters

<File No.>	The file number (integer) of the file with the data to be read in.
<Character Variable>	The variable that will store the value that is read in (character string)

Return Value

None.

Description

Reads data that exists within the line separated by the line feed code and assigns it to a character Variable.
<Character Variable> is less than 255 characters, which includes strings such as space, comma(,), double quotation marks("), and numbers.
When input carriage return (chr$(13)) in <Character Variable>, null string ("") is the return value.
When character strings are enclosed within double quotation marks (" "), the double quotation marks are also recognized as characters.

Example

Read in data until the end of the file.

```
dim DATA$(256)
open "/c0/input.dat" for Input as #1

for I&=0 to 255
    Line Input #1,TEMP$
    DATA$(I&)=TEMP$
    if eof(1)<>0 then exit for
next

close #1
```

Outputs all or a part of the program content to the macro console.

List [<Line No. 1>][-<Line No. 2>]

Parameters

None.

Return Value

None.

Description

Outputs the program from <Line No. 1> to <Line No. 2> to the macro console.
Omitting <Line No. 1> and <Line No. 2> will cause the whole program to be output.
If <Line No. 2> is omitted, only <Line No. 1> will be output.
If <Line No. 1> is omitted, the program will be output from the head to <Line No. 2>.

Example

List the entire Macro Program that is currently loaded.

```
List
```

Loads the Program into the Controller memory.

Load <File Name.>

Parameters

<File Name.>	The program file name of the file to be loaded (character string type).

Return Value

None.

Description

Any program that has been loaded up to that point is deleted.
Always specify an absolute path with the drive name included in "File Name".
Perform this action when the BUSY flag is OFF.
Once a program is loaded with the LOAD command, the internal variables will be initialized.
This means that, even when a custom command has been executed successfully, "ER" will be returned as the execution result.

Example

Load the "mcrtest.mcr" Program.

```
Load "/c0/mcrtest.mcr"
```

Load the System + Scene group data

LoadBackupData <filename>

Parameters

<filename>	File name (character type)

Return Value

None.

Description

Load the System + Scene group data.
The file name include a pass.

Example

Carry out 'Data save' after load the system + scene group data.

```
LoadBackupData "C:\BACKDIR\BackupData.bkd"
'Carry out the 'Data save'
SaveData
```

Load the scene data

LoadScene <sceneNo>, <filename>

Parameters

<sceneNo>	Scene number (integer type)
<filename>	File name (character type)

Return Value

None.

Description

Load the scene data.
The file name include a pass.

Example

Change scene data to scene 2 after reading in scene 2.

```
LoadScene 2, "C:\BACKDIR\scene02.scn"
ChangeScene 2
```

Load the Scene group data

LoadSceneGroup <sceneGroupNo>, <filename>

Parameters

<sceneGroupNo>	Scene group number (integer type)
<filename>	File name (character type)

Return Value

None.

Description

Load the Scene group data.
The file name include a pass.

Example

Change scene data to scene 0 after reading in scene group 2.

```
LoadSceneGroup 2, "C:\BACKDIR\scenegroup02.sgp"
ChangeScene 0
```

Load the System data

LoadSystemData <filename>

Parameters

<filename>	File name (character type)

Return Value

None.

Description

Load the System data.
The file name include a pass.

Example

Carry out 'Data save' after load the System data

```
LoadSystemData "C:\BACKDIR\Backupsysset.ini"
'Carry out the 'Data save
SaveData
```

Load the Processing unit data

LoadUnitData <sceneNo>, <unitNo>, <unitCount>, <mode>, <fileName>

Parameters

<sceneNo>	Scene number (integer type)
<unitNo>	Processing unit number (integer type)
<unitCount>	Number of the processing units (integer type)
<mode>	Load mode (integer type) 0:Overwrite mode 1:Insert mode
<filename>	File name (character type)

Return Value

None.

Description

Load the file appointed with a <filename>
At the position appointed with a <unitNo>, only the number of <unitCount> reads processing unit data.
When appoint -1 in a <sceneNo>, load it in the current scene.
When appoint -1 in an <unitCount>, load all processing unit data.
The file name include a pass.

Example

Behind processing unit number 3, insert five processing units.

```
LoadUnitData 2, 4, 5, 1, "C:\BACKDIR\unitsave.scn"
```

Gets the natural logarithm value.

Log (<Expression>)

Parameters

<Expression>	The expression that gets the natural log (integer type or double-precision type)

Return Value

Returns the value of the double-precision type number.
The content of the value is the natural logarithm value of the specified expression.

Description

The base of the natural log is e=2.71828...
The number specified in the <Expression> must be a positive number.
Specify either an integer type or double-precision type real number in the <Expression>.

Example

Get the natural log of Variable X.

```
XLOG#=Log(X&)
```

The result is as follows:(When X=25)

```
XLOG#=3.21887582487
```


Gets the approximate line from multiple point coordinates using the method of least squares.

Lsqumeth <No. of Coordinates>,<X Coordinate>,<Y Coordinate>,<Straight Line Component>

Parameters

<No. of Coordinates>	The number of coordinates that will be calculated for the approximate line (integer).
<X Coordinate>	X coordinate array of the point for calculating the approximate line (double-precision array).
<Y Coordinate>	Y coordinate array of the point for calculating the approximate line (double-precision array).
<Straight Line Component>	Approximate straight line parameter (double-precision array).

Return Value

None.

Description

Specify the array to store the point of each coordinate in the <X Coordinate> and <Y Coordinate>. When the specified <Number of Coordinates> is less than the number of array elements, an error will occur.
The parameters a, b and c that make up the straight line ax+by+c=0 are stored in <Straight Line Component>."a" to "c" are each stored in array elements 0 to 2.
It is necessary to specify a number greater than or equal to 2 for <Number of Coordinates>.
When all of the specified points are the same coordinate, 0 is stored in the a, b and c listed above.
This is mainly used to get the straight line expression of an edge from the edge points measured by multiple Edge measurements.

Example

Calculate the line expression of an edge on a piece of work from 4 edge points.

```
Dim POSX#(3),POSY#(3),PARM#(2)
For I&=0 To 3
    GetUnitData I&+1,"X",POSX#(I&)
    GetUnitData I&+1,"Y",POSY#(I&)
Next
Lsqumeth 4,POSX#(),POSY#(),PARM#()

Erase POSX#(),POSY#(),PARM#()
```

Carry out The measurement

Measure [<wait>]

Parameters

<wait>	End timing mode (character type) 0:Come back immediately without waiting until the measurement end. 1:Wait until the measurement end and come back. 2:Wait until a measurement and the end of the measurement result indication and come back.

Return Value

None.

Description

Carry out one time of measurement.
When an apple is omitted, assume it 0.

Example

Carry out The measurement.

```
Measure
```

Permit the measurement execution

MeasureStart

Parameters

None.

Return Value

None.

Description

After this command practice, input of the measurement trigger is accepted.
Use it in MeasureStop command and a pair.

Example

Perform scene change.

```
MeasureStop
ChangeScene 2
MeasureStart
```


Forbid the measurement execution

MeasureStop
MeasureStop <mode>

Parameters

<mode>	mode (integer type)

Return Value

None.

Description

After this command practice, do not accept input of the measurement trigger.
It is necessary to execute MeasureStart command to accept the measurement trigger again.
When an apple is omitted, assume it 0.

Example

Perform scene change.

```
MeasureStop
ChangeScene 2
MeasureStart
```

Fetches a part of the character string.

Mid$ (<Character String>,<Starting Position>,<No. of Characters>)

Parameters

<Character String>	The Character String to be extracted (character type).
<Starting Position>	The position to begin extraction (integer type).
<No. of Characters>	The number of characters to be extracted (integer type).

Return Value

The character string taken out.

Description

Fetches the <No. of Characters> from within the <Character String> starting from the specified <Starting Position>.
Specify the range of the <No. of Characters> of the character string from 1 from the extraction starting position.
The value of the <Starting Position> and the <No. of Characters> must be 1 or more.
The value of the <Starting Position> must be less than the length of the <Character String>.
Specify the number of characters to extract from the character string in <No.of Characters>.
When the <No. of Characters> is greater than the <No. of Characters> to the right of the <Starting Position>, the entire character string to the right of <Starting Position> is extracted.

Example

```
INPUTSTR$="ABCDEFG"
OUTPUTSTR1$=Mid$(INPUTSTR$, 2, 4)
OUTPUTSTR2$=Mid$(INPUTSTR$, 3, 8)
```

The result is as follows:

```
OUTPUTSTR1$="BCDE"
OUTPUTSTR2$="CDEFG"
```

Creates a directory in the Memory Card.

Mkdir <Directory Path Name>

Parameters

<Directory Path Name>	The path of the directory to be created (character string).

Return Value

None.

Description

Always specify an absolute path with the drive name included for the <Directory Path Name>.
A directory will not be created in the cases stated below.
The specified directory already exists.
No Memory Card has been attached.
There is insufficient memory on the Memory Card.

Example

Create the "IMAGE2" directory below the root of Drive C.

```
Mkdir "C:\IMAGE2"
```

Gives the remainder.

<Expression 1> Mod <Expression 2>

Parameters

<Expression 1>	The expression to be divided (integer).
<Expression 2>	The expression to divide (integer).

Return Value

Returns the value of the integer.
The content of the value is the remainder of <Expression 1> when divided by <Expression 2>.

Description

The value of <Expression 2> must not be 0.
Values must be from -2147483648 to 2147483647 for <Expression 1> and <Expression 2>.
When the values of <Expression 1> and <Expression 2> are double-precision type, the fractional part is handled as a rounded value.

Example

Run a counter between 0 and 100.

```
I&=(I&+1) Mod 100
```

Move the processing unit

MoveUnit <srcUnitNo>, <destUnitNo>

Parameters

<srcUnitNo>	Movement former unit number (integer type)
<destUnitNo>	Movement unit number (integer type)

Return Value

None.

Description

Move a disposal unit registered to apples position before a mandarin orange.
When a processing unit is registered with the position of the <destUnitNo>, insert it.
After movement, the processing unit number is waved again.

Example

Move processing unit number 2 between processing unit number 5 and processing unit number 6.

```
MoveUnit 2, 6
```

Delete the program from memory.

New

Parameters

None.

Return Value

None.

Description

Delete the program and clears all variables other than the reserved variables.
Execute this command via control communication method.
This command works incorrectly if it is implemented in the Macro program.

Example

Delete the current program and load the new program ("/c0/newprog.mcr").

```
New

Load "/c0/newprog.mcr"
```

Gets the negation result of the expression.

Not (<Expression>)

Parameters

<Expression>	The expression to be subjected to the negation calculation (integer).

Return Value

Return the calculation result.

Description

The value given by the <Expression> will be a 32-digit binary number and each bit will be given a reversed value.
Specify a value from -2147483648 to 2147483647 in the <Expression>.
When the value of the <Expression> is a double-precision type, the fractional part is handled as a rounded value.

Example

Get the negation of Variable X.

```
X&=0

XX&=Not X&
```

The result is as follows:

```
XX&=-1
```


Branches in accordance with the specified condition.

On <Expression> Gosub <Label>[,<Label>...]

Parameters

<Expression>	The condition expression that controls branching (integer).
<Label>	Label name for the migration (label).

Return Value

None.

Description

The flow of the program processing branches to the subroutine <Label> that corresponds to the value given in <Expression>.
When the value given by the <Expression> is 1, branching is done to the location specified by the 1st <Label>.When it is "n", branching is done to the location specified by the nth <Label>.
When the value given by the <Expression> is 0, or when the <Label> has been omitted, program processing moves to the next line.
When the value given by the <Expression> is 0, or when it has become larger than the number of <Labels>, program processing moves to the next line.
When the value of the <Expression> becomes negative, it becomes an error.
Even when the <Label> of the migration destination does not exist, it will not become an error, and program processing will be moved to the next line.
After the execution of the specified subroutine, processing is returned to the statement following the On Gosub statement by the return statement in the subroutine.

Example

```
*MEASUREPROC
      A&=3
      On A& Gosub *A, *B, *C
Return

*A
      Print "A"
Return

*B
      Print "B"
Return

*C
      Print "C"
Return
```


Branches processing in accordance with the specified condition.

On <Expression> Goto <Label>[,<Label>...]

Parameters

<Expression>	The condition expression that controls branching (integer).
<Label>	Label name for the migration (label).

Return Value

None.

Description

The flow of the program processing moves to the <Label> that corresponds to the value given in <Expression>.
When the value given by the <Expression> is 1, branching is done to the location specified by the 1st <Label>. When it is "n", branching is done to the location specified by the nth <Label>.
When the value given by the <Expression> is 0, or when the <Label> has been omitted, program processing moves to the next line.
When the value of the <Expression> becomes negative, it becomes an error.

Example

Migrate to each label using the current Unit No.

```
On UnitNum& Goto *UNIT1PROC,*UNIT2PROC,*UNIT3PROC
*UNIT1PROC
    Print "I am Unit1"
Return
*UNIT2PROC
    Print "I am Unit2"
Return
*UNIT3PROC
    Print "I am Unit3"
Return
```


Opens a file.

Open <File Name> for Output | Input | Append as #<File No.>

Parameters

<File Name>	The file name of the file to be opened (character string).
<File No.>	The file number (integer) assigned to the file that is opened.

Return Value

None.

Description

Opens the <File No.> specified for the file in order to allow I/O processing of data in the file on the Memory Card.
After the I/O processing of data has been completed, the Close command is used to close the file.
Specify the following values in I/O mode.
Input : When data is to be read in from the file.
Output: When data is to be written to the file.
Append: When data is to be added to the file.
Specify a positive integer from 0 to 15 in <File No.>. Note that multiple files cannot be simultaneously opened using a single <File No.>.
The following I/O can be used in place of the <File Name> until the specified <File No.> is closed using the Close command.
Sequential file I/O operations can be combined using the Input# statement for reading data and the Print# statement for writing data, etc.
When the Open command is executed For Input for a file that does not exist, it becomes an "Illegal function call".

Example

Read in data until the end of the file.

```
Open "C:\input.dat" FOR INPUT As #1

For I&=0 To 255
    DATA$ = Input$(8,#1)
    DATA$(I&)=DATA$
    If Eof(1)<>0 Then Exit For
Next

Close #1
```


Gets the logical sum of 2 expressions.

<Expression 1> Or <Expression 2>

Parameters

<Expression 1>	The expression (integer type) that requests the logical sum.
<Expression 2>	The expression (integer type) that requests the logical sum.

Return Value

Returns the value of the integer.
The content of the value is the logical sum of the 2 expressions.

Description

It can also be used in an If statement as an Or condition.Refer to Calculation for details on logical expressions.
Reference: Calculation (p.159)
Values from -2147483648 to 2147483647 can be specified for <Expression 1> and <Expression 2>.
When the values of <Expression 1> and <Expression 2> are double-precision type, the fractional part is handled as a rounded value.

Example

Get the logical sum of Value EXP1 and Value EXP2.

```
EXPALL&=EXP1& Or EXP2&
```

The result is as follows:(When EXP1=1 and EXP2=4)

```
EXPALL&=5
```

Fetches the specified part separated by the specified character from the character string.

Piece$ (<Character String>,<Separation Character>,<Starting No.>,<Ending No.>)

Parameters

<Character String>	The separated Character String (character string).

<Separation Character>	The character used for separation (character string).
<Starting No.>	The starting number for extraction (integer).
<Ending No.>	The ending number for extraction (integer).

Return Value

Returns the value of the character type string.
The content of the value is the extracted character string.

Description

Fetches the part of the character string separated by the <Separation Character> from the specified <Character String> in the range indicated by the <Starting No.> and <Ending No.>.
If the part of the character string separated by the <Separation Character> does not exist, the entire character string is returned.
Specify a number of 1 or more in <Starting No.> and <Ending No.>.
When the <Starting No.> is greater than the <Ending No.> the Null string (" ") is returned.
When the <Ending No.> exceeds the numerical range that can be specified, it is assumed to be the largest specifiable number and the character string is returned.

Example

Fetch the character string separated with semicolons (;).

```
STRING1$=Piece$ ("PIECE1;PIECE2;PIECE3;PIECE4",";",1,1)
STRING2$=Piece$ ("PIECE1;PIECE2;PIECE3;PIECE4",";",3,4)
```

The results are as follows:

```
STRING1$="PIECE1"
STRING2$="PIECE3
PIECE4"
```

Output data to the file

Print# <File No.> [,<Expression> [;|,<Expression> ...]][;|,]

Parameters

<File No.>	The file number (integer) of the file with the data to be read in.
<Expression>	The expression to be output and the character string (integer, double-precision, character string).

Return Value

None.

Description

Output the character string to the file.

Example

Output the character string to the file "C:\sample.txt".

```
Open "C:\sample.txt" For Append As #1
STRING$ = "Sample"
Print #1, STRING$ + " Print#"
Close #1
```

Writes data (macro console).

Print <Expression>[;|,<Expression>...]][;|,]

Parameters

<Expression>	The expression to be output and the character string (integer, double-precision, character string).

Return Value

None.

Description

Output the variables and character strings to the macro console.
When the <Expression> is delimited with commas, it is output delimited by tabs.
When the <Expression> is delimited with semicolons, it is output after what was output immediately before.
When the final semicolon (;) is deleted, the delimiter is attached and output.
The delimiter is that which is set in [SYS] -> [Communications] -> [Normal (ignored process)].

Example

Output the measurement results.

```
GetUnitData Unitnum&,"CR",CR#
GetUnitData Unitnum&,"X",X#
GetUnitData Unitnum&,"Y",Y#
Print CR#;",";X#;",";Y#
```

Output terminal all point output

PutAll <ioIdent>, <data>

Parameters

<ioIdent>	Identification name (string) of I/O module that executes send processing
<data>	Data to be output (integer)

Return Value

None.

Description

Identification name (string) of I/O module that executes send processing is specified in argument<ioIdent>.
The content of operation depends on the specification of the I/O module.
Reference: List of IO modules (p.299)

Example

Performs a batch output of the state of terminals such as the parallel I/Os

```
data& = 1
PutAll "ParallelIo", data&
```

Output terminal a point output

PutPort <ioIdent>, <portNo>, <state>

Parameters

<ioIdent>	Identification name (string) of I/O module that executes send processing
<portNo>	Port number (integer)
<state>	State (integer) 0:OFF,1:ON

Return Value

None.

Description

Identification name (string) of I/O module that executes send processing is specified in argument<ioIdent>.
The content of operation depends on the specification of the I/O module.
Reference: List of IO modules (p.299)

Example

Using a parallel interface, turn ON the DO0.

```
data& = 1
PutPort "ParallelIo", 0, data&
```

Publish the optional event

RaiseOptionEvent <eventNo>, <parameter>

Parameters

<eventNo>	Event number (integer type) 0x000 to 0x0ff: Transmit the event to 'remote and local' 0x100 to 0x1ff: Transmit an event to only local 0x200 to 0x2ff: Transmit an event to only remote
<parameter>	parameter (integer type)

Return Value

None.

Description

A customized user defines the use freely and is a usable event.
Order the publication of the event that assumed an apple and a mandarin orange an argument to a system.
An event set by a system is a notice of connection (100) at the time of the remote control, 2 events of the notice of cancellation (200) now. (the parameter is unused)
It is necessary to handle the event number in FZ-USER.

Example

Transmit an event to the system on the FZ actual machine at the time of the remote control.

```
RaiseOptionEvent 100, 0
```

Begin to read data from designated memory of the PLC

ReadPlcMemory <ioIdent>, <area>, <channelOffset>, <channelCount>, <readData()>

Parameters

<ioIdent>	Identification name of I/O module (character type)
<area>	Area classification number (integer type)
<channelOffset>	Offset from the top of an area targeted for reading (integer type)
<channelCount>	size of read data (integer type)
<readData()>	Read data (Integer type sequence)

Return Value

None.

Description

Set a identification Name Identification name in an <ioIdent>.
Set a Area classification number Identification name in an <area>.
Reference: List of IO modules (p.299)
Appoint an <channelOffset> and the <channelCount> with the number of the channels.
The read data argument <readData()> by one dimension integer type array variable, do not specify it with the number of element like X&() but like () only with the type.
Gets the data of readData() using GetPlcData command.
The size of the sequence has to secure enough size to store the data which began to read.

Example

Begin to read data for 10ch from 4ch of the DM area of the OMRON PLC. Gets the 20 integer type data from read data.

```
Dim readData&(30)
Dim getData&(20)

'Begin to read data from PLC.
ReadPlcMemory "SerialPlcLink", 130, 4, 10, readData&()

'Gets the data from read data.
For I&=0 To 19
    GetPlcData "SerialPlcLink", readData&(), I&*4, 4, getData&(I&)
Next
```

Receive data

ReceiveData <ioIdent>, <inputData()>, <inputMaxSize>, <inputSize>[, <parameter()>, <parameterSize>]

Parameters

<ioIdent>	Identification name (string) of I/O module that executes reception processing
<inputData()>	Date to be receive (string)
<inputMaxSize>	The max size of data (integer type)
<inputSize>	Data size (integer type)
<parameter()>	Parameter of reception processing (integer array type)
<parameterSize>	Size of reception processing parameter (integer type)

Return Value

None.

Description

Identification name (string) of I/O module that executes reception processing is specified in argument<ioIdent>.
Reference: List of IO modules (p.299)
Parameter of reception processing is saves as one dimensional integer array variable, do not specify it with the number of element like X&() but like () only with the type.
What data you specify is according to the specification of the I/O module.

Example

Receive up to 10 bytes of data from the serial

```
Dim data&(256)

ReceiveData "SerialNormal", data&(), 10, size&
```

Update the indication of the image display window

RefreshImageWindow

Parameters

None.

Return Value

None.

Description

Update the indication of the image display window.

Example

Update the indication of the image display window.

```
RefreshImageWindow
```

Update the indication of the judgement result display window

RefreshJudgeWindow

Parameters

None.

Return Value

None.

Description

Update the indication of the judgement result display window.

Example

Update the indication of the judgement result display window.

```
RefreshJudgeWindow
```


Update the indication of the text display window

RefreshTextWindow

Parameters

None.

Return Value

None.

Description

Update the indication of the text display window.

Example

Update the indication of the text display window.

```
RefreshTextWindow
```

Update the indication of the measurement processing time display window

RefreshTimeWindow

Parameters

None.

Return Value

None.

Description

Update the indication of the measurement processing time display window.

Example

Update the indication of the measurement processing time display window.

```
RefreshTimeWindow
```

Inserts comments into the program.

Rem

Parameters

None.

Return Value

None.

Description

This is used to insert comments and explanations in the program. The readability of the program is enhanced with the use of comments.
Everything until the end of the line after Rem is handled as a non-executable comment.
The Rem statement is a non-executable statement. It does not influence the program's execution in any way.
All of the characters and symbols specified in the comment statement are handled as comments.
A single quotation mark (') expresses a comment statement the same as a Rem statement does.

Example

Insert comments into the source code.

```
Rem Output the judge result of the latest unit
Print UnitJudge(UnitNo-1)
```

Carry out re-measurement processing

Remeasure <preImageNo> [,<wait>]
Remeasure <fileName> [,<wait>]

Parameters

<preImageNo>	Image logging number (integer type)
<fileName>	File name (character type)
<wait>	End timing mode (integer type) 0:Come back immediately without waiting until the measurement end. 1:Wait until the measurement end and come back. 2:Wait until a measurement and the end of the measurement result indication and come back.

Return Value

None.

Description

Carry out one time of re-measurement.
Appoints the <preImageNo> or <fileName>.
When appoint 0 in an apple, latest logging image the re-measurement.
When appoint 1, logging image before one again the re-measure.
Include a pass in an <fileName>.
When an <wait> is omitted, assume it 0.

Example

Carry out re-measurement processing.

```
'Measure it with the latest logging image.
Remeasure 0

'Measure it with the preservation logging image.
Remeasure "C:\IMAGE\sample.ifz" , 1

'Measure it with the preservation image.(BMP form)
Remeasure "C:\IMAGE\sample.bmp"
```

Fetches the specified character string length from the right of the character string.

Right$ (<Character String>,<No. of Characters>)

Parameters

<Character String>	The Character String that will be extracted (character type).
<No. of Characters>	The size of characters to be extracted (integer type).

Return Value

Returns the value of the character type string.
The content of the value is the extracted character string.

Description

Fetches the character string with the length of characters specified by <No. of Characters> from the right side (the last part) of the specified <Character String>.
Specify the number of characters to extract from the character string in <No.of Characters> as a numeric value.
The <No. of Characters> must be a value of 1 or more.
When the <No. of Characters> exceeds the length of the <Character String>, the <Character String> is returned as is.

Example

Get the last 3 characters of the character string, "OMRON".

```
CHARA$=Right$("OMRON",3)
```

The result is as follows:

```
CHARA$="RON"
```

Deletes a directory within the memory card.

Rmdir <Directory Path Name>

Parameters

<Directory Path Name>	The path of the directory to be deleted (character string).

Return Value

None.

Description

Always specify an absolute path with the drive name included for the <Directory Path Name>.
The directory will not be deleted in the cases stated below.
The directory specified for deletion does not exist.
No Memory Card has been attached.
When there are 1 or more files in the directory.

Example

Delete the Drive C "IMAGE2" directory.

```
Rmdir "C:\IMAGE2"
```

Output RUN state

RunOut <ioIdent>, <state>

Parameters

<ioIdent>	Identification name (string) of I/O module that executes send processing
<state>	State 0:OFF,1:ON (integer type)

Return Value

None.

Description

Identification name (string) of I/O module that executes send processing is specified in argument<ioIdent>.
The content of operation depends on the specification of the I/O module.
Reference: List of IO modules (p.299)

Example

ON the RUN signal of the parallel interface

```
RunOut "ParallelIo", 1
```


Save the System + Scene group data

SaveBackupData <fileName>

Parameters

<filename>	File name (character type)

Return Value

None.

Description

Save system data and scene group data (0) by a name appointed with an <fileName>.
The file name include a pass.
When already appoint an existing file name, it is overwritten.

Example

Save system + scene group data in a file.

```
SaveBackupData "C:\BACKDIR\BackupData.bkd"
```

Saves data to a controller

SaveData

Parameters

None.

Return Value

None.

Description

Saves the System + Scene group data

Example

Save current setting information.

```
SaveData
```

Save image data

SaveImage <preImage>, <filename>

Parameters

<preImage>	Image logging number (integer type)
<filename>	File name (character string type)

Return Value

None.

Description

Save the image data.
Save the image specified by the operand <preImage> under the name specified by the operand <filename>.
Please specify operand <filename> with a password.
If -1 is specified in the operand <preImage>, the last input image will be saved.

Example

Save the last measured image in the file.

```
SaveImage -1, "C:\IMAGE\sample.ifz"
```

Save the scene data

SaveScene <sceneNo>, <filename>

Parameters

<sceneNo>	Save scene number (integer type)
<filename>	File name (character type)

Return Value

None.

Description

Save scene by a name appointed with an <fileName>.
The file name include a pass.
When already appoint an existing file name, it is overwritten.

Example

Save setting information of scene 2 in a file.

```
SaveScene 2, C:\BACKDIR\scene02.scn
```


Save the scene group data

SaveSceneGroup <sceneGroupNo>, <filename>

Parameters

<sceneGroupNo>	Save scene group number (integer type)
<filename>	File name (character type)

Return Value

None.

Description

Save scene group by a name appointed with an <fileName>.
The file name include a pass.
When already appoint an existing file name, it is overwritten.

Example

Save setting information of scene group 2 in a file.

```
SaveSceneGroup 2, "C:\BACKDIR\scenegroup02.sgp"
```

Save the System data

SaveSystemData <filename>

Parameters

<filename>	File name (character type)

Return Value

None.

Description

Save System data by a name appointed with an <fileName>.
The file name include a pass.
When already appoint an existing file name, it is overwritten.

Example

Save System data in a file.

```
SaveSystemData "C:\BACKDIR\Backupsysset.ini"
```


Save the Processing unit data

SaveUnitData <sceneNo>, <unitNo>, <unitCount>, <fileName>

Parameters

<sceneNo>	Preservation scene number (integer type)
<unitNo>	Start processing unit number (integer type)
<unitCount>	Number of the preservation processing units (integer type)
<filename>	File name (character type)

Return Value

None.

Description

Save Processing unit data by a name appointed with an <fileName>.
When appoint -1 in a <sceneNo>, it is handled than current scene data.
The file name include a pass.
When already appoint an existing file name, it is overwritten.

Example

Output processing unit number 2-4 of the current scene in a file.

```
SaveUnitData -1, 2, 3, "C:\BACKDIR\unitsave.scn"
```

Gets the available scene number

SceneCount

Parameters

None.

Return Value

Returns the value of the integer type.
The content of the value is available scene numbers.

Description

Gets the available scene number.

Example

Gets the available scene number. Gets the scene number that can set afterwards.

```
'Gets the available scene number.
NUM& = SceneCount
'Gets the scene number that can set.
settnum& = 32-SceneCount
```


Gets the explanation of the scene

SceneDescription$ (<sceneNo>)

Parameters

<sceneNo>	Scene number (integer type)

Return Value

Returns the value of the character type.
The content of the value is explanation of the scene.

Description

Gets the explanation of the scene.
When explanation is unestablished, return a null string ("").
Cannot acquire the explanation of the scene that is bigger than maximum scene number.

Example

Gets the explanation of scene 1. Set a explanation if unestablished.

```
'Gets the explanation of scene.
description$ = SceneDescription$(1)
If description$ = "" Then
'Set the explanation of scene.
    SetSceneDescription 1, "Description 1"
Endif
```

Gets the number of available scene groups

SceneGroupCount

Parameters

None.

Return Value

Returns the value of the integer type.
The content of the value is available scene groups.

Description

The number of effective scene group is 0 - SceneGroupCount-1.

Example

Gets the number of effective scene groups.

```
groupCount& = SceneGroupCount
```

Gets the current scene group number

SceneGroupNo

Parameters

None.

Return Value

Returns the value of the integer type.
The content of the value is current scene group number.

Description

Gets the current scene group number.

Example

Gets the current scene group number. If scene group number is 3, change it to scene 3.

```
'Gets the current scene group number.
groupNo& = SceneGroupNo
If groupNo& = 3 Then
    ChangeScene 3
Endif
```

Gets the scene group title name

SceneGroupTitle$ (<sceneGroupNo>)

Parameters

<sceneGroupNo>	Scene group number (integer type)

Return Value

The content of the value is scene group title name.

Description

Do not appoint it other than -1 in an <sceneGroupNo>.
Gets the scene group title name.
When a title is not set, return "" (null string).

Example

Gets the scene group title name. Set a scene group title if unestablished.

```
If SceneGroupTitle$(-1) = "" Then
    SetSceneGroupTitle -1 , "Group name"
Endif
```

Gets the scene creator name

SceneMaker$ (<sceneNo>)

Parameters

<sceneNo>	scene number (integer type)

Return Value

Returns the value of the character type.
The content of the value is scene creator name.

Description

Gets the scene creator name.
When a creator name is unestablished, return a null string ("").
Cannot acquire the creator name of the scene that is bigger than maximum scene number.

Example

Gets the scene number 3 creator name. Set a creator name if unestablished.

```
If SceneMaker$(3) = "" Then
    SetSceneMaker 3, "Maker"
Endif
```

Get the current scene number

SceneNo

Parameters

None.

Return Value

Returns the value of the integer type.
The content of the value is current scene number.

Description

Get the current scene number.

Example

If current scene number is not 2, change it to scene 2.

```
NO& = SceneNo
If NO& <> 2 Then
    ChangeScene 2
Endif
```

Gets the scene title name

SceneTitle$ (<sceneNo>)

Parameters

<sceneNo>	Scene number (integer type)

Return Value

Returns the value of the character type.
The content of the value is scene title name.

Description

Gets the scene title name.
When a title name is unestablished, return a null string ("").
Cannot acquire the title name of the scene that is bigger than maximum scene number.

Example

Gets the scene number 2 title name. Set a title name if unestablished.

```
If SceneTitle$(2) = "" Then
    SetSceneTitle 2 , "Title"
Endif
```

Save the capture of the screen

ScreenCapture <fileName>

Parameters

<filename>	File name (haracter type)

Return Value

None.

Description

Capture the screen and save it in BMP form by a name appointed with an <filename>.
Capture is capture of the screenfuls.
The file name include a pass.
When already appoint an existing file name, it is overwritten.

Example

Output the capture of the screen to a file.

```
ScreenCapture "C:\IMAGE\samplecapture.bmp"
```

Controls the branching of processing in accordance with the expression results.

Select <Expression>
[Case <Value>
    <Case statement within the block>
:
:
Case Else
    <Case Else statement within the block>]
End Select

Parameters

<Expression>	The expression that controls branch processing (integer).
<Value>	The value that defines each Case item (integer).

<Case statement within the block>	The statement to be executed (statement) when the result of the <Expression> is equal to the <Value>.
<Case Else statement within the block>	The statement to be executed (statement) when the result of the <Expression> is not equal to the <Value>.

Return Value

None.

Description

Branching to each statement is done in accordance with the result of the <Expression>.
An integer value or a formula can be specified in the <Expression>.Processing will branch to the <Value> of Case that matches the result.
When no formula matches, processing branches to that defined by Case Else.
Multiple Case statements can be used.
The Case statement and Case Else statement can be omitted.
The End Select statement can be omitted.
When multiple expression results exist that match the Case statement <Value>, only the first Case statement from among them is executed.
Moving control from outside the Select block to the inside or moving control from inside it to the outside using statements such as the goto statement is not possible.

Example

Distribute the processing according to the judge result of latest unit.

```
RESULT&=UnitJudge(Unitnum&-1)
Select RESULT&
Case 0
    Print "UnMeasured"
Case 1
    Print "Judge OK"
Case -1
    Print "Judge NG"
END SELECT
```

Send data

SendData <ioIdent>, <outputData()>, <outputSize>[, <parameter()>, <parameterSize>]

Parameters

<ioIdent>	Identification name (string) of I/O module that executes send processing
<outputData()>	Data to be output (string)
<outputSize>	The size of data which is to be output (integer)
<parameter()>	Parameter of send processing (integer array type)
<parameterSize>	Size of send processing parameter (integer)

Return Value

None.

Description

Identification name (string) of I/O module that executes reception processing is specified in argument<ioIdent>.
Reference: List of IO modules (p.299)
The data to be send is stores in argument <outputData()> by one dimension integer type array variable, do not specify it with the number of element like X&() but like () only with the type.
The parameters of the send processing is stores in argument <parameter()> by one dimension integer type array variable, do not specify it with the number of element like X&() but like () only with the type.

Example

Send a string using serial interface

```
Dim sData&(2)
sData&(0) = 2
sData&(1) = 8
SendData "SerialNormal", sData&(), 8
```

Sends string

SendString <ioIdent>, <outputString>

Parameters

<ioIdent>	Identification name (string) of I/O module that executes send processing
<outputString>	String to be send

Return Value

None.

Description

Identification name (string) of I/O module that executes send processing is specified in argument<ioIdent>.
Reference: List of IO modules (p.299)
The string to be send is specified in argument<count>.

Example

Send a string using serial interface

```
sData$ = "OMRON"
SendString "SerialNormal", sData$
```

Set the processing unit number of image/text window

SetDisplayUnitNo <unitNo>

Parameters

<unitNo>	processing unit number (integer type)

Return Value

None.

Description

Set the processing unit number of image/text window

Example

If display unit number is -1, set processing unit number 2 in display unit number.

```
If DisplayUnitNo = -1 Then
    SetDisplayUnitNo 2
Endif
```

Sets global data

SetGlobalData <dataIdent>, <data>

Parameters

<dataIdent>	Data ident that is to be set
<data>	Data that is to be set

Return Value

None.

Description

Sets global data.

Example

10 in the global data set "GsetData"

```
SetGlobalData "GsetData", 10
```

Set the attribute of the image window

SetImageWindow <windowNo>, <locationX>, <locationY>, <width>, <height>, <unitNo>,
<subNo>, <magnification>, <originX>, <originY>, <update>, <visible>

Parameters

<windowNo>	Window number (integer type)
<locationX>	Upper left X coordinate value of the window (integer type)
<locationY>	Upper left Y coordinate value of the window (integer type)
<width>	Window width (integer type)
<height>	Window height (integer type)
<unitNo>	Processing unit number (integer type)
<subNo>	Sub number to be displayed (integer type)
<magnification>	Display magnification (Real number type)
<originX>	Upper left X coordinate of a display image relative to the window upper left coordinate (integer type)
<originY>	Upper left X coordinate of a display image relative to the window upper left coordinate (integer type)
<update>	Update timing (integer type) 0: Every measurement 1: Only when an overall judgement result is NG at the time of measurement 2: Only when a target processing unit is NG at the time of measurement 3: Always updated (through display)
<visible>	Display (integer type) 0: Window invisible 1: Window visible

Return Value

None.

Description

The information of the image display window is saved every scene.
When set "0.5" in an <magnification>, make displaying compactedly.When set "2.0", spread and display.
When appoint -1 in an <magnification>, it becomes the automatic magnification to a window size.

Example

Set the image display window 0.

```
SetImageWindow 0, 0, 0, <width>, <height>, <unitNo>,
                <subNo>, <magnification>, <originX>, <originY>, <update>, <visible>
```

Set the output mode of the measurement result

SetMeasureOut <mode>

Parameters

<mode>	Output mode (0: OFF, 1: ON) (integer type)

Return Value

None.

Description

Set the output mode of the measurement result.
When set an output mode to 0, the data are not output to the outside even if the serial data output in the flow is carried out.
When I set an output mode to 1, the data are output to the outside if the serial data output in the flow is carried out.

Example

Turn on an output mode.

```
SetMeasureOut 1
```

Set PLC the write data

SetPlcData <ioIdent>, <writeData()>, <offset>, <size>, <data>

Parameters

<ioIdent>	Identification name of I/O module (character type)
<writeData()>	Write data(integer type Sequence)
<offset>	Offset value (integer type)
<size>	Size of write data (integer type)
<data>	Data which are targeted for setting (any type)

Return Value

None.

Description

PSet PLC the write data.
Use it in a use to make the write data of the WritePlcMemory command.
Set a identification Name Identification name in an <ioIdent>.
Reference: List of IO modules (p.299)
The data to be Set PLC the write data argument <writeData()> by one dimension integer type array variable, do not specify it with the number of element like X&() but like () only with the type.
To an <offset> and a <size>, appoint an offset position and size of the <writeData()> sequence with the number of bytes.
In an <data>, appoint data for the setting.
The value that an <size> can appoint is 2/4/8 byte. The data acquisition is each carried out for 2 bytes integer /4 byte integer /8 byte real number.
When appoint the data of the character string type, appoint the character string head to set in size, and the character string that added NULL to the end is set for character string from the top of the character string that appointed to the number of bytes appointed in size.
When appoint -1, the character string that appointed is set all in size including NULL of the end.

Example

Set the PLC of write data to DM area.

```
Dim writeData&(100)

'Set 12.56 (real number type data) in writeData().
SetPlcData "SerialPlcLink", writeData&(), 0, 8, 12.56

'Set 150 (integer type data) in writeData().
SetPlcData "SerialPlcLink", writeData&(), 2, 8, 150

'Set "OMRON"( character string data) in writeData().
SetPlcData "SerialPlcLink", writeData&(), 3, 12, "OMRON"

'Set 12345 (integer type data) in writeData().
SetPlcData "SerialPlcLink", writeData&(), 5, 14, 12345
```

Set the explanation of the scene

SetSceneDescription <sceneNo>, <sceneDescription>

Parameters

<sceneNo>	scene number (integer type)
<sceneDescription>	Explanation (character type)

Return Value

None.

Description

The number of the <sceneDescription> is less than 255 characters.
The scene that is bigger than maximum scene number cannot set explanation.

Example

Gets the explanation of scene. Set a explanation if unestablished.

```
'Gets the explanation of scene
description$ = SceneDescription$(1)
If description$ = "" Then
    'Set the explanation.
    SetSceneDescription 1, "Description 1"
Endif
```

Set the scene group title name

SetSceneGroupTitle <sceneGroupNo> , <sceneGroupTitle>

Parameters

<sceneGroupNo>	Scene group number (integer type)
<sceneGroupTitle>	title name (character type)

Return Value

None.

Description

Do not appoint it other than -1 in an <sceneGroupNo>.
The number of the <sceneGroupTitle> is less than 15 characters.

Example

Gets the title name of scene group 0. Set a title name if unestablished.

```
If SceneGroupTitle$(-1) = "" Then
    SetSceneGroupTitle -1 , "Group name"
Endif
```

Set the scene maker name

SetSceneMaker <sceneNo>, <sceneMaker>

Parameters

<sceneNo>	Scene number (integer type)
<sceneMaker>	maker name (character type)

Return Value

None.

Description

The number of the <sceneMaker> is less than 15 characters.
The scene that is bigger than maximum scene number cannot set a maker name.

Example

Gets the maker name of scene 3. Set a maker name if unestablished.

```
If SceneMaker$(3) = "" Then
    SetSceneMaker 3, "Maker"
Endif
```


Set the scene title name

SetSceneTitle <sceneNo> , <sceneTitle>

Parameters

<sceneNo>	Scene number (integer type)
<sceneTitle>	title name (character type)

Return Value

None.

Description

The number of the <sceneTitle> is less than 15 characters.
The scene that is bigger than maximum scene number cannot set a title name.

Example

Gets the title name of scene 2. Set a title name if unestablished.

```
If SceneTitle$(2) = "" Then
    SetSceneTitle 2 , "Title"
Endif
```

Sets system data

SetSystemData <dataIdent0>, <dataIdent1>, <data>

Parameters

<dataIdent0>	Data ident 0 to be set

<dataIdent1>	Data ident 1 to be set
<data>	Data to be set

Return Value

None.

Description

Sets system data.
Reference: List of system data (p.297)

Example

Set the directory where you want to save a screen capture of the measurement control setting

```
dirName$ = "C:\temp\bmp\"
SetSystemData "Measure", "captureDirectory", dirName$
```

Set the attribute of the Text Window

SetTextWindow <unitNo>, <subNo>, <update>. <visible>

Parameters

<unitNo>	Processing unit number (integer type)
<subNo>	Sub number to be displayed (integer type)
<update>	Update mode (always 0) (integer type)
<visible>	Indication mode (integer type) 0:Window non-indication 1:Window indication

Return Value

None.

Description

Set the attribute of the text display window.

Example

Set processing unit number 5 to a text display window, and make a window an display state.

```
SetTextWindow 5, 0, 0, 1
```

Sets processing unit data

SetUnitData <unitNo>, <dataNo> | <dataIdent>, <data>

Parameters

<unitNo>	Processing unit No.
<dataNo>	Data No.
<dataIdent>	Data identification name
<data>	Setting data

Return Value

None.

Description

Performs the setting of the processing unit data of a processing item.

Example

Set to "Off" to "reflect to overall judgment" of the search processing unit processing unit number 2

```
SetUnitData 2, 103, 1
'or
SetUnitData 2, "overallJudge", 1
```

Notes

It is forbidden to modify parameters of image input category units from *MeasureProc.

Sets processing unit figure data

SetUnitFigure <unitNo>, <figureNo>, <figure()>

Parameters

<unitNo>	Processing unit number
<figureNo>	The figure number to be set
<figure()>	The figure data to be set

Return Value

None.

Description

The integer type array variable of one dimension that stores the set graphic data is specified for the argument < figure() > in shape to add only () without specifying the element number like XX&().

Example

Set in a rectangular shape to the area of ??the search processing unit # 2 processing unit

```
Dim figure&(5)
figure&(0) = 8     'Shape Type
figure(1) = 100     'X coordinate of the upper left point
figure(2) = 100     'Y coordinate of the upper left point
figure(3) = 300     'X coordinate of the lower right corner
figure(4) = 300     'Y coordinate of the lower right corner

SetUnitFigure 2, 1, figure&()
```


Sets judge value of a processing unit

SetUnitJudge <unitNo>, <judge>[, <totalJudgeRefrect>]

Parameters

<unitNo>	Processing unit number
<judge>	Judgement result to be set
<totalJudgeRefrect>	Whether or not reflected on the overall judgement

Return Value

None.

Description

Sets the judgement result of the relevant processing unit.
The processing unit-number to be set is specified for the argument <unitNo>.
To the argument <judge> as a judgment result of the setting.
The following judgement result values can be set.

JUDGE_NC	No judgement (unmeasured)
JUDGE_OK	Judgement result OK
JUDGE_NG	Judgement result NG
JUDGE_IMAGEERROR	Judgement result error (image format mismatch)
JUDGE_MODELERROR	Judgement result error (unregistered model)
JUDGE_MEMORYERROR	Judgement result error (insufficient memory)

It is specified for the argument <totalJudgeRefrect>(possible to omit) whether to reflect the judgment result of the setting in the total judgment result by either of the following value.

False	reflected
True	not reflected

Example

Set to OK determination result of the determination result of the search processing unit # 2 processing unit

```
SetUnitJudge 2, JUDGE_OK, True
```

Sets the processing unit title name

SetUnitTitle <unitNo>, <unitTitle>

Parameters

<unitNo>	Processing unit number
<unitTitle>	The processing unit title name that is to be set

Return Value

None.

Description

Sets the processing unit title name.

Example

Sets the name of the search target in the title of the search processing unit # 2 processing unit

```
SetUnitTitle 2, "Bolt Search"
```

Gets the sine of the specified expression.

Sin (<Expression>)

Parameters

<Expression>	The expression that gets the sine (integer type or double-precision type)

Return Value

Returns the value of the double-precision type number.
The content of the value is the sine value that is fetched. This is returned as a numeric value within the range of -1 to 1.

Description

Specify the angle in the <Expression> as a radian. In the case of angle notation (X degrees), it is necessary to convert to a radian by multiplying pi/180.
Specify either an integer type or double-precision type real number in the <Expression>.

Example

Get the sine of 30 degrees.

```
DATA#=Sin(30/180*3.141592)
```

The result is as follows:

```
DATA#=0.5
```

Gets the square root.

Sqr (<Expression>)

Parameters

<Expression>	The expression that gets the square root (integer type or double-precision type)

Return Value

Returns the value of the double-precision type number.
The content of the value is the square root value that is fetched.

Description

Get the square root of the specified expression. The value of the <Expression> must be 0 or a positive number.
Specify either an integer type or double-precision type real number in the <Expression>.
Regardless of the type of value specified in <Expression> the Sqr function returns a double-precision real number type value.

Example

Get the square root of 256.

```
DATA#=Sqr(256)
```

The result is as follows:

```
DATA#=16
```

Time of starting a measurement processing

StartTimer

Parameters

None.

Return Value

Time information at the time of StartTimer is called.

Description

Start the elapse time measure.
Gets the elapsed time since the specified measurement start time in Timer function.

Example

By on the store (which can be an element of real array) real variable the return value of this function, passed to the first argument of the function Timer, of measuring the elapsed time between function calls Timer from function calls StartTimer the typical usage is

```
T#=StartTimer
'*(Processing of the measurement object processing time)
TIME&=Timer(T#,0)
```

This program example will be stored in an integer variable unit processing time of processing of the * ms that TIME &

Stops the execution of the program.

Stop

Parameters

None.

Return Value

None.

Description

Stops the execution of the program. The Stop statement can be used anywhere within the program.
A program that has been stopped can be resumed using the Cont statement.
This is used mainly in debugging.

Example

```
'When the Stop statement is executed in the program, execution of the process of Macro Program is suspended;
'however, the Macro Program processing is not exited.Thus, the processing of the menu will not be continued.
'In addition, a prompt such as that shown below will be displayed at the macro console.

    'MACRO>

'While the prompt shown above is displayed, it is possible to directly input Macro Commands.

'Example: MACRO> print A&[ENT]

'When the cont command is input, program processing halted by the Stop statement is continued.
```

Converts a numeric value into a numeric character string.

Str$ (<Expression>)

Parameters

<Expression>	The expression to be converted (integer type or double-precision type)

Return Value

Returns the value of the character string.
The content of the value is the converted character string.

Description

The numeric value specified by the <Expression> is converted into a character string.A numeric value cannot be directly assigned to a character variable. It is assigned to a character variable after it has been converted to a number in character notation using the Str$ function.
There is the reverse function val in relation to Str$ where the character string of the number is converted to a numeric value.

Example

Convert the measurement results of each processing unit to character strings.

```
A#=10
B#=11
Print Str$(A#)+Str$(B#)
```

The results are as follows:

```
1011
```

Converts to a numeric character string with the numeric value format specified.

Str2$ (<Expression>,<Integer Part>,<Fractional Part>,<0 Suppression>,<Negative Expression>)

Parameters

<Expression>	The expression to be converted (integer type or double-precision type).
<Integer Part>	The number of digits for the integer part (integer)
<Fractional Part>	The number of digits for the fractional part (integer).
<0 Suppression>	The fill method for the region of empty spaces to the left (integer).
<Negative Expression>	The method of expressing negatives (integer).

Return Value

Returns the value of the character string.
The content of the value is the converted character string.

Description

The numeric value specified by the <Expression> is converted into a character string. A numeric value cannot be directly assigned to a character variable. It is assigned to a character variable after it has been converted to a number in character notation in accordance with the specified format using the Str2$ function.
Specify the number of integer digits in <Integer Part>.0 - 8 can be specified. When 0 is specified, it is taken to mean "all of the digits present".
Example: In the case where 0 is specified for the Integer Part.
If the <Expression> is 99, then it becomes 99
If the <Expression> is 999, then it becomes 999
Specify the number of fraction digits in the <Fractional Part>.0 - 5 can be specified.If 0 is specified, everything after the radix point will be rounded up.
Example: In the case where 0 is specified for the Fractional Part.
If the <Expression> is 99.099, then it becomes 99
If the <Expression> is 999.999, then it becomes 1000
For numeric values that cannot be contained within the digits specified for the <Integer Part> the specified digits will be the maximum value.(In the case of negative values, it becomes the minimum value)
Example:
In the case where 2 is specified for the Integer Part and 0 is specified for the Fractional Part.
If the <Expression> is 179.099 then it becomes 99
Rounding is carried out for numeric values that cannot be accommodated within the digits specified for <Integer Part>/<Fractional Part>.
Example: In the case where the integer 8 is specified for the Integer Part and 0 for the Fractional Part:
If the <Expression> is 99.999, then it becomes 100
Specify the following values for <0 Suppression>.
0: Fill with spaces
1: Fill with zeros
Specify the following values for the <Negative Expression>.
0: -
1: 8
The <Negative Expression> is included in the number of digits of the Integer Part.It follows that even in numeric values with the same absolute values, the number of digits in the negative number becomes larger.
Example: In the case where the integer 3 is specified for the Integer Part and 3 for the Fractional Part:
If the <Expression> is 999.999, then it becomes 999.999
If the <Expression> is -999.999, then it becomes -99.999

Example

Convert a measurement value to a character string and output it to the macro console.

```
RESX$=Str2$(150,3,3,0,0)
RESY$=Str2$(359,3,3,0,0)
RESCR$=Str2$(97,3,0,0,0)

Print RESX$+","+RESY$+","+RESCR$
```

The results are as follows:In the case where (X,Y)=(150,359) and the Correlation Value is 97.

```
150.000,359.000, 97
```

Reboot the controller

SystemReset

Parameters

None.

Return Value

None.

Description

In the case of a controller, reboot the controller.
In the case of a PC, do nothing.

Example

If a date changes, reboot the controller.

```
*MCRINIT
    'Acquire a day when it was loaded.
    STARTDAY$ = Left$(Date$,2)
Return

*MEASUREPROC
    'If a date changes, reboot the controller.
    If Left$(Date$,2) <> STARTDAY$ Then
        SystemReset
    Endif
Return
```

Gets the tangent of the specified expression.

Tan (<Expression>)

Parameters

<Expression>	The expression that gets the tangent (integer type or double-precision type)

Return Value

Returns the value of the double-precision type number.
The content of the value is the value of the tangent that is fetched.

Description

Specify the angle in the <Expression> as a radian. In the case of angle notation (X degrees), it is necessary to convert to a radian by multiplying pi/180.
Specify either an integer type or double-precision type real number in the <Expression>.

Example

Get the tangent of 45 degrees.

```
DATA#=Tan(45/180*3.141592)
```

The result is as follows:

```
DATA#=0.999999673205
```

Reads out the time from the internal clock.

Time$

Parameters

None.

Return Value

Returns the value of the character string.
The content of the value is the character string in which the time from the internal clock is given as Hour (HH), Minute (MM) and Second (SS), separated by colons (:).
The range of the time returned is as follows.
Hour (HH) : 00 - 23
Minute (MM) : 00 - 59
Second (SS) : 00 - 59

Description

Read out the time from the internal clock in the Controller.
The internal clock setting is performed using [System Settings] -> [Date/Time].

Example

Read out the date from the internal clock, change the format and output it to the macro console.

```
Dim NOW$(2)
NOW$=Time$
For I&=0 To 2
    NOW$(I&) = Piece$(NOW$,":",I&+1,I&+1)
Next
Print NOW$(0)+"Hours"+NOW$(1)+"Minutes"+NOW$(2)+"Seconds"
```

Gets a processing time

Timer(<start>, <mode>))

Parameters

<start>	The real type variable saving the return value of StartTimer (the real type array element is acceptable)
<mode>	The mode of the time 0:The elapsed time of each ms is acquired 1:The elapsed time of each μs is acquired

Return Value

The elapsed time since the measurement start time.
The acquired value is an integral value of the unit according to the specification of the argument <mode>, and it is omitted below the decimal point. Moreover, the error margin can be caused by the processing time of the StartTimer function and the Timer function at the acquisition time.

Description

Get the amount of time that has elapsed after StartTimer function is called .

Example

By on the store (which can be an element of real array) real variable the return value of this function, passed to the first argument of the function Timer, of measuring the elapsed time between function calls Timer from function calls StartTimer the typical usage is

```
T#=StartTimer
*(Processing of the measurement object processing time)
TIME&=Timer(T#,0)
```

This program example will be stored in an integer variable unit processing time of processing of the * ms that TIME &

Carries out exception handling.

Try
<Target Statement for Error Detection>
Catch
<Statement at the time when the Error occurs>
End Try

Parameters

<Target Statement for Error Detection>	The statement in which the error is to be detected (statement).
<Statement at the time when the Error occurs>	The statement to be executed when an error is detected (statement).

Return Value

None.

Description

The processing to be carried out when a Macro Error occurs can be defined.
When an error occurs between the Try - Catch commands (<Target Statement for Error Detection>), the command between the Catch - End Try (<Statement at the time when the Error occurs>) is executed.
The error that occurs between Catch - End Try is not considered to be a target error and normal error handling is carried out.
Try - Catch - End Try Commands can be nested.
Moving control from outside the select block to the inside or moving control from inside it to the outside using statements such as the Goto statement is not possible.
The kind of error which occurs between Catch - End Try can be identified by using the Errno command.
The command which generated the error between Catch - End Try can be specified by using the Errcmnd$ command.

Example

Writing data to a file.

```
*DATAWRITE
    Try
        Open "/C0/DATA.DAT" for OUTPUT as #1
        Print #1, DATA$
        Close
    Catch

        ' In the case where the error is generated by the "Open" command.
        If ERRCMND$ = "Open" Then
            Print "Unable to open file"
            ' In the case where the error is generated by the "Print" command.
        Elseif ERRCMND$ = "Print" Then
            Close
            Print "Writing failed"
        Endif
    End Try
```

Convert a small letter into a capital letter

UCase$(<character>)

Parameters

<character>	Conversion former character string (character type)

Return Value

Returns the value of the character type.
The contents of the value are character string after the conversion.

Description

Convert a small letter into a capital letter.

Example

Convert a small letter into a capital letter.

```
CHARA1$="AbcdEFGhI"
CHARA2$=UCase$(CHARA1$)
```

The results are as follows:

```
CHARA2$="ABCDEFGHI"
```


Gets the enrollment number of the processing unit

UnitCount

Parameters

None.

Return Value

Returns the value of the integer type.
The content of the value is enrollment number of the processing unit.

Description

Gets the enrollment number of processing unit from the current flow.

Example

Add the search unit to the last of the flow.

```
'Gets the enrollment number of the processing unit
unitNo& = UnitCount
'Set the identifier of the processing item.
itemIdent$ = "Serch"

'Add the search unit to the last of the flow.
AssignUnit unitNo&, itemIdent$
```

Gets processing unit data (numeric value)

UnitData(<unitNo>, <dataNo> | <dataIdent>)

Parameters

<unitNo>	Processing unit number (integer type)

<dataNo>	Data number (integer type)
<dataIdent>	Data ident name (character type)

Return Value

The processing unit data.

Description

Gets the processing unit data of a processing item.
Gets the numeric value, otherwise, get the value which is transform to numeric value.

Example

Gets a value measured in the X coordinate processing unit Search has been registered in the processing unit number 5

```
serrch# = UnitData(5, 6)
or
serrch# = UnitData(5, "X")
```

Gets processing unit data (character string)

UnitData$(<unitNo>, <dataNo> | <dataIdent>)

Parameters

<unitNo>	Processing unit number (integer type)
<dataNo>	Data number (integer type)
<dataIdent>	Data ident name (character type)

Return Value

The processing unit data.

Description

Gets the processing unit data of a processing item.
Gets the character string value, otherwise, get the value which is transform to character string value.

Example

Gets a string decoding has been registered to the processing unit of the number 5 processing unit 2DCode+

```
decodeChar$ = UnitData$(5, 7)
or
decodeChar$ = UnitData$(5, "decodeCharStr")
```

Gets processing unit information

UnitInfo(<unitNo>, <kind>)

Parameters

<unitNo>	Processing unit number (integer type)
<kind>	The kind of information that is to be get (integer type)

Return Value

Processing unit information.

Description

Gets processing unit information.
The information kind is specified in the argument <kind>.
The value that can be specified is as follows.0: The kind of processing item
1: The size of setting data struct
2: The size of measure data struct
3: The size of control data struct
4: The maximum of figure data
5: The maximum of model data
6: The maximum of image data
7: The maximum of inner processing unit
8: Whether camera setting is effective or not
9: Whether processing unit measure processing can parallel or not

Example

Check processing units that are registered in the register to the processing unit number 2 model whether

```
If UnitInfo(2, 5) > 0 Then
    'Possible to perform processing model
    .
    .
    .
Endif
```

Gets the processing item ident name of processing unit

UnitItemIdent$(<unitNo>)

Parameters

<unitNo>	Processing unit number (integer type)

Return Value

The processing item ident name of processing unit.
The null character string("") is returned for unregistration the specified processing unit.

Description

Gets the processing item ident name of processing unit.

Example

To obtain the unit number of the search processing unit is registered in the flow

```
    'Gets the number of registration of a processing unit
    count& = UnitCount

    'Search Search for processing unit
    For i&=0 To count&
        If UnitItemIdent$(i&) = "Search" Then
          no& = i&
          Goto *proc
        Endif
    Next
*proc
```


Gets the judgement value of the processing unit

UnitJudge(<unitNo>)

Parameters

<unitNo>	Processing unit number (integer type)

Return Value

0	No judgement (not yet measured)
1	Judgement result OK
-1	Judgement result NG
-10	Judgement result error (image format does not match)
-11	Judgement result error (model not yet registered)
-12	Judgement result NG (insufficient memory)
-20	Judgement result error (other error)

Description

Gets the judgement value of the processing unit.

Example

Acquire the judgement result for processing unit 5.

```
'Gets the result of the determination
judge& = UnitJudge(5)
```

Gets the processing unit title name

UnitTitle$(<unitNo>)

Parameters

<unitNo>	Processing unit number (integer type)

Return Value

The processing unit title name.

Description

Gets the processing unit title name.

Example

Output to a file name and title of the unit number of the unit processing unit that is registered in the flow

```
'Gets the number of registration of a processing unit
Inum& = UnitCount

'Registration number, which loops
For I&=0 To Inum&-1
    title$ = UnitTitle$(I&)
    'Output to a file unit number and title
    .
    .
    .
Next
```

Converts the number of a character string notation into a numeric value.

Val(<Character String>)

Parameters

<Character String>	The Character String to be converted to a numeric value (character string).

Return Value

Returns the value of the double-precision type number.
The content of the value is the converted numeric value.

Description

The number specified by the <Character String> is converted into a numeric value.
Specify an integer type notation of +, -, 0 to 9 for the head in <Character String>, or a character constant or a character variable for the character string in real number notation.
When a character that cannot be converted to a numeric value has been mixed in the character string specified for <Character String>, the characters up to that character will be converted to numeric values.
When there is no +, -, 0 to 9 at the head of the <Character String> the value returned will be 0.
There is the reverse function str$ in relation to Val where the numeric value is converted to a character string.

Example

```
A#=10
B#=20
C#=Val(Str$(A#)+Str$(B#))+10
```

The result is as follows:

```
C#=1030
```

Returns saved variables.

Varpop

Parameters

None.

Return Value

None.

Description

Returns variables saved by the Varpush command.
The variable returned is that which was saved by the nearby Varpush command.

Example

Declare an array.

```
*EXPA
	' Save the variable content of a variable to be used as an internal variable
	' --> The content of the specified variable will be stored in the storage region managed by the YVM system

	Varpush A&,B&,C&,D#,E#

	' The content of the variable stored by Varpush can be changed at will.

	GetUnitData 2,"CR",A&
	GetUnitData 3,"CR",B&
	GetUnitData 4,"CR",C&
	GetUnitData 5,"X",D#
	GetUnitData 6,"Y",E#

	' In the case where nesting is used in processing,
	' the variables with the same names of A&,B&,C& are used in Subroutine *EXPB.
	' however, the variable content will be used in *EXPB Varpush/Varpop
	' saving/returning, so there will be no arbitrary rewriting of the variable content.

	Gosub *EXPB

	Print A&,B&,C&,D#,E#

	' The content of the saved variable is returned		' --> When Varpop is executed, the variable content
saved by the nearby Varpush will be returned.

	Varpop
Return

*EXPB
	' The content of variables A&,B&,C&,D#,E# is stored to a different region by
	' Varpush which is executed at the beginning of the *EXPA Subroutine
	' so there is no danger of the content returned before disappearing.
	' Varpush can be executed up to a maximum of 16 times.

	Varpush A&,B&,C&,D#,E#

	GetUnitData 2,"X",A&
	GetUnitData 3,"X",B&
	GetUnitData 4,"X",C&
	D#=3
	E#=100/512

	Print A&,B&,C&,D#,E#

	Varpop
Return
```

Temporarily saves the value of a variable.

Varpush <Variable Name 1>[,<Variable Name 2>[,...,<Variable Name N>]])

Parameters

<Variable Name>	The name (variable name) of the variable to be saved.

Return Value

None.

Description

The value of the variable specified by <Variable Name N> is saved temporarily.
By combining the saving and returning of a variable, it is possible to use the interim variable as an internal variable.The creative efficiency and maintainability of a large program can be enhanced through the use of internal variables.
If the variables fit within a row (255 characters), as many as desired can be saved at one time.
Saved variable values are stored in a hierarchy of up to 16 levels.The levels are increased by 1 each time saving is carried out and reduced by 1 each time a return is done.Saving to the 17th hierarchical level will result in an "Internal error".
Only integer and double-precision variables can be saved.Character string and mixed character string variables cannot be specified.
Executing the New command and the Load command will clear all of the saved variable values.

Example

Declare an array.

```
*EXPA
    ' Save the variable content of variables to be used as internal variables
    ' --> The content of the specified variables will be stored in the storage
    ' region managed by the YVM system

    Varpush A&,B&,C&,D#,E#

    ' The content of the variable stored by Varpush can be changed at will.

    GetUnitData 2,"CR",A&
    GetUnitData 3,"CR",B&
    GetUnitData 4,"CR",C&
    GetUnitData 5,"X",D#
    GetUnitData 6,"Y",E#

    ' In the case where nesting is used in processing,
    ' the variables with the same names of A&,B&,C& are used in Subroutine *EXPB.
    ' however, the variable content will be used in *EXPB Varpush/Varpop
    ' saving/returning, so there will be no arbitrary rewriting of the variable content.

    Gosub *EXPB

    Print A&,B&,C&,D#,E#

    ' The content of variables A&,B&,C&,D#,E# is stored to a different region by
    ' Varpush which is executed at the beginning of the *EXPA Subroutine
    ' so there is no danger of the content disappearing before it gets returned.
    ' Varpush can be executed up to a maximum of 16 times.

    Varpop
Return

*EXPB
    ' The content of variables A&?B&?C&?D#?E# is stored to a different region by
    ' Varpush which is executed at the beginning of the *EXPA Subroutine
    ' so there is no danger of the content disappearing before it gets returned.
    ' Varpush can be executed up to a maximum of 16 times.

    Varpush A&,B&,C&,D#,E#

    GetUnitData 2,"X",A&
    GetUnitData 3,"X",B&
    GetUnitData 4,"X",C&
    D#=3
    E#=100/512

    Print A&,B&,C&,D#,E#

    Varpop
Return
```

Standby at specified time

Wait <time>

Parameters

<time>	Standby tim (integer type)

Return Value

None.

Description

Standby at the time specified by the argument < time >.
The time of each ms is specified for the argument < time >.
Because the standby is done without occupying CPU ability, the processing of the background is not controlled while standing by.
The error margin can be caused in the time specified by the standby time and the argument actual < time >. In general, error margins grow more in the StartTimer-Timer function.

Write in data at designated storage device of the PLC

WritePlcMemory <ioIdent>, <area>, <channelOffset>, <channelCount>, <writeData()>

Parameters

<ioIdent>	Identification name of I/O module (character type)
<area>	Area classification number (integer type)
<channelOffset>	Offset from the top of an area targeted for writing (integer type)
<channelCount>	size of write data (integer type)
<writeData()>	write data (Integer type sequence)

Return Value

None.

Description

Set a identification Name Identification name in an <ioIdent>.
Set a Area classification number Identification name in an <area>.
Reference: List of IO modules (p.299)
Appoint an <channelOffset> and the <channelCount> with the number of the channels.
The write data argument <writeData()> by one dimension integer type array variable, do not specify it with the number of element like X&() but like () only with the type.
Set the data of writeData() using SetPlcData command.

Example

Write in data from 10ch of the DM area of the OMRON PLC.

```
'Set data in 'writeData()
Dim writeData&(100)

'Set 12.56 (real number type data) in the top of writeData().
SetPlcData "SerialPlcLink", writeData&(), 0, 8, 12.56

"Write in data at PLC
WritePlcMemory "SerialPlcLink", 130, 10, 1, writeData&()
```

Gets the exclusive disjunction (exclusive-OR) of 2 expressions.

<Expression 1> Xor <Expression 2>

Parameters

<Expression 1>	The expression that requests the exclusive disjunction (integer type).
<Expression 2>	The expression that requests the exclusive disjunction (integer type).

Return Value

Returns the value of the integer.
The content of the value is the requested exclusive disjunction.

Description

Each of the values of <Expression 1> and <Expression 1> will be given as a 32-digit binary number and each bit will be given the exclusive disjunction.
Values from -2147483648 to 2147483647 can be specified for <Expression 1> and <Expression 2>.
When the values of <Expression 1> and <Expression 2> are double-precision type, the fractional part is handled as a rounded value.

Example

Get the exclusive disjunction (exclusive-OR) of 12 and 31.

```
DATA1&=12
DATA2&=31

DATA3&=DATA1& Xor DATA2&
```

The result is as follows:

```
DATA3&=19
```

List of system data

Table: Data identification name 0

CameraControl	Camera delay setting
UdpNormal	Communication - Ethernet setting
SerialNormal	Communication - Serial setting

ParallelIO	Communication - Parallel setting
Configuration	Language setting/Startup setting
Logging	Logging setting
Measure	Measurement control setting

Table: Data identification name 1

CameraControl (Camera delay setting)	
cameraDelay0	STEP-camera 0 delay
cameraDelay1	STEP-camera 1 delay
cameraDelay2	STEP-camera 2 delay
cameraDelay3	STEP-camera 3 delay
UdpNormal (Communication - Ethernet setting)	
portNo	Port number
enableDhcp	Get an IP address automatically 0: OFF 1: ON
ipAddress	IP Address
subnetMask	Subnet mask
defaultGateway	Default gateway
destIpAddress	IP address to which the data is output
SerialNormal (Communication - Serial setting)	
rsMode	Communication type 0: RS-232C 1: RS-422
baudRate	Baud rate (2400/4800/9600/19200/38400/576000/115200)
byteSize	Data length (7, 8)
parity	Parity 0: OFF 1: Odd 2: Even
stopBits	Stop bit (1, 2)
softFlow	Flow control 0: OFF 1: Xon/Xoff
delimiter	Delimiter 0: CR 1: LF 2: CR+L
timeout	Timeout
multiDrop	Multidrop 0: OFF 1: ON
mdUnitNo	Model number
broadcast	Broadcast under the multidrop connection 0: OFF 1: ON
ParallelIO (Communication - Parallel setting)	
polarity	Output polarity
handshake	Output control
cycleTime	Output cycle

riseTime	Startup time
outputTime	Time to output
timeout	Timeout
delayCount	Delay count
orOutMode	One-shot OR signal
orOutputTime	One-shot OR signal time
Configuration (Language setting/Startup setting)	
language	Language jpn: Japanese mode eng: English mode
InitialSceneNo	Startup scene number
initialSceneGroupNo	Startup scene group number
initialMeasureOut	Outputs the measurement result at startup 0: OFF 1: ON
Logging (Logging setting)	
imageLogging	Image logging 0: Logging not executed 1: Logging only at NG 2: Logging all
dataLogging	Data Logging 0: Logging not executed 1: Logging only at NG 2: Logging all
imageLoggingDirectory	Destination folder to save image logging
dataLoggingDirectory	Destination folder to save data logging
imageLoggingPriority	Image logging mode 0: Logging operation has priority 1: Measurement interval has priority
imageLoggingScene	Switches the saving folder by image logging scene group/scene 0: Disable 1: Enable
imageLoggingJudge	Switches the saving folder by image logging overall judgement 0: Disable 1: Enable
imageLoggingHeader	String prepended to the image logging file name
Measure (measurement control setting)	
stepError	STEP in measure 0: ERROR ON 1: ERROR OFF
sceneGroupSave	Save when switching a scene group 0: Save not performed when switching a scene group 1: Save performed when switching a scene group
captureDirectory	Directory in which a screen capture is saved

List of IO modules

Identification name	IO module name	References
EtherNetIP	EtherNet/IP Interface communication	Reference: Details (p.300)
ParallelIo	Parallel Interface communication	Reference: Details (p.301)

SerialNormal SerialNormal2 (Fxxx series method)	Serial Interface Non-procedure communication	Reference: Details (p.302)
SerialPlcLinkM	Serial Interface PLC Link (MELSEC QnU/Q/QnAS) communication	Reference: Details (p.304)
SerialPlcLink	Serial Interface PLC Link (SYSMAC CS/CJ/CP/One) communication	Reference: Details (p.305)
TcpClient	TCP Client Non-procedure communication	Reference: Details (p.308)
TcpNormal	TCP Non-procedure communication	Reference: Details (p.309)
UdpNormal UdpNormal2 (Fxxx series method)	UDP Non-procedure communication	Reference: Details (p.311)
UdpPlcLinkM	PLC Link (MELSEC QnU/Q/QnAS) communication	Reference: Details (p.312)
UdpPlcLinkY	PLC Link (JEPMC MP) communication	Reference: Details (p.315)
UdpPlcLink	PLC Link (SYSMAC CS/CJ/CP/One) communication	Reference: Details (p.317)

EtherNetIP

EtherNet/IP Interface communication

IoModule identification name

EtherNetIP

Overview

This is a module is for sending and receiving commands and data by Ethernet/IP protocol.

System data

Identification	Meaning	Initial value
handshake	Output control 0: none 1: Handshaking	0
cycleTime	Output period[ms]	100
outputTime	Output time[ms]	50
timeout	timeout[s]	100

Supported functions

IoInitialize	○	
GetPort	○	Reference: Input terminal a point input (p.214)
PutPort	○	Reference: Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: Input terminal all point input (p.210)
PutAll	○	Reference: Output terminal all point output (p.249)
ReceiveData	○	Reference: Receive data (p.252)
SendData	○	Reference: Send data (p.267)

SendString	○	Reference: ▶ Sends string (p.268)
ReadPlcMemory	×	—
WritePlcMemory	×	—
SetPlcData	×	—
GetPlcData	×	—

Example

Receive data

```
Dim data&(256)
Dim ipaddr&(4)
'Gets the five data.
ReceiveData "UdpPlcLink", data5&(), 4*5, size&
```

Tranmit data.
Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
'Transmit the five data.
SendData "UdpPlcLink", data&(), 4*5
```

ParallelIo

Parallel Interface communication

IoModule identification name

ParallelIo

Overview

This is a module is for sending and receiving commands and data via the Parallel interface.

System data

Identification	Meaning	Initial value
polarity	polarity 0:ON when NG 1:ON when OK	0
handshake	handshake 0:none 1:handshake 2:synchronous output	0
cycleTime	cycle time[0.1ms]	100
riseTime	rise time[0.1ms]	10
outputTime	output time[0.1ms]	50
timeout	timeout[0.1ms]	100
delayCount	delay count	1
orOutMode	one-shot output when OK signal 0:do not 1:do	0
orOutputTime	time of one-shot output when OK signal[0.1ms]	50

Supported functions

IoInitialize	○	—
GetPort	○	Reference: ▶ Output terminal a point output (p.214)
PutPort	○	Reference: ▶ Input terminal a point input (p.250)
BusyOut	○	Reference: ▶ Output BUSY state (p.188)
JudgeOut	○	Reference: ▶ Judge result output (p.230)
RunOut	○	Reference: ▶ ROutput RUN state (p.230)
GetAll	○	Reference: ▶ Input terminal all point input (p.210)
PutAll	○	Reference: ▶ Output terminal all point output (p.249)
ReceiveData	○	Reference: ▶ Receive data (p.252)
SendData	○	Reference: ▶ Send data (p.267)
SendString	○	Reference: ▶ Sends string (p.268)
ReadPlcMemory	×	—
WritePlcMemory	×	—
SetPlcData	×	—
GetPlcData	×	—

Example

Receive data
A parameter of ReceiveData, the parameter size are unnecessary.

```
Dim data&(256)

'Gets the five data.
ReceiveData "ParallelIo", data&(), 4*5, size&
```

Send data
A parameter of SendData, the parameter size are unnecessary.

```
Dim data&(256)

'Transmit the five data.
SendData "ParallelIo", data&(), 4*5
```

SerialNormal

Serial Interface Non-procedure communication

IoModule identification name

SerialNormal
SerialNormal2 (Fxxx series method)

Overview

This is a module is for sending and receiving commands and data via the serial interface.

System data

Identification	Meaning	Initial value
rsMode	Interface 0: RS-232C 1: RS-422	0
baudRate	Baud rate[bps]	38400
byteSize	Data length[bit] 7 or 8	8
parity	parity 0:none 1:odd number 2:even number	0
stopBits	stop bits[bit] 0:1 1:2	0
softFlow	Flow control 0:None 1:Xon/Xoff	0
delimiter	Delimiter 0:CR 1:LF 2:CR+LF	0
timeout	Timeout[s]	5

Supported functions

IoInitialize	○	
GetPort	○	Reference: ▶ Input terminal a point input (p.214)
PutPort	○	Reference: ▶ Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: ▶ Input terminal all point input (p.210)
PutAll	○	Reference: ▶ Output terminal all point output (p.249)
ReceiveData	○	Reference: ▶ Receive data (p.252)
SendData	○	Reference: ▶ Send data (p.267)
SendString	○	Reference: ▶ Sends string (p.268)
ReadPlcMemory	×	—
WritePlcMemory	×	—
SetPlcData	×	—
GetPlcData	×	—

Example

Receive data

A parameter of ReceiveData, the parameter size are unnecessary.

```
Dim data&(256)

'Gets the five data.
ReceiveData "SerialPlcLink", data&(), 4*5, size&
```

Send data
A parameter of ReceiveData, the parameter size are unnecessary.

```
Dim data&(256)

'Transmit the five data.
SendData "SerialPlcLink", data&(), 4*5
```

SerialPlcLinkM

Serial Interface PLC Link (MELSEC QnU/Q/QnAS) communication

IoModule identification name

SerialPlcLinkM

Overview

This is a module is for sending and receiving commands and data via the serial PLC Link interface.

System data

Identification	Meaning	Initial value
rsMode	Interface 0: RS-232C 1: RS-422	0
baudRate	baud rate[bps]	9600
byteSize	Data length [bit] 7 or 8	7
parity	Parity 0:none 1:odd number 2:even number	2
stopBits	Stop bits [bit] 0:1 1:2	1
softFlow	Flow control 0:none 1:Xon/Xoff	0
timeout	timeout[s]	5

PLC Link data

Identification	Meaning	Initial value
commandArea	Command area Area	Data register
commandMemoryAddress	Command area Address	0
responseArea	Response area Area	Data register
responseMemoryAddress	Response area Address	100
outputArea	Data Output area Area	Data register
outputMemoryAddress	Data Output area Address	200
handshake	handshaking	1

responseTimeout	Retry interval [ms]	10000

Area classification

Area classification name	Classification code
Data register	168
File register	175
Link register	180

Supported functions

IoInitialize	○	
GetPort	○	Reference: ▶ Input terminal a point input (p.214)
PutPort	○	Reference: ▶ Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: ▶ Input terminal all point input (p.210)
PutAll	○	Reference: ▶ Output terminal all point output (p.249)
ReceiveData	○	Reference: ▶ Receive data (p.252)
SendData	○	Reference: ▶ Send data (p.267)
SendString	○	Reference: ▶ Sends string (p.268)
ReadPlcMemory	○	Reference: ▶ Begin to read data from designated memory of the PLC (p.251)
WritePlcMemory	○	Reference: ▶ Write in data at designated storage device of the PLC (p.296)
SetPlcData	○	Reference: ▶ Set PLC the write data (p.271)
GetPlcData	○	Reference: ▶ Gets PLC the read data (p.213)

Example

Receive data

A parameter of ReceiveData, the parameter size are unnecessary.

```
Dim data&(256)

'Gets the five data.
ReceiveData "SerialPlcLinkM", data&(), 4*5, size&
```

Send data

A parameter of ReceiveData, the parameter size are unnecessary.

```
Dim data&(256)

'Transmit the five data.
SendData "SerialPlcLinkM", data&(), 4*5
```

SerialPlcLink

Serial Interface PLC Link (SYSMAC CS/CJ/CP/One) communication

IoModule identification name

SerialPlcLink

Overview

This is a module is for sending and receiving commands and data via the serial PLC Link interface.

System data

Identification	Meaning	Initial value
rsMode	Interface 0: RS-232C 1: RS-422	0
baudRate	baud rate [bps]	9600
byteSize	Data length [bit] 7 or 8	7
parity	Parity 0:none 1:odd number 2:even number	2
stopBits	Stop bits [bit] 0:1 1:2	1
softFlow	Flow control 0:None 1:Xon/Xoff	0
timeout	timeout [s]	5

PLC Link data

Identification	Meaning	Initial value
commandArea	Command area Area	CIO Area (CIO)
commandMemoryAddress	Command area Address	0
responseArea	Response area Area	CIO Area (CIO)
responseMemoryAddress	Response area Address	100
outputArea	Data Output area Area	CIO Area (CIO)
outputMemoryAddress	Data Output area Address	200
handshake	handshaking	1
responseTimeout	Retry interval [ms]	10000

Area classification

Area classification name	Classification code
CIO Area (CIO)	176
Work Area(WR)	177
Holding Bit Area (HR)	178
Auxiliary Bit Area (AR)	179
DM Area (DM)	130
EM Area (EMO)	160
EM Area (EM1)	161

EM Area (EM2)	162
EM Area (EM2)	163
EM Area (EM4)	164
EM Area (EM5)	165
EM Area (EM6)	166
EM Area (EM7)	167
EM Area (EM8)	168
EM Area (EM9)	169
EM Area (EMA)	170
EM Area (EMB)	171
EM Area (EMC)	172

Supported functions

IoInitialize	○	
GetPort	○	Reference: ▸ Input terminal a point input (p.214)
PutPort	○	Reference: ▸ Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: ▸ Input terminal all point input (p.210)
PutAll	○	Reference: ▸ Output terminal all point output (p.249)
ReceiveData	○	Reference: ▸ Receive data (p.252)
SendData	○	Reference: ▸ Send data (p.267)
SendString	○	Reference: ▸ Sends string (p.268)
ReadPlcMemory	○	Reference: ▸ Begin to read data from designated memory of the PLC (p.251)
WritePlcMemory	○	Reference: ▸ Write in data at designated storage device of the PLC (p.296)
SetPlcData	○	Reference: ▸ Set PLC the write data (p.271)
GetPlcData	○	Reference: ▸ Gets PLC the read data (p.213)

Example

Receive data

A parameter of ReceiveData, the parameter size are unnecessary.

```
Dim data&(256)

'Gets the five data.
ReceiveData "SerialPlcLink", data&(), 4*5, size&
```

Send data

A parameter of ReceiveData, the parameter size are unnecessary.

```
Dim data&(256)

'Transmit the five data.
SendData "SerialPlcLink", data&(), 4*5
```

Gets 7ch data from 10ch of the DM area.
Gets the data from readData().

```
Dim readData&(256)
Dim data3$(21)

'Gets the data from PLC
ReadPlcMemory "SerialPlcLink", 130, 10, 7, readData&()

'Gets the data of the real number type
GetPlcData "SerialPlcLink", readData&(), 0, 8, data1#
'Gets the data of the integer type
GetPlcData "SerialPlcLink", readData&(), 8, 4, data2&
'Gets the data of the character type
GetPlcData "SerialPlcLink", readData&(), 12, 5, data2&
```

Set data to writeData().
Write in data for 7ch from 10ch of the DM area.

```
Dim writeData&(256)

'Set the data (123.45) of the real number type.
SetPlcData "SerialPlcLink", writeData&(), 0, 8, 123.45
'Set the data (20) of the integer type.
SetPlcData "SerialPlcLink", writeData&(), 32, 4, 20
'Set the data (OMRON) of the character type.
SetPlcData "SerialPlcLink", writeData&(), 36, 5, "OMRON"

'Write in data for 7ch from 10ch of the DM area.
WritePlcMemory "SerialPlcLink", 130, 10, 7, writeData&()
```

TcpClient

TCP Client Non-procedure communication

IoModule identification name

TcpClient

Overview

This is a module is for sending and receiving commands and data by Ethernet TCP Client protocol.

System data

Identification	Meaning	Initial value
enableDhcp	Enable DHCP 0:Disabled 1:Enabled	0
ipAddress	IP address of the system	10.5.5.100
subnetMask	Subnet mask	255.255.255.0
defaultGateway	Gateway address	10.5.5.110
dns	DNS server address	10.5.5.1
serverIpAddress	Server IP address	10.5.5.101
portNo	Port number to receive commands	9600

Supported functions

IoInitialize	○	
GetPort	○	Reference: ▶ Input terminal a point input (p.214)
PutPort	○	Reference: ▶ Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: ▶ Input terminal all point input (p.210)
PutAll	○	Reference: ▶ Output terminal all point output (p.249)
ReceiveData	○	Reference: ▶ Receive data (p.252)
SendData	○	Reference: ▶ Send data (p.267)
SendString	○	Reference: ▶ Sends string (p.268)
ReadPlcMemory	×	—
WritePlcMemory	×	—
SetPlcData	×	—
GetPlcData	×	—

Example

Receive data.
Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Gets the five data.
ReceiveData "TcpClient", data&(), 4*5, size&, ipaddr&(), 4*4
```

Send data
Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Transmit the five data.
SendData "TcpClient", data&(), 4*5, ipaddr&(), 4*4
```

TcpNormal

TCP Non-procedure communication

IoModule identification name

TcpNormal

Overview

This is a module is for sending and receiving commands and data by Ethernet TCP protocol.

System data

Identification	Meaning	Initial value
enableDhcp	Enable DHCP 0:Disabled 1:Enabled	0
ipAddress	IP address of the system	10.5.5.100
subnetMask	Subnet mask	255.255.255.0
defaultGateway	Gateway address	10.5.5.110
dns	DNS server address	10.5.5.1
portNo	Port number to receive commands	9600

Supported functions

IoInitialize	○	
GetPort	○	Reference: ▶ Input terminal a point input (p.214)
PutPort	○	Reference: ▶ Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: ▶ Input terminal all point input (p.210)
PutAll	○	Reference: ▶ Output terminal all point output (p.249)
ReceiveData	○	Reference: ▶ Receive data (p.252)
SendData	○	Reference: ▶ Send data (p.267)
SendString	○	Reference: ▶ Sends string (p.268)
ReadPlcMemory	×	—
WritePlcMemory	×	—
SetPlcData	×	—
GetPlcData	×	—

Example

Receive data

Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Gets the five data.
ReceiveData "TcpNormal", data&(), 4*5, size&, ipaddr&(), 4*4
```

Send data

Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Transmit the five data.
SendData "TcpNormal", data&(), 4*5, ipaddr&(), 4*4
```


UdpNormal

TCP Non-procedure communication

IoModule identification name

UdpNormal
UdpNormal2 (Fxxx series method)

Overview

This is a module is for sending and receiving commands and data by Ethernet UDP protocol.

System data

Identification	Meaning	Initial value
enableDhcp	Enable DHCP 0:Disabled 1:Enabled	0
ipAddress	IP address of the system	10.5.5.100
subnetMask	Subnet mask	255.255.255.0
defaultGateway	Gateway address	10.5.5.110
dns	DNS server address	10.5.5.1
destIpAddress	Destination IP address to send data	0.0.0.0
portNo	Port number to receive commands	9600
portNo2	Port number to send data	-1

(*) If the input port number and the output port number are the same setting, set the output port number to -1.

Supported functions

IoInitialize	○	
GetPort	○	Reference: ▶ Input terminal a point input (p.214)
PutPort	○	Reference: ▶ Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: ▶ Input terminal all point input (p.210)
PutAll	○	Reference: ▶ Output terminal all point output (p.249)

ReceiveData	○	Reference: ▶ Receive data (p.252)
SendData	○	Reference: ▶ Send data (p.267)
SendString	○	Reference: ▶ Sends string (p.268)
ReadPlcMemory	×	—
WritePlcMemory	×	—
SetPlcData	×	—
GetPlcData	×	—

Example

Receive data

Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Gets the five data.
ReceiveData "UdpNormal", data&(), 4*5, size&, ipaddr&(), 4*4
```

Send data

Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Transmit the five data.
SendData "UdpNormal", data&(), 4*5, ipaddr&(), 4*4
```

UdpPlcLinkM

PLC Link (MELSEC QnU/Q/QnAS) communication

IoModule identification name

UdpPlcLinkM

Overview

This is a module is for sending and receiving commands and data by Ethernet PLC Link protocol.

System data

Identification	Meaning	Initial value
enableDhcp	Enable DHCP 0:Disabled 1:Enabled	0
ipAddress	IP address of the system	10.5.5.100
subnetMask	Subnet mask	255.255.255.0
defaultGateway	Gateway address	10.5.5.110
dns	DNS server address	10.5.5.1
destIpAddress	Output IP address	0.0.0.0
portNo	Input port No	9600

PLC Link data

commandArea	Command area Area	Data register
commandMemoryAddress	Command area Address	0
responseArea	Response area Area	Data register
responseMemoryAddress	Response area Address	100
outputArea	Data Output area Area	Data register
outputMemoryAddress	Data Output area Address	200
handshake	handshaking	1
responseTimeout	Retry interval [ms]	10000

Area classification

Area classification name	Classification code
Data register	168
File register	175
Link register	180

Supported functions

IoInitialize	○	—
GetPort	○	Reference: ▶ Input terminal a point input (p.214)
PutPort	○	Reference: ▶ Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: ▶ Input terminal all point input (p.210)
PutAll	○	Reference: ▶ Output terminal all point output (p.249)
ReceiveData	○	Reference: ▶ Receive data (p.252)
SendData	○	Reference: ▶ Send data (p.267)
SendString	○	Reference: ▶ Sends string (p.268)
ReadPlcMemory	○	Reference: ▶ Begin to read data from designated memory of the PLC (p.251)
WritePlcMemory	○	Reference: ▶ Write in data at designated storage device of the PLC (p.296)
SetPlcData	○	Reference: ▶ Set PLC the write data (p.271)
GetPlcData	○	Reference: ▶ Gets PLC the read data (p.213)

Example

Receive data
Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Gets the five data.
ReceiveData "UdpPlcLinkM", data&(), 4*5, size&, ipaddr&(), 4*4
```

Send data
Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Transmit the five data.
SendData "UdpPlcLinkM", data&(), 4*5, ipaddr&(), 4*4
```

Gets 7ch data from 10ch of the Data register area.
Gets the data from readData().

```
Dim readData&(256)
Dim data3$(21)

'Gets the data from PLC
ReadPlcMemory "UdpPlcLinkM", 168, 10, 7, readData&()

'Gets the data of the real number type
GetPlcData "UdpPlcLinkM", readData&(), 0, 8, data1#
'Gets the data of the integer type
GetPlcData "UdpPlcLinkM", readData&(), 8, 4, data2&
'Gets the data of the character type
GetPlcData "UdpPlcLinkM", readData&(), 12, 5, data2&
```

Set data to writeData().
Write in data for 7ch from 10ch of the DM area.

```
Dim writeData&(256)

'Set the data (123.45) of the real number type.
SetPlcData "UdpPlcLinkM", writeData&(), 0, 8, 123.45
'Set the data (20) of the integer type.
SetPlcData "UdpPlcLinkM", writeData&(), 32, 4, 20
'Set the data (OMRON) of the character type.
SetPlcData "UdpPlcLinkM", writeData&(), 36, 5, "OMRON"

'Write in data for 7ch from 10ch of the Data register area.
WritePlcMemory "UdpPlcLinkM", 168, 10, 7, writeData&()
```

UdpPlcLinkY

PLC Link (JEPMC MP) communication

IoModule identification name

UdpPlcLinkY

Overview

This is a module is for sending and receiving commands and data by Ethernet PLC Link protocol.

System data

Identification	Meaning	Initial value
enableDhcp	Enable DHCP 0:Disabled 1:Enabled	0
ipAddress	IP address of the system	10.5.5.100
subnetMask	Subnet mask	255.255.255.0
defaultGateway	Gateway address	10.5.5.110
dns	DNS server address	10.5.5.1
destIpAddress	Output IP address	0.0.0.0
portNo	Input port No	9600

PLC Link data

commandArea	Command area Area	Data register
commandMemoryAddress	Command area Address	0
responseArea	Response area Area	Data register
responseMemoryAddress	Response area Address	100
outputArea	Data Output area Area	Data register
outputMemoryAddress	Data Output area Address	200
handshake	handshaking	1
responseTimeout	Retry interval [ms]	10000

Area classification

Area classification name	Classification code
Data register	176

Supported functions

IoInitialize	○	—
GetPort	○	Reference: ▶ Input terminal a point input (p.214)
PutPort	○	Reference: ▶ Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: ▶ Input terminal all point input (p.210)

PutAll	○	Reference: ▶ Output terminal all point output (p.249)
ReceiveData	○	Reference: ▶ Receive data (p.252)
SendData	○	Reference: ▶ Send data (p.267)
SendString	○	Reference: ▶ Sends string (p.268)
ReadPlcMemory	○	Reference: ▶ Begin to read data from designated memory of the PLC (p.251)
WritePlcMemory	○	Reference: ▶ Write in data at designated storage device of the PLC (p.296)
SetPlcData	○	Reference: ▶ Set PLC the write data (p.271)
GetPlcData	○	Reference: ▶ Gets PLC the read data (p.213)

Example

Receive data

Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Gets the five data.
ReceiveData "UdpPlcLinkY", data&(), 4*5, size&, ipaddr&(), 4*4
```

Send data

Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Transmit the five data.
SendData "UdpPlcLinkY", data&(), 4*5, ipaddr&(), 4*4
```

Gets 7ch data from 10ch of the Data register area.
Gets the data from readData().

```
Dim readData&(256)
Dim data3$(21)

'Gets the data from PLC
ReadPlcMemory "UdpPlcLinkY", 176, 10, 7, readData&()

'Gets the data of the real number type
GetPlcData "UdpPlcLinkY", readData&(), 0, 8, data1#
'Gets the data of the integer type
GetPlcData "UdpPlcLinkY", readData&(), 8, 4, data2&
'Gets the data of the character type
GetPlcData "UdpPlcLinkY", readData&(), 12, 5, data2&
```

Set data to writeData().
Write in data for 7ch from 10ch of the DM area.

```
Dim writeData&(256)

'Set the data (123.45) of the real number type.
SetPlcData "UdpPlcLinkY", writeData&(), 0, 8, 123.45
'Set the data (20) of the integer type.
SetPlcData "UdpPlcLinkY", writeData&(), 32, 4, 20
'Set the data (OMRON) of the character type.
SetPlcData "UdpPlcLinkY", writeData&(), 36, 5, "OMRON"

'Write in data for 7ch from 10ch of the Data register area.
WritePlcMemory "UdpPlcLinkY", 176, 10, 7, writeData&()
```


UdpPlcLink

PLC Link (SYSMAC CS/CJ/CP/One) communication

IoModule identification name

UdpPlcLink

Overview

This is a module is for sending and receiving commands and data by Ethernet PLC Link protocol.

System data

Identification	Meaning	Initial value
enableDhcp	Enable DHCP 0:Disabled 1:Enabled	0
ipAddress	IP address of the system	10.5.5.100
subnetMask	Subnet mask	255.255.255.0
defaultGateway	Gateway address	10.5.5.110
dns	DNS server address	10.5.5.1
destIpAddress	Output IP address	0.0.0.0
portNo	Input port No	9600

PLC Link data

commandArea	Command area Area	Data register
commandMemoryAddress	Command area Address	0
responseArea	Response area Area	Data register
responseMemoryAddress	Response area Address	100
outputArea	Data Output area Area	CIO Area (CIO)
outputMemoryAddress	Data Output area Address	200
handshake	handshaking	1
responseTimeout	Retry interval [ms]	10000

Area classification

Area classification name	Classification code
CIO Area (CIO)	176
Work Area(WR)	177
Holding Bit Area (HR)	178
Auxiliary Bit Area (AR)	179
DM Area (DM)	130
EM Area (EMO)	160
EM Area (EM1)	161
EM Area (EM2)	162
EM Area (EM2)	163
EM Area (EM4)	164
EM Area (EM5)	165
EM Area (EM6)	166
EM Area (EM7)	167
EM Area (EM8)	168
EM Area (EM9)	169
EM Area (EMA)	170
EM Area (EMB)	171
EM Area (EMC)	172

Supported functions

IoInitialize	○	—
GetPort	○	Reference: ▸ Input terminal a point input (p.214)
PutPort	○	Reference: ▸ Output terminal a point output (p.250)
BusyOut	×	—
JudgeOut	×	—
RunOut	×	—
GetAll	○	Reference: ▸ Input terminal all point input (p.210)
PutAll	○	Reference: ▸ Output terminal all point output (p.249)
ReceiveData	○	Reference: ▸ Receive data (p.252)
SendData	○	Reference: ▸ Send data (p.267)
SendString	○	Reference: ▸ Sends string (p.268)
ReadPlcMemory	○	Reference: ▸ Begin to read data from designated memory of the PLC (p.251)
WritePlcMemory	○	Reference: ▸ Write in data at designated storage device of the PLC (p.296)
SetPlcData	○	Reference: ▸ Set PLC the write data (p.271)
GetPlcData	○	Reference: ▸ Gets PLC the read data (p.213)

Example

Receive data

Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Gets the five data.
ReceiveData "UdpPlcLink", data&(), 4*5, size&, ipaddr&(), 4*4
```

Send data
Set an IP address and parameter size (*4 integer type domain) in a parameter to use an Ethernet.

```
Dim data&(256)
Dim ipaddr&(4)
'Set the IP address of the destination.
ipaddr&(0) = 10
ipaddr&(1) = 1
ipaddr&(2) = 1
ipaddr&(3) = 101
'Transmit the five data.
SendData "UdpPlcLink", data&(), 4*5, ipaddr&(), 4*4
```

Gets 7ch data from 10ch of the DM area.
Gets the data from readData().

```
Dim readData&(256)
Dim data3$(21)

'Gets the data from PLC
ReadPlcMemory "UdpPlcLink", 130, 10, 7, readData&()

'Gets the data of the real number type
GetPlcData "UdpPlcLink", readData&(), 0, 8, data1#
'Gets the data of the integer type
GetPlcData "UdpPlcLink", readData&(), 8, 4, data2&
'Gets the data of the character type
GetPlcData "UdpPlcLink", readData&(), 12, 5, data2&
```

Set data to writeData().
Write in data for 7ch from 10ch of the DM area.

```
Dim writeData&(256)

'Set the data (123.45) of the real number type.
SetPlcData "UdpPlcLink", writeData&(), 0, 8, 123.45
'Set the data (20) of the integer type.
SetPlcData "UdpPlcLink", writeData&(), 32, 4, 20
'Set the data (OMRON) of the character type.
SetPlcData "UdpPlcLink", writeData&(), 36, 5, "OMRON"

'Write in data for 7ch from 10ch of the DM area.
WritePlcMemory "UdpPlcLink", 130, 10, 7, writeData&()
```

Overview

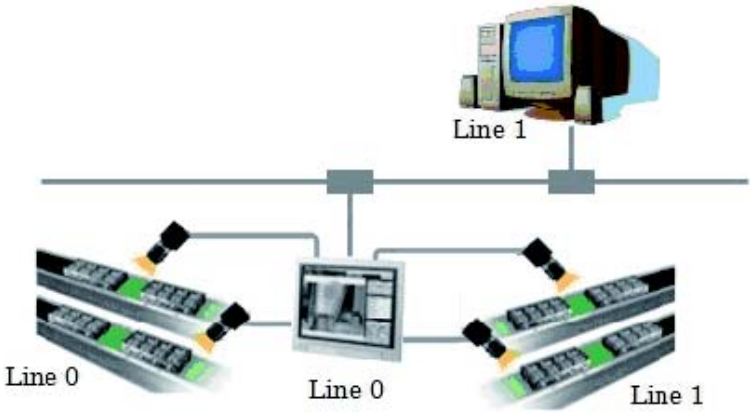
With this function, processing items that are performed by the controller can be remotely edited or actual measurements can be remotely performed by another PC on the network. This function is enabled only with Ethernet connection.

Important

- A controller window cannot be operated or displayed simultaneously on multiple PCs on the network.

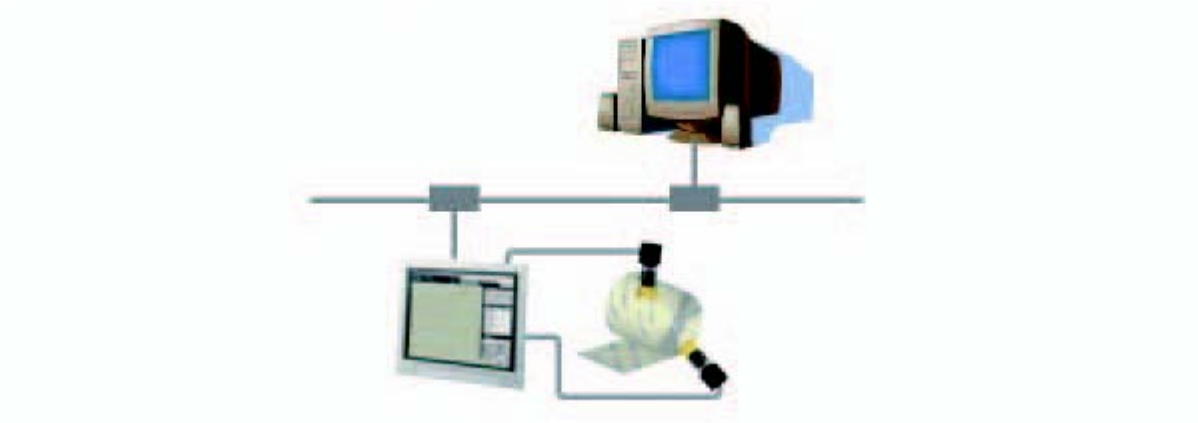
For example, the function can be used as follows.
(1) GUI operations, such as editing multiple inspection and measurement line processing items and changing the settings, can be performed by a single dedicated PC.

(2) Two measurement windows in two line random trigger modes can be operated by a different window each.



(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 communication environment and a GUI environment for remote operation.

Install FZ Remote Operation Tool on the remote operation PC.

Important

- Make sure that the 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:

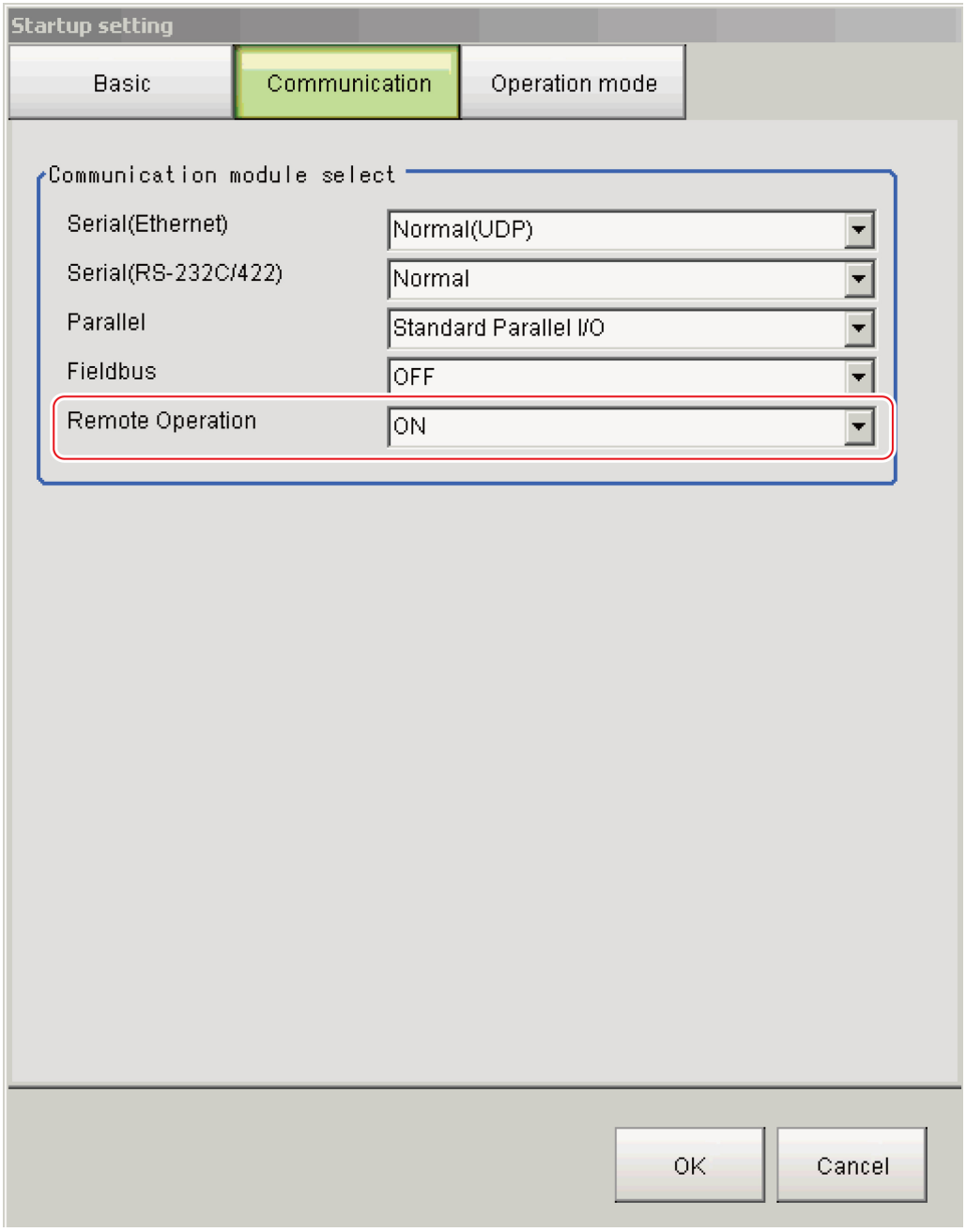
CPU	Core 2Duo 2.2 GHz or higher
OS	Windows XP Professional SP2 or higher
Memory	2 GB (3 GB or higher recommended)
Hard disk free capacity	2 GB or higher
Display window	Resolution 1,024 x 768 dots or higher Display color True Color (32 bits)
Network	10Base-T compatible network (100Base-TX recommended)
CD-ROM drive	Quad-speed or faster

To use the remote operation software, Microsoft .NET Frameworks 3.5 must be installed.
This CD-ROM contains the Microsoft .NET Frameworks 3.5 installer. Please use as required.

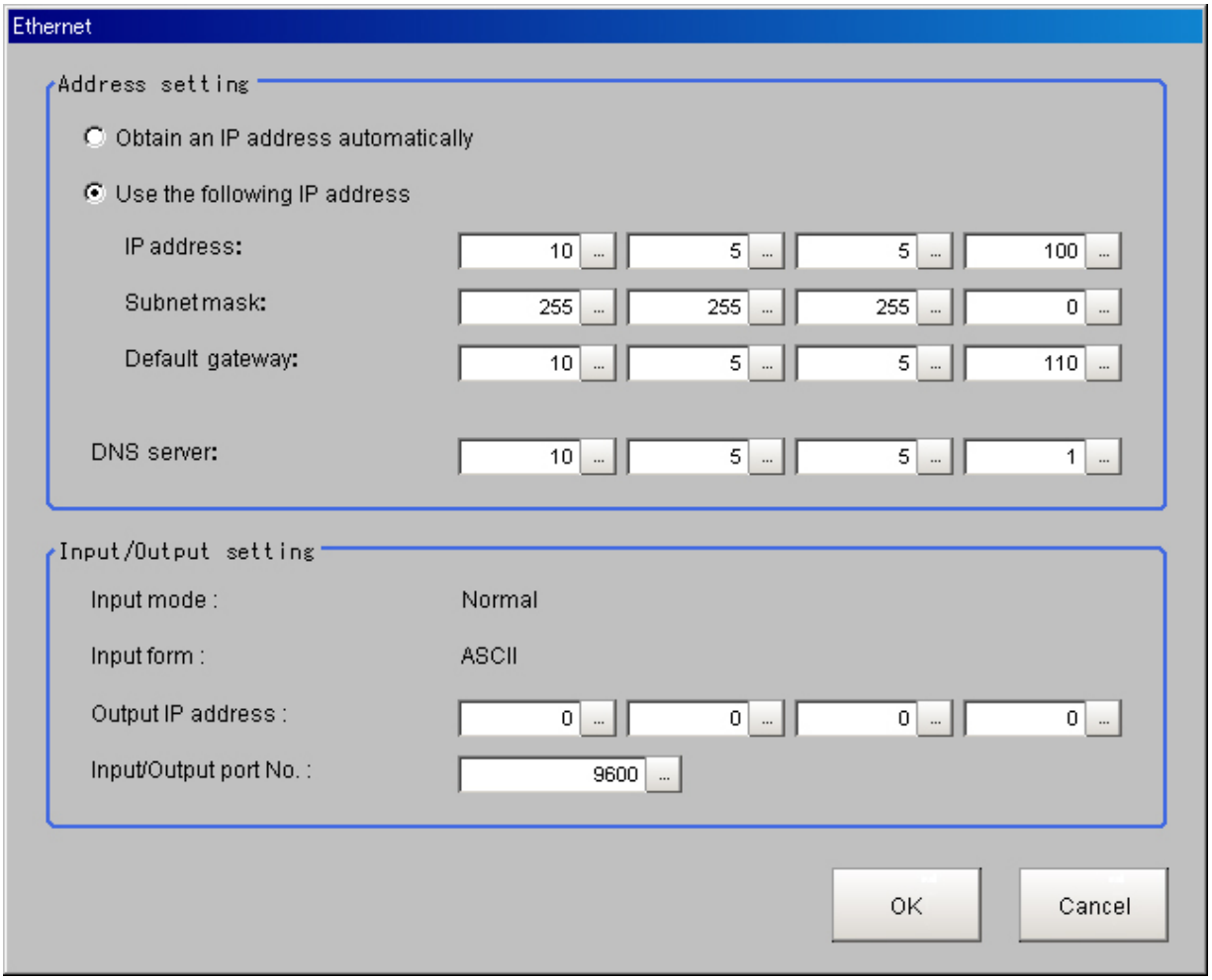
Set the network

Specify the network settings on both the controller and the remote operation PC.
In the communication module, specify the module by serial (Ethernet) and enter the IP address.

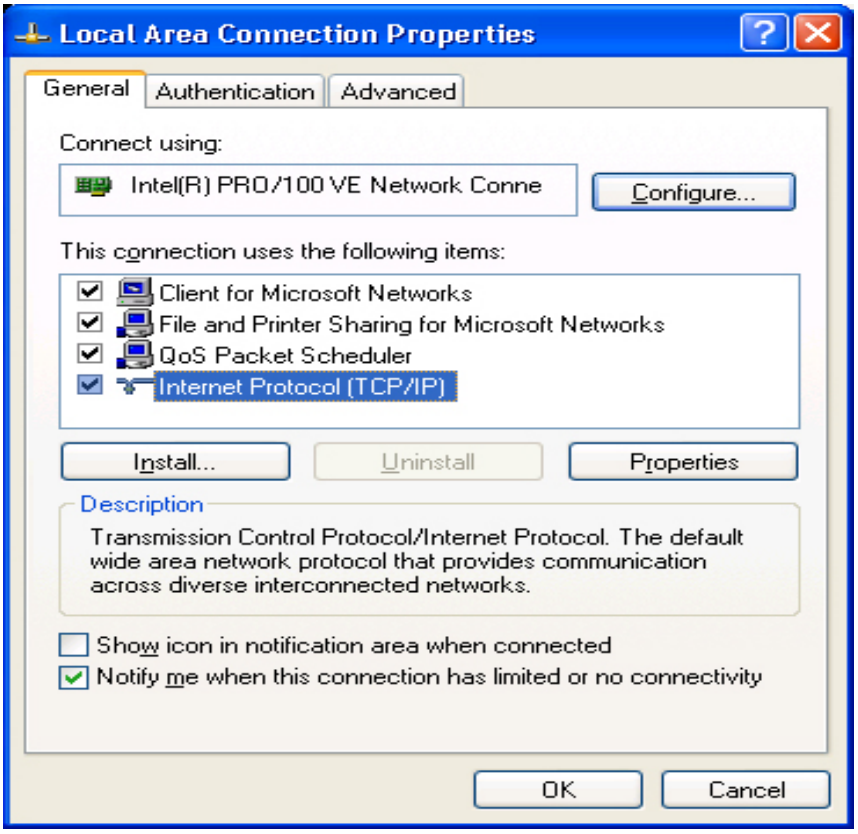
1. Set the communication module.
   Select [System] - [Controller] - [Startup setting] and then [Communication] and select [Remote Operation: ON].



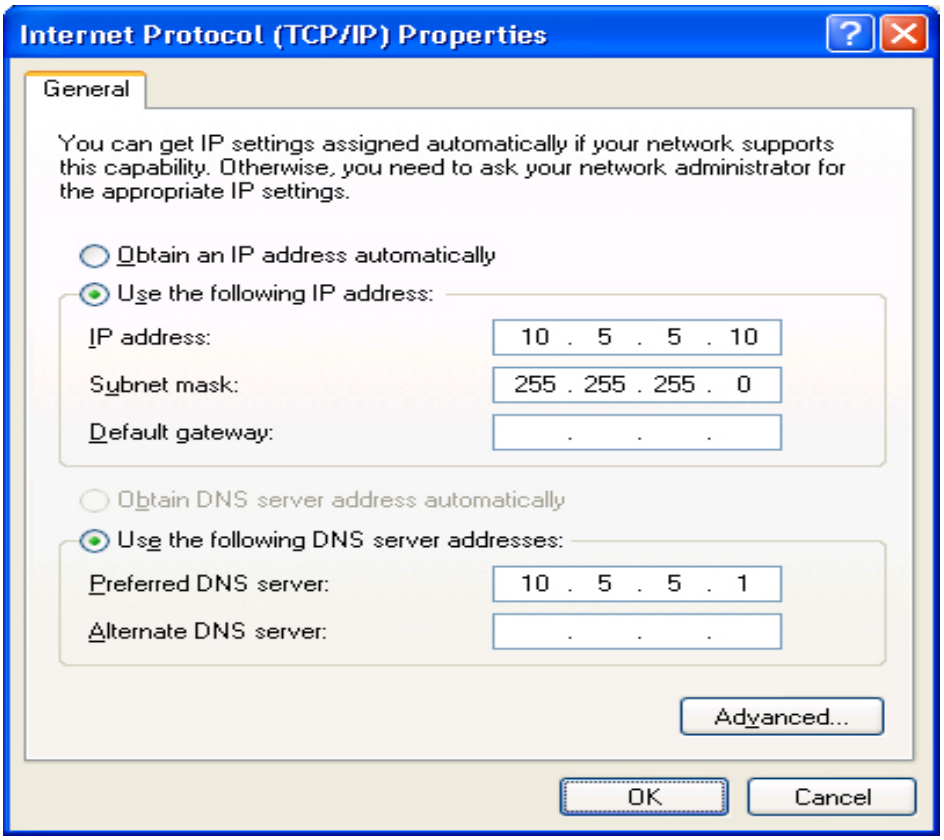
2. Click [Data save], and restart when the settings have been saved.
3. Set the IP address.
   Select System - Communication - Ethernet, and specify the IP address.



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.



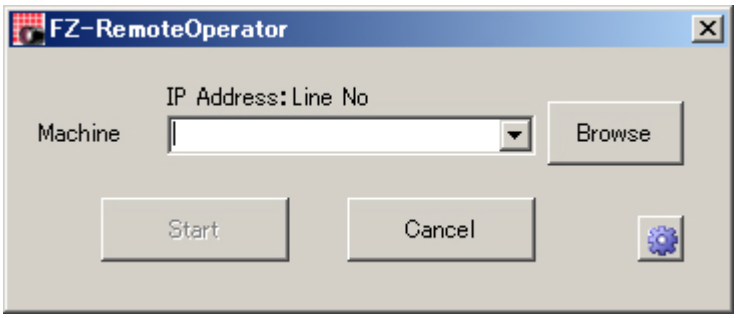
How to Start

1. From the Start button located in the lower left area of the window of the remote operation PC, select [Start] - [All Programs] - [OMRON] - [FZ4 Simulator] and then select and launch [FZ Remote Operation Tool].
Note that a window that can be measured must be displayed on the controller.

Important

- Do not connect or disconnect [FZ Remote Operation Tool] when a measurement is being performed or the system is running.

2. In the dialog box displayed by [FZ-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.

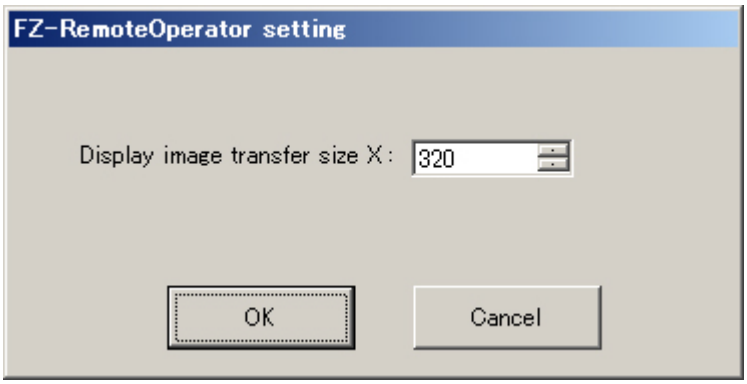


* The "Line No" selected here is one of the following based on the system's operation mode.

Operation mode		Setting
High-speed logging mode		Line No = 0
Parallel-operation high-speed mode		Line No = 0
Single-line High-speed mode		Line No = 0
Non-stop adjustment	Measurement window	Line No = 0
	Non-stop adjustment window	Line No = 1
Multi-line random trigger	Line 0 side	Line No = 0
	Line 1 side	Line No = 1

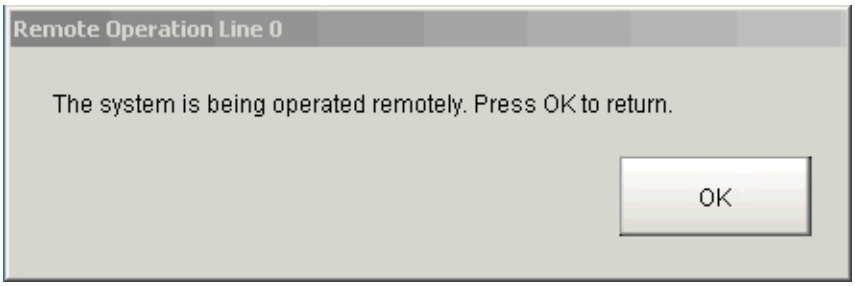
The controller cannot be connected if a line number other than above is specified.

3. As necessary, change the size of the image to transfer for the remote operation. Select ( ) to set.

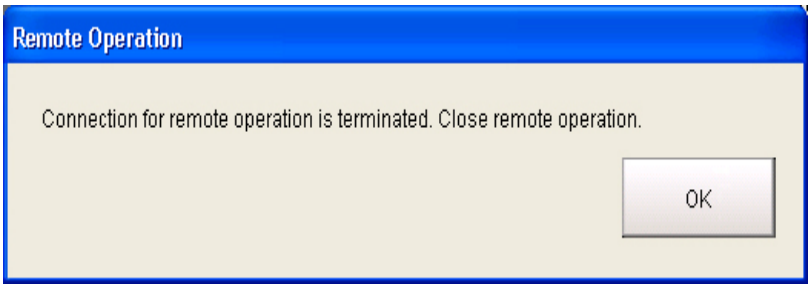


Description	Setting value [Factory default]	Description
Display image transfer size (Size of the image to transfer)	4 to 640 [320]	This sets the size of the image to display on the remote operation screen.

4. Press the [Start] button. Once a remote operation is established, the remotely operated window is displayed on the controller.



Press the OK button on this window to terminate the remote operation from the controller.
The window on which the remote operation is disconnected is displayed on the remote operation PC.



Differences from Local Operation and Limitation

There is no fundamental difference between local operation on the controller and a remote operation. The remote operation PC windows, however, are not the windows of the controller themselves, and thus, the following types of operational differences can be caused.
Major differences are listed as follows:

Functions to be noted	Description	
	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 modes, except for the single-line high-speed mode, can be executed.
Data file reference	Directly reference the controller folder.	Reference the controller folder on the network drive.
Screen capture	The controller windows can be captured.	The controller windows are captured (not the remote PC windows).
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.

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 [CTL+TAB] to switch between the windows.
- If there is an error during a remote operation (for example, a camera connection error), the error dialog box is displayed, not on the remote PC, but on the controller.
- The remote operation communication will be disconnected if a network setting (such as the IP address, subnet mask, and default gateway) on the controller is modified using the remote operation function. Restart FZ 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/Loading Data

This chapter explains the methods for saving and loading settings and image data.

- Reference: Basic Knowledge about Data Saving (p.330)
- Reference: Saving Settings Data to Controller Memory (p.332)
- Reference: Saving Settings Data to RAMDisk/USB Device (p.334)
- Reference: Saving Logging Images to RAMDisk/USB Device (p.336)
- Reference: Copying/Moving Files (p.338)
- Reference: Loading Settings Data to Controller (p.340)

Basic Knowledge about Data Saving

This section explains methods for saving and loading settings data and image data.

About Saving Areas

The following saving areas can be used with this device.

Saving area		Description
Controller	Flash memory	Settings data is saved in this area.Data is held even after the power is turned off.
	On-board memory	This is the area where images are temporarily stored when logging images using the logging function. This memory is a ring memory, and images will be overwritten starting with the oldest image if the maximum number of save images is exceeded.
	RAM disk	Can be used as a temporary file save destination.Data is cleared if the controller power is turned off. The RAMDisk data can be sent to or received from external devices using the FTP function.
USB memory		Used to back up settings data as a precaution, to copy settings data to another controller, and to load data to a PC.To keep data, save to the USB memory before turning off power to the controller.

Important

During data transfer, do not turn off the power.

- 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. Data will be corrupted and the system will not work properly at the next startup.
- Do not remove USB memory devices during saving or loading.Operation of the controller may damage data or the USB memory.
- Do not change the extension of saved files. If changed, the file cannot be loaded as the 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 USB memory capacity.If saving fails and the error message "Please check." appears, check to see if there is unnecessary data in the USB memory and save after this data has been deleted.

About USB Drive Names

A controller is equipped with 4 USB interfaces. If multiple USB memory devices are plugged in, specify the USB memory drive that is to be the destination.
The drive names of USB memory devices are called 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 memory device inserted, drive names *1 will be assigned based on the ports in which the USB memory devices are inserted. Depending on the controller type, USB memory devices are recognized and drive name will be assigned using the following sequence.
*1: In the case of FZ4-11 ☐☐ /H11 ☐☐ , USB drives are assigned as drives E: \ , F: \ , G: \ and H: \ in the order in which they are plugged.

- Integrated panel type
  1: Left side of the front - 2: Right side of the front - 3: Front of the side face - 4: Back of the side face

- BOX type
  1: Lower left of the front - 2: Lower right of the front - 3: Upper left of the front - 4: Upper right of the front

Important

When the BOX type controller is used

- If USB memory devices are separately connected to adjacent USB interfaces, the contact between USB memory devices may possibly lead to failure or damage.

Saving Settings Data to Controller Memory

Saves system data and scene group data on the controller's flash memory. Make sure to save settings data when settings have been changed.

Important

- If "Save to file" is performed for system + scene group 0 data, the data being saved will also be saved to the controller flash memory at the same time. Do not turn off the power during processing. The controller may not start up properly the next time it is turned on.
- During data transfer to USB memory, do not remove the USB memory device until transfer is completed. Data and/or the USB memory may corrupt.

Note

- When using scene groups 1 to 31, only system data can be saved in the controller flash memory. Note, however, that if a USB memory device is plugged in, scene group data can be saved to the USB memory. (For FZ4-11 ☐☐ /H11 ☐☐ , all data are saved in the controller.)

When Using Scene Group 0

1. On the Main screen, tap [Data save] in the toolbar.

A confirmation message is displayed.

Note

- The same operation is available by tapping [Data] menu - [Data save].

2. Tap [Yes].
System data and scene group data are saved on the controller's flash memory.

When Using Scene Groups 1 to 31

1. Plug a USB memory device into the controller.
2. On the Main screen, tap [Data save] in the toolbar.

A confirmation message is displayed.

3. Tap [Yes].
System data is saved to the controller's flash memory and scene group data is saved to the USB memory, respectively.

The data from scene groups 1 to 31 is saved to the USBDisk. (For FZ4-11 ☐☐ /H11 ☐☐ , all data are saved in the controller.)
When multiple USB memories are connected to the controller, check in the file explorer window,

etc. that the USB memory where scene group data is to be saved is recognized as the USBDisk.
Reference: About USB Drive Names (p.330)

Note

- If a USB memory device is not plugged in, a check message is displayed.
  If [OK] is tapped, only system data is saved in the controller flash memory.

Saving Settings Data to RAMDisk/USB Device

Saves the setting data file to the RAM Disk or USB memory. The data that can be saved is as follows.

Data	Description
System data (*.ini)	Settings data, such as the [System] menu settings contents, which is shared within the controller
Scene data (*.scn)	Data for each scene. Sequence of units set in each scene and setting values of units within scenes.
Scene group data (*.sgp)	The data of scene group with 32 scenes.
System + Scene group 0 data (*.bkd)	Data combining the system data and the data from Scene Group 0.

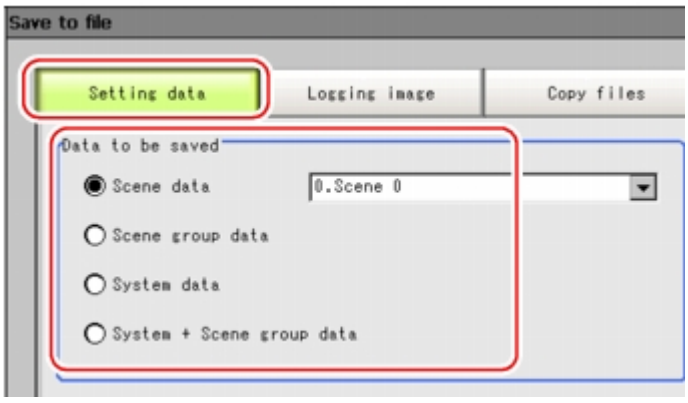
Important

- During saving, do not restart, turn off power or remove the USB memory.Data will be corrupted and the system will not work properly at the next start-up. It is especially necessary to pay attention when "Save to file" is being performed for system + scene group 0 data, as the data being saved will also be saved to the controller flash memory at the same time.

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. When saving to USB memory, plug a USB memory device into the controller.
2. On the Main screen, tap [Data] - [Save to file].
   The Save to File window is displayed.
3. Tap [Setting data] and select the data to save.



4. When scene data is selected, tap [▼] to select the scene number that is to be the save target.

5. Specify the save destination folder and file name.

6. Tap [OK].

The window showing transfer status is displayed, and the data is sent to the save destination.

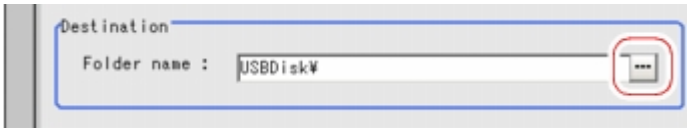
Saving Logging Images to RAMDisk/USB Device

Logged image data in the controller memory is saved to RAMDisk or USB memory.
Reference: About Saving Areas (p.330)

1. When saving to USB memory, plug a USB memory device into the controller.
2. On the Main screen, tap [Data] - [Save to file].
   The Save to File window is displayed.
3. Tap [Logging image] and select the file to save.

Setting item	Setting value [Factory default]	Description
Data to be saved	[All logging image]	Saves all the logging images.
	Select image	Saves the selected logging image. Tap [▼] and select the image to save. When [Latest measurement - logging image] is selected, the save file name will be LoggingImage000.ifz.

4. Specify the save destination folder.



5. Tap [OK].

The window showing transfer status is displayed, and the data is sent to the save destination.

How to Use USB Memory (FZ4-11 □□ /H11 □□ only)

The drive information of the controller can be checked.

1. On the Main screen, tap [Other] menu - [System information].
   The system information is displayed.
2. Information of each drive is displayed in the [Memory state] dialog box.
   If a USB memory is inserted, the [Eject] button is displayed.

3. To remove the USB memory, tap the [Eject] button.
   When the USB memory can be removed

   If the removal failed, wait until the USB is no longer accessed and then try removing the USB again.

Important

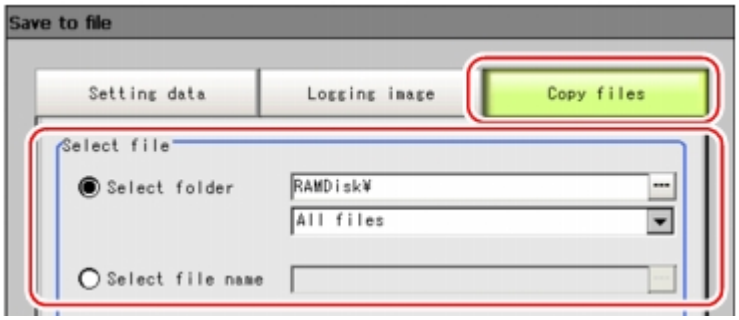
- Absolutely do not remove the USB memory while the USB memory is being accessed as this can result in a serious malfunction.

Copying/Moving Files

Files can be copied or moved between the controller RAM Disk and USB memory.
Images and data saved on the RAM Disk are deleted if the power is turned off. If you wish to keep these images and data, copy or move them to the USB memory. The types of files that can be copied/moved are as follows:

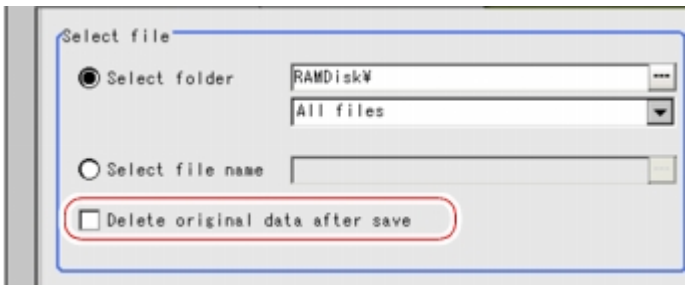
- Settings data (scene data, scene group data, system data)
- Logging Image
- Logging data

1. Plug a USB memory device into the controller.
2. On the Main screen, tap [Data] - [Save to file].
   The Save to File window is displayed.
3. Tap [Copy files] and select the file or folder to copy or move.



Setting item	Setting value [Factory default]	Description
Select file	[Select folder]	Copies or moves multiple files in a folder. ・ Tap [...] and specify the source folder to copy/move. ・ Tap [▼] and select the file format. If [All files] is selected, you can copy or move all files in the folder. When any of the file formats is selected, you can specify the type of files (extension) in the folder to copy or move.
	Select file name	Copies or moves the selected file. Tap [...] and specify a file name.

4. If you wish to delete the source file after saving a copy to USB memory, check "Delete original data after save".



5. Tap [OK].

The window showing transfer status is displayed, and the data is sent to the save destination.

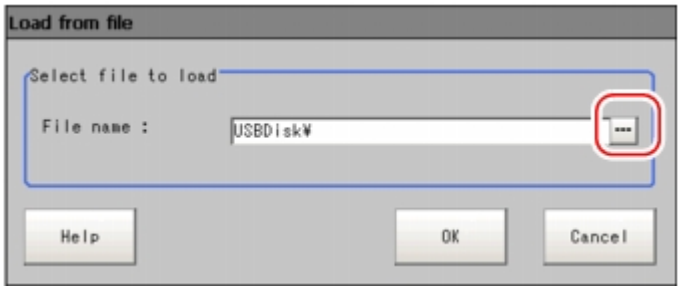
Loading Settings Data to Controller

Loads the settings data saved in an external device to the controller. The scene name and scene group name that have been loaded are displayed in the measurement information display area.

Note

- If "Load from file" is performed for system + scene group 0 data, the data being loaded will also be saved to the controller flash memory at the same time.During loading, do not restart, turn off power or remove the USB memory. Data will be corrupted and the system will not work properly at the next startup.
- Be sure to restart the controller immediately after reading the system + scene group data.

1. Perform either of the following.
   - Plug the USB memory device which has the load data stored in it into the controller.
   - Send setting data to the controller's RAM Disk via FTP.
2. On the Main screen, tap the [Data] menu - [Load from file].
   The Load from File window is displayed.
3. Select the file to load.



4. Tap [OK].

The window showing the transfer status is displayed, and the data is transferred.

Changing the System Environment

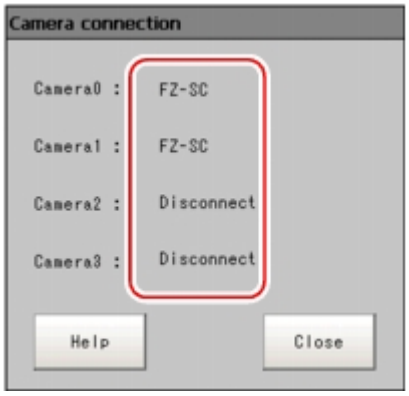
This chapter describes settings related to the controller system environment.

- Reference: Setting Conditions for Camera Use (p.342)
- Reference: Setting Conditions Related to Operation during Measurement (p.344)
- Reference: Setting the System Operation Environment (p.345)

Checking Camera Connections [Camera Connection]

Verify whether or not cameras are connected.This section includes no special settings.

1. On the Main screen, tap the [System] menu - [Camera] - [Camera connection].
   The Camera Connection window is displayed.
2. Verify the connection status.



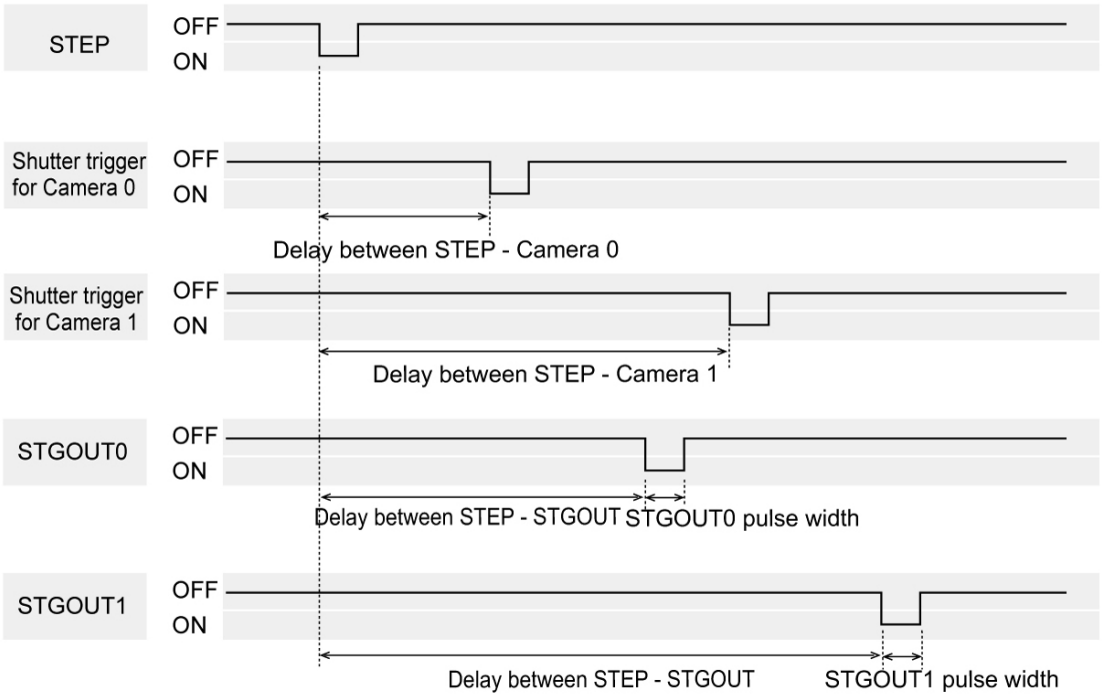
3. Tap [Close].

Setting Trigger Delay [Inter-camera Setting]

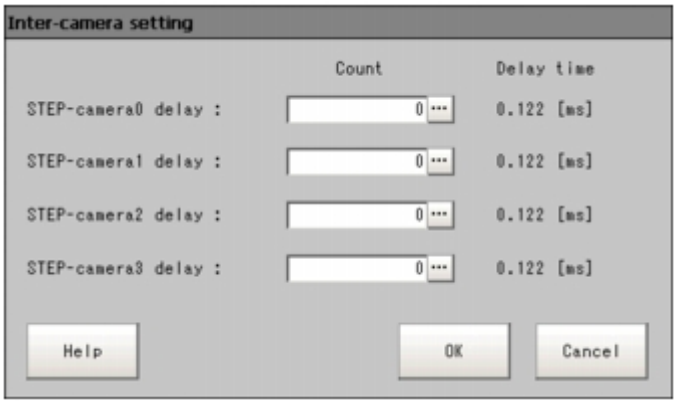
This creates settings for the delay from when the input trigger STEP signal is received to until the shutter trigger occurs.When multiple cameras are used, this prevents mutual lighting interference and can be used as a simple trigger delay when only one camera is used.

Note

- The STGOUT pulse width is set in "Electronic flash setting" of the [Camera Image Input] processing item.
  Reference: ▶ "Processing Item List Manual", "Electronic Flash Setting" (p.24)



1. On the Main screen, tap the [System] menu - [Camera] - [Inter-camera setting].
   The Inter-camera Setting window is displayed.
2. Tap [...] of each item and set values.



Item	Set value [Factory default]	Description
STEP - Camera 0 delay	[0] to 511 (1 count/30 µs) Max. 15 ms	Set delay between receiving the STEP signal and the beginning of camera exposure. Delay time = count x 30 µs + 122 µs
STEP - Camera 1 delay		
STEP - Camera 2 delay		
STEP - Camera 3 delay		

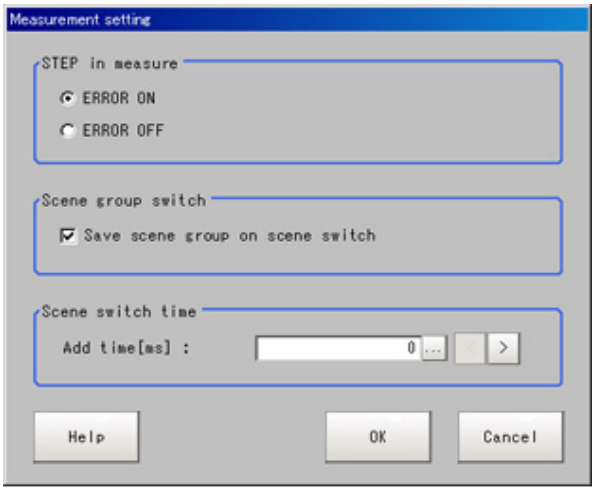
3. Tap [OK].
   The settings are confirmed and the Inter-camera Setting window closes.

Setting Conditions Related to Operation during Measurement

With operation during measurement, the following items can be changed.

- Operation when the next STEP signal is input during measurement
- Saving of scene groups during scene group switching

1. On the Main screen, tap the [Measure] menu - [Measure setting].
   The Measurement Setting window is displayed.
2. Set each item as required.
   When they are not displayed, create settings through the [System] menu - [Controller] - [Create shortcut].



Item	Set value [Factory default]	Description
STEP in measure	・ [ERROR ON] ・ ERROR OFF	Sets whether the ERROR signal output turns on when the following STEP signals are input during measurement.
Save scene group on scene switch	・ [Checked] ・ Unchecked	Sets operation when scene group switching is performed.Sets whether the scene group is saved when it is switched.The scene group switching time can be reduced if the check is removed, but if the power is turned off without saving when settings have been changed, the changed contents will be cleared.
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 external devices, the BUSY signal ON time can be added.This is set in 1 ms units.The displayed value can be changed in 5 ms increments by tapping "<" and ">".

Note

- The settings of "Save scene group on scene switch" are linked with the settings of the Switch Scene Group window.Settings specified later override the previous ones.
  Reference: ▶ Switching Scenes and Scene Groups (p.65)

3. Tap [OK].
   The display returns to the Main screen.

Setting the System Operation Environment

Sets the controller's operation environment. The following settings are available.

- Reference: Setting the Date and Time [Date-time Setting] (p.345)
- Reference: Selecting the Language [Language Setting] (p.345)
- Reference: Setting the Fan Rotation Speed [Fan Control Setting] (p.346)
- Reference: Setting the Start-up Status [Startup Setting] (p.347)
- Reference: Setting the RUN Window Display [RUN mode View Setting] (p.352)
- Reference: Setting the RUN Window Shortcut [Create Shortcut] (p.352)
- Reference: Setting the Encoder Trigger [Encoder Trigger Setting] (p.353)
- Reference: Setting the STEP Input Detection Pulse Width [STEP Setting] (p.355)
- Reference: Setting a Network Drive [Network Drive Setting] (p.356)

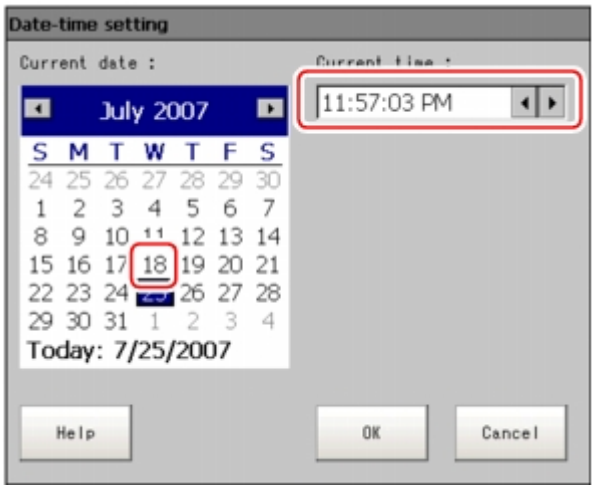
In addition, the controller model and measurement application version can be checked.

- Reference: Checking System Information [System Information] (p.358)

Setting the Date and Time [Date-time Setting]

Confirm that the date and time on the embedded calendar are correct, and make corrections if they are not.
The log data dates and times, etc. are set based on contents set here.

1. On the Main screen, tap the [System] menu - [Controller] - [Date-time setting].
   The Date-time Setting window is displayed.
2. Set the date and time.



   1. Tap the date that is to be set.
   2. Set the time.

3. Tap [OK].
   The Date-time Setting window closes.

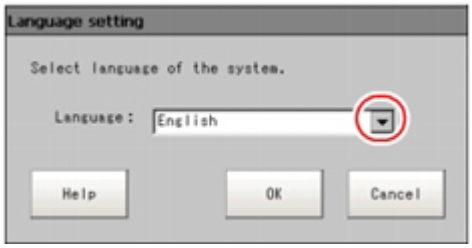
Selecting the Language [Language Setting]

Sets the language used for the characters displayed on the screen.Messages in the application software will be displayed in Japanese or English depending on the language selected here.

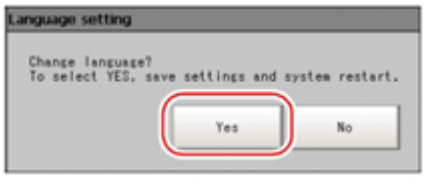
Note

- When a controller with default factory settings is started up, the Language Setting window is automatically displayed.
- The controller factory default setting is Japanese language display.If the language setting is changed to English, the system automatically restarts.

1. On the Main screen, tap the [System] menu - [Controller] - [Language setting].
   The Language Setting window is displayed.
2. Tap [▼] and select a language.



3. Tap [OK].
   A confirmation message is displayed.
4. Tap [Yes].



The setting is saved in the controller and the system automatically restarts.After the system restarts, the language switches to the selected one.

Note

- The Language Setting window is displayed also when restarting after executing "System initialization".

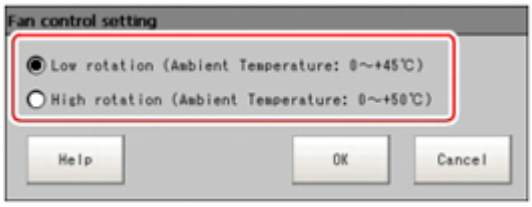
Setting the Fan Rotation Speed [Fan Control Setting]

Sets the rotation speed of the controller fan.
(FZ4-6□□ /H6□□ , FZ4-7□□ /H7□□ , FZ4-11□□ /H11□□ only)

Note

- The factory default setting is low rotation.Use fast rotation when using the system in a high-temperature environment between +45 and +50 ° C.

1. On the Main screen, tap the [System] menu- [Controller] - [Fan control setting].
   The Fan Control Setting window is displayed.
2. Select a fan setting.



Set value [Factory default]	Description
・ [Low rotation (Ambient temperature: 0 to +45 ° C)] ・ High rotation (Ambient temperature: 0 to +50 ° C)	Select a fan rotation speed.

3. Tap [OK].

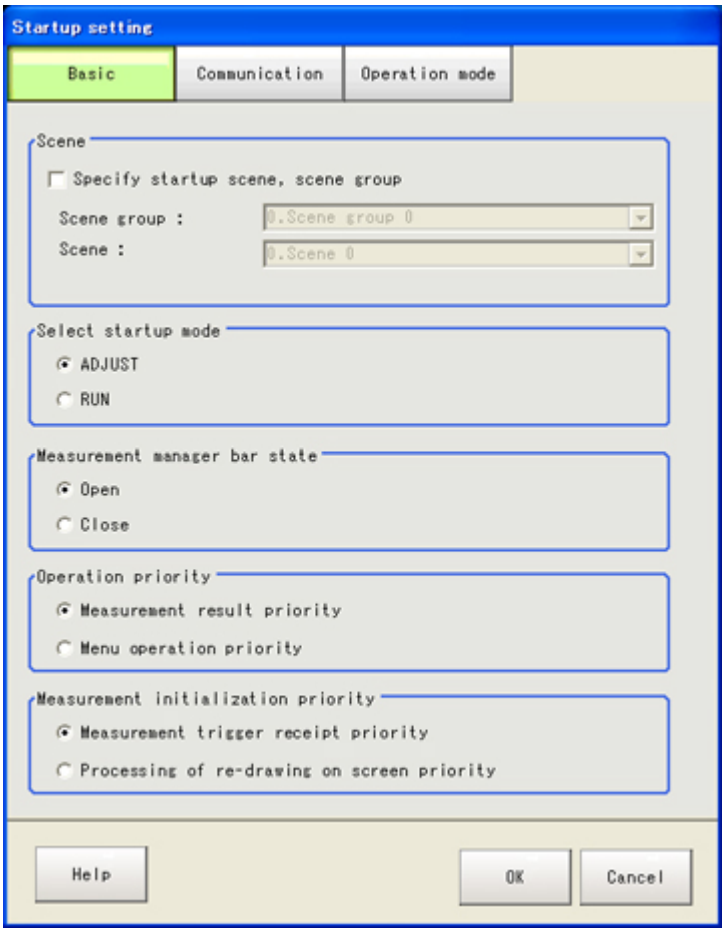
Important

- The fan control setting is disabled in the FZ4-L35 □ series.

Setting the Start-up Status [Startup Setting]

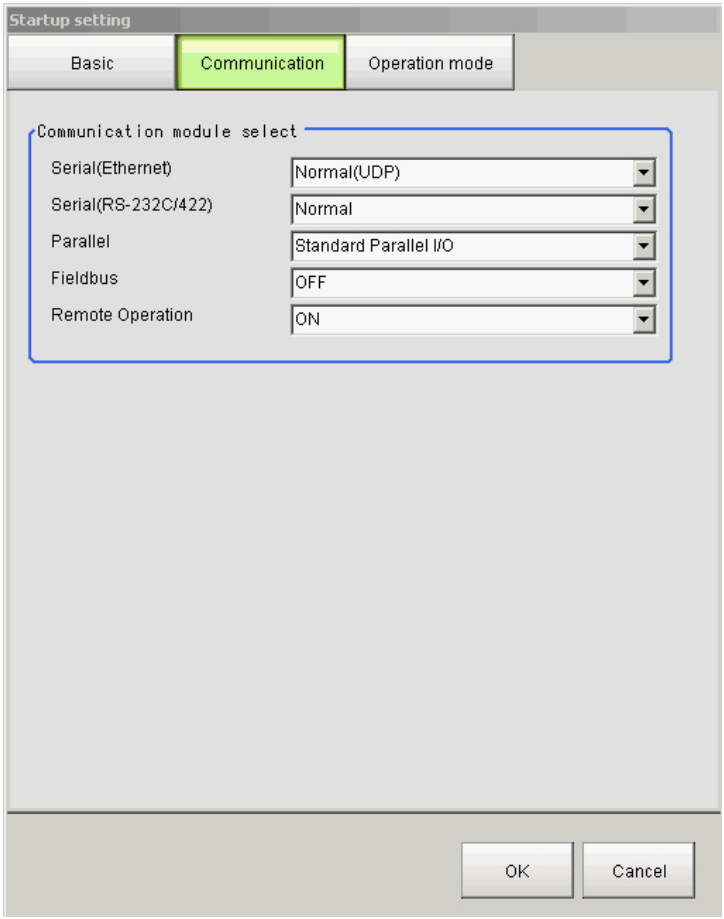
The status for when power is turned on is set here.
Inspection can be set to start immediately after the power is turned on by setting the scene number of the scene in which measurement contents are set.
In addition, settings can be done so that the Camera Setting window is not displayed during start-up.

1. On the Main screen, tap the [System] menu - [Controller] - [Startup setting].
   The Startup Setting window is displayed.
2. Change the settings.



Item		Setting value [Factory default]	Description
Scene			
	Specify startup scene, scene group	Checked	The selected scene/scene group will be the scene/ scene group during start-up.
		[Unchecked]	The scene/scene group set in the controller when "Data save" is executed will be the scene/scene group at start-up.
	Scene Group	Scene groups 0 to 31 [Scene group 0]	Selects the scene group displayed during start-up.
	Scene	Scenes 0 to 31 [Scene 0]	Selects the scene displayed during start-up.
Select startup mode		・ [ADJUST] ・ RUN	Selects whether the ADJUST window or RUN window is displayed during start-up.
Measurement manager bar state		・ [Open] ・ Close	Selects whether to display the measurement manager bar during start-up.
Operation priority			Specifies whether measurement results display or menu operation is to have priority.
		[Measurement result priority]	Measurement results display processing is prioritized. Menu operation will be harder to receive due to its lowered priority status.
		Menu operation priority	Menu operation is prioritized. Measurement results display may be incomplete.
Measurement initialization priority			Measurement initialization is performed immediately after scene switching or flow editing. Whether measurement trigger reception or screen re-drawing processing has priority during measurement initialization can be specified.
		[Measurement trigger receipt priority]	Measurement trigger reception is prioritized even during measurement initialization processing. Display for screen re-drawing processing may be incomplete due to its lowered priority status.
		Processing of re-drawing on screen priority	Screen re-drawing processing is prioritized. Measurement triggers will not be received until screen re-drawing processing is complete.

Communication



Item	Setting value [Factory default]	Description
Serial (Ethernet)	・ [Normal(UDP)] ・ Normal(TCP) ・ Normal(TCP Client) ・ Normal(UDP) (Fxxx series method) ・ PLC Link (SYSMAC CS/CJ/CP/One) ・ PLC Link (MELSEC QnU/Q/QnAS) ・ PLC Link (JEPMC MP)	Specifies the communication module. Serial/Ethernet Normal/Normal (Fxxx series method): Communication is performed with external devices through Normal communication. For differences between Normal and Normal (Fxxx series method), see the following Reference. PLC Link: Communication is performed via a link area with the PLC. Parallel Standard Parallel I/O: Communication is performed via a standard parallel interface. Fieldbus: Communication is performed via EtherCAT communication and EtherNet/IP. EtherCAT is valid only when FZM1 controller is used. Remote operation: The controller is operated from an external device.
Serial (RS-232C/ RS-422)	・ [Normal] ・ Normal (Fxxx series method) ・ PLC Link (SYSMAC CS/CJ/CP/One) ・ PLC Link (MELSEC QnU/Q/QnAS)	
Parallel	[Standard Parallel I/O]	Specifies the communication module. Serial/Ethernet Normal/Normal (Fxxx series method): Communication is performed with external devices through Normal communication. For differences between Normal and Normal (Fxxx series method), see the following Reference. PLC Link: Communication is performed via a link area with the PLC. Parallel Standard Parallel I/O: Communication is performed via a standard parallel interface. Fieldbus: Communication is performed via EtherCAT communication and EtherNet/IP. EtherCAT is valid only when FZM1 controller is used. Remote operation: The controller is operated from an external device.
Fildbus	・ [OFF] ・ EtherCAT ・ EtherNet/IP	
Remote Operation	・ [ON] ・ OFF	

Important

- Do not set EtherNet/IP and PLC link at the same time. They cannot be used at the same time.
  Example)
  SetSerial (Ethernet): PLC link and Fieldbus: EtherNet/IP at the same time.
  Set Serial (RS-232C/422): PLC link and Fieldbus: EtherNet/IP at the same time.
  Set PLC link and Fieldbus: EtherNet/IP at the same time to both serial (Ethernet) and serial (RS-232C/422).
- Do not set PLC link to both serial (Ethernet) and serial (RS-232C/422). They cannot be used at the same time.

Operation mode (FZ4-11 □ □ /FZ4-H11 □ □ only)

Item	Setting value [Factory default]	Description
Operation mode	・ Parallel-operation high-speed mode ・ Single-line High-speed mode ・ High-speed logging mode ・ Multi-line random-trigger mode ・ Non-stop adjustment mode	Sets the operation mode. Reference: ▶ Setting Operation Mode (p.30)

3. Tap [OK].

Settings are confirmed and the Startup Setting window closes.

Reference

- About Normal (Fxxx series method)

With the Normal (Fxxx series method) communication method, the OK response timing in relation to MEASURE commands is different from that of the Normal communication method.

Normal (Fxxx series method) communication method	Normal communication method
MEASURE Measurement result OK	MEASURE OK Measurement result

- About OK Response

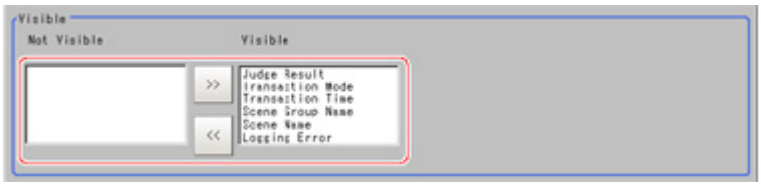
With the Normal communication method, OK response is returned when the controller accepted a command.

With Normal (Fxxx series method), OK response is returned when the command execution is completed.

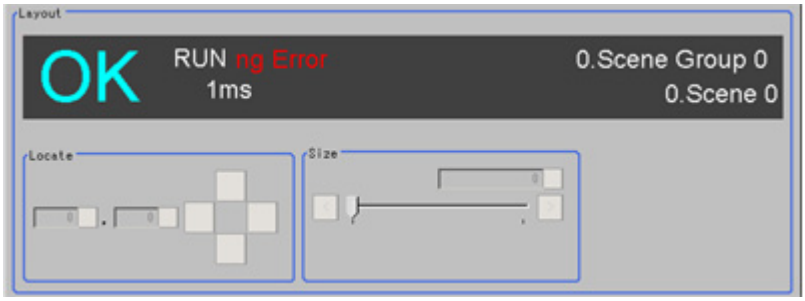
Setting the RUN Window Display [RUN mode View Setting]

The layout of display contents and size of characters can be set.

1. On the Main screen, tap the [System] menu - [Controller] - [RUN mode view setting].
   The current RUN window mode is displayed.To change the mode, specify the mode in System/ Controller/Select RUN mode .
2. Set items to be displayed.



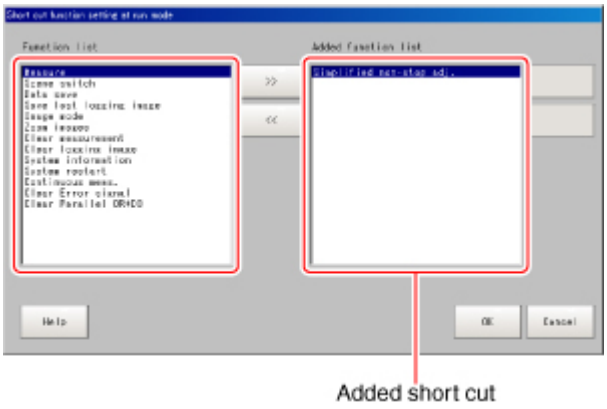
3. Set the layout as required.



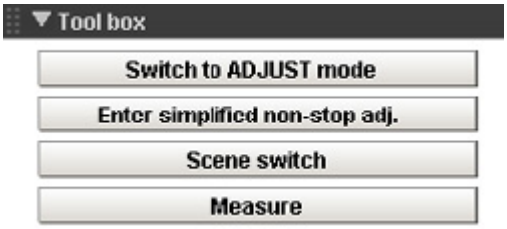
Setting the RUN Window Shortcut [Create Shortcut]

The short cut button can be added to the RUN window.The button is added to the tool box.

1. On the Main screen, tap the [System] menu - [Controller] - [Create shortcut].
2. Set the functions to be added.



3. Set the sequence as required.
   Short cuts are added in the sequence set here.

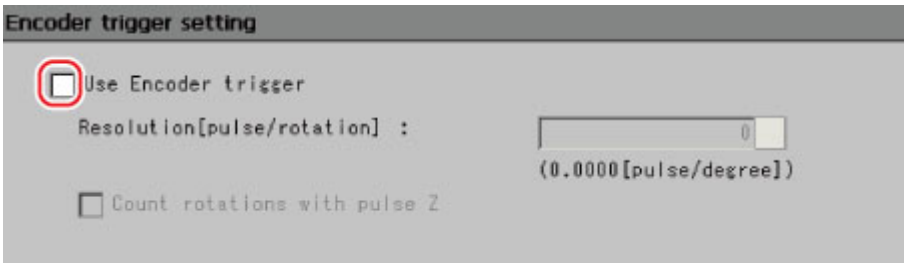


Note

- Some of these short cuts have functions, such as scene switching, which affect measurement.A password protection function can be added in order to restrict use.
  Reference: Setting User Group Operation Restrictions (p.141)

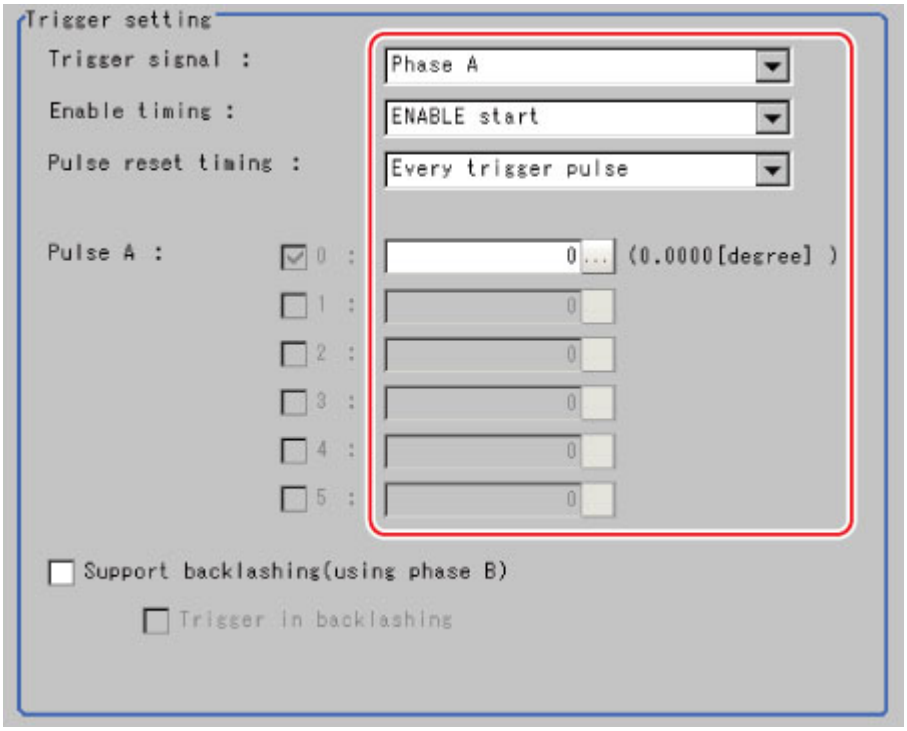
Setting the Encoder Trigger [Encoder Trigger Setting]

1. On the Main screen, tap the [System] menu - [Controller] - [Encoder trigger setting].
2. Set the target encoder.



Setting item	Set value [Factory default]	Description
Use Encoder trigger	・ Checked ・ [Unchecked]	Sets whether the encoder trigger will be used. The maximum input frequency of the encoder trigger is 20 kHz.
Resolution	[1] to 65535	Sets how many pulses equal one rotation. Please set according to the resolution of the encoder.
Count rotations with pulse Z	・ Checked ・ [Unchecked]	When on, judges whether it made a full rotation with pulse Z. When off, judges whether it made a full rotation based on whether phase A pulse input reaches phase A resolution.

3. Set the trigger detailed settings as required.



Setting item		Set value [Factory default]	Description
Trigger signal		・ [Phase A] ・ Phase Z	Sets the phase to be used as the trigger signal.
When phase A			
	Enable timing	・ [ENABLE start] ・ STEP start	Sets the timing for starting the pulse count. ENABLE start: Counts the pulses input during the measurement trigger receipt period. STEP start: Does not count pulses even during the measurement trigger receipt period until the STEP signal is input.
	Pulse reset timing	・ [Every trigger pulse] ・ Every rotation (Pulse Z)	Sets the timing for resetting. When it is every rotation, multiple settings for phase A are possible.
	Pulse A	[0] to 65536	Sets how many pulses it takes for the trigger to be produced.
	Support backlashing	・ [Checked] ・ Unchecked	Sets whether the rotation direction is detected.
	Trigger in backlashing	・ Checked ・ [Unchecked]	Sets whether a trigger is produced during reverse rotation.
When phase Z			

	Enable timing	・ [ENABLE start] ・ STEP start	Sets the timing for starting the pulse count. ENABLE start: Counts the pulses input during the measurement trigger receipt period. STEP start: Does not count pulses even during the measurement trigger receipt period until the STEP signal is input.
	Pulse reset timing	・ [Every trigger pulse]	Sets the timing for resetting.
	Pulse Z	[0] to 1023	Sets how many pulses it takes for the trigger to be produced.

Important

・ The encoder trigger setting is disabled in the FZ4-L35 □ series.

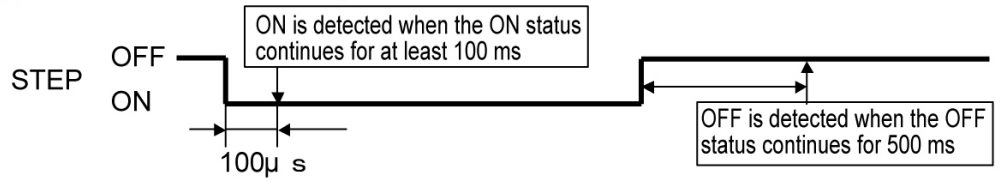
Setting the STEP Input Detection Pulse Width [STEP Setting]

This setting is performed as a countermeasure against STEP input chattering and to prevent operation malfunctions due to entrance of noise.

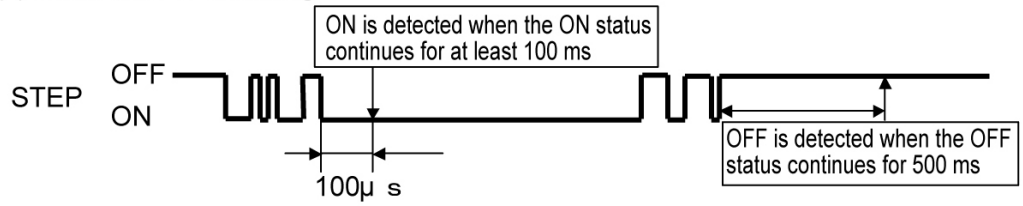
When Filter Setting Value Is 100 µs (Initial Value)

The STEP signal is detected as being on at the point it is on continuously for at least 100 µs, and measurement begins at this 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 µs is activated and the STEP signal is detected as OFF when it is off for at least 500 µs.

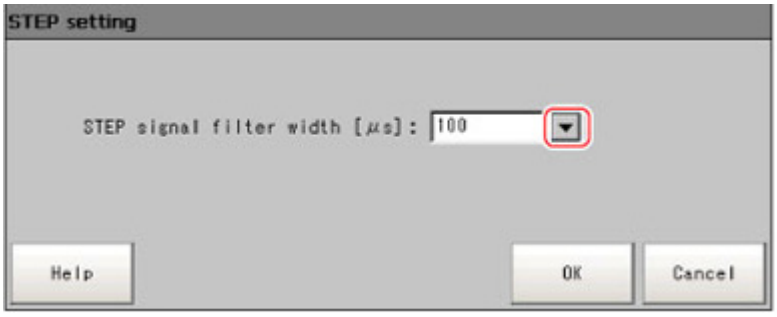
(1) When there is no chattering



(2) When there is chattering



1. On the Main screen, tap the [System] menu - [Controller] - [STEP setting].
2. Set the filter width in the "STEP setting" area.

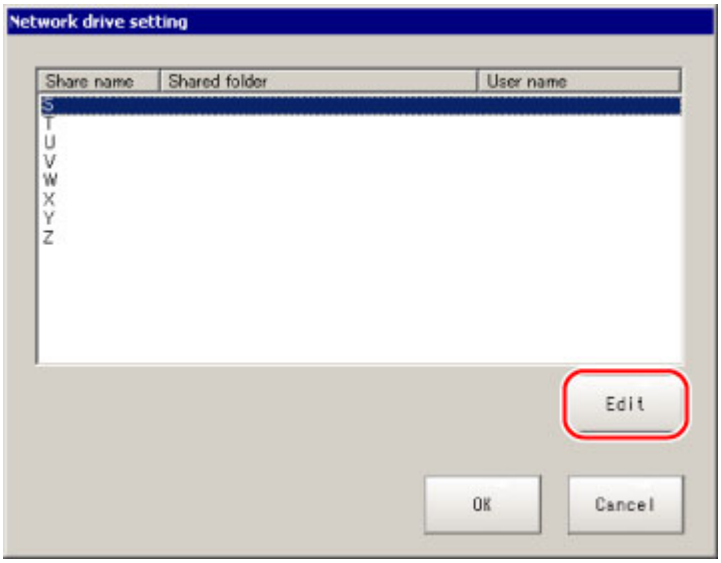


Setting item	Set value [Factory default]	Description
STEP signal filter width [µs]	・ [100] ・ 200 ・ 300 ・ 400 ・ 500	Sets the filter width.

Setting a Network Drive [Network Drive Setting]

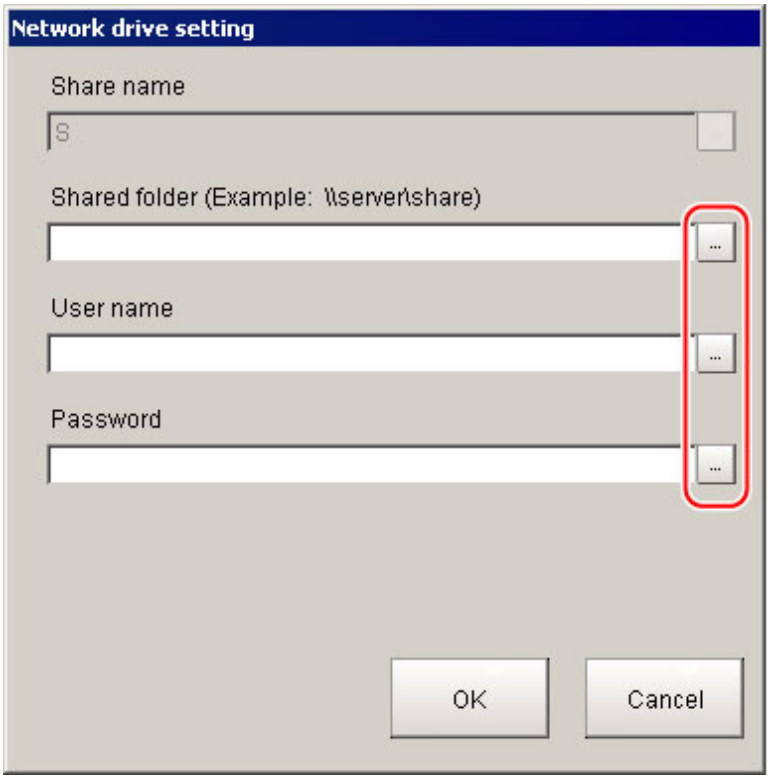
Set a network drive.
Register the shared folder on a network drive with a shared name. The network drive connected to the Select File/Folder window of the FZ software will be displayed.

1. On the Main screen, tap the [System] menu- [Controller] - [Network drive setting].
2. Select the shared name to be registered, and tap [Edit].



3. Enter the information to be allocated to the network drive (shared name), such as the shared

folder, user name and password.



Setting item	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 FZ4-L35 □ /FZ4-6 □ □ /FZ4-7 □ □ , the shared name is displayed in the \Network folder. For FZ4-11 □ □ /FZ4-H11 □ □ , the drive letters, such as E:, F:, G:, and H:, are displayed.
Shared folder	-	Specify the shared folder name. Specify the name of the folder that has been created in advance on the network drive. For example, if the host name is VISION and the shared name is COMMON, specify a name such as \\VISION\COMMON.
User name	-	Enter the user name and the password to access the network drive. If you are unclear about the user name or the password, contact the device network administrator.
Password	-	

4. Tap [OK].
5. Tap [OK] on the network drive setting screen, and close the screen.

The setting is enabled after the controller is restarted.

Important

- When image logging or data logging is executed for a network drive, the communication may be disrupted and the logging process may not be executed successfully due to the controller measurement load that becomes too heavy when the multiple image input function is used. In this case, set a reasonable amount of measurement takt time.
- 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. A connection 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 of the connection target. Make sure that the setting on the connection target is not set to automatic disconnection.
- Date and time of the update of the file 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's.

Checking System Information [System Information]

The controller model and measurement application version can be checked.
You can check the USB memory status with FZ4-11□□ /H11□□ series only.
Reference: How to Use USB Memory (p.337)

1. On the Main screen, tap [Other] menu - [System information].
   The System Information window is displayed.
2. Check the information.
   The controller model and measurement application version can be checked.

3. Tap [Memory state].
   The following information can be checked.
   - Available application memory
     The application memory is the memory used by all applications.
     By confirming available memory, this provides a rough standard for confirming status while operating.
   - Available data memory (FZ4-L35□ / FZ4-6□□ /FZ4-H6□□ /FZ4-7□□ /FZ4-H7□□ only)
     The data memory is the amount of memory that can be used for scene group data. Check the available memory that can be used for unit data and settings data for each unit.
4. Tap [Close].
   The System Information window closes.

Methods for Connecting and Communicating with External Devices

This chapter describes communication with external devices such as PCs and programmable controllers, etc.

- Reference: About Connecting with External Devices (p.360)
- Reference: Communicating through Serial Communication (PLC Link) (p.363)
- Reference: Controlling/Outputting through Serial Communication (Non-procedure) (p.435)
- Reference: Control/Output through EtherNet/IP (p.522)
- Reference: Controlling/Outputting through Parallel Communication (p.540)
- Reference: Externally Outputting Data through FTP (p.561)

About Connecting with External Devices

With the FZ4, serial interfaces and parallel interfaces can be used to communicate with external devices.
With serial interfaces, RS-232C/RS-422 and Ethernet can be selected as communication ports.
Non-procedure and PLC link can be used with either communication port.
Data transfer through EtherNet/IP (tag data link communication) or FTP is also possible with Ethernet.

Protocols usable with serial interface

The protocols that can be used with a serial interface are listed below.

Non-procedure	Controls the FZ4 through commands from a PC or specialized device. Also possible to control from the PLC.
PLC link	The FZ4 is controlled and measurement results are acquired only through data memory operations in the PLC. The FZ4 reads commands in the data memory (DM) and channel I/O (CIO) in the PLC, executes measurement, and writes execution results to the data memory. This is appropriate when the PLC is used as an external device. The PLC supported by the FZ4 PLC link protocol is the SYSMAC CS/CJ/CP/One series PLC from OMRON (models supporting FINS command) and PLC MELSEC Q series (protocol: MC protocol) from Mitsubishi Electric Corporation.

With a parallel interface, control such as measurement control, scene group switching, scene switching, clearing errors, clearing measurement values, clearing parallel terminals is possible.

Important

- PLC link function refers to a function that communicates using 3 link areas indicated below: the command area, response area and data output area.
  It is different from the serial PLC link protocol used to inter-connect PLCs serially.

Connectable Models

Ethernet

Series name	CPU	Interface	
		CPU built-in port	Ethernet unit
SYSMAC_CJ2	CJ2H	Yes	CJ1W-EIP21 (PLC link only),CJ1W-ETN21
SYSMAC_CJ1	CJ1H, CJ1G	-	CJ1W-EIP21 (PLC link only),CJ1W-ETN21
	CJ1M	*Built-in type only	CJ1W-EIP21 (PLC link only),CJ1W-ETN21
SYSMAC_CS1	CS1H,CS1D,CS1G	-	CS1W-EIP21 (PLC link only),CS1W-ETN21
SYSMAC_CP1	CP1L	-	CP1W-CIF41
	CP1H	-	CP1W-CIF41
SYSMAC_One	NSJ	*Built-in type only	NSJW-ETN21

EtherNet/IP (tag data link communication)

Series name	CPU	Interface	
		CPU built-in port	EtherNet/IP unit
SYSMAC NJ	NJ501,NJ301	Yes	CJ1W-EIP21
SYSMAC_CJ2	CJ2M,CJ2H	*Built-in type only	CJ1W-EIP21

SYSMAC_CJ1	CJ1H,CJ1G	-	CJ1W-EIP21
	CJ1M	*Built-in type only	CJ1W-EIP21
SYSMAC_CS1	CS1H,CS1D,CS1G	-	CS1W-EIP21

[Note]: When connecting to an EtherNet/IP Unit, the EDS file in which the FZ4 connection information has been defined needs to be installed on the tool (Network Configurator).

Serial

Series name	CPU	Interface	
		CPU built-in port	Serial communication unit
SYSMAC_CJ2	CJ2H	Yes	CJ1W-SCU21-V1, CJ1W-SCU31-V1, CJ1W-SCU41-V1
	CJ2M	*Built-in type only	
SYSMAC_CJ1	CJ1H, CJ1G, CJ1M	Yes	CJ1W-SCU21-V1, CJ1W-SCU31-V1, CJ1W-SCU41-V1
SYSMAC_CS1	CS1H,CS1D,CS1G	Yes	CS1W-SCBxx-V1, CS1W-SCU21-V1, CS1W-SCU31-V1
SYSMAC_CP1	CP1E,CP1L, CP1H	-	CP1W-CIF01
SYSMAC_One	NSJ	Yes	-

Mitsubishi Electric Corporation

Ethernet

Series name	Model name	CPU name	CPU	Interface	
				CPU built-in port	Ethernet/IP unit
MELSEC-QnU	Universal model	QnUDECPU	Q03UDECPU,Q04UDECPU Q06UDECPU,Q10UDECPU Q13UDECPU,Q20UDECPU Q26UDECPU	Yes	QJ71E71-100, Q71E71-B2, QJ71E71-B5
		QnUDCPU	Q03UDCPU,Q04UDCPU Q06UDCPU,Q10UDCPU Q13UDCPU,Q20UDCPU Q26UDCPU	-	
		QnUCPU	Q00UJCPU,Q00UCPU Q01UCPU,Q02UCPU	-	
	Basic model	QnCPU	Q00JCPU,Q00CPU Q01CPU	-	
MELSEC-Q series	High performance model	QCPU	Q02CPU,Q02HCPU Q06HCPU,Q12HCPU Q25HCPU	-	
MELSEC-QnAS series	-	-	Q2ASCPU,Q2ASCPU-S1 Q2ASHCPU,Q2ASHCPU-S1	-	

Serial

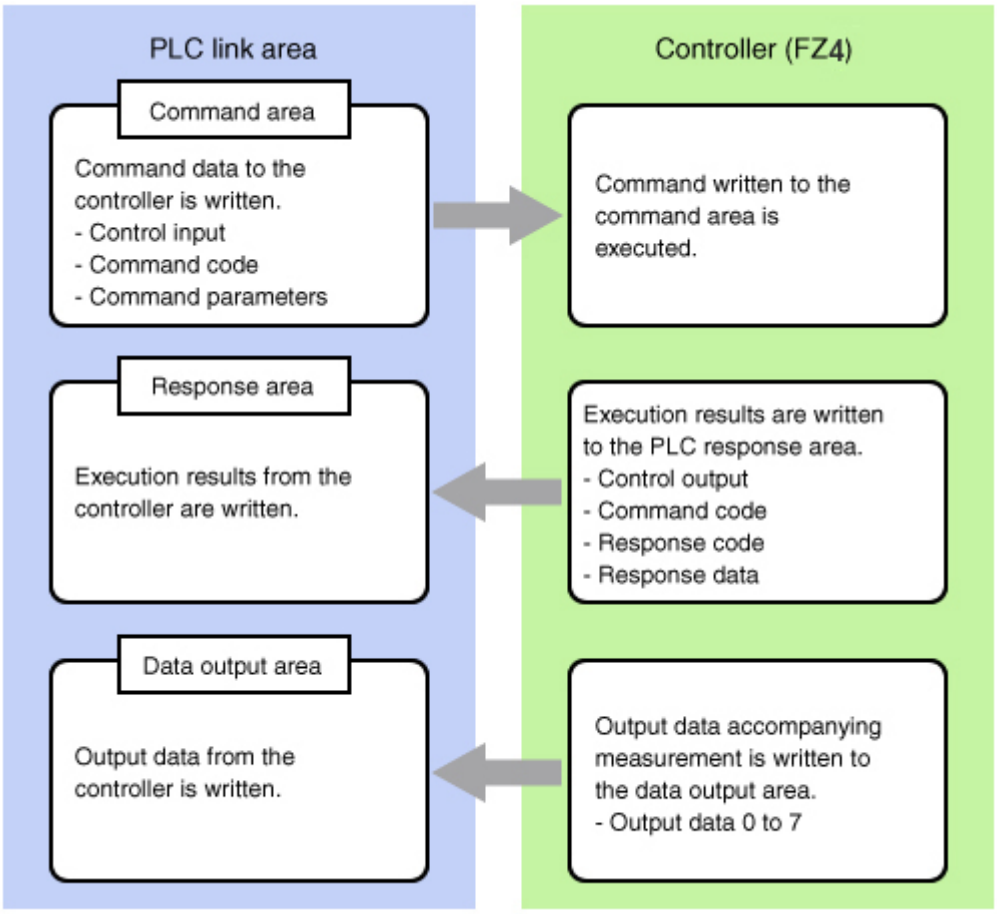
Series name	Model name	CPU name	CPU	Interface	
				CPU built-in port	Serial communication unit
MELSEC-QnU	Universal model	QnUDECPU	Q03UDECPU,Q04UDECPU Q06UDECPU,Q10UDECPU Q13UDECPU,Q20UDECPU Q26UDECPU	-	QJ71C24N, QJ71C24N-R2
		QnUDCPU	Q03UDCPU,Q04UDCPU Q06UDCPU,Q10UDCPU Q13UDCPU,Q20UDCPU Q26UDCPU	Yes	
		QnUCPU	Q00UJCPU,Q00UCPU Q01UCPU,Q02UCPU	Yes	
	Basic model	QnCPU	Q00JCPU,Q00CPU Q01CPU	Yes	
MELSEC-Q series	High performance model	QCPU	Q02CPU,Q02HCPU Q06HCPU,Q12HCPU Q25HCPU	-	
MELSEC-QnAS series	-	-	Q2ASCPU,Q2ASCPU-S1 Q2ASHCPU,Q2ASHCPU-S1	-	A1SJ71QC24N1, A1SJ71QC24N1-R2

Communicating through Serial Communication (PLC Link)

This section explains how to set the required communication specifications and the input format when using PLC Link to communicate with external devices.

Communication Processing Flow (PLC Link)

Communication between the PLC and FZ4 is performed using the 3 link areas indicated below: the command area, response area, and data area.
The command area is used when control commands are sent from the PLC to the FZ4.
The FZ4 can be controlled by writing commands to the command area.
In the response area, the execution results of control commands described in the command area are written.
The output data accompanying measurement is written to the data output area.



When using PLC Link, it is necessary to specify PLC Link with the communication module.
Reference: Setting the Start-up Status [Startup Setting] (p.347)

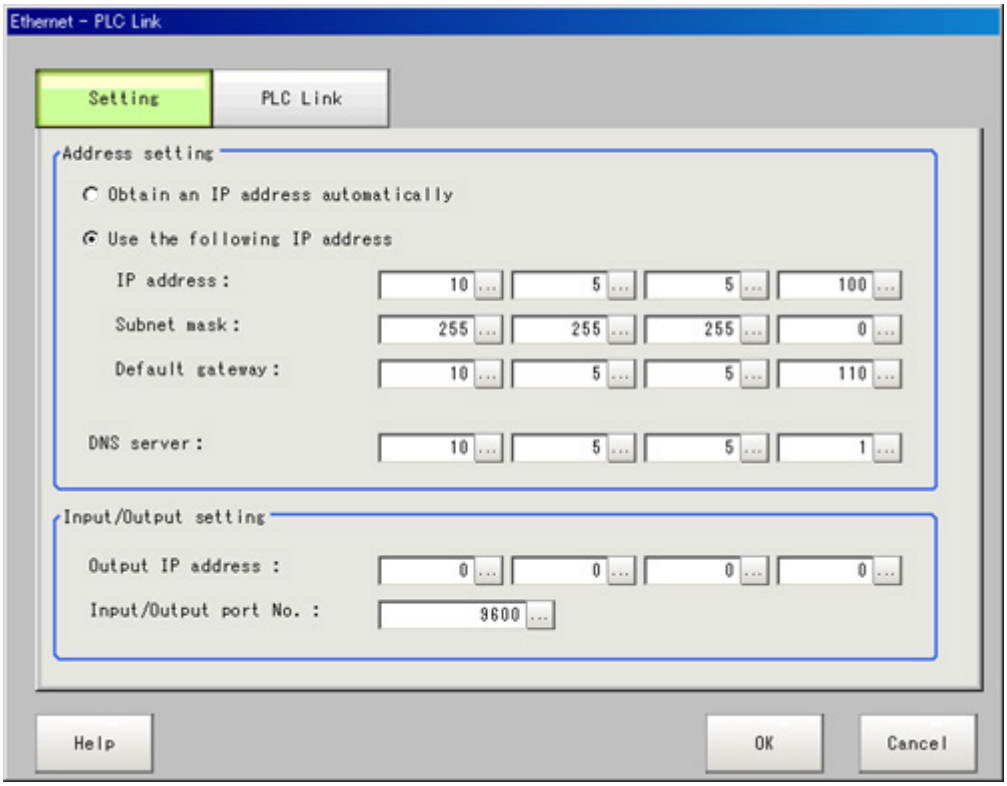
Setting Communication Specifications (Ethernet - PLC Link)

Communication specifications such as link areas or communication speed and data length are set.
Reference: Setting Communication Specifications (RS-232C/422 - PLC Link) (p.368)

Important

- Before setting the communication specifications, set the "Serial (Ethernet)" communication module to "PLC link (SYSMAC CS/CJ/CP/One)" (or to "PLC link (MELSEC Q series)" in the case of a PLC by Mitsubishi Electric Corporation), save the setting, and then restart the system. When the system is restarted, the communication settings are initialized.
  Reference: Setting the Start-up Status [Startup Setting] (p.347)
- Use the same communication specification settings for the controller and the external device.
- When making system settings/Ethernet settings, do not send external input into the Ethernet.

1. On the Main screen, tap the [System] menu - [Communication] - [Ethernet(PLC Link)].
   The Ethernet window is displayed.
2. In the communication setting area, set the following items.



Setting item	Setting value [Factory default]		Description
Address setting			
	• Obtain an IP address automatically • [Use the following IP address]		Set the IP address of the controller. When "Obtain an IP address automatically" is selected, the IP address of the controller will be automatically obtained. When "Use the following IP address" is selected, set the IP address, subnet mask, and the default gateway address.
	IP address	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [10.5.5.100]	Input the controller IP address.

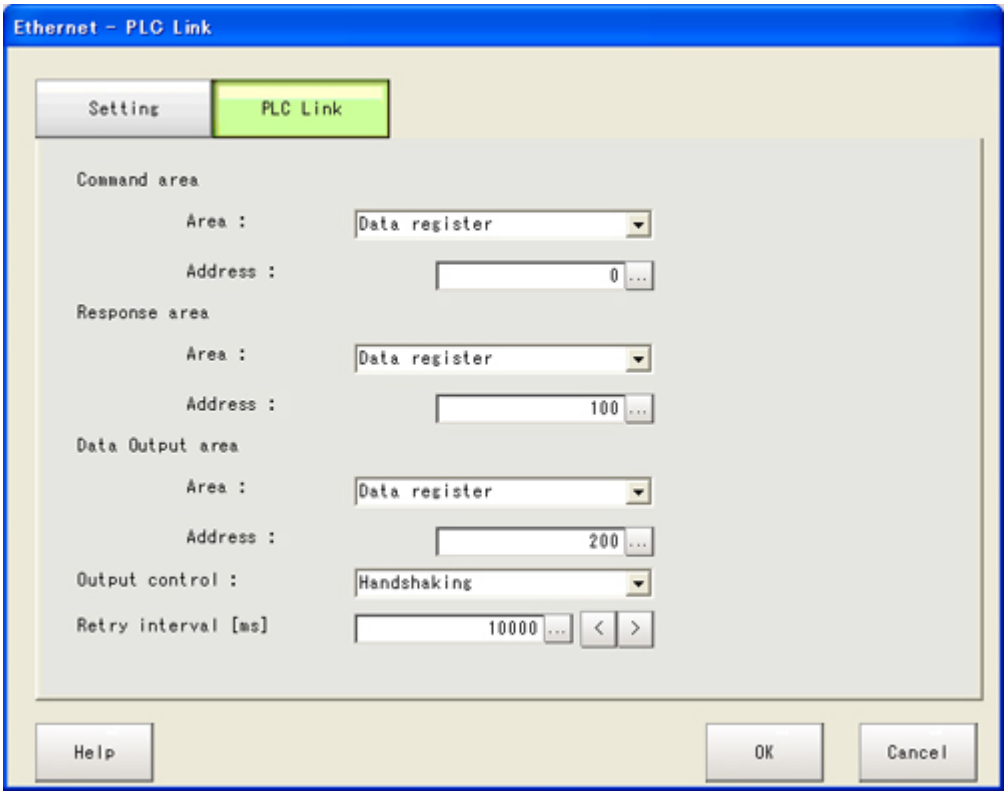
	Subnet mask	0.0.0.0 to 255.255.255.255 [255.255.255.0]	Input the subnet mask address.
	Default gateway	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [10.5.5.110]	Input the default gateway address.
	DNS server	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [10.5.5.1]	Input the DNS server address.
Input/Output setting			
	Output IP address	a.b.c.d a: 0 to 255 b: 0 to 255 c: 0 to 255 d: 0 to 255 [0.0.0.0]	Input the output destination IP address.
	Input/Output port No.	0 to 65535 [9600]	Set the port No. to use for data I/O with the controller.

Important

- If the operation mode (FZ4-11 □ □ /H11 □ □ only) is [Multi-line random-trigger mode], set a different I/O port No. for line 0 and line 1.

3. Tap [PLC link setting].
The PLC Link Setting window is displayed.

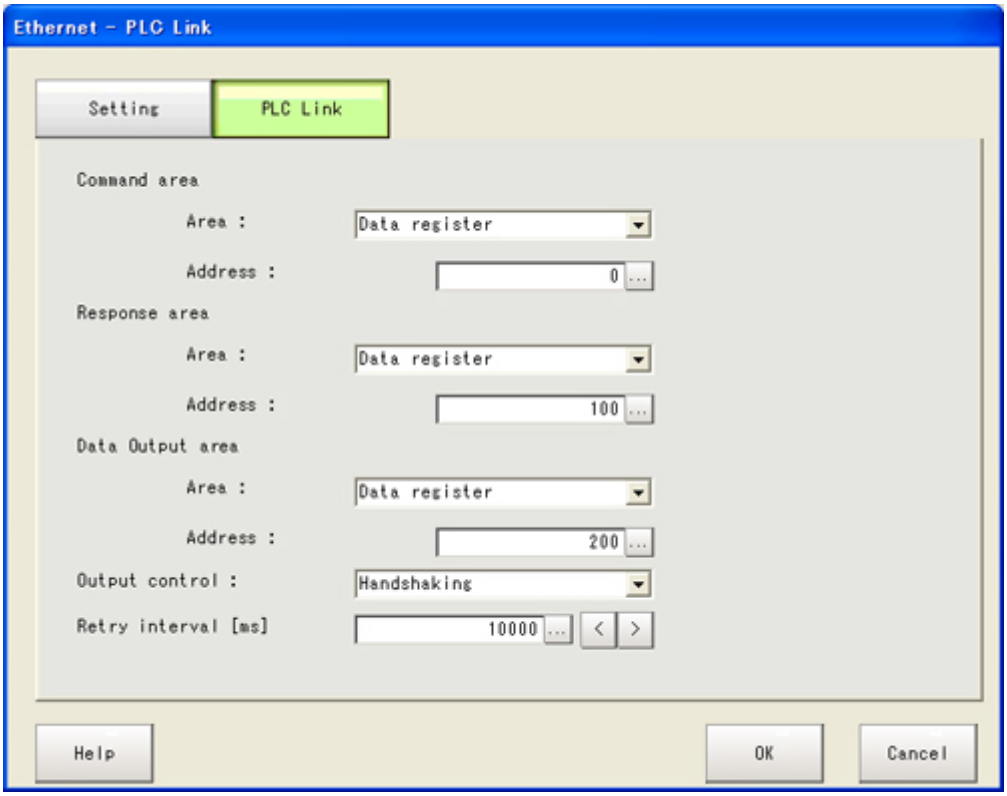
4. Set the following items.



Setting item	Setting value [Factory default]		Description
Command area			
	Area	・ [CIO Area (CIO)] ・ Work Area(WR) ・ Holding Bit Area(HR) ・ Auxiliary Bit Area(AR) ・ DM Area (DM) ・ EM Area (EMO-EMC)	Set the Command area. Available EM areas vary depending on the type of the PLC to be connected.
	Address	0 to 99999 [0]	Set the top channel address in the Command area.
Response area			
	Area	・ [CIO Area (CIO)] ・ Work Area(WR) ・ Holding Bit Area(HR) ・ Auxiliary Bit Area(AR) ・ DM Area (DM) ・ EM Area (EMO-EMC)	Set the Response area. Available EM areas vary depending on the type of the PLC to be connected.
	Address	0 to 99999 [100]	Set the top channel address in the Response area.
Data output area			

	Area	・ [CIO Area (CIO)] ・ Work Area(WR) ・ Holding Bit Area(HR) ・ Auxiliary Bit Area(AR) ・ DM Area (DM) ・ EM Area (EMO-EMC)	Set the Data output area. Available EM areas vary depending on the type of the PLC to be connected.
	Address	0 to 99999 [200]	Set the top channel address in the Data output area.
Output control		・ None ・ [Handshaking]	Set whether or not to provide an interlock with the PLC when performing data output. None: Data is output regardless of the status of signals from the PLC. GATE is always OFF. Handshaking: Data is output after confirming DSA from the PLC.
Retry interval [ms]		1000 to 999999 [10000]	Set the communication retry interval.

PLC by Mitsubishi Electric Corporation



Setting item	Setting value [Factory default]		Description
Command area			
	Area	・ [Data register] ・ File register ・ Link register	Set the Command area.

	Address	0 to 99999 [0]	Set the top channel address in the Command area.
Response area			
	Area	・ [Data register] ・ File register ・ Link register	Set the Response area.
	Address	0 to 99999 [100]	Set the top channel address in the Response area.
Data output area			
	Area	・ [Data register] ・ File register ・ Link register	Set the Data output area.
	Address	0 to 99999 [200]	Set the top channel address in the Data output area.
Output control		・ None ・ [Handshaking]	Set whether or not to provide an interlock with the PLC when performing data output. None: Data is output regardless of the status of signals from the PLC. GATE is always OFF. Handshaking: Data is output after confirming DSA from the PLC.
Retry interval [ms]		1000 to 999999 [10000]	Set the communication retry interval.

5. Tap [OK].
   The settings are confirmed and the Ethernet window closes.

Checking Communication Status

Use PLC tools, etc. to check the communication status.

Important

- The communication time is different depending on the communication environment. Make sure to verify on the actual usage environment before use. The communication speed of the controllers for the FZ4-L35 □ /6 □ □ /7 □ □ series may be faster than the speed of the controllers for FZ4-11 □ □ series depending on the conditions.

Setting Communication Specifications (RS-232C/422-PLC Link)

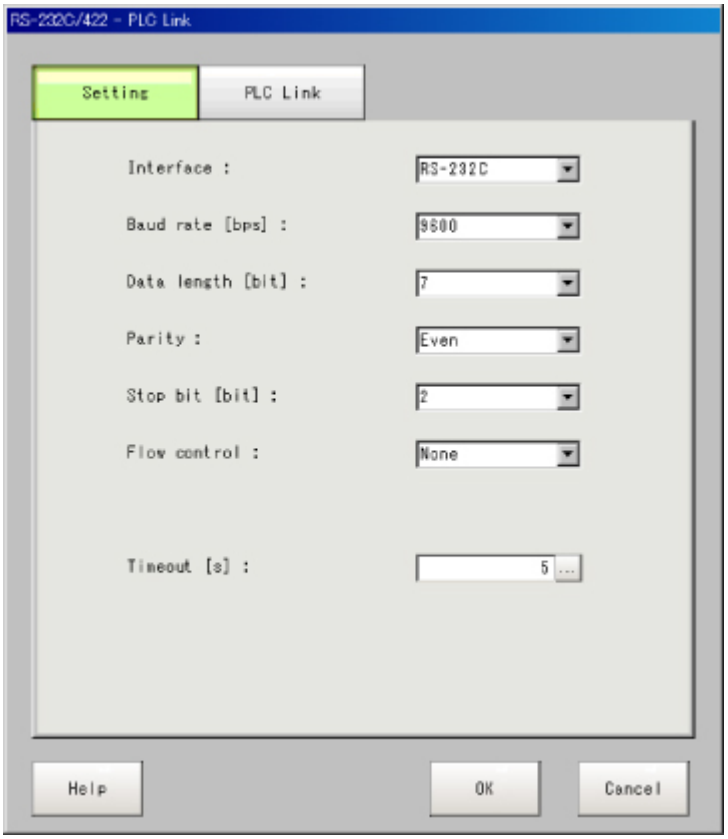
Communication specifications such as link areas or communication speed and data length are set.
Reference: Setting Communication Specifications (Ethernet - PLC Link) (p.363)

Important

- Before setting the communication specifications, set the "Serial (RS-232C/422)" communication module to "PLC link (SYSMAC CS/CJ/CP/One)" (or to "PLC link (MELSEC Q series)" in the case of a PLC by Mitsubishi Electric Corporation), save the setting to the controller, and then restart the system. When the system is restarted, the communication settings are initialized.
  Reference: Setting the Start-up Status [Startup Setting] (p.347)
- Use the same communication specification settings for the controller and the external device.
- If the operation mode (FZ4-11 □ □ /H11 □ □ only) is [Multi-line random-trigger mode], "RS232C/422-PLC link" cannot be selected for line 1.

1. On the Main screen, tap the [System] menu - [Communication] - [RS-232C/RS-422:PLC Link].
   The serial interface window is displayed.

2. In the communication setting area, set the following items.



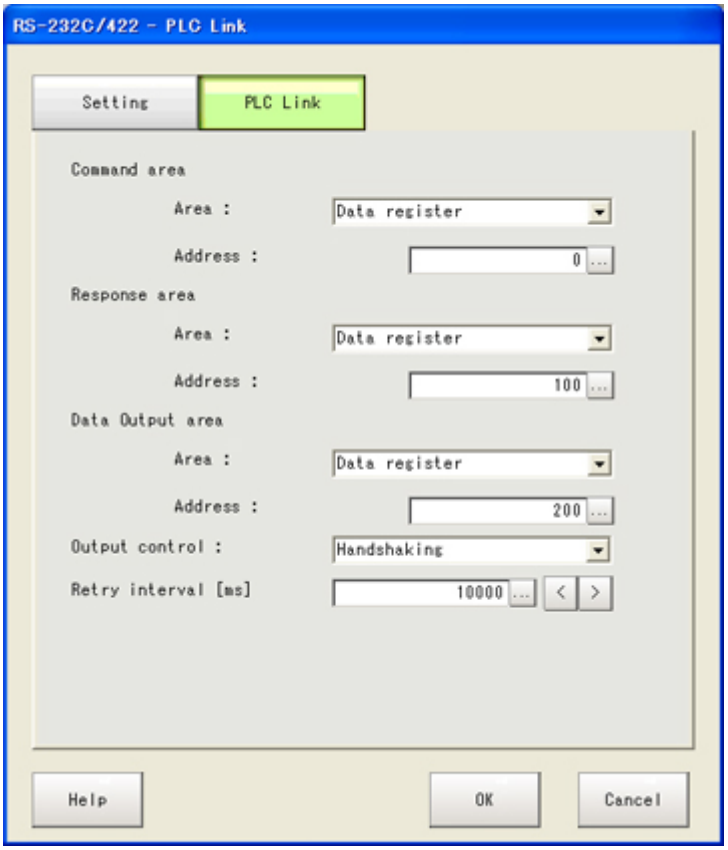
Setting item	Setting value [Factory default]	Description
Interface	・ [RS-232C] ・ RS-422 [Note 3]	Adjust to the PLC communication specifications. When connecting with PLC made by OMRON, set "Upper Link" on the PLC side.
Band rate [bps] [Note 1]	・ 2400 ・ 4800 ・ [9600] ・ 19200 ・ 38400 ・ 57600 ・ 115200	Adjust to the PLC communication specifications.
Data length [bit] [Note 2]	・ [7] ・ 8	Adjust to the PLC communication specifications.
Parity	・ None ・ Odd ・ [Even]	
Stop bit [bit]	・ 1 ・ [2]	
Flow control	[None]	Flow control is not performed with software. If the time in which there is no response from external devices reaches the timeout setting time, a timeout error occurs and an error message is displayed in the window. The parallel interface ERROR signal also turns on.
	Xon/Xoff	Flow control is performed with software. Data is sent according to the Xon/Xoff codes from external devices.
Timeout [s]	1 to 120 [5]	Set the time in which a timeout error will occur in seconds.

[Note 1]: If a speed of [38400 bps] or higher is selected, effective communication cannot be guaranteed depending on the cable length because speeds of over 20 kbps are not defined in RS-232C standards. In this case, set the communication speed at [19200 bps] or lower.

[Note 2]: With the RS-232C MELSEC Q series, set the data length to 8.

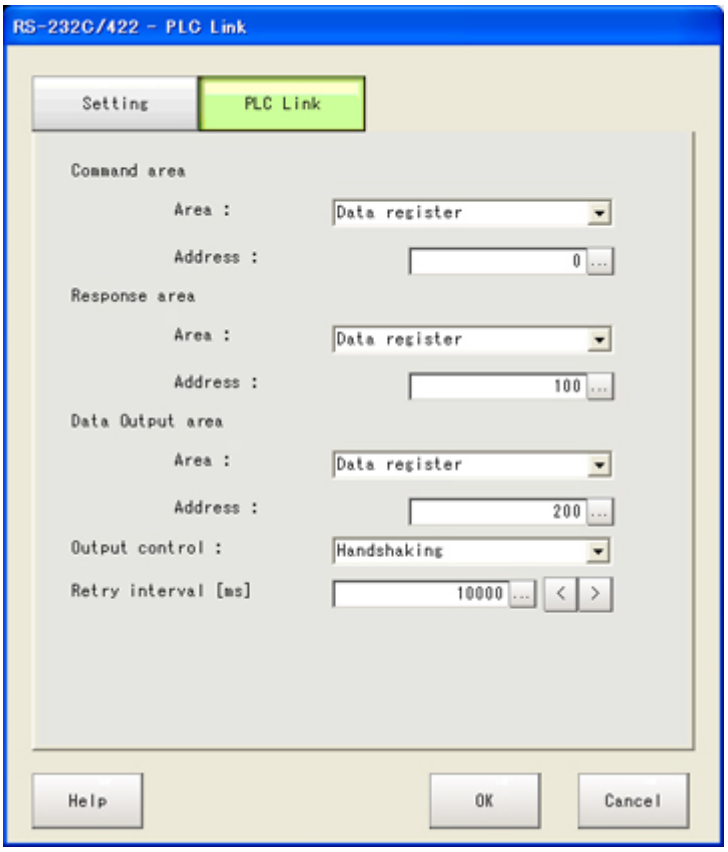
[Note 3]: With the MELSEC Q series, RS-422 cannot be used.

3. Tap [PLC Link setting].
   The PLC Link Setting window is displayed.
4. Set the following items.



Setting item		Setting value [Factory default]	Description
Command area			
	Area	・ [CIO Area (CIO)] ・ Work Area(WR) ・ Holding Bit Area(HR) ・ Auxiliary Bit Area (AR) ・ DM Area (DM) ・ EM Area(EMO)	Set the Command area.
	Address	0 to 99999 [0]	Set the top channel address in the Command area.
Response area			
	Area	・ [CIO Area (CIO)] ・ Work Area(WR) ・ Holding Bit Area(HR) ・ Auxiliary Bit Area (AR) ・ DM Area (DM) ・ EM Area(EMO)	Set the Response area.

	Address	0 to 99999 [100]	Set the top channel address in the Response area.
Data output area			
	Area	・ [CIO Area (CIO)] ・ Work Area(WR) ・ Holding Bit Area(HR) ・ Auxiliary Bit Area (AR) ・ DM Area (DM) ・ EM Area(EMO)	Set the Data output area.
	Address	0 to 99999 [200]	Set the top channel address in the Data output area.
Output control		・ None ・ [Handshaking]	Set whether or not to provide an interlock with the PLC when performing data output. None: Data is output regardless of the status of signals from the PLC. GATE is always OFF. Handshaking: Data is output after confirming DSA from the PLC.
Retry interval [ms]		1000 to 999999 [10000]	Set the communication retry interval.



Setting item		Setting value [Factory default]	Description
Command area			
	Area	・ [Data register] ・ File register ・ Link register	Set the Command area.
	Address	0 to 99999 [0]	Set the top channel address in the Command area.
Response area			
	Area	・ [Data register] ・ File register ・ Link register	Set the Response area.
	Address	0 to 99999 [100]	Set the top channel address in the Response area.
Data output area			
	Area	・ [Data register] ・ File register ・ Link register	Set the Data output area.
	Address	0 to 99999 [200]	Set the top channel address in the Data output area.

Output control	・ None ・ [Handshaking]	Set whether or not to provide an interlock with the PLC when performing data output. None: Data is output regardless of the status of signals from the PLC. GATE is always OFF. Handshaking: Data is output after confirming DSA from the PLC.
Retry interval [ms]	1000 to 999999 [10000]	Set the communication retry interval.

5. Tap [OK].
The settings are confirmed and the serial interface window closes.

Checking Communication Status

Use PLC tools, etc. to check the communication status.

Important

- The communication time is different depending on the communication environment. Make sure to verify on the actual usage environment before use. The communication speed of the controllers for the FZ4-L35 □ /6 □ □ /7 □ □ series may be faster than the speed of the controllers for FZ4-11 □ □ series depending on the conditions.

Memory Allocation (PLC Link)

This section explains allocations for each area including the command area, response area, and output area.

Command Area

PLC to controller (FZ4)

Command area top channel	Bit																Name
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0								XEXE								EXE	Control input (2CH)
+1																DSA	
+2	CMD-CODE																Command code (2CH)
+3																	
+4	CMD-PARAM																Command parameter (Length changeable)
+5																	
+6																	
+7																	
+8																	
+9																	
+10																	
. . .																	

Signal	Signal name	Function
EXE	Command execution bit	Executes commands Reference: ▶ Command Control (p.375)

DSA	Data output request bit	Requests the next data output Reference: ▸ Data Output (p.430)
EXEX	Measurement execution bit	Executing measurement
CMD-CODE	Command code	Stores command codes
CMD-PARAM	Command parameter	Stores command parameters

Response Area

Controller (FZ4) to PLC

Response area top channel	Bit																Name
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0						XWAIT	XBUSY	XFLG							BUSY	FLG	Control output (2CH)
+1																GATE	
+2	CMD-CODE																Command code (2CH)
+3																	
+4	RES-CODE																Response code (2CH)
+5																	
+6	RES-DATA																Response data (Length changeable)
+7																	
+8																	
+9																	
+10																	
.																	
.																	
.																	

Signal	Signal name	Function
FLG	Command completion bit	Turns on when command execution is complete.
GATE	Data output completion bit	Turns on when data output is complete.
BUSY	Command execution in progress bit	Turns on when command execution is in progress.
XFLG	Measuring command completion bit	Turns ON when measuring command execution is complete.
XBUSY	Measuring command executing bit	Turns ON while a measuring command is being executed.
XWAIT	Measuring command standby bit	Turns ON when a measuring command can be executed.
CMD-CODE	Command code	Returns the executed command code.
RES-CODE	Response code	Stores the response from the executed command
RES-DATA	Response data	Stores the response data from the executed command

Output Area

Controller (FZ4) to PLC

Output area top channel	Bit																Name
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0	DATA0																Output data 0
+1																	

+2 +3	DATA1	Output data 1
+4 +5	DATA2	Output data 2
+6 +7	DATA3	Output data 3
+8 +9	DATA4	Output data 4
+10 +11	DATA5	Output data 5
+12 +13	DATA6	Output data 6
+14 +15	DATA7	Output data 7

Signal	Signal name	Function
DATA0-7	Output data 0 to 7	The data set in the output processing items is output. When there are multiple processing items, data is overwritten to this area while "handshaking" is performed.

Data storage to the PLC I/O memory varies depending on the PLC to be connected.
Reference: ▶ Memory Display Image on PLC I/O (p.618)

Command Control (PLC Link)

This section explains each command used in PLC link.

Execute command

Command area top channel		Function	References
+3	+2		
0010	1010	Measurement is performed one time	Reference: ▶ Details (p.378)
0010	1020	Starts continuous measurement	Reference: ▶ Details (p.378)
0010	1030	Completes continuous measurement	Reference: ▶ Details (p.379)
0010	1040	Executes measurement tests on specified units	Reference: ▶ Details (p.379)
0010	2010	Clears measurement values	Reference: ▶ Details (p.380)
0010	3010	Saves in controller	Reference: ▶ Details (p.380)
0010	4010	Re-registers the model data with the current image	Reference: ▶ Details (p.381)
0010	5010	Moves the image display position in parallel the specified distance	Reference: ▶ Details (p.382)
0010	5020	Zooms in/out the image display by the specified zoom ratio	Reference: ▶ Details (p.382)
0010	5030	Returns the display position and display zoom ratio to their initial values	Reference: ▶ Details (p.383)
0010	7010	Copies scene data	Reference: ▶ Details (p.384)
0010	7020	Deletes scene data	Reference: ▶ Details (p.384)
0010	7030	Moves scene data	Reference: ▶ Details (p.385)
0010	8010	Registers specified image data as registered image	Reference: ▶ Details (p.386)
0010	8020	Loads the specified registered data as a measurement image	Reference: ▶ Details (p.386)

0010	9010	Responds in the response areas +6+7 with the data that was set in command areas +4+5	Reference: Details (p.387)
0010	A010	Adds a user account to a specified group ID	Reference: Details (p.388)
0010	A020	Deletes a specified user account	Reference: Details (p.389)
0010	B010	Branches to the flow head (processing unit No. 0)	Reference: Details (p.389)
0010	F010	Restarts the controller	Reference: Details (p.390)

Get state command

Command area top channel		Function	References
+3	+2		
0020	1000	Acquires scene No.	Reference: Details (p.390)
0020	2000	Acquires scene group No.	Reference: Details (p.391)
0020	4000	Gets the currently displayed layout number	Reference: Details (p.391)
0020	5010	Gets the number of the unit currently displayed in the specified display image window	Reference: Details (p.392)
0020	5020	Gets the number of the sub-image in the specified image display window	Reference: Details (p.393)
0020	5030	Gets the image mode for the specified image display window	Reference: Details (p.394)
0020	7010	Gets the input state of an individual communications module: Enabled or Disabled	Reference: Details (p.394)
0020	7020	Gets the output state to an external device: Enabled or Disabled	Reference: Details (p.395)
0020	8010	Gets the state of the specified parallel I/O terminal: Active or Inactive	Reference: Details (p.396)
0020	8020	Gets all the ON/OFF states for terminals other than DI at once	Reference: Details (p.397)
0020	8030	Retrieves the states of DI terminals in batches: Active or Inactive.	Reference: Details (p.397)
0020	9000	Acquires the user name for the currently logged in user account	Reference: Details (p.398)
0020	9010	Acquires the affiliation group ID for the currently logged in user account	Reference: Details (p.398)
0020	A000	Gets the operation log state	Reference: Details (p.399)

State setting command

Command area top channel		Function	References
+3	+2		
0030	1000	Switching Scenes	Reference: Details (p.400)
0030	2000	Switch the scene group No.	Reference: Details (p.400)
0030	4000	Sets a layout number to switch between screens	Reference: Details (p.401)
0030	5010	Sets the number of the unit displayed in the specified image display window	Reference: Details (p.402)
0030	5020	Sets the number of the sub-image displayed in the specified image display window	Reference: Details (p.402)
0030	5030	Sets the image mode for the specified image display window	Reference: Details (p.403)
0030	7010	Enables/Disables inputs into an individual communications module	Reference: Details (p.404)
0030	7020	Enables/Disables outputs to external devices	Reference: Details (p.404)
0030	8010	Sets specified parallel I/O terminals ON/OFF	Reference: Details (p.405)
0030	8020	Sets all the ON/OFF states for terminals other than DO	Reference: Details (p.406)
0030	8030	Enables/Disables the D0 terminal in batches	Reference: Details (p.407)

0030	9000	Alters the user account used by the user currently logging in	Reference: ▶ Details (p.408)
0030	A000	Sets the operation log state	Reference: ▶ Details (p.408)

Data read command

Command area top channel		Function	References
+3	+2		
0040	1000	Acquires unit data	Reference: ▶ Details (p.409)
0040	2000	Acquires the current date and time	Reference: ▶ Details (p.410)
0040	3000	Acquires system version information	Reference: ▶ Details (p.411)
0040	4000	Acquires settings related to image logging	Reference: ▶ Details (p.411)
0040	4010	Gets the defined image logging folder name	Reference: ▶ Details (p.412)
0040	4020	Gets the defined data logging folder name	Reference: ▶ Details (p.412)
0040	4030	Gets the defined screen capture folder name	Reference: ▶ Details (p.413)
0040	4040	Acquires the set image logging prefix	Reference: ▶ Details (p.414)
0040	4050	Acquires the set data logging condition	Reference: ▶ Details (p.414)
0040	4060	Acquires the set DI terminal offset data	Reference: ▶ Details (p.415)

Data write command

Command area top channel		Function	References
+3	+2		
0050	1000	Sets unit data	Reference: ▶ Details (p.416)
0050	2000	Sets the date/time	Reference: ▶ Details (p.417)
0050	4000	Changes settings related to image logging	Reference: ▶ Details (p.418)
0050	4010	Gets the defined image logging folder name	Reference: ▶ Details (p.418)
0050	4020	Gets the defined data logging folder name	Reference: ▶ Details (p.419)
0050	4030	Gets the defined screen capture folder name	Reference: ▶ Details (p.420)
0050	4040	Sets the image logging prefix	Reference: ▶ Details (p.420)
0050	4050	Sets the data logging condition	Reference: ▶ Details (p.421)
0050	4060	Sets the terminal offset data	Reference: ▶ Details (p.421)

File load command

Command area top channel		Function	References
+3	+2		
0060	1000	Loads the Scene data	Reference: ▶ Details (p.422)
0060	2000	Loads the scene group data	Reference: ▶ Details (p.423)
0060	3000	Loads system data	Reference: ▶ Details (p.423)
0060	5000	Loads System + Scene group 0 data	Reference: ▶ Details (p.424)

File save command

Command area top channel		Function	References
+3	+2		
0070	1000	Saves the Scene data	Reference: ▶ Details (p.425)

0070	2000	Saves the scene group data	Reference: Details (p.425)
0070	3000	Saves system data	Reference: Details (p.426)
0070	4000	Saves image data.	Reference: Details (p.426)
0070	4010	Saves all the image data in the image buffer (specified with [main unit logging image])	Reference: Details (p.427)
0070	4020	Saves the last logging image	Reference: Details (p.428)
0070	5000	Saves System + Scene Group 0 data in a file	Reference: Details (p.429)
0070	6000	Executes a screen capture	Reference: Details (p.429)

Executing Measurement

Executes measurement one time.

Command (PLC to Controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1010	0001	0000	0001	0000	Set command codes.
+3	0010	0000	0000	0001	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0001	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Starting Continuous Measurement

Starts continuous measurement.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1020	0001	0000	0010	0000	Set command codes.
+3	0010	0000	0000	0001	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0001	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Stopping Continuous Measurement

Stops continuous measurement.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1030	0001	0000	0011	0000	Set command codes.
+3	0010	0000	0000	0001	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0001	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Unit stand-alone test measurement execution

Performs a test measurement on the specified unit.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1040	0001	0000	0100	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Specifies the unit No.
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0001	0000	0100	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Clearing Measurement Values

Clears all measurement values.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	2010	0010	0000	0001	0000	Set command codes.
+3	0010	0000	0000	0001	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0010	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Saving in Controller

Stores the current system data and scene group in the controller.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	3010	0011	0000	0001	0000	Set command codes.
+3	0010	0000	0000	0001	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0011	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Model re-registration

Reregisters a model using the current model.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4010	0100	0000	0001	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Specifies the unit No.
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Specifies the model number.
+7	—	0000	0000	0000	0000	
+8	—	0000	0000	0000	0000	Specifies the target data. When the setting value is expressed in binary, if the 1st bit is 1, the model is re-registered. When the setting value is expressed in binary, if the 2nd bit is 1, the reference position is updated. When the setting value is expressed in binary, if the 3rd bit is 1, the detection position is updated. Example) - When only re-registering the model: 1 x 1 + 2 x 0 + 4 x 0 = 1 (setting value) - When only updating the reference position: 1 x 0 + 2 x 1 + 4 x 0 = 2 (setting value) - When updating or re-registering everything: 1 x 1 + 2 x 1 + 4 x 1 = 7 (setting value)
+9	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Scroll

The image display window whose number is specified is moved the specified distance in parallel. The setting range for the movement distance is not restricted. Also, because the scale for movement is independent of the display zoom ratio, the movement is not affected by change in the zoom ratio.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5010	0101	0000	0001	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Specifies the display image window number.
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Sets the X movement distance (camera coordinate system).
+7	—	0000	0000	0000	0000	
+8	—	0000	0000	0000	0000	Sets the Y movement distance (camera coordinate system).
+9	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Zoom

Zooms the image display window whose number is specified in or out to the specified zoom ratio. The zoom ratio here is the ratio compared to the original image (100%).

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5020	0101	0000	0010	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	

+4	—	0000	0000	0000	0000	Specifies the display image window number.
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Sets magnification. (Value multiplied by 1000) 250 to 16000
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Fit

Returns the display position and display zoom ratio for the image display window to their default values.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5030	0101	0000	0011	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Specifies the display image window number. 1-screen display: 1 2-screen display, 1, 2 4-screen display: 1 to 4 Thumbnail display: 0 to 4
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Scene data copy

Copies the data for the scene with the number specified with command argument 1 to the scene with the number specified with command argument 2. If there is already data at the copy destination, the copied data is written over that data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	7010	0111	0000	0001	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Specifies the number of the scene to copy from.
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Specifies the number of the scene to copy to.
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0111	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Scene data deletion

Deletes the data for the scene whose number is specified with command argument 1.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	7020	0111	0000	0010	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Specifies the number of the scene to delete.
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0111	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Scene data move

Copies the data for the scene with the number specified with command argument 1 to the scene with the number specified with command argument 2. Deletes scene data with a number specified by command argument 1 after completing copying. If there is already data at the copy destination, the copied data is written over that data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	7030	0111	0000	0011	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Specifies the number of the scene to move from.
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Specifies the number of the scene to move to.
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0111	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Registered image setting

Registers a specified image data as a registered image. This operation results in the same operation as when pressing the Register button on the Register Image Management tool. If the source to register is 0, the last measured image, command argument 3 can be omitted.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	8010	1000	0000	0001	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Specifies the number of the image to register. (0 to 999)
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Specifies the type of data to register from. 0: Last measured image 1: Logging image 2: Image file
+7	—	0000	0000	0000	0000	
+8	—	0000	0000	0000	0000	Specifies the logging image number or file name. Source to register: Logging image number (0 to the number of logging images in the controller - 1) in the case of a controller logging image. Source to register: Image file name (0 to 256 characters) in the case of an image file.
+9	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1000	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Loading registration images

Loads a specified registered image as a measured image. This operation results in the same operation as when pressing the Load button on the Register Image Management tool.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	8020	1000	0000	0010	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Specifies the number of the image to register.
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1000	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Echo

Returns as is any character string sent by an external device. Command argument 1 is alphanumerics only. Responds in the response areas +6+7 with the data that was set in command areas +4+5.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	9010	1001	0000	0001	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Sets any data (2 words).
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1001	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Any data (2 words)
+7	0000	0000	0000	0000	

User account setting

Adds a user account to the specified group ID. If the group ID the account of the user currently logging in belongs is not zero, 0, a command error occurs. If the user account to be set has already existed, it will be overwritten with the new account.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	A010	1010	0000	0001	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Sets the affiliated group ID. 0 to 7
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Sets the user ID.
:	—	0000	0000	0000	0000	
+21	—	0000	0000	0000	0000	
+22	—	0000	0000	0000	0000	Sets the password.
:	—	0000	0000	0000	0000	
+37	—	0000	0000	0000	0000	
+38	—	0000	0000	0000	0000	Sets a user account (UG0).
:	—	0000	0000	0000	0000	
+53	—	0000	0000	0000	0000	
+54	—	0000	0000	0000	0000	Sets a password (UG0).
:	—	0000	0000	0000	0000	
+70	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1010	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

User account deletion

Deletes the specified user account. If the group ID the account of the user currently logging in belongs to is not zero, 0, a command error occurs. If the specified user account does not exist, a command acknowledge returns.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	A020	1010	0000	0010	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	
+4	—	0000	0000	0000	0000	Sets the user ID.
:	—	0000	0000	0000	0000	
+19	—	0000	0000	0000	0000	
+20	—	0000	0000	0000	0000	Sets a user account (UG0).
:	—	0000	0000	0000	0000	
+35	—	0000	0000	0000	0000	
+36	—	0000	0000	0000	0000	Sets a password (UG0).
:	—	0000	0000	0000	0000	
+52	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1010	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Return to a flow head

Branches to the flow head (processing unit No. 0). This command can only be executed when the corresponding flow control processing item is used.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	B010	1011	0000	0001	0000	Sets command codes.
+3	0010	0000	0000	0001	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1011	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Restart

Restarts the controller.

Important

- When a restart command is executed, BUSY does not turn off even after the command execution bit turns off. After a restart command is executed, perform a memory clear of BUSY on the PLC side.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	F010	1111	0000	0001	0000	Set command codes.
+3	0010	0010	0000	0001	0000	

Response (Controller to PLC)

There is no response because restarting is performed.

Acquiring Scene Number

Acquires the current scene No.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1000	0001	0000	0000	0000	Set command codes.
+3	0020	0000	0000	0010	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0001	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Stores the acquired scene No.
+7	0000	0000	0000	0000	

Acquiring Scene Group Number

Acquires the current scene group No.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	2000	0010	0000	0000	0000	Set command codes.
+3	0020	0000	0000	0010	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0010	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Acquired scene group No.
+7	0000	0000	0000	0000	

Getting layout number

Gets the number of the currently displayed layout.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4000	0100	0000	0000	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	

+4	—	0000	0000	0000	0000	Specifies the item to acquire. 0: Local 1: Remote
+5	—	0000	0000	0000	0000	

Important

- For non-remote operation, only 0: Local can be specified. For remote operation, only 1: Remote can be specified.
  If this command is executed with any combination other than the above, it is not supported in Ver. 4.20.
  Note that unexpected operations could occur.

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Layout No. 0: Adjust window, 1: Run window
+7	0000	0000	0000	0000	

Getting display image unit number

Gets the number of the unit currently displayed in the specified image display window.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5010	0101	0000	0001	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	
+4	—	0000	0000	0000	0000	Specifies the display image window number. 1-screen display: 1 2-screen display, 1, 2 4-screen display: 1 to 4 Thumbnail display: 0 to 4
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Unit No.
+7	0000	0000	0000	0000	

Getting display sub-image number

Gets the number of the sub-image currently displayed in the specified image display window.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5020	0101	0000	0010	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	
+4	—	0000	0000	0000	0000	Specifies the display image window number. 1-screen display: 1 2-screen display, 1, 2 4-screen display: 1 to 4 Thumbnail display: 0 to 4
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Sub image number.
+7	0000	0000	0000	0000	

Getting image display state

Gets the image mode for the specified Image Display window.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5030	0101	0000	0011	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	
+4	—	0000	0000	0000	0000	Specifies the display image window number. 1-screen display: 1 2-screen display, 1, 2 4-screen display: 1 to 4 Thumbnail display: 0 to 4
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Image mode 0: Through 1: Freeze or Freeze and Last NG together 2: Last NG
+7	0000	0000	0000	0000	

Getting communication input state

Gets the input state (permitted/prohibited) for communication modules.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	7010	0111	0000	0001	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	

+4	—	0000	0000	0000	0000	Specifies the communication module type. 0: Serial (Ethernet) 1: Serial (RS-232C/422) 2: Parallel I/O 3: Fieldbus 4: Remote operation
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0111	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Input state 0: Prohibited 1: Permitted
+7	0000	0000	0000	0000	

Getting communication output state

Gets the output state to an external device: Enabled or Disabled:

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	7020	0111	0000	0010	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0111	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

+6	0000	0000	0000	0000	Response data Output state 0: Prohibited 1: Permitted
+7	0000	0000	0000	0000	

Getting terminal state

Gets the state of the specified parallel I/O terminal: Active or Inactive.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	8010	1000	0000	0001	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	
+4	—	0000	0000	0000	0000	Specifies the terminal type. 0: STEP 1: DSA 2: DI
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Specifies the terminal number. When the terminal type is STEP 0: STEP1, 1: STEP1 When the terminal type is DSA 0:DSA1, 1: DSA1 When the terminal type is DI 0: DI0 to 7: DI7
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1000	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Terminal state ON: 1 OFF: 0
+7	0000	0000	0000	0000	

Getting terminal state at once

Retrieves the states of terminals except for DI in batches: Active or Inactive.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	8020	1000	0000	0010	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1000	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Terminal state (ON: 1 OFF: 0) BIT0: STEP0 BIT1: DSA0 BIT2: STEP1 BIT3: DSA1
+7	0000	0000	0000	0000	

Getting DI state at once

Gets all the DI terminal ON/OFF states.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	8030	1000	0000	0011	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1000	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Terminal state BIT0: DI0 BIT1: DI1 BIT2: DI2 BIT3: DI3 BIT4: DI4 BIT5: DI5 BIT6: DI6 BIT7: DI7
+7	0000	0000	0000	0000	

Acquires the login account name

Acquiring the user name for the currently logged in account.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	9000	1001	0000	0000	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	
+4	—	0000	0000	0000	0000	Specifies the item to acquire. 0: Local 1: Remote
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1001	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Acquired user name
+7	0000	0000	0000	0000	

Acquiring the login account group ID

Acquires the group ID for the currently logged in account.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	9000	1001	0000	0000	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	
+4	—	0000	0000	0000	0000	Specifies the item to acquire. 0: Local 1: Remote
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1001	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Acquired affiliated group ID
+7	0000	0000	0000	0000	

Getting operation log state

Gets the logging operation state.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	A000	1010	0000	0000	0000	Sets command codes.
+3	0020	0000	0000	0010	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1010	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0010	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

+6	0000	0000	0000	0000	Response data Operation log state gotten 1: ON 0: OFF
+7	0000	0000	0000	0000	

Scene Switching

Switches the scene number to be used.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1000	0001	0000	0000	0000	Set command codes.
+3	0030	0000	0000	0011	0000	
+4	-	0000	0000	0000	0000	Specifies the scene No.
+5	-	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0001	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Scene Group Switching

Switches the scene group number to be used.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	2000	0010	0000	0000	0000	Set command codes.
+3	0030	0000	0000	0011	0000	
+4	-	0000	0000	0000	0000	Specifies the scene group No. To switch to scene group 1, set as follows: +4 channel: 1, +5 channel: 0.
+5	-	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0010	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Layout numbers setting

Sets the layout number and switches the window.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4000	0100	0000	0000	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Specifies the item to set. 0: Local 1: Remote
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Sets the layout number. 0: ADJUST window, 1: RUN window
+7	—	0000	0000	0000	0000	

Important

- For non-remote operation, only 0: Local can be specified. For remote operation, only 1: Remote can be specified.
  If this command is executed with any combination other than the above, it is not supported in Ver. 4.20.
  Note that unexpected operations could occur.

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Display image unit number setting

Sets the number of the unit displayed in the specified image display window.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5010	0101	0000	0001	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Specifies the display image window number. 1-screen display: 1 2-screen display, 1, 2 4-screen display: 1 to 4 Thumbnail display: 0 to 4
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Sets the unit number.
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Display image sub-numbers setting

Sets the number of the sub-image displayed in the specified image display window.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5020	0101	0000	0010	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Specifies the display image window number. 1-screen display: 1 2-screen display, 1, 2 4-screen display: 1 to 4 Thumbnail display: 0 to 4
+5	—	0000	0000	0000	0000	

+6	—	0000	0000	0000	0000	Sets the sub-image number.
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Image display state setting

Sets the image mode for the specified Image Display window.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5030	0101	0000	0011	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Specifies the display image window number. 1-screen display: 1 2-screen display, 1, 2 4-screen display: 1 to 4 Thumbnail display: 0 to 4
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Sets the image mode. 0: Through 1: Freeze or Freeze and Last NG together 2: Last NG
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Communication input state setting

Permits/prohibits input to communication modules. Any communication module whose input state is set to Prohibit (0) accepts no communications whatsoever. However, inputs related to hardware (parallel STEP signals/DSA signals and ECAT STEP, etc.) are not included in the prohibition.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	7010	0111	0000	0001	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Specifies the communication module type. 0: Serial (Ethernet) 1: Serial (RS-232C/422) 2: Parallel IO 3: Fieldbus 4: Remote operation
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Sets the input state. 0: Prohibited 1: Permitted
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0111	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Communication output state setting

Permits/prohibits output to external devices When the input state is disabled, i.e., set to (0), all the communications modules are unable to transmit data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	7020	0111	0000	0010	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Sets the output state. 0: Prohibited 1: Permitted
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0111	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Terminal state setting

Sets the state of the specified parallel I/O terminal: Active or Inactive.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	8010	1000	0000	0001	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Specifies the terminal type. 3: RUN 4: ERR 5: BUSY 6: OR 7: GATE 8: READY 9: DO
+5	—	0000	0000	0000	0000	

+6	—	0000	0000	0000	0000	Specifies the terminal number. When the terminal type is RUN, ERR or BUSY 0 When the terminal type is OR 0: OR0, 1: OR1 When the terminal type is GATE 0: GATE0 1: GATE1 When the terminal type is READY 0: READY0 1: READY1 When the terminal type is DO 0: DO0 to 15: DO15
+7	—	0000	0000	0000	0000	
+8	—	0000	0000	0000	0000	Sets the terminal state. 0: OFF 1: ON
+9	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1000	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Terminal state batch setting

Sets the states of terminals except for D0 in batches: Active or Inactive.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	8020	1000	0000	0010	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	

+4	—	0000	0000	0000	0000	Sets the terminal state.
+5	—	0000	0000	0000	0000	0th bit: RUN 1st bit: ERR 2nd bit: BUSY 3rd bit: OR0 4th bit: OR1 5th bit: GATE0 6th bit: GATE1 7th bit: READY0 8th bit: READY1 0: OFF, 1: ON

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1000	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Terminal state batch setting

Sets all the DO terminal ON/OFF states.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	8030	1000	0000	0011	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Sets the terminal state.
+5	—	0000	0000	0000	0000	1st bit: DO0 : 16th bit: DO15

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1000	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Login account setting

Switches the currently logged in account.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	9000	1001	0000	0000	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Specifies the item to set. 0: Local 1: Remote
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Sets the user ID.
+7	—	0000	0000	0000	0000	
+8	—	0000	0000	0000	0000	Sets the password.
+9	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1001	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Operation log state setting

Sets the logged operation state. This command allows configuring the logging operation state in the same manner as for the Start/End Logging Operation buttons on the Main screen.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	A000	1010	0000	0000	0000	Sets command codes.
+3	0030	0000	0000	0011	0000	
+4	—	0000	0000	0000	0000	Specifies the operation log state. ON: 1 OFF: 0
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	1010	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0011	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Acquiring Unit Data

Acquires the specified processing unit data.

Important

- In unit data setting/acquisition, external reference table No. 139 (verification string) of Character Inspection, external reference table No. 164 (judgement comparison character string) of barcodes+, and external reference table No. 172 (judgement comparison character string) of 2D Code and 2D Code+ cannot be used.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1000	0001	0000	0000	0000	Set command codes.
+3	0040	0000	0000	0100	0000	
+4	-	0000	0000	0000	0000	Specifies the unit No.
+5	-	0000	0000	0000	0000	
+6	-	0000	0000	0000	0000	Specifies data number in the External Reference Tables.
+7	-	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0001	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0100	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Acquired data (Value multiplied by 1000)
+7	0000	0000	0000	0000	

Acquiring Date and Time

Acquires the date and time from the internal calendar timer in the controller.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	2000	0010	0000	0000	0000	Set command codes.
+3	0040	0000	0000	0100	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0010	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0100	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Year data: 1900 to 2100
+7	0000	0000	0000	0000	
+8	0000	0000	0000	0000	Month data: 1 to 12
+9	0000	0000	0000	0000	
+10	0000	0000	0000	0000	Date data: 1 to 31
+11	0000	0000	0000	0000	
+12	0000	0000	0000	0000	Hour data: 0 to 23
+13	0000	0000	0000	0000	
+14	0000	0000	0000	0000	Minute data: 0 to 59
+15	0000	0000	0000	0000	
+16	0000	0000	0000	0000	Second data: 0 to 59
+17	0000	0000	0000	0000	

Acquiring Version Information

Acquires the controller version information.

Command (PLC to Controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	3000	0011	0000	0000	0000	Set command codes.
+3	0040	0000	0000	0100	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0011	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0100	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Version information character string
+7	0000	0000	0000	0000	
+8	0000	0000	0000	0000	
+9	0000	0000	0000	0000	
:	0000	0000	0000	0000	
:	0000	0000	0000	0000	

Acquires settings related to image logging.

Acquires settings related to image logging.

Command (PLC to Controller)

Command area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0000	0000	Sets command codes.
+3	0000	0000	0100	0000	
+4	0000	0000	0000	0000	Specifies [Identifier 0] and [Identifier 1]. [Identifier 0]: Specifies logging. [Identifier 1]: Specifies the name of the item to be acquired. Refer to identifier 1 of non-procedure command SYSDATA. Separate [Identifier 0] and [Identifier 1] with 00 (NULL).
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	
+7	0000	0000	0000	0000	
:	0000	0000	0000	0000	
:	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0000	0000	Command code Stores response target command codes.
+3	0000	0000	0100	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Setting values related to image logging
+7	0000	0000	0000	0000	
+8	0000	0000	0000	0000	
+9	0000	0000	0000	0000	
:	0000	0000	0000	0000	
:	0000	0000	0000	0000	

Getting image logging folder name

Gets the set image logging folder name.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4010	0100	0000	0001	0000	Sets command codes.
+3	0040	0000	0000	0100	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0011	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0111	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Folder name (absolute path)
+7	0000	0000	0000	0000	

Getting data logging folder name

Gets the set data logging folder name.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4020	0100	0000	0010	0000	Sets command codes.
+3	0040	0000	0000	0100	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0100	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Folder name (absolute path)
+7	0000	0000	0000	0000	

Getting screen capture folder name

Gets the set screen capture folder name.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4030	0100	0000	0011	0000	Sets command codes.
+3	0040	0000	0000	0100	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0100	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Folder name (absolute path)
+7	0000	0000	0000	0000	

Getting image logging prefix

Gets the prefix for the name of the file the image logging is saved to. The maximum length of the prefix character string is 32 characters.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4040	0100	0000	0100	0000	Sets command codes.
+3	0040	0000	0000	0100	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0100	0000	Command code Store response target command codes.
+3	0000	0000	0100	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Image logging prefix
+7	0000	0000	0000	0000	

Getting data logging condition

Gets the data logging condition for system data. Gets the "data logging condition" on the logging setting screen.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4050	0100	0000	0101	0000	Sets command codes.
+3	0040	0000	0000	0100	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0101	0000	Command code Store response target command codes.
+3	0000	0000	0100	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Data logging condition gotten 0: None 1: Save if NG. 2: All
+7	0000	0000	0000	0000	

Getting terminal offset

Acquires the DI terminal offset data.
The DI terminal offset is the value added to the command parameter for DI0-DI4 when a parallel command is executed.
Once the terminal offset setting command has been executed, the acquisition command is enabled.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4060	0100	0000	0110	0000	Sets command codes.
+3	0040	0000	0000	0100	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0110	0000	Command code Store response target command codes.
+3	0000	0000	0100	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	Response data Terminal offset value: 0 to 9999
+7	0000	0000	0000	0000	

Saving last logging image

Executes a save of the last input image. The character string handed over by the argument is used as the file name.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	0047	0000	0000	0100	0111	Sets command codes.
+3	0047	0000	0000	0100	0111	
+4	—	0000	0000	0000	0000	[Destination] File name/folder name to save to (absolute path) ・ If the extension is "ifz", the file is saved as is. ・If the extension is anything other than "ifz", ".ifz" is appended. ・ If there is no extension (folder name), timestamp.ifz is appended.
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0000	0000	0100	0111	Command code Store response target command codes.
+3	0000	0000	0100	0111	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Setting Unit Data

Sets the specified processing unit data.

Important

- In unit data setting/acquisition, external reference table No. 139 (verification string) of Character Inspection, external reference table No. 164 (judgement comparison character string) of barcodes+, and external reference table No. 172 (judgement comparison character string) of 2D Code and 2D Code+ cannot be used.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1000	0001	0000	0000	0000	Set command codes.
+3	0050	0000	0000	0101	0000	
+4	0000	0000	0000	0000	0000	Specifies the unit No.
+5	0000	0000	0000	0000	0000	

+6	0000	0000	0000	0000	0000	Specifies data number in the External Reference Tables.
+7	0000	0000	0000	0000	0000	
+8	0000	0000	0000	0000	0000	Input data to be set. (Value multiplied by 1000)
+9	0000	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0001	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0101	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Setting Date and Time

Sets the date and time of the internal calendar timer in the controller.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	2000	0010	0000	0000	0000	Set command codes.
+3	0050	0000	0000	0101	0000	
+4	0000	0000	0000	0000	0000	Year data: 1900 to 2100
+5	0000	0000	0000	0000	0000	
+6	0000	0000	0000	0000	0000	Month data: 1 to 12
+7	0000	0000	0000	0000	0000	
+8	0000	0000	0000	0000	0000	Date data: 1 to 31
+9	0000	0000	0000	0000	0000	
+10	0000	0000	0000	0000	0000	Hour data: 0 to 23
+11	0000	0000	0000	0000	0000	
+12	0000	0000	0000	0000	0000	Minute data: 0 to 59
+13	0000	0000	0000	0000	0000	
+14	0000	0000	0000	0000	0000	Second data: 0 to 59
+15	0000	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0010	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0101	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Changes settings related to image logging

Changes settings related to image logging.

Command (PLC to controller)

Command area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0000	0000	Sets command codes.
+3	0000	0000	0101	0000	
+4	0000	0000	0000	0000	Specifies [Identifier 0], [Identifier 1] and [Setting value]. [Identifier 0]: Specifies logging. [Identifier 1]: Specifies the name of the item to be set. Refer to identifier 1 of non-procedure command SYSDATA. [Setting value]: Specifies the setting value. Separate [Identifier 0] and [Identifier 1] with 00 (NULL).
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	
+7	0000	0000	0000	0000	
:	0000	0000	0000	0000	
:	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0000	0000	Command code Stores response target command codes.
+3	0000	0000	0101	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Image logging folder name setting

Sets the screen capture folder name.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4010	0100	0000	0001	0000	Sets command codes.
+3	0050	0000	0000	0101	0000	

+4	—	0000	0000	0000	0000	Specifies the name of the image capture folder with the absolute path. Up to 230 characters
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0101	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Data logging folder name setting

Sets the data logging folder name.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4020	0100	0000	0010	0000	Sets command codes.
+3	0050	0000	0000	0101	0000	
+4	—	0000	0000	0000	0000	Specifies the name of the data logging folder with the absolute path. Up to 247 characters
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0101	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Screen capture folder name setting

Sets the screen capture folder name.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4030	0100	0000	0011	0000	Sets command codes.
+3	0050	0000	0000	0101	0000	
+4	—	0000	0000	0000	0000	Specifies the name of the image capture folder with the absolute path. Up to 227 characters
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0101	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Image logging prefix setting

Sets the prefix for the name of the file the image logging is saved to. The maximum length of the prefix character string is 32 characters.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4040	0100	0000	0100	0000	Sets command codes.
+3	0050	0000	0000	0101	0000	
+4	—	0000	0000	0000	0000	Sets the image logging prefix. Up to 32 characters
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0100	0000	Command code Store response target command codes.
+3	0000	0000	0101	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Data logging condition setting

Sets the data logging conditions for system data. Sets the "Data logging condition" on the Logging Setting window .

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4050	0100	0000	0101	0000	Sets command codes.
+3	0050	0000	0000	0101	0000	
+4	—	0000	0000	0000	0000	Specifies the data logging conditions. 0: None 1: Only NG 2: All
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0101	0000	Command code Store response target command codes.
+3	0000	0000	0101	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Terminal offset setting

Sets the DI terminal offset data.
The terminal offset is the set value added to the command parameter specified with DI0-DI4.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4060	0100	0000	0110	0000	Sets command codes.
+3	0050	0000	0000	0101	0000	
+4	—	0000	0000	0000	0000	Specifies the terminal offset data. 0 to 9999
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0110	0000	Command code Store response target command codes.
+3	0000	0000	0101	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Loading scene data

Reads scene data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1000	0001	0000	0000	0000	Sets command codes.
+3	0060	0000	0000	0110	0000	
+4	—	0000	0000	0000	0000	Specifies the number of the scene to be loaded.
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Specifies the name of the file to be loaded with the absolute path. Up to 256 characters
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0001	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0110	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Loading scene group data

Reads scene group data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	2000	0010	0000	0000	0000	Sets command codes.
+3	0060	0000	0000	0110	0000	
+4	—	0000	0000	0000	0000	Specifies the number of the scene group to be loaded.
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	Specifies the name of the file to be loaded with the absolute path. Up to 256 characters
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0010	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0110	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Loading system data

Reads system data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	3000	0011	0000	0000	0000	Sets command codes.
+3	0060	0000	0000	0110	0000	

+4	—	0000	0000	0000	0000	Specifies the name of the file to be loaded with the absolute path. Up to 256 characters
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0011	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0110	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Loading all data

Reads system + scene group 0 data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5000	0101	0000	0000	0000	Sets command codes.
+3	0060	0000	0000	0110	0000	
+4	—	0000	0000	0000	0000	Specifies the name of the file to be loaded with the absolute path. Up to 256 characters
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0110	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Saving scene data

Saves scene data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	1000	0001	0000	0000	0000	Sets command codes.
+3	0070	0000	0000	0111	0000	
+4	—	0000	0000	0000	0000	Specifies the number of the scene to save.
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	[Destination] Up to 256 characters
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0111	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Saving scene group data

Saves scene group data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	2000	0010	0000	0000	0000	Sets command codes.
+3	0070	0000	0000	0111	0000	
+4	—	0000	0000	0000	0000	Specifies the number of the scene group to save.
+5	—	0000	0000	0000	0000	
+6	—	0000	0000	0000	0000	[Destination] Up to 256 characters
+7	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0010	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0111	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Saving system data

Saves system data.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	3000	0011	0000	0000	0000	Sets command codes.
+3	0070	0000	0000	0111	0000	
+4	—	0000	0000	0000	0000	[Destination] Up to 256 characters
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0011	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0111	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Saves image data

Saves image data.

Command (PLC to controller)

Command area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0000	0000	Sets command codes.
+3	0000	0000	0111	0000	
+4	0000	0000	0000	0000	Specifies the image data No.
+5	0000	0000	0000	0000	
+6	0000	0000	0000	0000	[Destination] When the destination is USBDisk2\IMG01\LABEL.IFZ, set as follows. +6 5553 (US) +7 4244 (BD) +8 6973 (is) +9 6b32 (k2) +10 5c49 (\I) +11 4d47 (MG) +12 3031 (01) +13 5c4c (\L) +14 4142 (AB) +15 454c (EL) +16 2e49 (.I) +17 465a (FZ)
+7	0000	0000	0000	0000	
:	0000	0000	0000	0000	
:	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0000	0000	Command code Stores response target command codes.
+3	0000	0000	0111	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Saving all image data

Writes all the image data in the image buffer (specified with [main unit logging image]) to external memory in ifz format.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4010	0100	0000	0001	0000	Sets command codes.
+3	0070	0000	0000	0111	0000	
+4	—	0000	0000	0000	0000	[Destination] Up to 256 characters
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0001	0000	Command code Store response target command codes.
+3	0000	0000	0111	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Saving last logging image

Saves the last logging image.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	4020	0100	0000	0010	0000	Sets command codes.
+3	0070	0000	0000	0111	0000	
+4	—	0000	0000	0000	0000	[Destination] Up to 256 characters When the destination to save to is USBDisk2\IMG01\LABEL.IFZ, set as follows. +6 5553 (US) +7 4244 (BD) +8 6973 (is) +9 6b32 (k2) +10 5c49 (\I) +11 4d47 (MG) +12 3031 (01) +13 5c4c (\L) +14 4142 (AB) +15 454c (EL) +16 2e49 (.I) +17 465a (FZ)
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0010	0000	Command code Store response target command codes.
+3	0000	0000	0111	0000	

+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Saving all data

The system + scene group 0 data currently being used by the controller is saved to a file.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	5000	0101	0000	0000	0000	Sets command codes.
+3	0070	0000	0000	0111	0000	
+4	—	0000	0000	0000	0000	[Destination] Up to 256 characters
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0101	0000	0000	0000	Command code Store response target command codes.
+3	0000	0000	0111	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

Screen capture

Captures the screen. The folder into which the captured image is saved depends on the system data setting. Saves with the file name in the argument. If the file name extension is other than ".bmp", then ".bmp" is added to the file name.

Command (PLC to controller)

Command area top channel	Command code	Bit				Description
		15-12	11-8	7-4	3-0	
+2	6010	0110	0000	0001	0000	Sets command codes.
+3	0070	0000	0000	0111	0000	

+4	—	0000	0000	0000	0000	Specifies the save destination and file name for saving with an absolute path. When 00 00 00 00 is set in +4 or higher, the command operates without an argument.
+5	—	0000	0000	0000	0000	

Response (Controller to PLC)

Response area top channel	Bit				Description
	15-12	11-8	7-4	3-0	
+2	0100	0000	0011	0000	Command code Store response target command codes.
+3	0000	0000	0001	0000	
+4	0000	0000	0000	0000	Response code Command execution result OK: 0 (0000 0000) NG: -1 (FFFF FFFF)
+5	0000	0000	0000	0000	

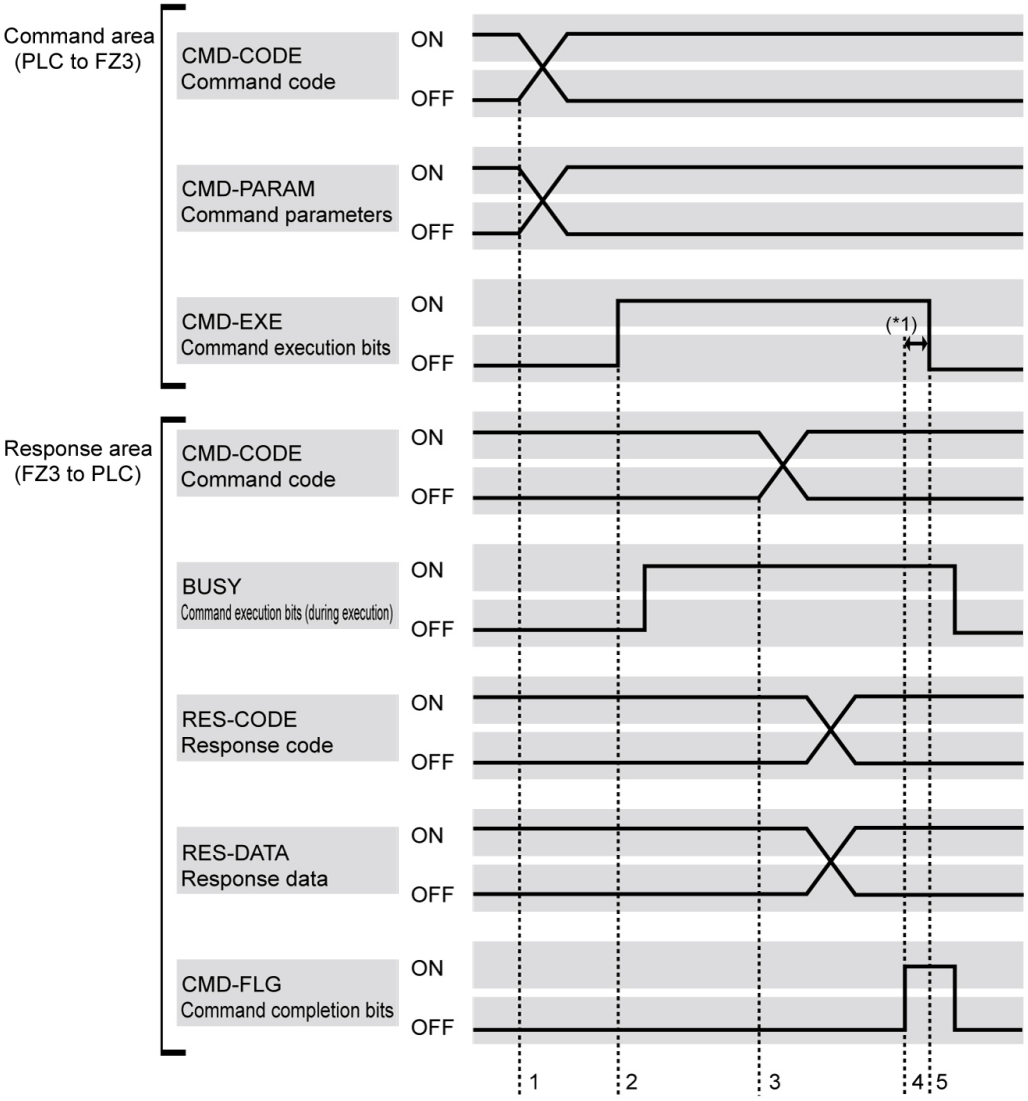
Data Output (PLC Link)

Either fixed point output or floating point output can be selected for data output.
Reference: Data Output (p.574)

Timing Chart (PLC Link)

This section explains timing charts for command, response, output, and measurement commands.

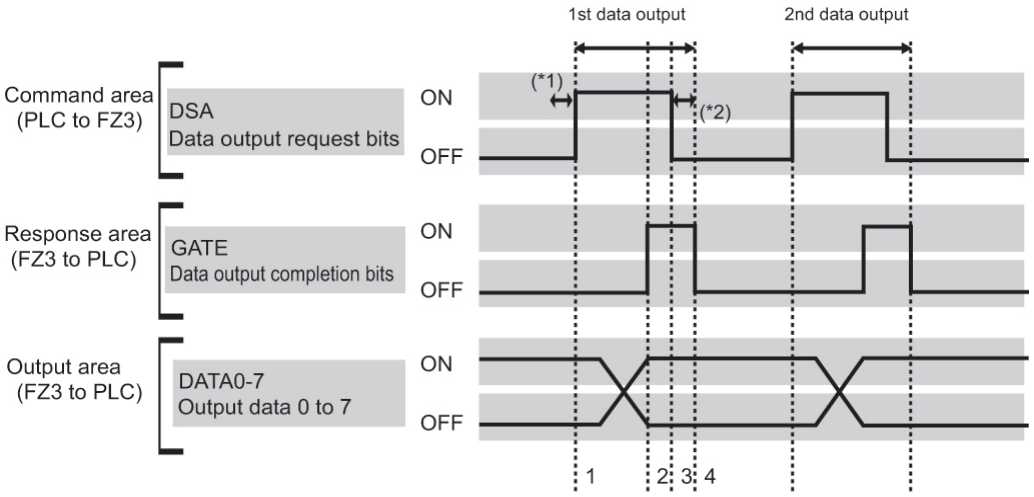
Command to Response



1. CMD-CODE and CMD-PARAM are set from the PLC, and then CMD-EXE is turned on. The FZ3 receives an execution instruction.
2. When the FZ3 receives the execution instruction, BUSY is turned on and the command is executed.
3. When the FZ3 completes execution, CMD-CODE, RES-CODE, and RES-DATA are set and then CMD-FLG is turned on.
4. The PLC confirms that CMD-FLG has turned on and then CMD-EXE is turned off.
5. The FZ3 confirms that CMD-EXE has turned off and then CMD-FLG and BUSY are turned off.

*1: If CMD-EXE is not turned off within the retry interval (0 to 999999 ms), CMD-FLG and BUSY are forcibly turned off.

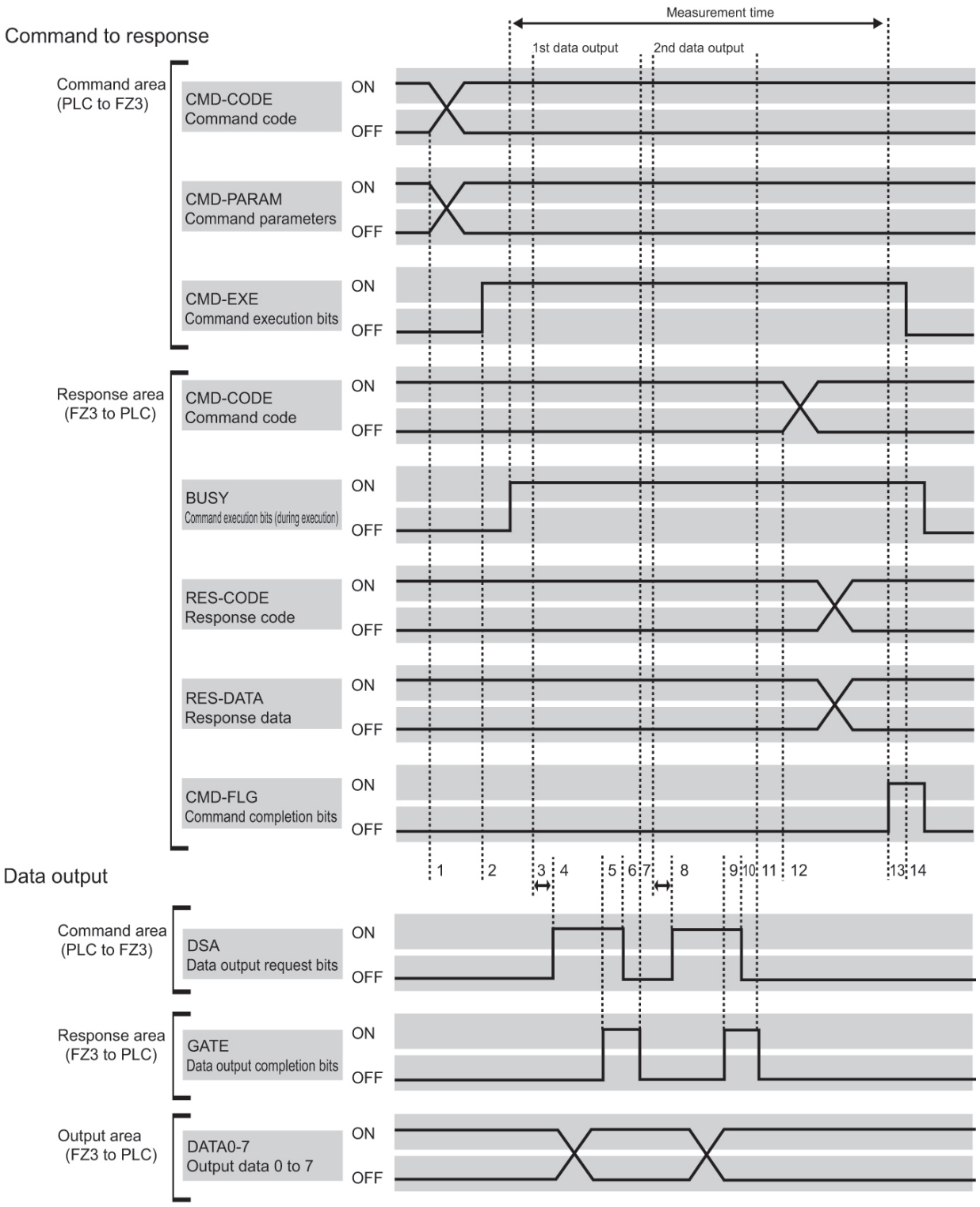
Data Output



1. Turn on DSA from the PLC and issue a data output request.
2. The FZ3 outputs data. After output is complete, GATE is turned on.
3. The PLC confirms that GATE has turned on, loads data, and then the DSA is turned off.
4. The FZ3 confirms that the DSA has turned off and then GATE is turned off.
   After measurement completion, the DSA is turned on from the PLC and the next data output is requested.

*1: If DSA is not turned on within the retry interval (0 to 999999 ms) after the processing flow has been adjusted to the order of data output units, the GATE will be forcibly turned off and data output will end. Use caution as data will be deleted.
*2: If the DSA is not turned off within the retry interval (0 to 999999 ms), GATE is forcibly turned off and output is ended.

Measurement Command Details

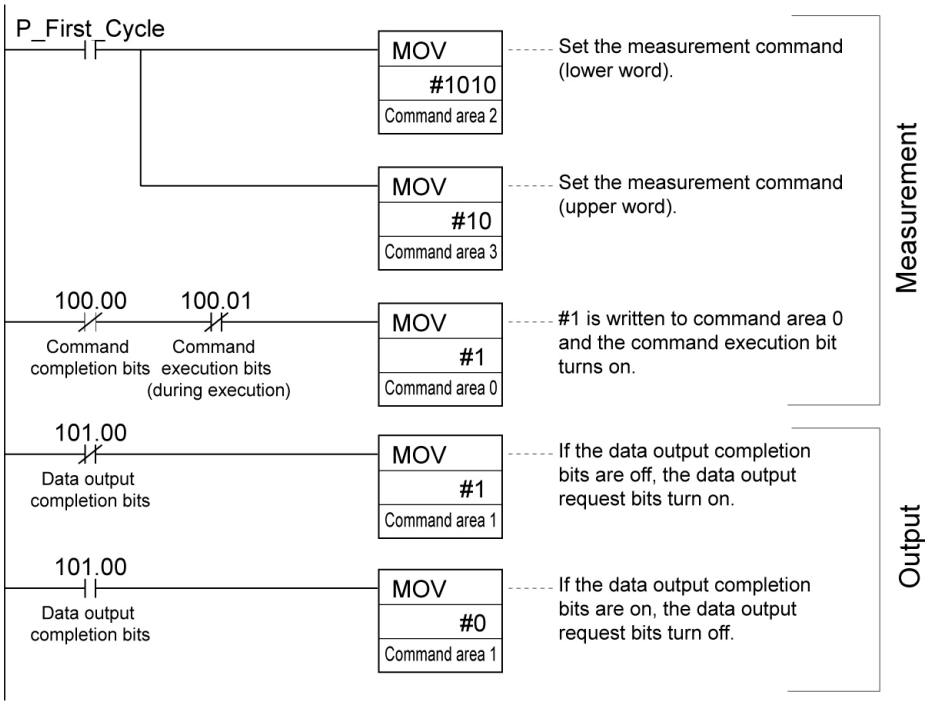


1. CMD-CODE and CMD-PARAM are set from the PLC, and then CMD-EXE is turned on. The FZ3 receives an execution instruction.
2. When the FZ3 receives the execution instruction, BUSY is turned on and the command is executed.
3. If DSA is not turned on within the retry interval (0 to 999999 ms) after the processing flow has been adjusted to the order of data output units, the GATE will be forcibly turned off and data output will end.
4. After measurement completion, the DSA is turned on from the PLC and data output is requested.
5. The FZ3 outputs data. After output is complete, GATE is turned on.
6. The PLC confirms that GATE has turned on, loads data, and then the DSA is turned off.
7. The FZ3 confirms that the DSA has turned off and then GATE is turned off. If there are 2 or more serial data output units in the processing flow, turn on DSA from the PLC and issue the next data output request.

   8 to 11. 2nd data output (same as 4 to 7)
12. When the FZ3 completes execution, CMD-CODE, RES-CODE, and RES-DATA are set and then CMD-FLG is turned on.
13. The PLC confirms that CMD-FLG has turned on and then CMD-EXE is turned off.
14. The FZ3 confirms that CMD-EXE has turned off and then CMD-FLG and BUSY are turned off.

Ladder Program Example (PLC Link)

This section shows a PLC ladder program example.



Controlling/Outputting through Serial Communication (Non-procedure)

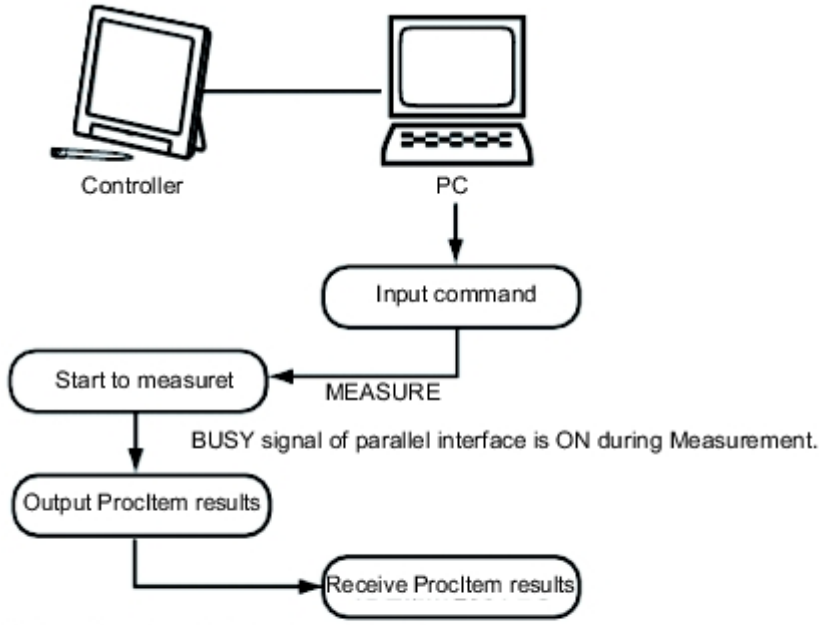
This section describes how to set required communication specifications and describes the I/O format for communication with external devices via serial interface (RS-232C/422 connection) using a non-procedure method with commands. Communication is performed via the Ethernet using the UDP/IP, TCP/IP protocols.

Communication Processing Flow (Non-procedure)

This section explains the processing flow of serial (non-procedure) communication.

1:1 connection

Example) Input measurement command and acquire the results



* When "Flow Control" is set to "Xon/Xoff".
If a PC has no response within preset overtime, line breakage or PC malfunction maybe occur, signalling an overtime error.
Error message will displayed in the window of controller and ERR signal of parallel interface is ON.

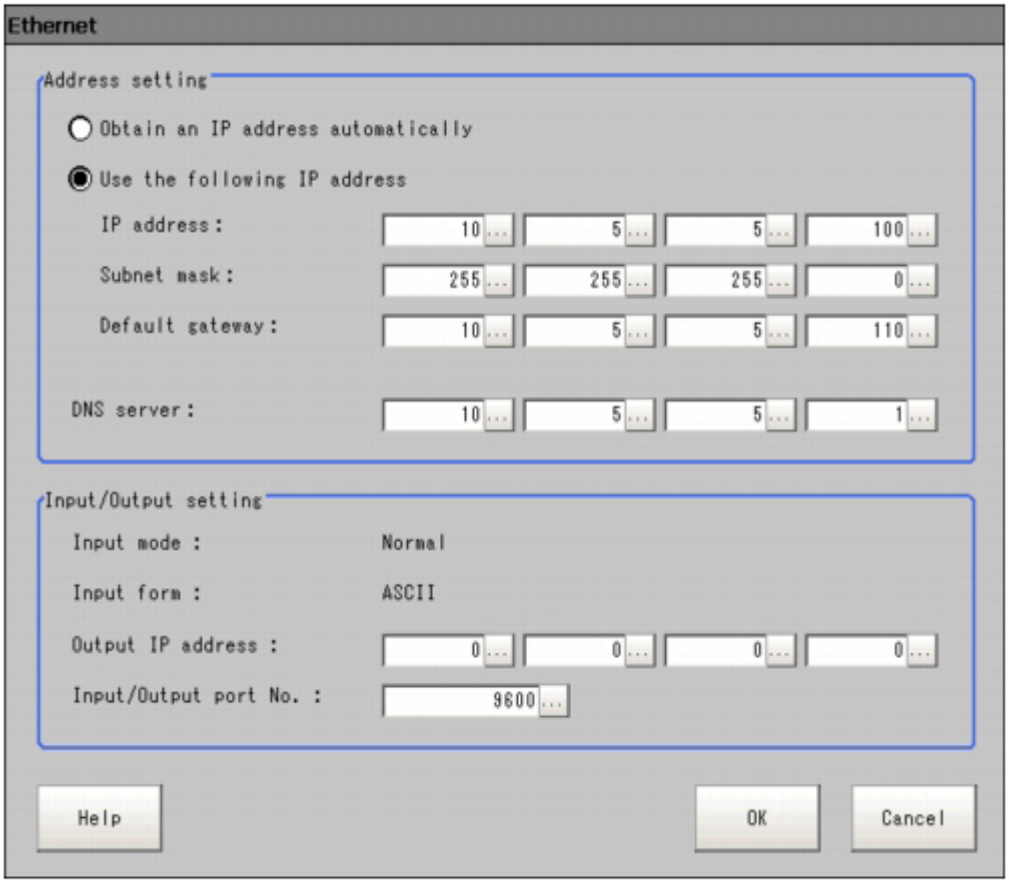
Setting Communication Specifications (Ethernet - Non-procedure)

Communication specifications such as communication speed and IP addresses are set for Ethernet communication.
Reference: Setting Communication Specifications (RS-232C/422 - Non-procedure) (p.439)

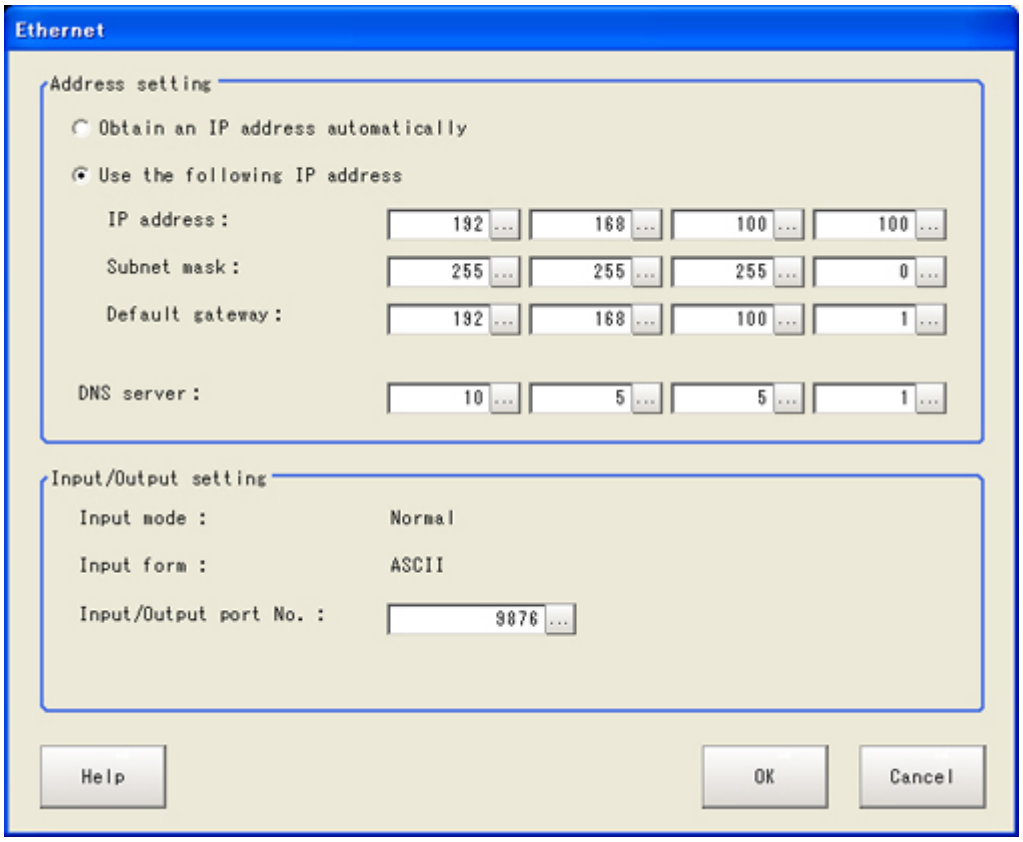
Important

- Before setting the communication specification, set the [Serial (Ethernet)] communication module to [Non-procedure (UDP)], [Non-procedure (TCP)], or [Non-procedure (UDP) (Fxxx series method)]. Save the setting to the controller and then restart the system.
  Reference: Setting the Start-up Status [Startup Setting] (p.347)
- Use the same communication specification settings for the controller and the external device.
- When making system settings/Ethernet settings, do not send external input into the Ethernet.
- If the operation mode (FZ4-11 □ □ /H11 □ □ only) is set to [Multi-line random-trigger mode], the controller address cannot be set for line 1. (The same setting for line 0 is used.)
- If the operation mode (FZ4-11 □ □ /H11 □ □ only) is set to [Multi-line random-trigger mode], set a different port number for line 0 and line 1.

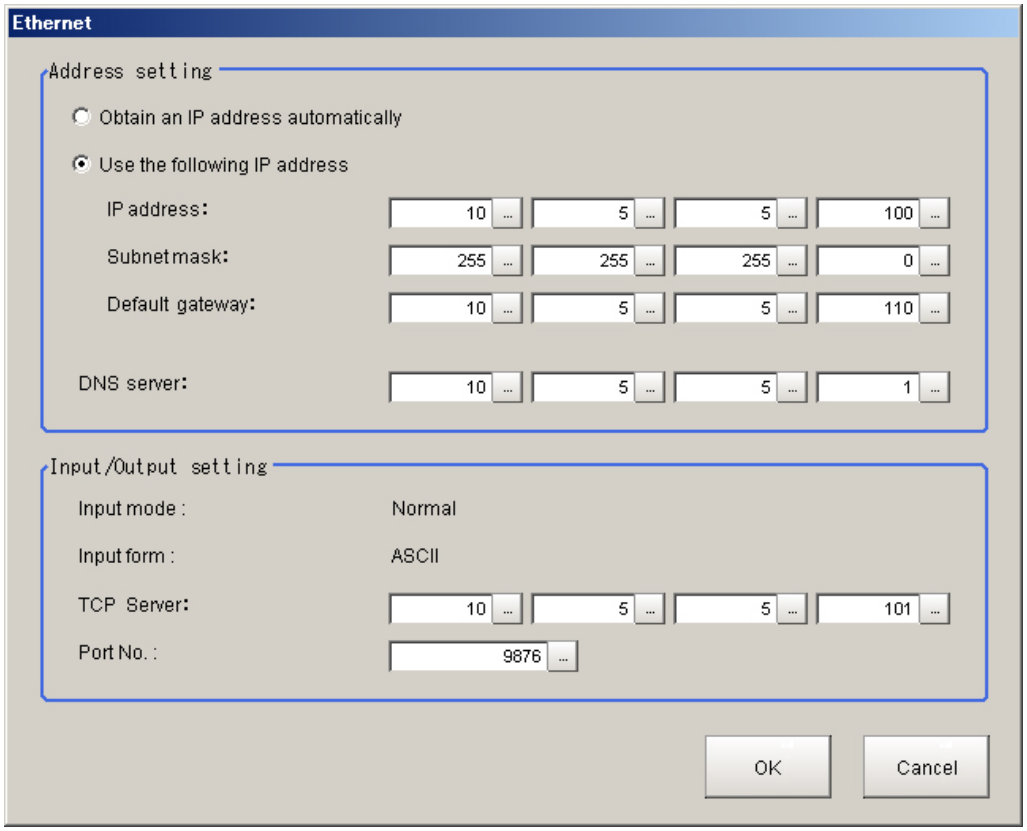
1. On the Main screen, tap [System] menu - [Communication] - [EtherNet non-procedure (xxx)]. (xxx depends on the communication module.)
   The Ethernet window is displayed.
2. Set the following items.
   Non-procedure (UDP)



Non-procedure (TCP)



Non-procedure (TCP Client)



Setting item		Setting value [Factory default]	Description
Address setting			
	・ Obtain an IP address automatically ・ [Use the following IP address]		Set the IP address of the controller. When "Obtain an IP address automatically" is selected, the IP address of the controller will be automatically obtained. When "Use the following IP address" is selected, set the IP address, subnet mask, and the default gateway address.
	IP address	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [10.5.5.100]	Input the controller IP address.
	Subnet mask	0.0.0.0 to 255.255.255.255 [255.255.255.0]	Input the subnet mask address.
	Default gateway	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [10.5.5.110]	Input the default gateway address.
	DNS server	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [10.5.5.1]	Input the DNS server address.
I/O setting			
	Input mode	[Normal]	This item cannot be changed.
	Input form	[ASCII]	This item cannot be changed.
	Output IP address[Note 1]	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [0.0.0.0]	Input the output destination IP address.
	TCP Server[Note 2]	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [10.5.5.101]	Input the TCP server IP address.
	Input/Output port No.	0 to 65535 [9600] [9876] [Note 3]	Set the port No. to use for data I/O with the controller. Set the same No. as on the host side.

[Note 1]: This is not displayed if the communication module is set to "Non-procedure (TCP)" or "non-procedure (TCP Client)".

[Note 2]: This is only displayed if the communication module is set to "non-procedure (TCP Client)".
[Note 3]: Only when the communication module is set to "Non-procedure (TCP)" or "non-procedure (TCP Client)", the initial setting value becomes [9876].
Reference: ▶ Setting the Start-up Status [Startup Setting] (p.347)

3. Tap [OK].
The settings are confirmed and the Ethernet window closes.

Setting Communication Specifications (RS-232C/422 - Non-procedure)

Communication specifications such as communication speed and IP addresses are set for serial interface (RS-232C/422 connection) communication.
Reference: ▶ Setting Communication Specifications (Ethernet - Non-procedure) (p.435)

Important

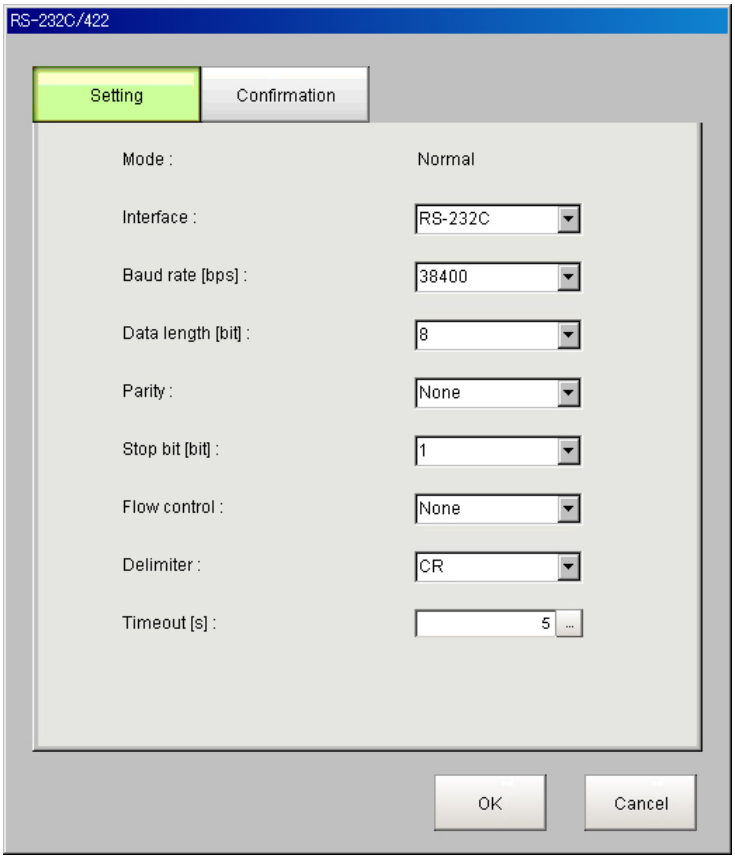
- Before setting the communication specifications, set the "Serial (RS-232C/422)" communication module to "Normal" or "Normal (Fxxx method)", save the setting to the controller, and then restart the system.
  Reference: ▶ Setting the Start-up Status [Startup Setting] (p.347)
- Use the same communication specification settings for the controller and the external device.
- If the operation mode (FZ4-11 □ □ /H11 □ □ only) is set to [Multi-line random-trigger mode], this setting is not supported for line 1.
- RS-422 is disabled on the FZ4-L35 □ series.

Reference

- During setting of communication specifications, input signals cannot be handled. However, the input status can be checked with [confirmation].
  Reference: ▶ Checking Communication Status (Non-procedure) (p.441)
- When data is output via serial communication, output is suspended while communication specifications are being set.

1. On the Main screen, tap the [System] menu - [Communication] - [RS-232C/422:Normal].
The Serial window is displayed.

2. Tap [Setting] to set communication specifications.



Item	Setting value [Factory default]	Description
Interface	・ [RS-232C] ・ RS-422	Adjust to the PC communication specifications.
Band rate [bps] [Note 1]	・ 2400 ・ 4800 ・ 9600 ・ 19200 ・ [38400] ・ 57600 ・ 115200	Adjust to the PC communication specifications.
Data length [bit]	・ 7 ・ [8]	Adjust to the PC communication specifications.
Parity	・ [OFF] ・ Odd ・ Even	
Stop bit [bit]	・ [1] ・ 2	
Flow control	[OFF]	Flow control is not performed with software. If the time in which there is no response from external devices reaches the timeout setting time, a timeout error occurs and an error message is displayed in the window. The parallel interface ERROR signal also turns on.
	Xon/Xoff	Flow control is performed with software. Data is sent according to the Xon/Xoff codes from external devices.

Delimiter	・ [CR] ・ LF ・ CR+LF	Adjust to the PC communication specifications.
Timeout [s]	1 to 120 [5]	Set the time in which a timeout error will occur in seconds.

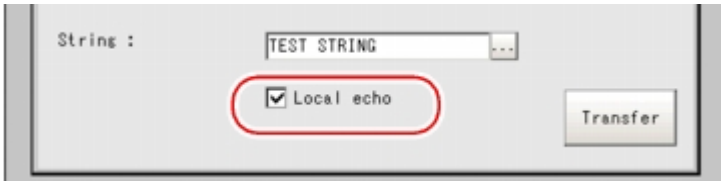
[Note 1]: If a speed of [38400 bps] or higher is selected, effective communication cannot be guaranteed depending on the cable length because speeds of over 20 kbps are not defined in RS-232C standards. In this case, set the communication speed at [19200 bps] or lower.

3. Tap [OK].
   The settings are confirmed and the Serial window closes.

Checking Communication Status (Non-procedure)

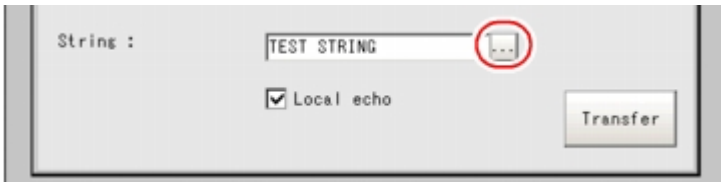
Check the communication status with connected external devices using the serial interface. You can check whether wiring and communication settings have been performed correctly.

1. On the Main screen, tap the [System] menu - [Communication] - [RS-232C/422:Normal].
   The Serial window is displayed.
2. Tap [Confirmation] to check the I/O status.
3. Check or uncheck the "Local echo" check box.

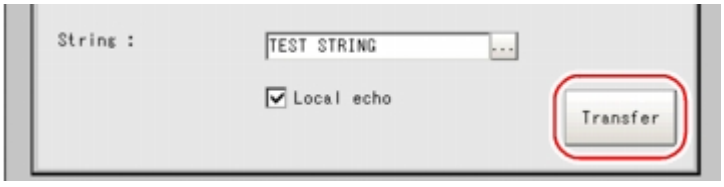


When it is checked, the transfer character string from the device is displayed in the Confirmation window.

4. Any character string can be input when editing the character string to be sent through "Transfer".
   A character string with up to 12 characters can be entered.



5. Tap [Transfer].



Contents of "String" are displayed on the window. Check that there are no problems.

ON	Description
[Send]	Character strings sent from external devices are displayed.
[Receive]	Character strings received from external devices are displayed.

6. Tap [OK].

The Serial window closes.

Command Format (Non-procedure)

This section explains the format of commands used in non-procedure method.

Important

- Japanese characters cannot be used. To load a scene, etc., set the file name beforehand using characters other than Japanese.

When Ethernet is used

For Ethernet (UDP) connections, delimiters are not required at the commands. Also note that there are no delimiters for responses.
For Ethernet (TCP) connections, delimiters are required at the commands. Also note that there are delimiters for responses.
As with scene number acquisition commands, when acquisition data and an OK response exist next to each other, the acquisition data and the OK response are sent as separate packets.
Reference: ▸ Command List (Non-procedure) (p.443)

Input format example (When using DISPCOND to acquire the display status)

<Command format>

I	M	A	G	E	D	I	S	P	C	O	N	D	C_R

<Response format>

Display state

O	K

Reference

- About OK Response
  With the Normal communication method, OK response is returned when the controller accepted a command.
  With Normal (Fxxx series method), OK response is returned when the command execution is completed.
  Reference: ▸ Setting the Start-up Status [Startup Setting] (p.347)

Important

- With serial data output (when Ethernet output is set), up to 128 processing units can be registered. Note, however, that not all data may be received depending on the network environment being used, PC performance, and the software for receiving data.

When serial interface (RS-232C/422 connection) is used

Communication specifications are performed according to the settings in Reference: ▸ Setting Communication Specifications (RS-232C/422 - Non-procedure) (p.439) .

Example of input format (SCENE command)

S	C	E	N	E				C_R

Scene No. (max. 2 digits)

Enter a delimiter at the end of commands.

In this manual, delimiters are expressed with " C_R ".

Separate parameters with spaces. (Not required before delimiters.)
In the following cases, an error occurs. The system quits abnormally and the return values are returned when an error occurs.

- When non-existing commands are specified
- The number of parameters is incorrect
- The range of the parameters is incorrect
- The content of parameters is incorrect
- When action cannot be ended correctly with an action instruction command

Important

- Commands can be input and measurement results can be output only when the Main screen is at the front and the BUSY signal is OFF. When using only the serial commands (normal), the command execution completion (BUSY OFF) can be recognized with the Fxxx method. Cannot receive commands when setting windows or the Edit Flow windows are displayed (excluding Serial - Confirmation). On the Main screen, even if the screen is switched to the Edit Flow window, etc., the data output after measurement will not be interrupted before all data is output. Can not react to commands when windows other than the Main screen are displayed.

Command List (Non-procedure)

This section explains the input format for each command used in the serial normal method.
Commands are input with ASCII code.Both lowercase and uppercase letters can be used.
FZ4-11 □ □ /FZ4-H11 □ □
The configuration is as follows: USBDisk:E, USBDisk2:F, USBDisk3:G, and USBDisk4:H.

Execute command

Command	Abbreviation	Function	References
BRUNCHSTART	BSU	Branches to the flow head (processing unit No. 0)	Reference: Details (p.448)
CLRMEAS	OFF	Clears all of the measurement values of the current scenes	Reference: Details (p.449)
CPYSCENE	CSD	Copies scene data	Reference: Details (p.449)
DATASAVE	OFF	Saves System + Scene group data in the controller's memory	Reference: Details (p.453)
DELSCENE	DSD	Deletes scene data	Reference: Details (p.456)
ECHO	EEC	Returns an arbitrary string as it is to the external device, which has sent the string	Reference: Details (p.460)
IMAGEFIT	EIF	Returns the display position and display zoom ratio to their initial values	Reference: Details (p.466)
IMAGESCROLL	EIS	Moves the image display position in parallel the specified distance	Reference: Details (p.471)
IMAGEZOOM	EIZ	Zooms in/out the image display by the specified zoom ratio	Reference: Details (p.477)
MEASURE	M	Perform measurement once	Reference: Details (p.487)
		Start continuous measurement	Reference: Details (p.487)
		Complete continuous measurement	Reference: Details (p.488)
MEASUREUNIT	MTU	Executes measurement tests on specified units	Reference: Details (p.489)
MOVSCENE	MSD	Moves scene data	Reference: Details (p.489)
REGIMAGE	RID	Registers specified image data as registered image	Reference: Details (p.498)
		Loads the specified registered data as a measurement image	
RESET	OFF	Restart the controller	Reference: Details (p.500)
TIMER	TMR	Executes the specified command string after a specified delay	Reference: Details (p.512)

UPDATEMODEL	UMD	Re-registers the model data with the current image	Reference: ▶ Details (p.515)
USERACCOUNT	UAD	Adds a user account to a specified group ID	Reference: ▶ Details (p.516)
		Deletes a specified user account	

Get state command

Command	Abbreviation	Function	References
DIPORTCOND	DPC	Retrieves the states of DI terminals in batches: Active or Inactive.	Reference: ▶ Details (p.458)
IMAGEDISPCOND	IDC	Gets the image mode for the specified image display window	Reference: ▶ Details (p.464)
IMAGESUBNO	ISN	Gets the sub-number currently displayed on the specified image display window	Reference: ▶ Details (p.473)
IMAGEUNITNO	IUN	Gets the unit number currently displayed on the specified image display window	Reference: ▶ Details (p.475)
INPUTTRANSSTATE	ITS	Gets the input state of an individual communications module: Enabled or Disabled	Reference: ▶ Details (p.479)
LAYOUTNO	DLN	Gets the currently displayed layout number	Reference: ▶ Details (p.482)
LOGINACCOUNT	LAI	Acquires the user name for the currently logged in user account	Reference: ▶ Details (p.484)
LOGINACCOUNTGROUP	LAG	Acquires the affiliation group ID for the currently logged in user account	Reference: ▶ Details (p.486)
OPELOG	OLC	Gets logging operation state	Reference: ▶ Details (p.490)
OUTPUTTRANSSTATE	OTS	Gets the output state to an external device: Enabled or Disabled	Reference: ▶ Details (p.492)
PARAALLCOND	PAC	Retrieves terminal states except for DI in batches	Reference: ▶ Details (p.494)
PARAPORTCOND	PPC	Gets the state of the specified parallel I/O terminal: Active or Inactive	Reference: ▶ Details (p.495)
SCENE	S	Acquires the current scene No.	Reference: ▶ Details (p.500)
SCNGROUP	SG	Acquires the scene group No currently in use	Reference: ▶ Details (p.502)

State setting command

Command	Abbreviation	Function	References
DOPORTCOND	DPC	Enables/Disables the D0 terminal in batches	Reference: ▶ Details (p.459)
IMAGEDISPCOND	IDC	Sets the image mode for the specified image display window	Reference: ▶ Details (p.464)
IMAGESUBNO	ISN	Sets the sub-number to be displayed on the specified image display window	Reference: ▶ Details (p.473)
IMAGEUNITNO	IUN	Sets the unit number to be displayed on the specified image display window	Reference: ▶ Details (p.475)
INPUTTRANSSTATE	ITS	Enables/Disables inputs into an individual communications module	Reference: ▶ Details (p.479)
LAYOUTNO	DLN	Sets a layout number to switch between screens	Reference: ▶ Details (p.482)
LOGINACCOUNT	LAI	Alters the user account used by the user currently logging in	Reference: ▶ Details (p.484)
OPELOGCOND	OLC	Sets logged operation state	Reference: ▶ Details (p.490)
OUTPUTTRANSSTATE	OTS	Enables/Disables outputs to external devices.	Reference: ▶ Details (p.492)
PARAALLCOND	PAC	Sets terminal states except for D0 in batches	Reference: ▶ Details (p.494)
PARAPORTCOND	PPC	Activates/Deactivates the specified parallel I/O terminal	Reference: ▶ Details (p.495)
SCENE	S	Switches scene No. currently being used	Reference: ▶ Details (p.500)
SCNGROUP	SG	Switch the scene group No.	Reference: ▶ Details (p.502)

Data read command

Command	Abbreviation	Function	References
DATALOGCOND	DLC	Acquires the set data logging condition	Reference: ▶ Details (p.450)

DATALOGFOLDER	DLF	Gets the defined data logging folder name	Reference: Details (p.452)
DATE	OFF	Acquires the current date and time	Reference: Details (p.454)
DIOFFSET	DIO	Acquires the set DI terminal offset data	Reference: Details (p.457)
IMAGECAPTUREFOLDER	ICF	Gets the defined screen capture folder name	Reference: Details (p.462)
IMAGELOGFOLDER	ILF	Gets the defined image logging folder name	Reference: Details (p.468)
IMAGELOGHEADER	ILH	Acquires the set image logging prefix	Reference: Details (p.470)
SYSDATA	OFF	Acquires settings related to image logging	Reference: Details (p.507)
UNITDATA	UD	Acquires the parameters and/or measurement values of specified processing units	Reference: Details (p.513)
VERGET	OFF	Acquires system version information	Reference: Details (p.518)

Data write command

Command	Abbreviation	Function	References
DATALOGCOND	DLC	Sets the data logging condition	Reference: Details (p.450)
DATALOGFOLDER	DLF	Setting the data logging folder name	Reference: Details (p.452)
DATE	OFF	Sets the date/time	Reference: Details (p.454)
DIOFFSET	DIO	Sets the terminal offset data	Reference: Details (p.457)
IMAGECAPTUREFOLDER	ICF	Gets the defined screen capture folder name	Reference: Details (p.462)
IMAGELOGFOLDER	ILF	Gets the defined image logging folder name	Reference: Details (p.468)
IMAGELOGHEADER	ILH	Gets the prefix of the image logging from the system data	Reference: Details (p.470)
SYSDATA	OFF	Changes settings related to image logging	Reference: Details (p.507)
UNITDATA	UD	Sets the parameters of specified processing units	Reference: Details (p.513)

File load command

Command	Abbreviation	Function	References
BKDLOAD	OFF	Loads System + Scene group 0 data	Reference: Details (p.446)
SCNLOAD	OFF	Loads the Scene data	Reference: Details (p.503)
SGRLOAD	OFF	Loads the scene group data	Reference: Details (p.505)
SYSLOAD	OFF	Loads system data	Reference: Details (p.510)

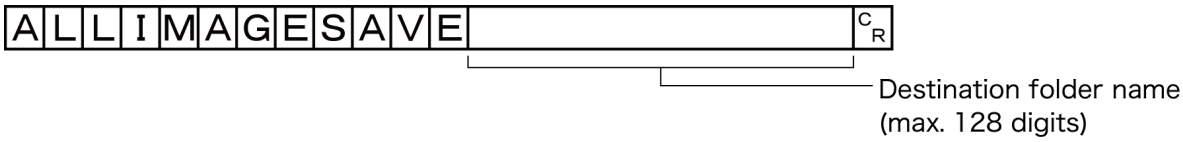
File save command

Command	Abbreviation	Function	References
ALLIMAGESAVE	AIS	Saves all the image data in the image buffer (specified with [main unit logging image])	Reference: Details (p.445)
BKDSAVE	OFF	Saves System + Scene Group 0 data in a file	Reference: Details (p.447)
IMAGECAPTURE	EIC	Captures a screen	Reference: Details (p.462)
IMGSAVE	OFF	Saves the image data	Reference: Details (p.478)
LASTIMAGESAVE	LIS	Save the image input last	Reference: Details (p.481)
SCNSAVE	OFF	Saves the Scene data	Reference: Details (p.504)
SGRSAVE	OFF	Saves the scene group data	Reference: Details (p.506)
SYSSAVE	OFF	Saves system data	Reference: Details (p.511)

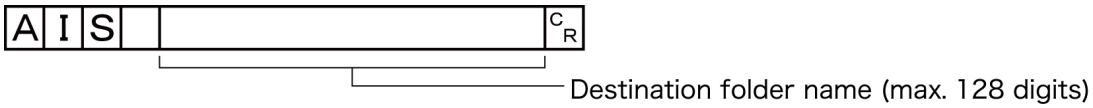
ALLIMAGESAVE or AIS

Writes all the image data in the image buffer (specified with [main unit logging image]) to external memory in ifz format.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

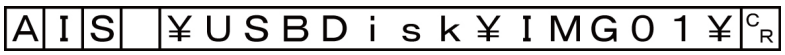
Destination folder name	Specify the name of the folder to save to with the absolute path (examples: \USBDisk\, E:\). Save destinations include directories under the following systems.

Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

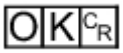
(Example)

When saving to the "IMG01" folder of the USB memory

<Command>



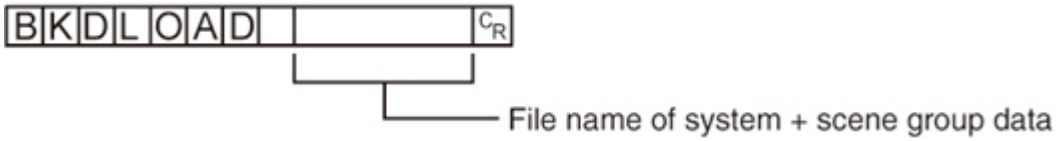
<Response>



BKDLOAD

Reads system + scene group 0 data.

<Command format>



<Response format>

When processing is performed normally

When processing is not performed normally

<Parameters explanation>

System + scene group data File name	Specifies the name of the file to be read with a definite path (ex.: \USBDisk\abc.bkd, E:\abc.bkd). Only files that are under the following systems and have a "BKD" extension can be read.

Load to	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

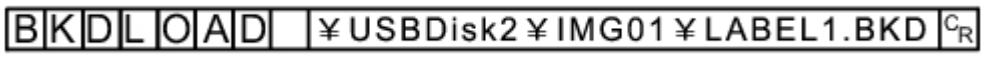
Important

- Do not turn off power to the controller until there is a response.

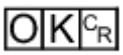
(Example)

When "LABEL1.BKD" in the "IMG01" folder of the USB memory to which the drive name "USBDisk2" is assigned is loaded to the controller

<Command>



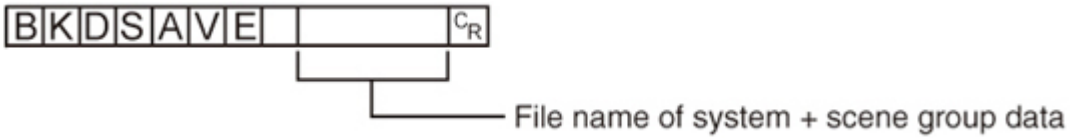
<Response>



BKDSAVE

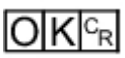
The system + scene group 0 data currently being used by the controller is saved to a file.

<Command format>



<Response format>

When processing is performed normally



When processing is not performed normally

<Parameters explanation>

File name of system + scene group data	Specifies the save destination and file name during saving with a definite path (ex.: \USBDisk\abc.bkd, E:\abc.bkd). Save destinations include directories under the following systems.Be sure to attach a "BKD" extension to the file name.

Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

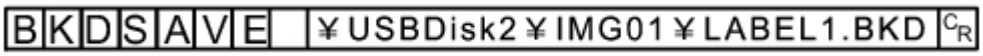
Important

- Do not turn off power to the controller until there is a response.

(Example)

When the currently used system + scene group 0 data is saved as "LABEL1.BKD" in the "IMG01" folder in the USB memory to which the drive name "USBDisk2" is assigned

<Command>



<Response>

BRUNCHSTART or BSU

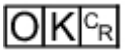
Branches to the flow head (processing unit No. 0). This command can only be executed when the corresponding flow control processing item is used.

<Command format>

or

(Response format)

When processing is performed normally



When processing is not performed normally

CLRMEAS

Clears all of the measurement values of the current scene.

<Command format>

<Response format>

When processing is performed normally

When processing is not performed normally

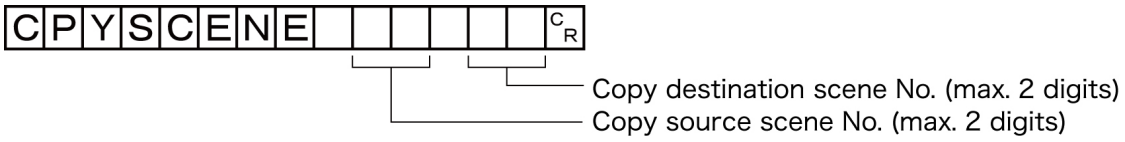
<Window display status after clearing>

Judgement result	Unmeasured (0)
Value	0
Character string	Null character

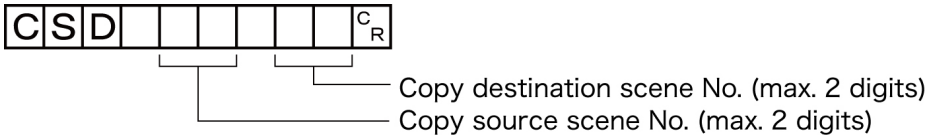
CPYSCENE or CSD

Copies the data for the scene with the number specified with command argument 1 to the scene with the number specified with command argument 2. If there is already data at the copy destination, the copied data is written over that data.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

Copy source scene No.	Specifies the scene No. to copy from (0 to the number of scenes in the scene group - 1).
Copy destination scene No.	Specifies the scene No. to copy to (0 to the number of scenes in the scene group minus 1).

(Example)

Copying the scene data for Scene 2 to Scene 10

<Command>

CSD 2 10 CR

<Response>

OK CR

DATALOGCOND or DLC

Getting the data logging condition

Gets the data logging condition for system data.
Gets the "data logging condition" on the logging setting screen.

<Command format>

DATALOGCOND CR

or

DLC CR

(Response format)

When processing is performed normally

Data logging condition CR

OK CR

When processing is not performed normally

ER CR

(Parameters explanation)

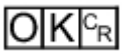
Data logging condition	0: None 1: Only NG 2: All

(Example)

When data logging condition is set to "None".

<Command>

<Response>



Setting the data logging condition.

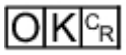
Sets the data logging condition for system data.
Sets the "Data logging condition" on the Logging Setting window .

<Command format>

or

(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

Data logging condition	0: None 1: Only NG 2: All

(Example)

When setting the data logging condition to "All"

<Command>

<Response>

DATALOGFOLDER or DLF

Getting the data logging folder name

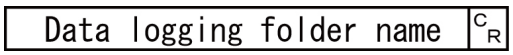
Gets the set data logging folder name.

<Command format>

or

(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

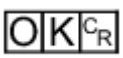
Data logging folder name	Responds with the data logging folder name with its absolute path.

(Example)

When setting the logging data save destination to "RAMDisk"

<Command>

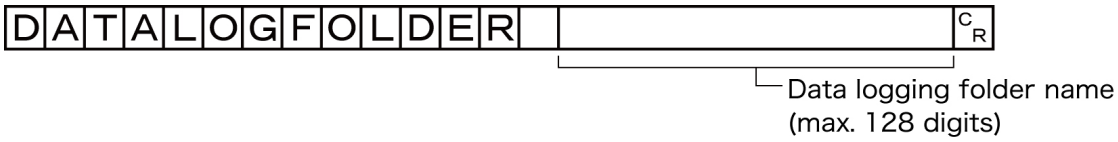
<Response>



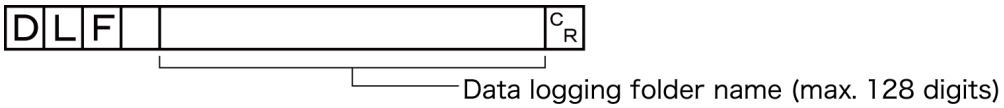
Setting the data logging folder name.

Sets the data logging folder name.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

Data logging folder name	Specify the name of the data logging folder with the absolute path (examples: \USBDisk\, E:\). Save destinations include directories under the following systems.

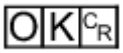
Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

(Example)

When setting the data logging folder name to "USBDisk"

<Command>

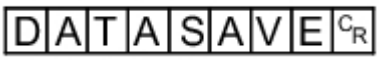
<Response>



DATASAVE

Saves system data and scene group data to the internal flash memory in the controller.

<Command format>



<Response format>

When processing is performed normally

When processing is not performed normally

Note

- If DATASAVE command is executed when using scene groups 1 to 31, system data is saved on the controller's flash memory and scene group data is saved to the USB memory. If there is no USB memory plugged in, ER is returned.
- Do not turn off power to the controller until there is a response.

DATE

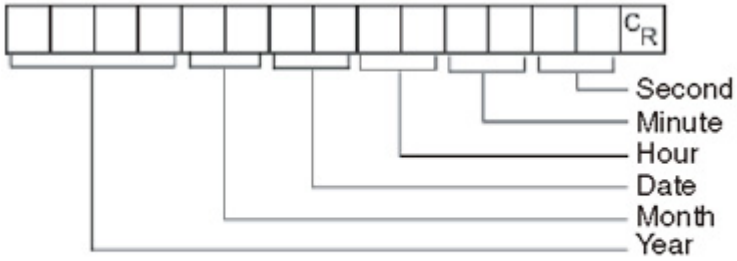
Acquiring date and time

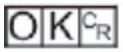
Acquires the date and time from the internal calendar timer in the controller.

<Command format>

<Response format>

When processing is performed normally





When processing is not performed normally

<Parameters explanation>

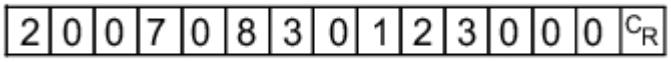
Year/Month/Date/ Hour/Minute/Second	The acquired date and time are output as a response. Year: 4 digits Month: 2 digits Date: 2 digits Hour: 2 digits Minute: 2 digits Second: 2 digits

(Example)

When the current date and time is 08/30/2007, 12:30:00

<Command>

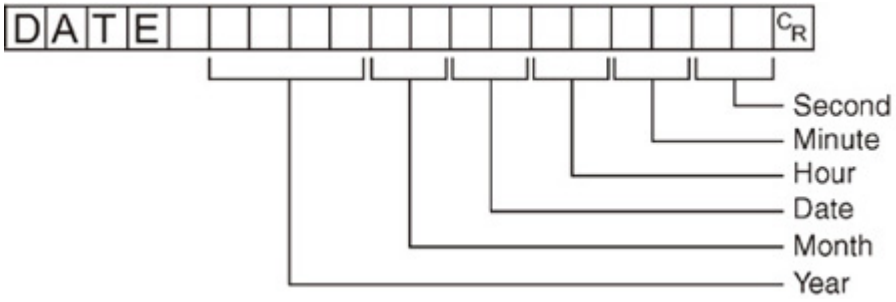
<Response>



Setting date and time

Changes the date and time of the internal calendar timer in the controller.

<Command format>



<Response format>

When processing is performed normally

When processing is not performed normally

<Parameters explanation>

Year/Month/Date/Hour/ Minute/Second	Set the date and time. Year: 4 digits Month: 2 digits Date: 2 digits Hour: 2 digits Minute: 2 digits Second: 2 digits

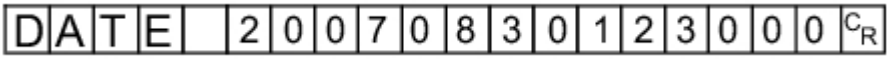
Note

- <Hour: 2 digits>, <Minute: 2 digits>, and <Second: 2 digits> can be omitted during setting.Settings cannot be updated when these are omitted, however, and the previous time will be kept unchanged.
  Allowable omission patterns include "omitting <second> only", "omitting <minute> and <second>", omitting <hour>, <minute>, and <second>". Patterns that cannot be used include "omitting <hour> only" and "omitting <minute> only".

(Example)

When changing the date and time to 8/30/2007, 12:30:00

<Command>

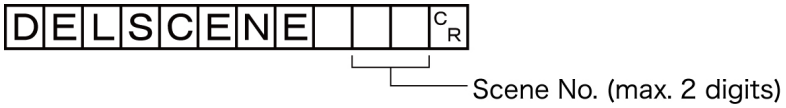


<Response>

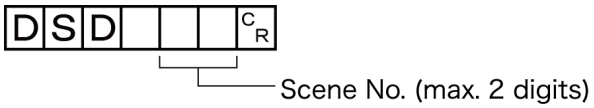
DELSCENE or DSD

Deletes the data for the scene whose number is specified with command argument 1.

<Command format>

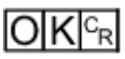


or



(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

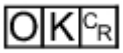
Scene No.	Specify the scene No. to delete the scene data for (0 to the number of scenes in the scene group minus 1).

(Example)

Deleting the scene data for Scene 2

<Command>

<Response>



DIOFFSET or DIO

Getting the terminal offset data

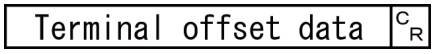
Acquires the DI terminal offset data.
The DI terminal offset is the value added to the command parameter for DI0-DI4 when a parallel command is executed.
Once the terminal offset setting command has been executed, the acquisition command is enabled.

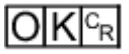
<Command format>

or

(Response format)

When processing is performed normally





When processing is not performed normally

(Parameters explanation)

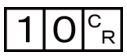
Terminal offset data	This is the set value for the terminal offset (0-9999).

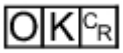
(Example)

When the terminal offset data is "10"

<Command>

<Response>

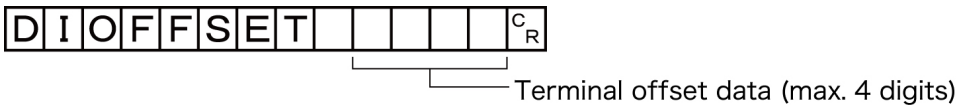




Setting the terminal offset data

Sets the DI terminal offset data.
The DI terminal offset is the value added to the command parameter for DI0-DI4 when a parallel command is executed.

<Command format>



or

(Response format)

When processing is performed normally

When processing is not performed normally

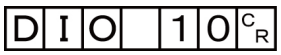
(Parameters explanation)

Terminal offset data	Specify the terminal offset data (0-9999).

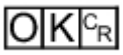
(Example)

When setting the terminal offset data to "10"

<Command>



<Response>



DIPORTCOND or DPC

Gets all the DI terminal ON/OFF states.

<Command format>

or

(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

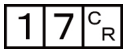
Terminal state	Responds with the DI0-DI7 states (0-255). ・1st bit: DI0 ・2nd bit: DI1 : ・8th bit: DI7

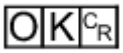
(Example)

When DI0 and DI4 are ON

<Command>

<Response>

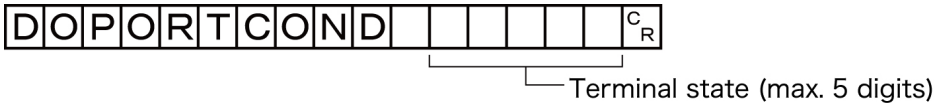




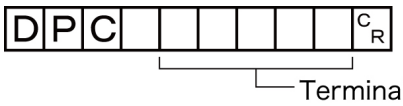
DOPORTCOND or DPC

Sets all the DO terminal ON/OFF states.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

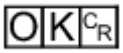
Terminal state	Specify the DO terminals to switch ON (0-65535). ・ 1st bit: DO0 ・ 2nd bit: DO1 : ・ 16th bit: DO15

(Example)

When setting DO0 and DO4 ON

<Command>

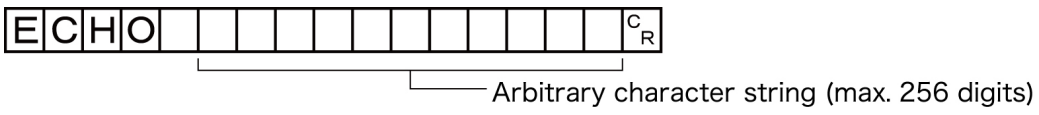
<Response>



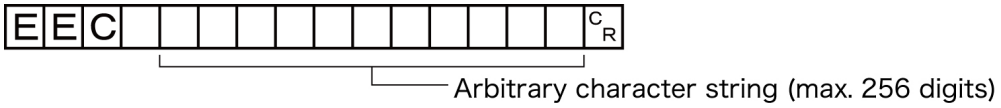
ECHO or EEC

Returns as is any character string sent by an external device. Only single-byte alphanumerics can be used.

<Command format>

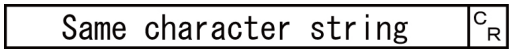


or



(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

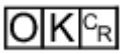
Arbitrary character string	Sets the character string returned as is. The response is the character string set here as is.

(Example)

When returning the character string "FZ4"

<Command>

<Response>



IMAGECAPTURE or EIC

Captures the screen. The folder into which the captured image is saved depends on the system data setting. The file name depends on the argument.

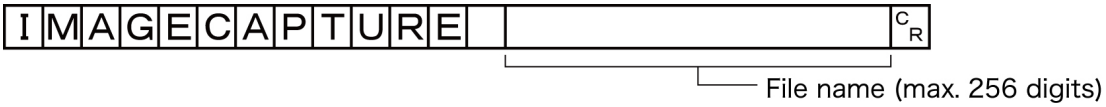
- No argument: Time stamp (Reference: ▶ Capturing Screens) (p.103))
- Argument: Saves with the file name in the argument. If the file name extension is other than ".bmp", then ".bmp" is added to the file name.

<Command format>

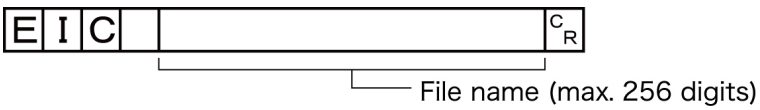
When there is no argument

or

When there is an argument

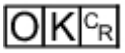


or



(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

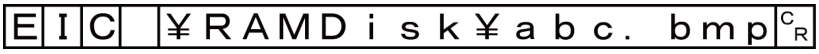
File name	Specify the save destination and file name for saving with the absolute path (Examples: C:\Data\RAMDisk\abc.bmp, \RAMDISK\abc.bmp). Be sure to attach the "BMP" extension to the file name.

Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK

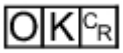
(Example)

When capturing an image to the file named "abc.bmp"

<Command>



<Response>



IMAGECAPTUREFOLDER or ICF

Getting the screen capture folder name

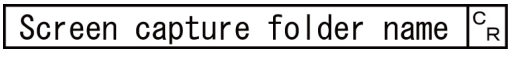
Gets the set screen capture folder name.

<Command format>

or

(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

Screen capture folder name	Responds with the name of the folder that the screen capture is saved to with its absolute path.

(Example)

When the screen capture save destination is set to "RAMDisk"

<Command>

ICF[CR]

<Response>

¥RAMDisk¥[CR]

OK[CR]

Setting the screen capture folder name

Sets the screen capture folder name.

<Command format>

IMAGECAPTUREFOLDER [ ][CR]

Image capture folder name
(max. 128 digits)

or

ICF [ ][CR]

Image capture folder name
(max. 128 digits)

(Response format)

When processing is performed normally

OK[CR]

When processing is not performed normally

ER[CR]

(Parameters explanation)

Image capture folder name	Specify the name of the folder to save the image capture into with the absolute path (examples: \USBDisk\, E:\). Save destinations include directories under the following systems.

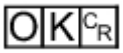
Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

(Example)

When setting the logging data folder name to "USBDisk"

<Command>

<Response>



IMAGEDISPCOND or IDC

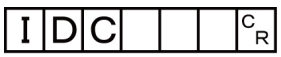
Gets image mode

Gets the image mode for the specified Image Display window.

<Command format>

Display image window number (max. 2 digits)

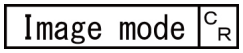
or



Display image window number (max. 2 digits)

(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

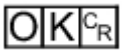
Display image window number	Specify the number (0-15) of the display image window where you are getting the image mode. Reference: ▶ Display image window numbers (p.467)
Image mode	0: Through. 1: Frozen camera image, or mixed with frozen camera image and last NG image. 2: Last NG image

(Example)

When getting the image mode of the displayed Image window 1

<Command>

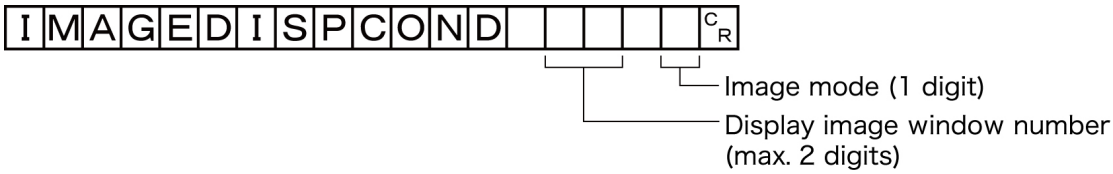
<Response>



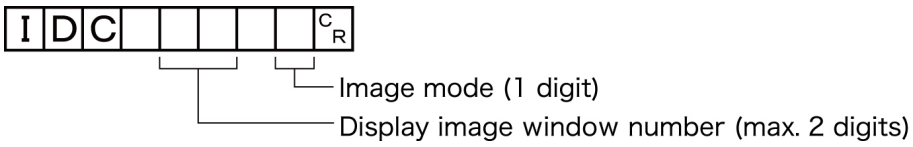
Sets image mode

Sets the image mode for the specified Image Display window.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

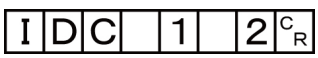
(Parameters explanation)

Display image window number	Specify the number (0-15) of the display image window where you are setting the image mode. Reference: ▶ Display image window numbers (p.467)
Image mode	0: Through. 1: Frozen camera image, or mixed with frozen camera image and last NG image. 2: Last NG image

(Example)

When setting "Last NG" for the image mode for the display image window 1

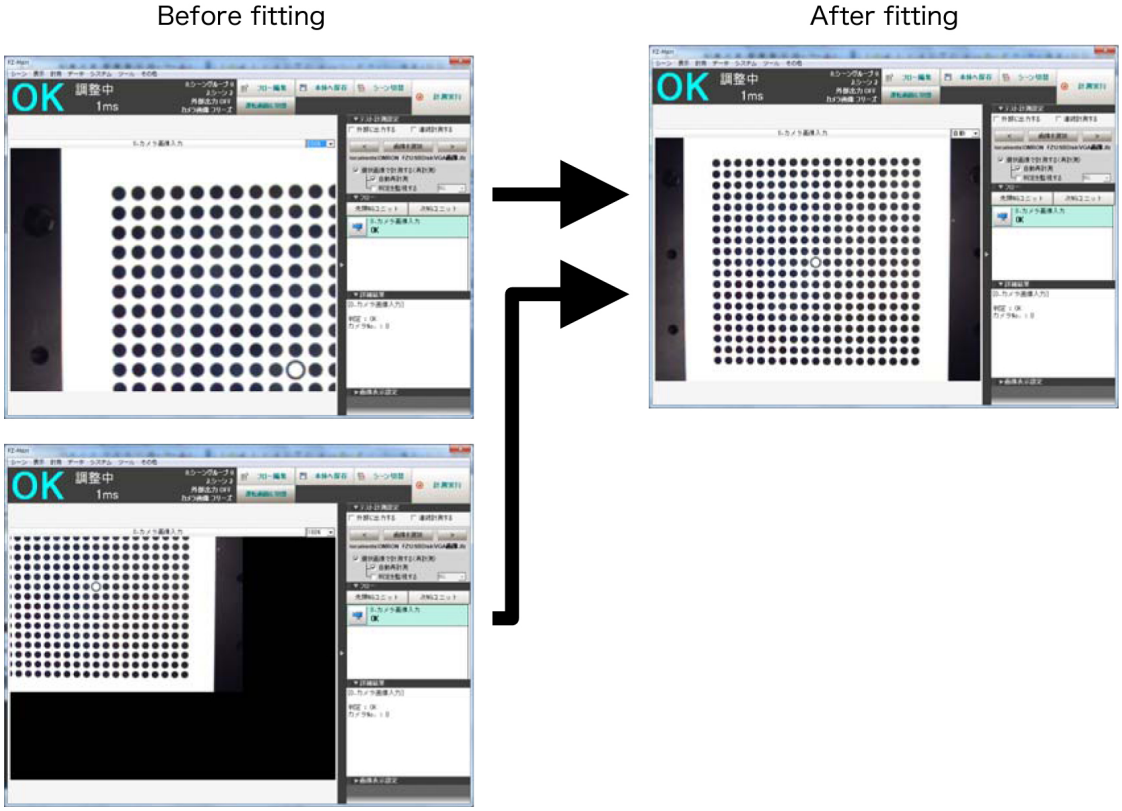
<Command>



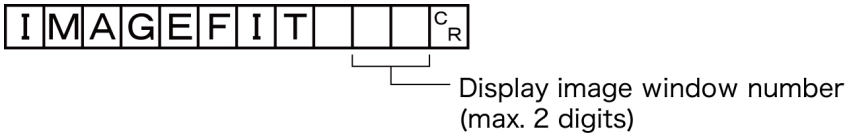
<Response>

IMAGEFIT or EIF

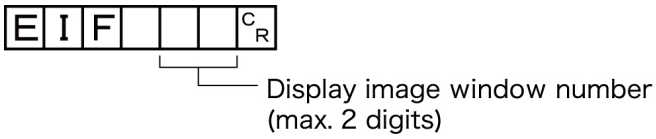
Returns the display position and display zoom ratio for the image display window to their default values.



<Command format>

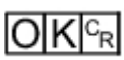


or



(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

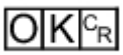
Display image window number	Specifies the number of the display image window, whose display position and display zoom ratio are returned to their default values (0 to 15).

(Example)

When returning the display position and display zoom ratio for the display image display window "1" to their default values

<Command>

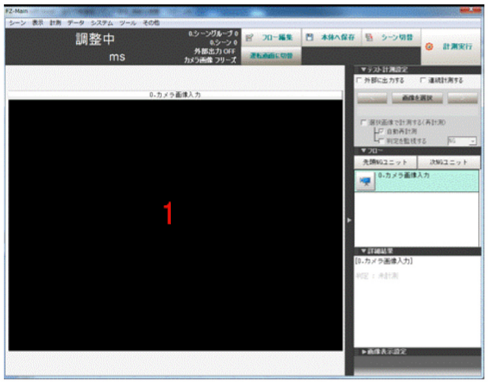
<Response>



Display image window numbers

The display image window numbers are assigned as follows according to the number of windows displayed in the image display area.

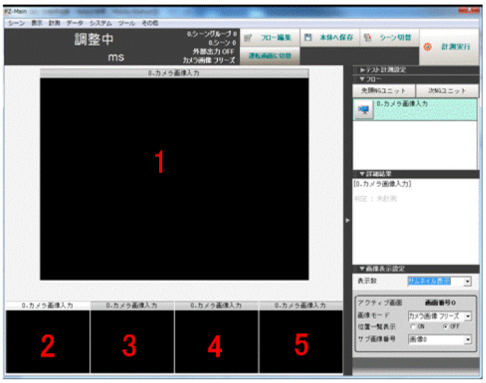
Display count: 1 screen



Display count: 2 screens

Display count: 4 screens

Display count: Thumbnail display



IMAGELOGFOLDER or ILF

Getting the image logging folder name

Gets the set image logging folder name.

<Command format>

IMAGELOGFOLDER$_{CR}$

or

ILF$_{CR}$

(Response format)

When processing is performed normally

Image logging folder name$_{CR}$

OK$_{CR}$

When processing is not performed normally

ER$_{CR}$

(Parameters explanation)

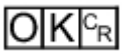
Image logging folder name	Responds with the name of the folder the logging image is saved to with its absolute path.

(Example)

When the image logging save destination is set to "RAMDisk"

<Command>

<Response>

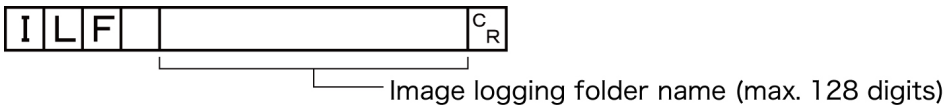


Setting the image logging folder name

Sets the image logging folder name.

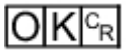
<Command format>

or



(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

Image logging folder name	Specify the name of the folder to save the logging image into with the absolute path (examples: \USBDisk\, E:\). Save destinations include directories under the following systems.

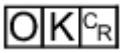
Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

(Example)

When setting the image logging folder name to "USBDisk"

<Command>

<Response>



IMAGELOGHEADER or ILH

Getting the prefix for the name of the file the image logging is saved to

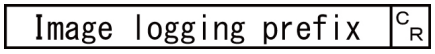
Gets the prefix for the name of the file the image logging is saved to. The maximum length of the prefix character string is 32 characters.

<Command format>

or

(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

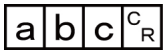
Image logging prefix	Responds with the prefix for the name of the file the image logging is saved to.

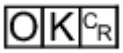
(Example)

When the prefix for the name of the file the image logging is saved to is set to "abc"

<Command>

<Response>

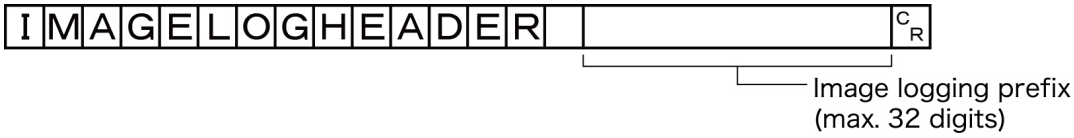




Setting the prefix for the name of the file the image logging is saved to

Sets the prefix for the name of the file the image logging is saved to. The maximum length of the prefix character string is 32 characters.

<Command format>



or

(Response format)

When processing is performed normally

When processing is not performed normally

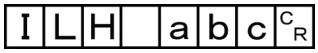
(Parameters explanation)

Image logging prefix	Sets the prefix for the name of the file the image logging is saved to (with a maximum of 32 characters). The set character string is added at the beginning of the name of the save file.

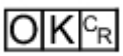
(Example)

When setting "abc" as the prefix for the name of the file the image logging is saved to

<Command>



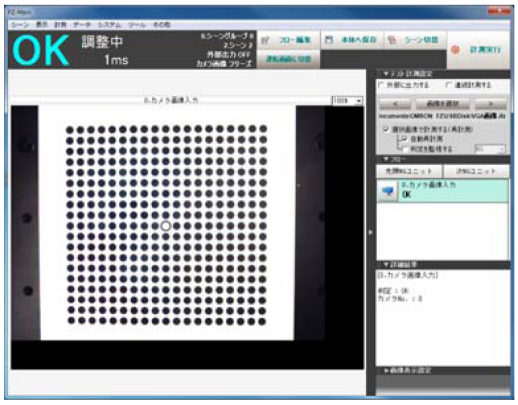
<Response>



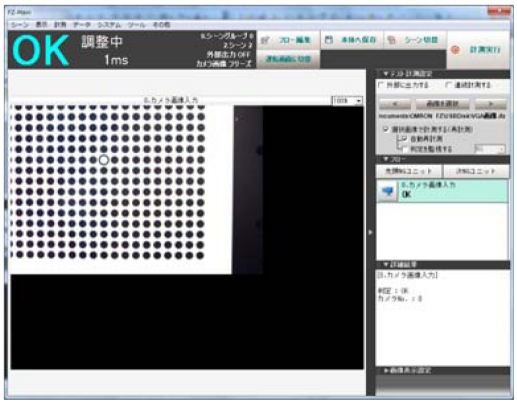
IMAGESCROLL or EIS

The image display window whose number is specified is moved the specified distance in parallel. The setting range for the movement distance is not restricted. Also, because the scale for movement is independent of the display zoom ratio, the movement is not affected by change in the zoom ratio.

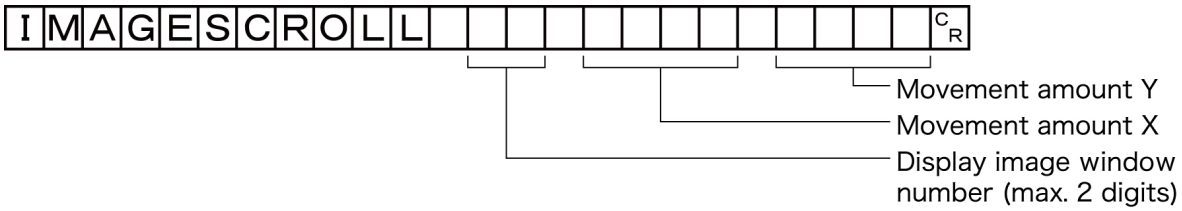
Before scrolling



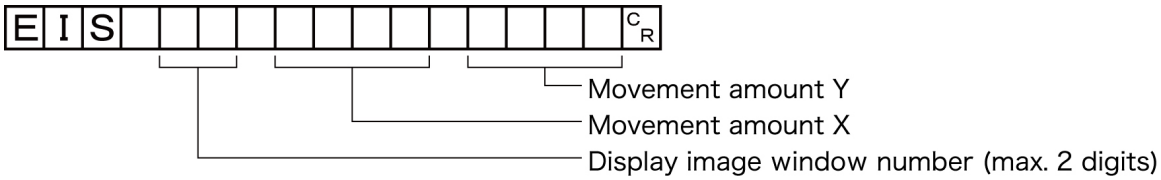
After scrolling



<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

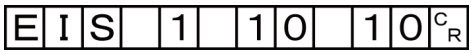
(Parameters explanation)

Display image window number	Specify the number of the display image window, whose display position and display zoom ratio are returned to their default values (0 to 15). Reference: ▶ Display image window numbers (p.467)
Movement amount X	Sets the X-direction movement distance (camera coordinate system).
Movement amount Y	Sets the Y-direction movement distance (camera coordinate system).

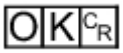
(Example)

When moving the display image display window "1" image in parallel "10" in the X direction and "10" in the Y direction

<Command>



<Response>



IMAGESUBNO or ISN

Getting the number of the currently displayed sub-image.

Gets the number of the sub-image currently displayed in the specified image display window.

<Command format>

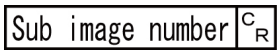
Display image window number
(max. 2 digits)

or

Display image window number
(max. 2 digits)

(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

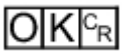
Display image window number	Specify the number (0-15) of the display image window where you are getting the image mode. Reference: ▶ Display image window numbers (p.467)
Sub image number.	Responds with the number of the sub-image displayed in the current display image window.

(Example)

When getting the number of the sub-image being displayed in display image window "1"

<Command>

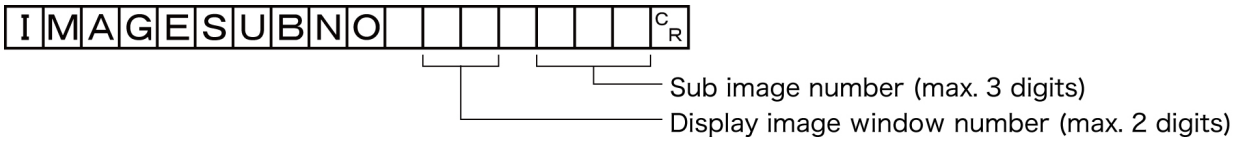
<Response>



Setting the number of the currently displayed sub-image

Sets the number of the sub-image displayed in the specified image display window.

<Command format>



or

(Response format)

When processing is performed normally

When processing is not performed normally

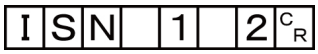
(Parameters explanation)

Display image window number	Specify the number (0-15) of the display image window where you are setting the image mode. Reference: ▶ Display image window numbers (p.467)
Sub image number.	Sets the number (-1 to 32) of the sub-image displayed in the display image window.

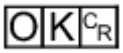
(Example)

When setting "2" as the number of the sub-image displayed in display image window "1"

<Command>



<Response>

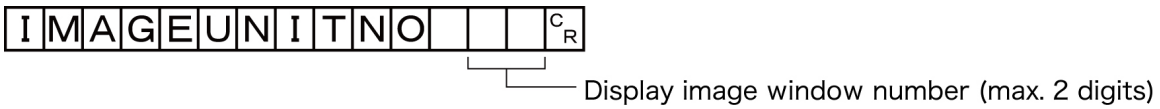


IMAGEUNITNO or IUN

Getting the number of the currently displayed unit

Gets the number of the sub-image currently displayed in the specified display image window.

<Command format>



or

(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

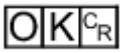
Display image window number	Specify the number of the display image window getting the unit number (0-4). Reference: ▶ Display image window numbers (p.467)
Unit No.	Responds with the number of the unit displayed in the current display image window.

(Example)

When getting the number of the unit being displayed in display image window "1"

<Command>

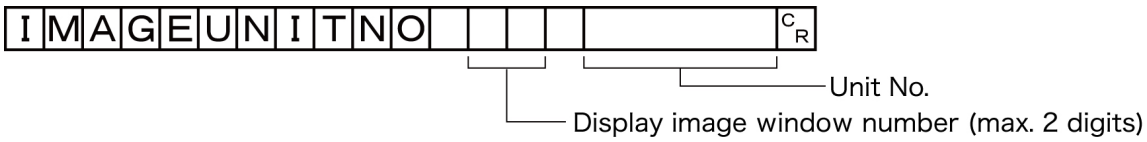
<Response>



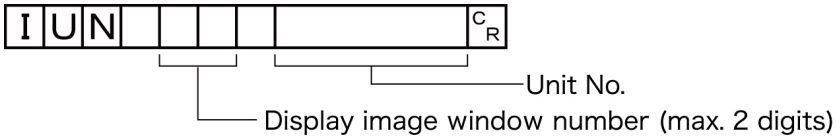
Setting the number of the displayed unit

Sets the number of the unit displayed in the specified image display window.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

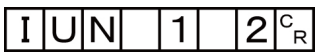
(Parameters explanation)

Display image window number	Specify the number of the display image window setting the unit number (0-4). Reference: ▶ Display image window numbers (p.467)
Unit No.	Sets the number (0 to number of units in current scene minus 1) of the unit displayed in the display image window.

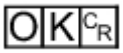
(Example)

When setting "2" as the number of the unit displayed in display image window "1"

<Command>



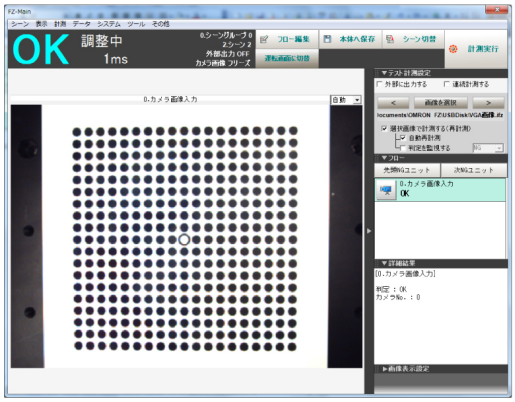
<Response>



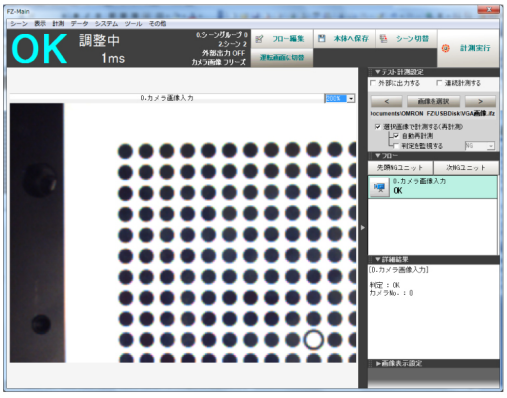
IMAGEZOOM or EIZ

Zooms the image display window whose number is specified in or out to the specified zoom ratio. The zoom ratio here is the ratio compared to the original image (100%).

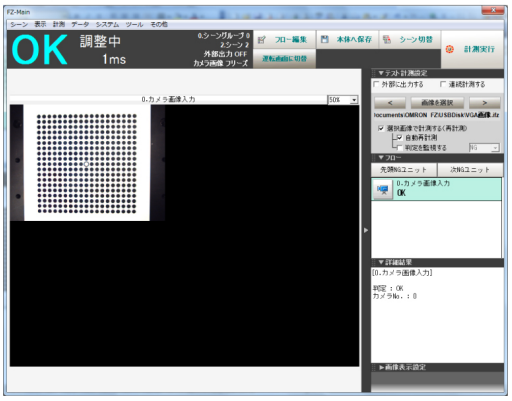
Before zooming



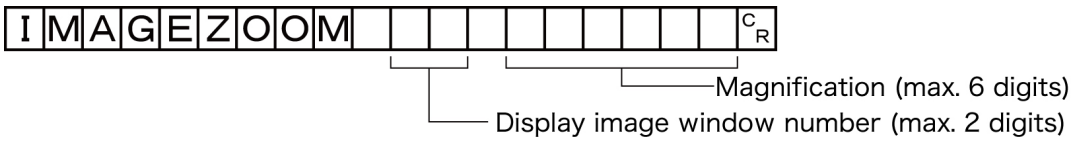
After zooming (zoom in)



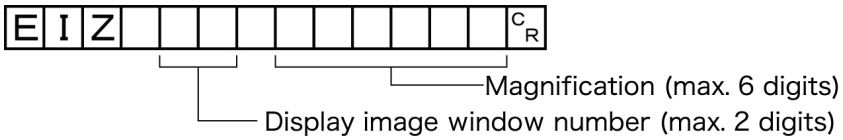
After zooming (zoom out)



<Command format>

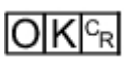


or



(Response format)

When processing is performed normally



When processing is not performed normally

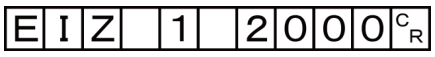
(Parameters explanation)

Display image window number	Specify the number of the display image window, whose display position and display zoom ratio are returned to their default values (0 to 15). Reference: ▸ Display image window numbers (p.467)
Magnification	Sets the zoom ratio (250-16000). 250 means 25%; 16000 means 1600%.

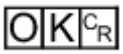
(Example)

When zooming in display image display window "1" to 200%

<Command>



<Response>



IMGSAVE

Saves image data.

<Command format>

<Response format>

When processing is performed normally

When processing is not performed normally

<Parameters explanation>

Image data No.	Specifies the No. of the image data to be saved (0 to max. number of logging images (I_MAX)). The maximum number of logging images can be a number with a maximum of 3 digits.The number of images will vary depending on the controller used and the camera connected. The image data number of the latest image is 0. Reference: ▸ About Number of Logging Images (p.611)

Save destination	Specifies the save destination and file name during saving with a definite path (ex.: \USBDisk\abc.IFZ, E:\abc.IFZ). Save destinations include directories under the following systems.Be sure to attach an "IFZ" extension to the file name.

Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

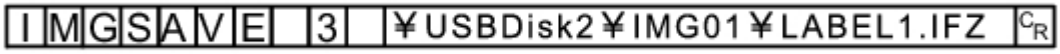
Important

- If the specified file name already exists, this existing file will be overwritten
- Do not turn off power to the controller until there is a response.

(Example)

When the image data of image data No. 3 is saved with the file name "LABEL1.IFZ" in the "IMG01" folder in the USB memory to which the drive name "USBDisk2" is assigned

<Command>



<Response>

INPUTTRANSSTATE or ITS

Getting communication module input states

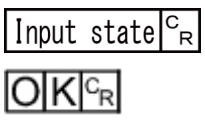
Gets the input state (permitted/prohibited) for communication modules.

<Command format>

or

(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

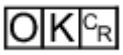
Communication module types	0: Serial (Ethernet) 1: Serial (RS-232C/422) 2: Parallel IO 3: Fieldbus 4: Remote operation
Input state	0: Prohibited 1: Permitted

(Example)

When getting the serial (Ethernet) input state

<Command>

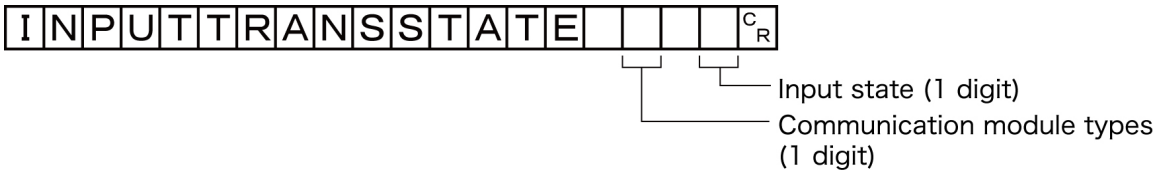
<Response>



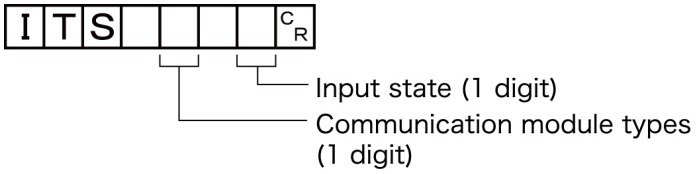
Setting communication module input states

Permits/prohibits input to communication modules.
Any communication module whose input state is set to Prohibit (0) accepts no communications whatsoever. However, inputs related to hardware (parallel STEP signals/DSA signals and ECAT STEP, etc.) are not included in the prohibition.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

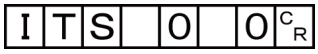
(Parameters explanation)

Communication module types	0: Serial (Ethernet) 1: Serial (RS-232C/422) 2: Parallel IO 3: Fieldbus 4: Remote operation
Input state	0: Prohibited 1: Permitted

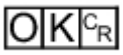
(Example)

When setting the serial (Ethernet) input state to Prohibited

<Command>



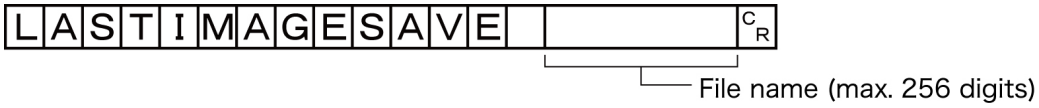
<Response>



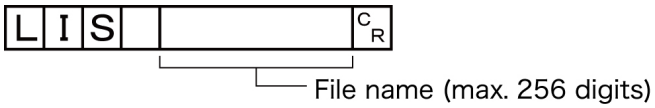
LASTIMAGESAVE or LIS

Executes a save of the last input image. The character string handed over by the argument is used as the file name.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

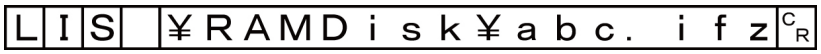
File name	Specify the save destination and file name for saving with the absolute path (Examples: C:\Data\RAMDisk\abc.bmp, \RAMDISK\abc.bmp). If you only give the folder name, then the "[time stamp].ifz" is automatically assigned as the file name.

Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK

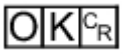
(Example)

When saving the last input image to the file named "abc.ifz".

<Command>



<Response>



Note

- When the extension is "ifz", the image is saved with the specified file name.
- When the extension is anything other than "ifz", the image is saved with ".ifz" appended to the file name.
- If there is no extension (only the folder name is given), the image is saved to a file named time stamp ".ifz".

LAYOUTNO or DLN

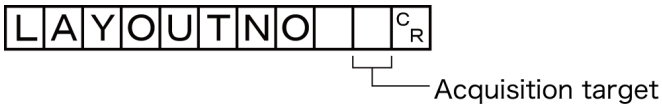
Getting the layout number

Gets the number of the currently displayed layout.

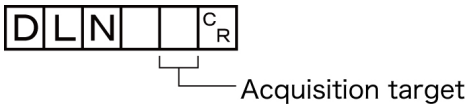
Important

- For non-remote operation, only 0: Local can be specified. For remote operation, only 1: Remote can be specified.
  If this command is executed with any combination other than the above, it is not supported in Ver. 4.20.
  Note that unexpected operations could occur.

<Command format>

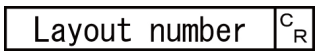


or



(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

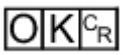
Acquisition target	0: Local 1: Remote
Layout number	0: ADJUST window 1: RUN window

(Example)

When the currently displayed window is the RUN window

<Command>

<Response>



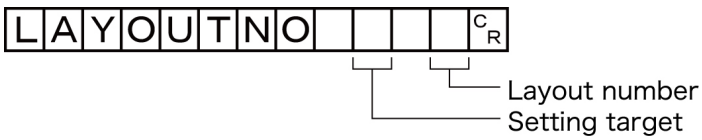
Setting the layout number

Sets the layout number and switches the window.

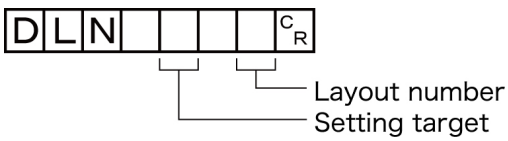
Important

- For non-remote operation, only 0: Local can be specified. For remote operation, only 1: Remote can be specified.
  If this command is executed with any combination other than the above, it is not supported in Ver. 4.20.
  Note that unexpected operations could occur.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

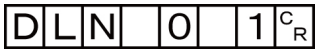
(Parameters explanation)

Setting target	0: Local 1: Remote
Layout number	0: ADJUST window 1: RUN window

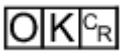
(Example)

When displaying the RUN window

<Command>



<Response>



LOGINACCOUNT or LAI

Acquires the user name for the currently logged in user account

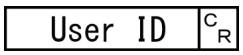
Gets the user ID for the currently logged in account.

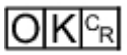
<Command format>

or

(Response format)

When processing is performed normally





When processing is not performed normally

(Parameters explanation)

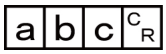
Acquisition target	0: Local 1: Remote
User ID	Returns the user ID in the user account used by the user currently logging in.

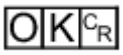
(Example)

When getting the name of the user account currently logged in

<Command>

<Response>

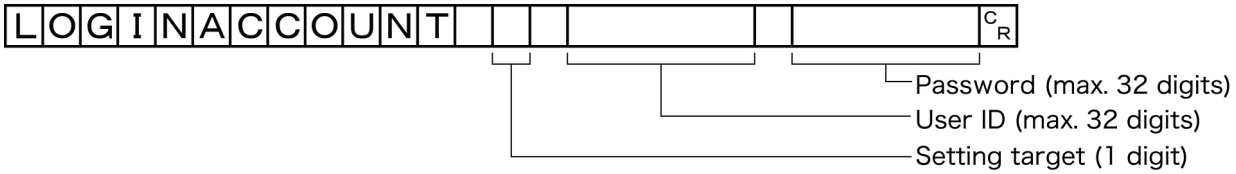




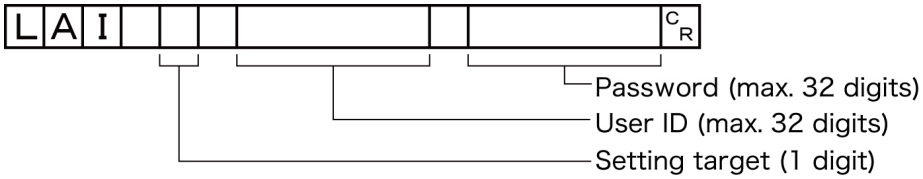
Switching the currently logged in account

Switches the currently logged in account.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

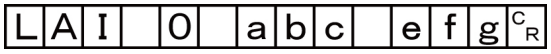
(Parameters explanation)

Setting target	0: Local 1: Remote
User ID	Specify the ID for the user to switch (32 characters maximum).
Password	Specify the password for the user to switch (32 characters maximum).

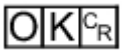
(Example)

When switching to user ID "abc" with password "efg"

<Command>



<Response>



LOGINACCOUNTGROUP or LAG

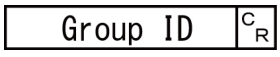
Gets the group ID in the user account used by the user currently logging in.

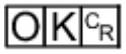
<Command format>

or

(Response format)

When processing is performed normally





When processing is not performed normally

(Parameters explanation)

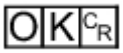
Acquisition target	0: Local 1: Remote
Group ID	Returns the group ID in the user account used by the user currently logging in.

(Example)

The following sample command returns user group ID, "UG1," in the user account used by the user currently logging in.

<Command>

<Response>

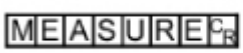


MEASURE or M

Executing measurement

Executes measurement one time.

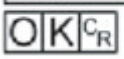
<Command format>



or

<Response format>

When processing is performed normally

Normal	Normal (Fxxx series)
 	 

When processing is not performed normally

Note

- About "Normal (Fxxx series method)"
  Reference: ▸ Setting the Start-up Status [Startup Setting] (p.347)

<Parameters explanation>

Measurement result	When "Data Output" is set in the flow, the measurement results are output. When "Data Output" is not set, the measurement results are not output. Reference: ▸ Output Format (Non-procedure) (p.519)

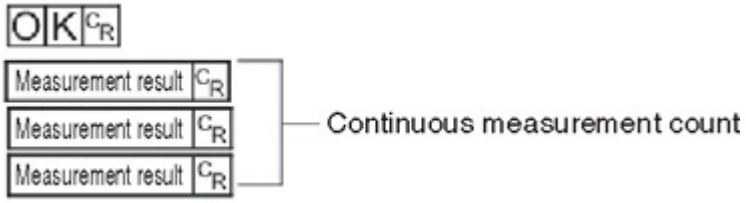
Starts continuous measurement

Starts continuous measurement.

<Command format>

<Response format>

When processing is performed normally



When processing is not performed normally

<Parameters explanation>

Measurement result	The measurement results from the number of times continuous measurement is performed are output as a response. Reference: ▸ Output Format (Non-procedure) (p.519)

Completes continuous measurement

Continuous measurement ends.

<Command format>

<Response format>

When processing is performed normally

When processing is not performed normally

Note

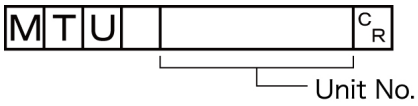
- To output measurement results, insert a [Data Output] processing unit in the scene.
  When the scene does not have a [Data Output] processing unit, only a command response is output.
  Reference: ▸ Output Format (Non-procedure) (p.519)
  Reference: ▸ "Processing Item List Manual", "Data Output" (p.574)

MEASUREUNIT or MTU

Performs a test measurement on the specified unit.

<Command format>

or



(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

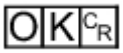
Unit No.	Specifies the unit number to run a test with: 0 to the uppermost unit model number in the unit.

(Example)

The following sample command runs a test on unit number 5:

<Command>

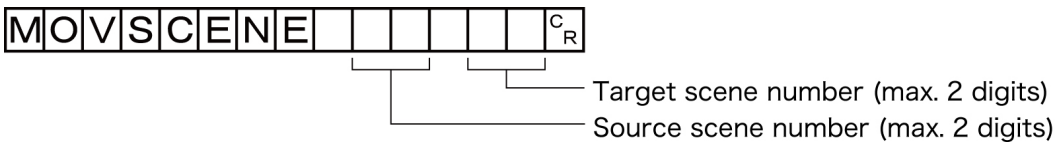
<Response>



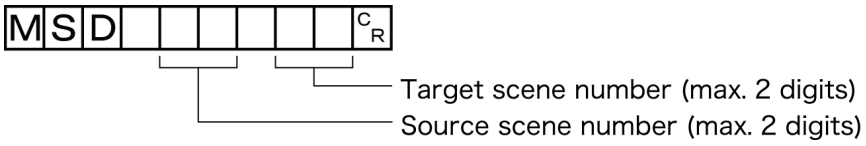
MOVSCENE or MSD

Copies the data for the scene with the number specified with command argument 1 to the scene with the number specified with command argument 2. Deletes scene data with a number specified by command argument 1 after completing copying. If there is already data at the copy destination, the copied data is written over that data.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

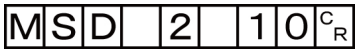
(Parameters explanation)

Source scene number	Specifies the scene number to copy scene data from: 0 to the number of the scenes in the scene group minus one.
Target scene number	Specifies the target scene number for copying scene data: 0 to the number of the scenes in the scene group minus one.

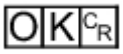
(Example)

The following sample command moves the scene data saved under scene 2 to scene 10:

<Command>



<Response>



OPELOGCOND or OLC

Gets logging operation state

Gets the logging operation state.

<Command format>

or

(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

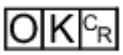
Logging operation state	0: OFF 1: ON

(Example)

The following sample command returns an enabled logging operation state:

<Command>

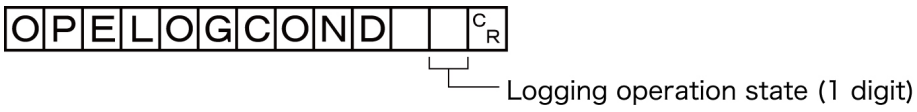
<Response>



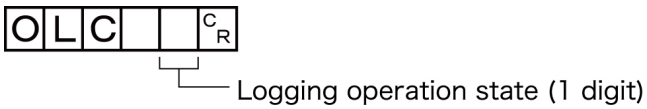
Sets logged operation state

Sets the logged operation state. This command allows configuring the logging operation state in the same manner as for the Start/End Logging Operation buttons on the Main screen.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

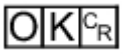
Logging operation state	0: OFF 1: ON

(Example)

The following sample command enables the logging operation state.

<Command>

<Response>



OUTPUTTRANSSTATE or OTS

Gets output state to external device

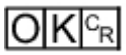
Gets the output state to an external device: Enabled or Disabled:

<Command format>

or

(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

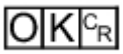
Output state	0: Prohibited 1: Permitted

(Example)

The following sample command retrieves the output state, Enabled:

<Command>

<Response>

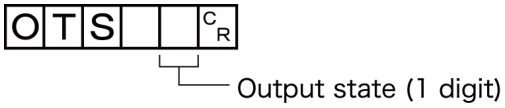


Sets the output state to external device

Enables/Disables outputs to external devices.
When the input state is disabled, i.e., set to (0), all the communications modules are unable to transmit data.

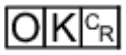
<Command format>

or



(Response format)

When processing is performed normally



When processing is not performed normally

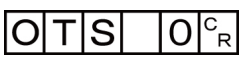
(Parameters explanation)

Output state	0: Prohibited 1: Permitted

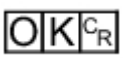
(Example)

The following sample command disables outputs to external devices:

<Command>



<Response>



PARAALLCOND or PAC

Retrieves terminal states except for DI in batches.

Retrieves the states of terminals except for DI in batches: Active or Inactive.

<Command format>

or

(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

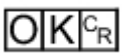
Terminal state	Returns the states of terminals 0 to 15: ・First bit: STEP0 ・Second bit: DSA0 ・Third bit: STEP1 ・Fourth bit: DSA1

(Example)

The following sample command returns the state of enabled STEP0 and DSA1:

<Command>

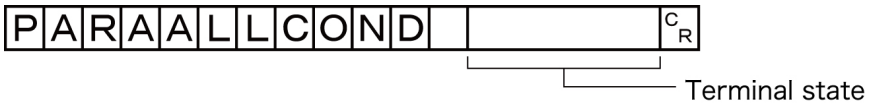
<Response>



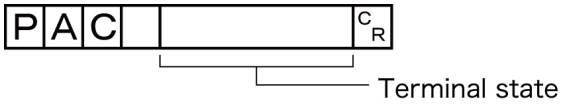
Sets terminal states except for D0 in batches

Sets the states of terminals except for D0 in batches: Active or Inactive.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

(Parameters explanation)

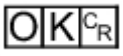
Terminal state	Sets the following terminal states (0 to 15): 0th bit: RUN 1st bit: ERR 2nd bit: BUSY 3rd bit: OR0 4th bit: OR1 5th bit: GATE0 6th bit: GATE1 7th bit: READY0 8th bit: READY1 1: ON, 0: OFF

(Example)

The following sample command activates RUN:

<Command>

<Response>

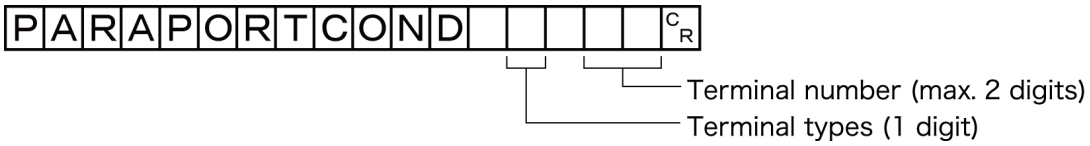


PARAPORTCOND or PPC

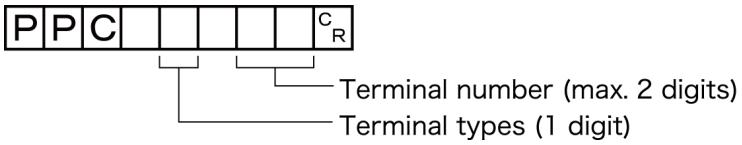
Gets the state of specified parallel I/O terminal

Gets the state of the specified parallel I/O terminal: Active or Inactive.

<Command format>

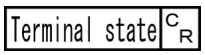


or



(Response format)

When processing is performed normally



When processing is not performed normally

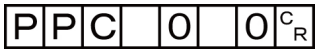
(Parameters explanation)

Terminal types	0: STEP 1: DSA 2: DI
Terminal number	Specifies the terminal number: 0 to 15. When the terminal type is STEP, 0: STEP0, 1: STEP1 When the terminal type is DSA, 0: DSA0, 1: DSA1 When the terminal type is DI, 0:DI0 to 7: DI7
Terminal state	0: OFF 1: ON

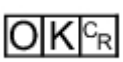
(Example)

The following sample command gets the state of STEP0:

<Command>



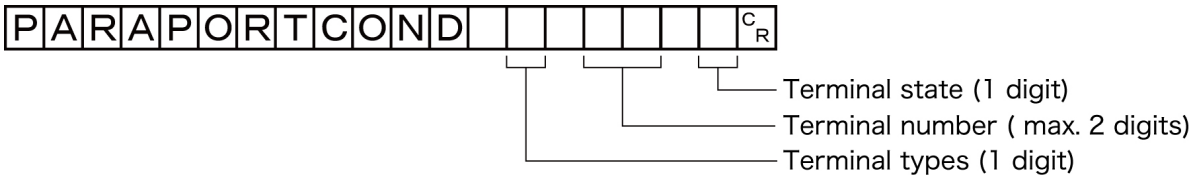
<Response>



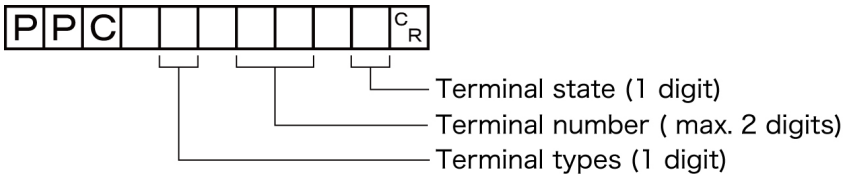
Sets the state of specified parallel I/O terminal

Sets the state of the specified parallel I/O terminal: Active or Inactive.

<Command format>

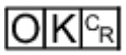


or



(Response format)

When processing is performed normally



When processing is not performed normally

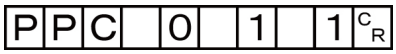
(Parameters explanation)

Terminal types	3: RUN 4: ERR 5: BUSY 6: OR 7: GATE 8: READY 9: DO
Terminal number	Specifies the terminal number.（0～15） When the terminal types are RUN, ERR and BUSY 0 When the terminal type is OR 0: OR0, 1: OR1 When the terminal type is GATE 0: GATE0 1: GATE1 When the terminal type is READY 0: READY0 1: READY1 When the terminal type is DO 0: DO0 to 15: DO15
Terminal state	0: OFF 1: ON

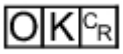
(Example)

The following sample command activates STEP1:

<Command>



<Response>

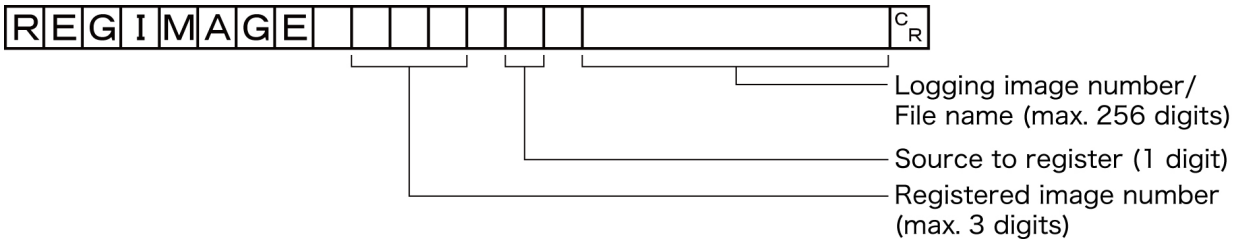


REGIMAGE or RID

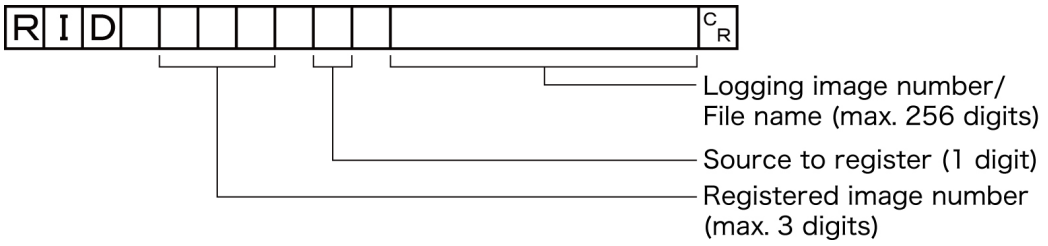
Registers specified image data as registered image

Registers a specified image data as a registered image. This operation results in the same operation as when pressing the Register button on the Register Image Management tool. If the source to register is 0, the last measured image, command argument 3 can be omitted.

<Command format>

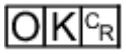


or



(Response format)

When processing is performed normally



When processing is not performed normally

(Parameters explanation)

Registered image number	Specifies the registered image number: 0 to 999.
Source to register	0: Last measured image 1: System logging image 2: Image file

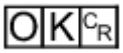
Logging image number/File name	If you have specified a system logging image as the source to register, specify a logging image number: 0 to the number of the logging system images minus one. If you have specified an image file, specify a file name with 0 to 256 characters.

(Example)

When an image with registered image number "100" and logging image number "10" is registered

<Command>

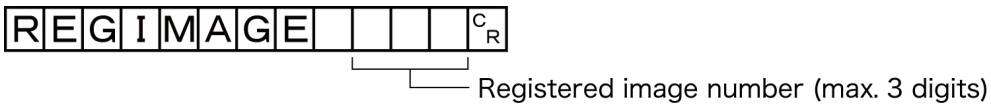
<Response>



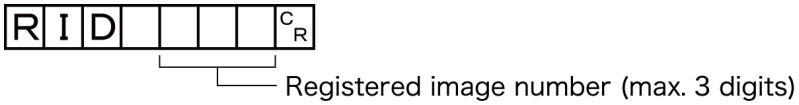
Loads specified image data as registered image

Loads a specified registered image as a measured image. This operation results in the same operation as when pressing the Load button on the Register Image Management tool.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

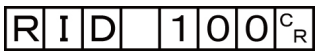
(Parameters explanation)

Registered image number	Specifies the registered image number: 0 to 999.

(Example)

The following sample command loads the image with registered image number 100 as a measured image.

<Command>



<Response>

RESET

Restart the controller.

<Command format>

<Response format>

OFF

SCENE or S

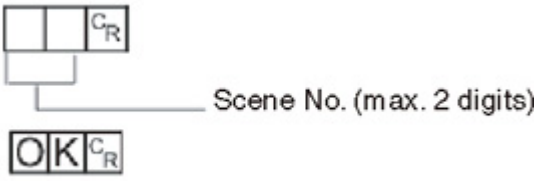
Acquires scene No.

Acquires the current scene No.

<Command format>

<Response format>

When processing is performed normally



When processing is not performed normally

<Parameters explanation>

Scene No.	The acquired scene No. (currently used scene No.) is output as a response (0 to 31).

(Example)

When scene 0 is being used

<Command>

SCENE CR

<Response>

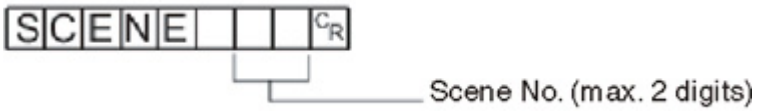
0 CR

OK CR

Scene switch No.

Switches the scene No. to be used.

<Command format>



<Response format>

When processing is performed normally

OK CR

When processing is not performed normally

ER CR

<Parameters explanation>

Scene No.	Specifies the scene No. after switching (0 to 31).

(Example)

When switching to scene 2

<Command>

SCENE 2 CR

<Response>

OK CR

SCNGROUP or SG

Acquires scene group No.

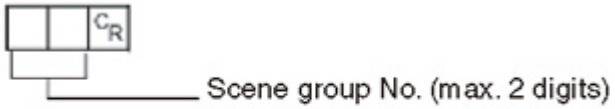
Acquires the current scene group No.

<Command format>

SCNGROUP$_{CR}$ or SG$_{CR}$

<Response format>

When processing is performed normally



OK$_{CR}$

When processing is not performed normally

ER$_{CR}$

<Parameters explanation>

Scene group No.	The acquired scene group No. (currently used scene group No.) is output as a response (0 to 31).

(Example)

When scene group 0 is being used

<Command>

SCNGROUP$_{CR}$

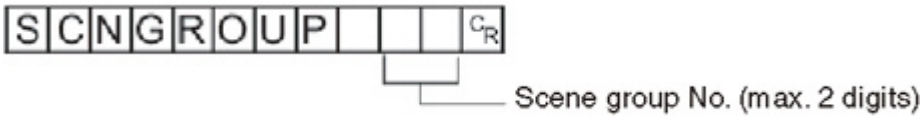
<Response>

0$_{CR}$
OK$_{CR}$

Switch the scene group No.

Switches the scene group No. to be used.

<Command format>



<Response format>

When processing is performed normally

When processing is not performed normally

<Parameters explanation>

Scene group No.	Specifies the scene group No. after switching (0 to 31).

(Example)

When switching to scene group 2

<Command>

<Response>

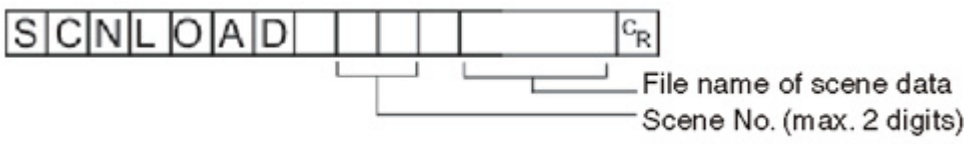
Important

- During parallel continuous measurement and when the STEP signal is input continuously, do not perform switching of the scene group. When this is performed, set "Unchecked" in "Save scene group on switch scene" in either of the settings items below.
  - Switch Scene Group window Reference: ▶ Switching Scene Groups (p.65)
  - [Measure setting] in the [Measure] menu Reference: ▶ Setting Conditions Related to Operation during Measurement (p.344)

SCNLOAD

Reads scene data.

<Command format>



<Response format>

When processing is performed normally

When processing is not performed normally

<Parameters explanation>

Scene No.	Specifies the scene No. to be read (0 to 31)
File name of scene data	Specifies the name of the file to be read with a definite path (ex.: \USBDisk\abc.scn, E:\abc.scn). Only files that are under the following systems and have an "SCN" extension can be read.

Load to	FZ4-1100 series	FZ-L35 □ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

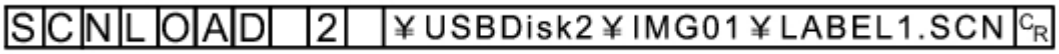
Important

- Do not turn off power to the controller until there is a response.

(Example)

When "LABEL.SCN" in the "IMG01" folder of the USB memory to which the drive name "USBDisk2" is assigned is loaded to the controller as scene 2.

<Command>

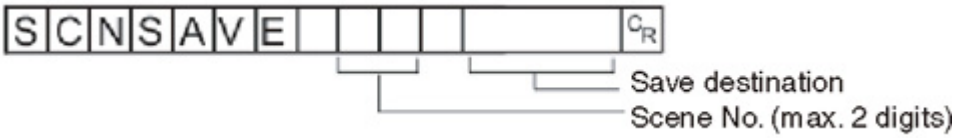


<Response>

SCNSAVE

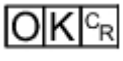
Saves scene data.

<Command format>



<Response format>

When processing is performed normally



When processing is not performed normally

<Parameters explanation>

Scene No.	Specifies the scene No. to save (0 to 31).
Save destination	Specifies the save destination and file name during saving with a definite path (ex.: \USBDisk\abc.scn, E:\abc.scn). Save destinations include directories under the following systems.Be sure to attach an "SCN" extension to the file name.

Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

Important

- If the specified file name already exists, this existing file will be overwritten
- Do not turn off power to the controller until there is a response.
- For the FZ4-1100 series, do not save to a non-volatile area on the C drive (such as C:\ProgramFiles\FZ). This would reduce the storage area for scene data etc. and make correct operation impossible.

(Example)

When scene data of scene No. 3 is saved with the file name "LABEL.SCN" in the "SCN01" folder in the USB memory to which the drive name "USBDisk2" is assigned

<Command>

<Response>

SGRLOAD

Reads scene group data.

<Command format>

<Response format>

When processing is performed normally

When processing is not performed normally

ER[CR]

<Parameters explanation>

Scene group No.	Specifies the scene group No. to be read (0 to 31)
File name of scene group data	Specifies the name of the file to be read with a definite path (ex.: \USBDisk\abc.sgp, E:\abc.sgp). Only files that are under the following systems and have an "SGP" extension can be read.

Load to	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

Important

- Do not turn off power to the controller until there is a response.

(Example)

When "LABEL.SGP" in the "IMG01" folder of the USB memory to which the drive name "USBDisk2" is assigned is loaded to scene group 3

<Command>

SGRLOAD 3 ¥USBDisk2¥IMG01¥LABEL1.SGP[CR]

<Response>

OK[CR]

Note

- For the USB memory drive, see Reference: ▶ About USB Drive Names (p.330) .

SGRSAVE

Saves scene group data.

<Command format>

<Response format>

When processing is performed normally

OK[CR]

When processing is not performed normally

<Parameters explanation>

Scene group No.	Specifies the scene group No. to save (0 to 31).
Save destination	Specifies the save destination and file name during saving with a definite path (ex.: \USBDisk\abc.sgp, E:\abc.sgp). Save destinations include directories under the following systems.Be sure to attach an "SGP" extension to the file name.

Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

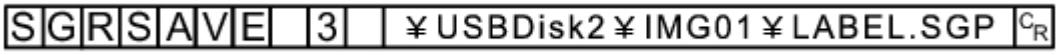
Important

- If the specified file name already exists, this existing file will be overwritten
- Do not turn off power to the controller until there is a response.
- For the FZ4-1100 series, do not save to a non-volatile area on the C drive (such as C:\ProgramFiles\FZ). This would reduce the storage area for scene data etc. and make correct operation impossible.

(Example)

When data stored in scene group 3 is saved with the file name "LABEL.SGP" in the "IMG01" folder in the USB memory to which the drive name "USBDisk2" is assigned

<Command>



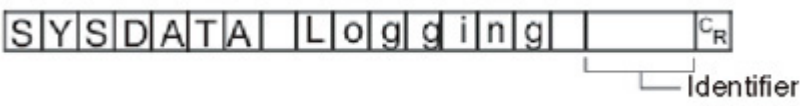
<Response>

SYSDATA

Acquires settings related to image logging

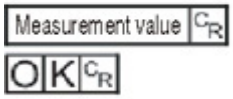
Acquires settings related to current image logging.

<Command format>



<Response format>

When processing is performed normally



When processing is not performed normally

<Parameters explanation>

Setting data	Identifier 1	Set value
Image Logging	imageLogging	・ 0: None ・ 1: Only NG ・ 2: All
Folder name of image logging save destination	imageLoggingDirectory	Save destination folder name (one-byte alphanumeric character) If the name of a folder that does not exist is specified, a new folder will be created.
Prefix for image logging file name	imageLoggingHeader	Prefix for image logging file name (one-byte alphanumeric characters)
Data Logging	dataLogging	・ 0: None ・ 1: Only NG ・ 2: All
Name of destination folder for saving data logging	dataLoggingDirectory	Save destination folder name (one-byte alphanumeric character)

Important

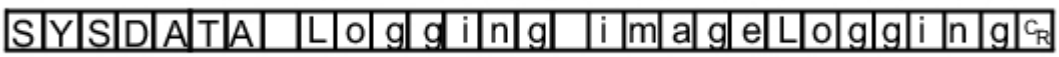
Specifying the name of a folder to save to

- The method for specifying the name of the folder to save to depends on the model.
  - For FZ4-11 □ □ series
    For RAMDisk C:\Data\RAMDisk
    For USB memory E:\,F:\
  - For FZ4-L35 □ /6 □ □ /7 □ □ series
    For RAMDisk \RAMDisk
    For USB memory \USBDisk、\USBDisk2
- For the FZ4-11 □ □ series, do not save to a non-volatile area on the C drive (such as C:\ProgramFiles\FZ). This would reduce the storage area for scene data etc. and make correct operation impossible.

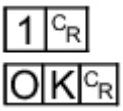
(Example)

When the image logging setting is acquired when the setting for acquiring the current image logging save condition is 1 (save only for NG error)

<Command>



<Response>

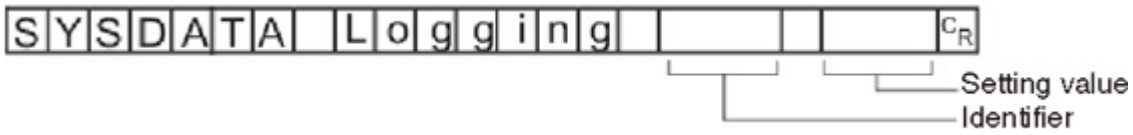


The current image logging save condition is "1: Only NG".

Changes settings related to image logging

Changes setting related to current image logging.

<Command format>



<Response format>

When processing is performed normally

When processing is not performed normally

<Parameters explanation>

Setting data	Identifier 1	Set value
Image Logging	imageLogging	・ 0: None ・ 1: Only NG ・ 2: All
Folder name of image logging save destination	imageLoggingDirectory	Save destination folder name (one-byte alphanumeric character)
Prefix for image logging file name	imageLoggingHeader	Prefix for image logging file name (one-byte alphanumeric characters)
Data Logging	dataLogging	・ 0: None ・ 1: Only NG ・ 2: All
Name of destination folder for saving data logging	dataLoggingDirectory	Save destination folder name (one-byte alphanumeric character)

Important

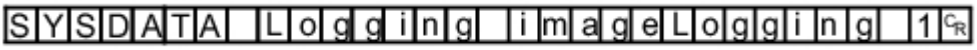
Specifying the name of a folder to save to

- The method for specifying the name of the folder to save to depends on the model.
  - For FZ4-11 □ □ series
    For RAMDisk C:\Data\RAMDisk
    For USB memory E:\,F:\
  - For FZ4-L35 □ /6 □ □ /7 □ □ series
    For RAMDisk \RAMDisk
    For USB memory \USBDisk、\USBDisk2
- For the FZ4-11 □ □ series, do not save to a non-volatile area on the C drive (such as C:\ProgramFiles\FZ). This would reduce the storage area for scene data etc. and make correct operation impossible.

(Example 1)

When creating settings so that image logging is only performed during NG errors

<Command>



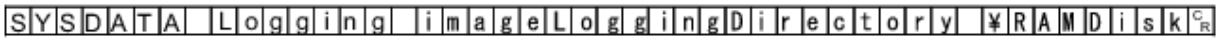
<Response>

(Example 2)

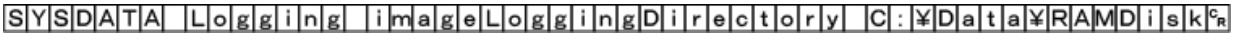
When the RAMDisk is set as the image logging save destination

<Command>

- For FZ4-L35□ /FZ4-4□□ /FZ4-7□



- For FZ4-11□□



<Response>

SYSLOAD

Reads system data.

<Command format>

<Response format>

When processing is performed normally

When processing is not performed normally

<Parameters explanation>

File name of system data	Specifies the name of the file to be read with a definite path (ex.: \USBDisk\abc.ini, E:\abc.ini). Only files that are under the following systems and have an "INI" extension can be read.

Load to	FZ4-1100 series	FZ-L35 □ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

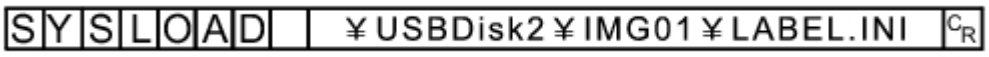
Important

- Do not turn off power to the controller until there is a response.

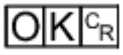
(Example)

When "LABEL.INI" in the "IMG01" folder of the USB memory to which the drive name "USBDisk2" is assigned is loaded

<Command>



<Response>



SYSSAVE

Saves system data.

<Command format>

<Response format>

When processing is performed normally

When processing is not performed normally

<Parameters explanation>

Save destination	Specifies the save destination and file name during saving with a definite path (ex.: \USBDisk\abc.ini, E:\abc.ini). Save destinations include directories under the following systems.Be sure to attach an "INI" extension to the file name.

Save destination	FZ4-1100 series	FZ-L35□ /600/700 series
RAMDisk	C:\Data\RAMDisk	\RAMDISK
USBDisk	E:\,F:\,G:\,H:\	\USBDisk to \USBDisk3

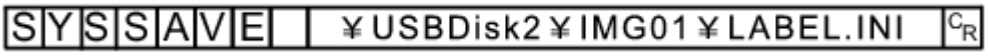
Important

- If the specified file name already exists, this existing file will be overwritten
- Do not turn off power to the controller until there is a response.
- For the FZ4-1100 series, do not save to a non-volatile area on the C drive (such as C:\ProgramFiles\FZ). This would reduce the storage area for scene data etc. and make correct operation impossible.

(Example)

When saving system data in the file named "LABEL.INI" in the "IMG01" folder in the USB memory to which the drive name "USBDisk2" is assigned

<Command>

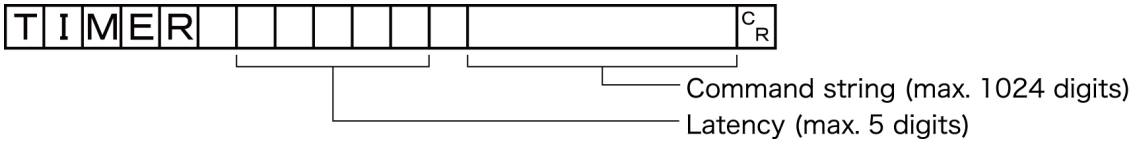


<Response>

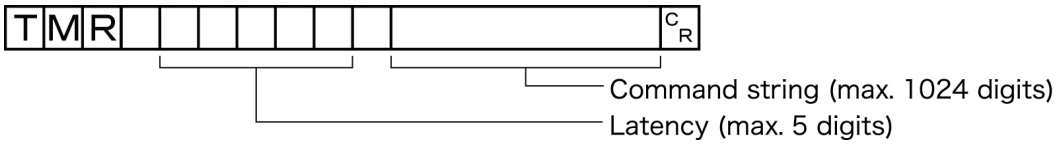
TIMER or TMR

Issues the specified command string after a specified delay.

<Command format>

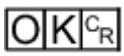


or



(Response format)

When processing is performed normally



When processing is not performed normally

ER$_{CR}$

(Parameters explanation)

Latency	Specifies the required delay to when the specified command is issued in milliseconds, 100 to 99999.
Command string	Specifies the command string. (Max: 1024 characters)

(Example)

In case of permission of trigger input when 3000 ms elapses

<Command>

TMR 3000 TIS 1$_{CR}$

<Response>

abc$_{CR}$

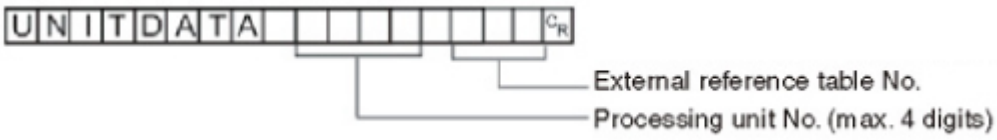
OK$_{CR}$

UNITDATA or UD

Acquiring processing unit parameters and measurement values

The set parameters and measurement values for the processing units set in the scene currently being used are acquired.

<Command format>



<Response format>

When processing is performed normally

Measurement value $_{CR}$

OK$_{CR}$

When processing is not performed normally

ER$_{CR}$

<Parameters explanation>

Processing unit No.	Specifies the processing unit No. (0 to 9999).
External reference table No.	Varies depending on the specified processing unit processing items.For details, see the "External Reference Table" of the processing items registered in the processing unit. For more details, refer to External Reference Table for each processing item in Processing Item List Manual.
Measurement	The acquired measurement value is output as a response.

(Example)

When the judgement result of [Search] set as the 6th processing unit (processing unit number "5") is acquired (external reference table value is "0")

<Command>

UNITDATA 5 0 CR

<Response>

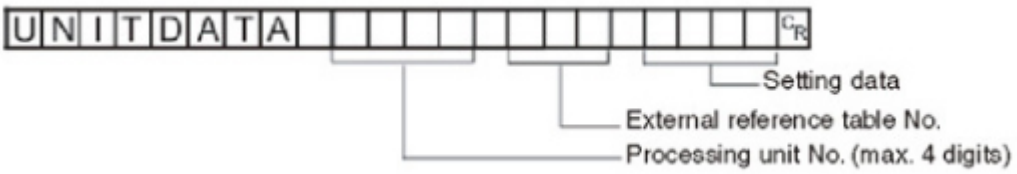
0 CR

OK CR

Changing processing unit parameters

The set parameters for the processing units set in the scene currently being used are changed.

<Command format>



<Response format>

When processing is performed normally

OK CR

When processing is not performed normally

ER CR

<Parameters explanation>

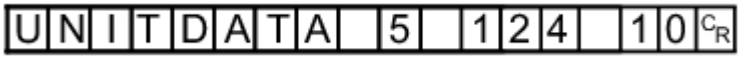
Processing unit No.	Specifies the processing unit No. (0 to 9999).

External reference table No.	Varies depending on the specified processing unit processing items.For details, see the "External Reference Table" of the processing items registered in the processing unit. For more details, refer to External Reference Table for each processing item in Processing Item List Manual.
Setting data	Set the settings data parameters.

(Example)

When "Skipping angle" (external reference table value "124") in [Search] set as the 6th processing unit (processing unit number "5") is changed to "10"

<Command>

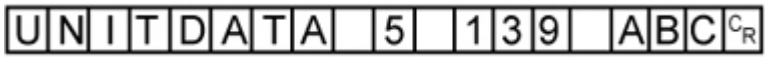


<Response>

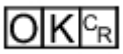
(Example)

When "Verification string" (external reference table value "139") in [Character Inspection] set as the 6th processing unit (processing unit number "5") is changed to "ABC"

<Command>



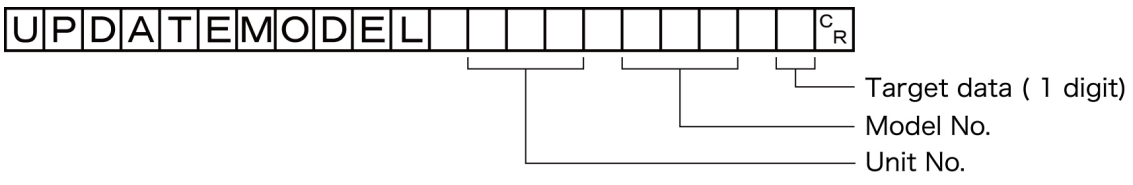
<Response>



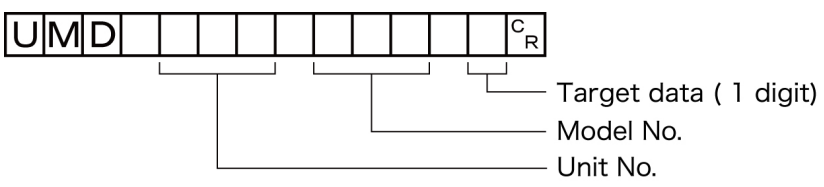
UPDATEMODEL or UMD

Reregisters a model using the current model.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

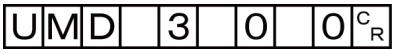
(Parameters explanation)

Unit No.	Specifies the processing unit number of a model to reregister: 0 to the number of unit data minus one.
Model No.	Specifies the model number to register a model: 0 to the uppermost unit model number in the unit. Specifying a nonexistent model number causes an error.
Target data	Specifies the target data. When the setting value is expressed in binary, if the 1st bit is 1, the model is re-registered. When the setting value is expressed in binary, if the 2nd bit is 1, the reference position is updated. When the setting value is expressed in binary, if the 3rd bit is 1, the detection position is updated. Example) - When only re-registering the model: 1 x 1 + 2 x 0 + 4 x 0 = 1 (setting value) - When only updating the reference position: 1 x 0 + 2 x 1 + 4 x 0 = 2 (setting value) - When updating or re-registering everything: 1 x 1 + 2 x 1 + 4 x 1 = 7 (setting value)

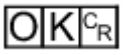
(Example)

The following sample command reregisters a model with unit number 3, model number 0 and target data 0.

<Command>



<Response>

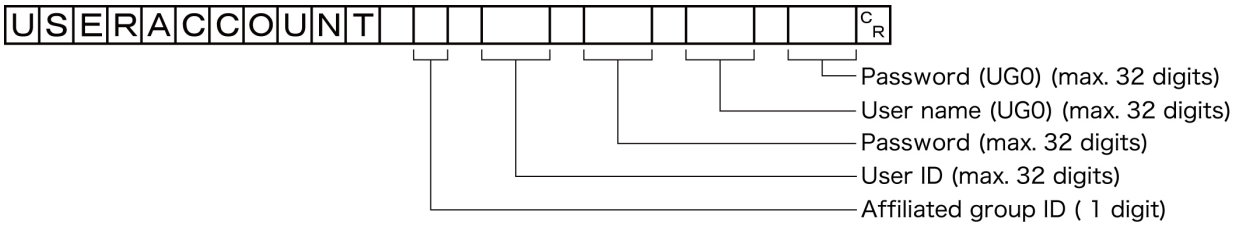


USERACCOUNT or UAD

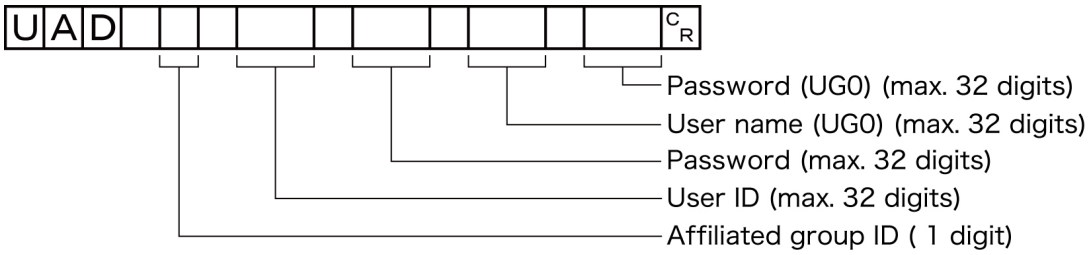
Adds user account to specified user group

Adds the user account to the specified affiliated group ID.
If the user account for the set image is already registered, that setting is overwritten.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

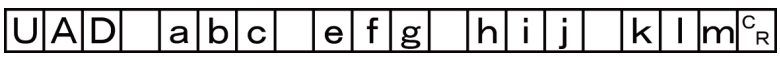
(Parameters explanation)

Affiliated group ID	Specifies a group ID to which a user account is to be added: 0 to 7.
User ID	Specifies a user ID of the user to be added with up to 32 characters.
Password	Specifies a password for the user to be added with up to 32 characters.
User name (UG0)	Specifies the user name for a user belonging to the UG0 group (32 characters maximum).
Password (UG0)	Specifies the password for the above UG0 group user (32 characters maximum).

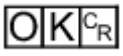
(Example)

When a user with user ID "abc" and password "efg" is added to the affiliate group ID "1"

<Command>



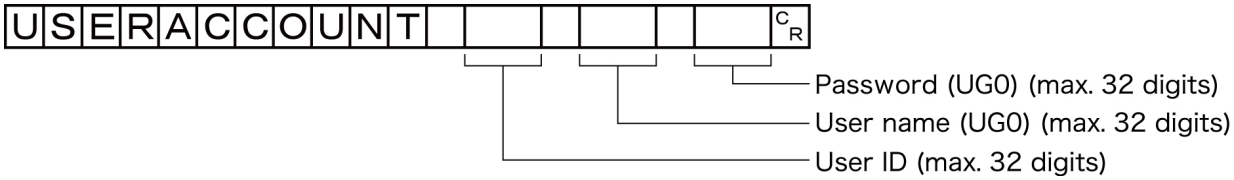
<Response>



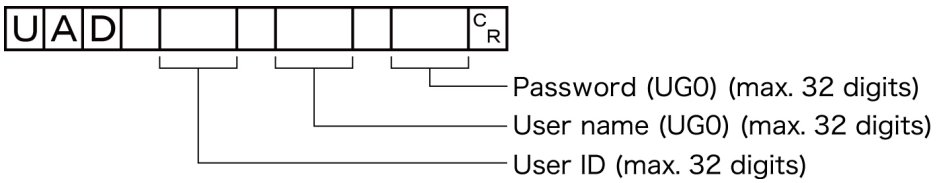
Deletes user account

Deletes the specified user account.
If the specified user account does not exist, the command returns OK without doing any processing at all.

<Command format>



or



(Response format)

When processing is performed normally

When processing is not performed normally

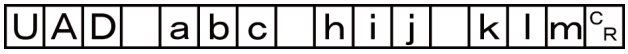
(Parameters explanation)

User ID	Specifies the user ID of the user to be deleted with up to 32 characters.
User name (UG0)	Specifies the user name for a user belonging to the UG0 group (32 characters maximum).
Password (UG0)	Specifies the password for the above UG0 group user (32 characters maximum).

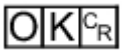
(Example)

The following sample command deletes the user with user ID "abc."

<Command>



<Response>



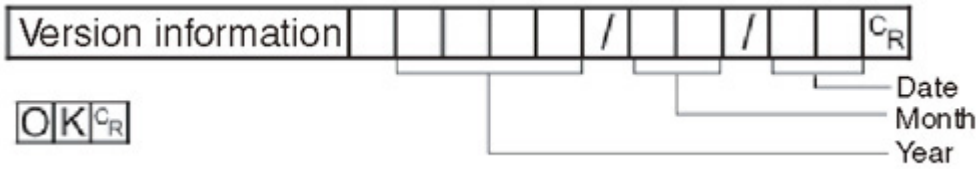
VERGET

Acquires the controller version information.

<Command format>

<Response format>

When processing is performed normally



When processing is not performed normally

<Parameters explanation>

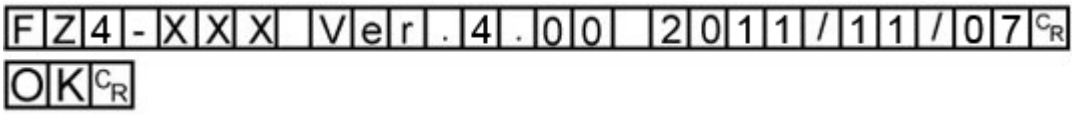
Version information	・ Type of controller ・ Software version

(Example)

When the controller type is "FZ4-XXX", the software version is "4.00", and the date is "Nov. 07, 2011"

<Command>

<Response>



Output Format (Non-procedure)

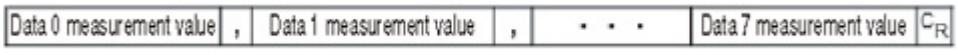
If the processing unit [Data Output] is set in a scene, measurement results are sequentially output starting from the smallest data No. set in [Setting] of [Data Output].

Reference: ▸ "Processing Item List Manual", "Data Output" (p.574)

When Outputting ASCII Data

Set the output format as "ASCII" in [Setting] of the [Data Output] processing item.
The factory settings default value is "ASCII".

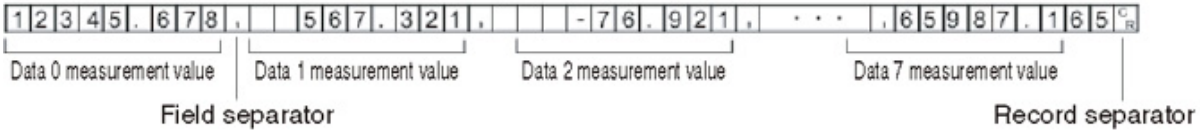
Output format



Note

- The output format, number of digits and the data separator, etc. can be changed if necessary.
  Reference: ▶ "Processing Item List Manual", "Data Output" (p.574)

Example) Integer digits: "5 digits", decimal places: "3 digits", negative numbers: "-", field separator: "comma", record separator: "delimiter"



Note

- Field separators are not output in the absence of the following data.
- Decimals are rounded up and output.

The range of values that can be output is as follows:

-999999999.9999 <= Measurement value <= 999999999.9999

When measurement value is < -999999999.9999, "-999999999.9999" is output.

When measurement value is > 999999999.9999, "999999999.9999" is output.

When JG (Judgement) is set, the next value is output.

OK:1

NG:-1

Note

- Even if measurement is complete, data output will not stop until all of the data is output. Please note, data output will not be interrupted.

When outputting

Binary Data

Set the output format as "Binary" in [Setting] of the [Data Output] processing item.

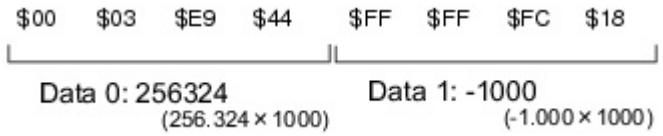
Output format

The measurement data is multiplied by 1000 and output is continuous with 4 bytes per each data item.

Negative numbers are output in 2's complement format.

For a definition of 2's complement, see Reference: ▸ Terminology Explanations (p.590) .

Example) When Data 0 is "256.324", and data 1 is "-1.000"



Note

- Unlike ASCII output, binary output has no separators between data such as field separators or record separators, etc.
  Reference: ▸ "Processing Item List Manual", "Data Output" (p.574)

The range of values that can be output is as follows:

-2147483.648 <= Measurement value <= 2147483.647

When measurement value is < -2147483.648, "-2147483.648" is output.

When measurement value is > 2147483.647, "2147483.647" is output.

When JG (Judgement) is set, the next value is output.

OK:1000(1 × 1000)

NG:1000(-1 × 1000)

Note

- Even if measurement is complete, data output will not stop until all of the data is output. Please note, data output will not be interrupted.

Control/Output through EtherNet/IP

This section explains how to set the required communication specifications when using EtherNet/IP to communicate with external devices.
EtherNet/IP is a multi-vendor network for the industrial community using Ethernet that is managed by ODVA (Open DeviceNet Vender Association).
A cyclic communication (tag data link communication) with an EtherNet/IP device that supports the class 1 communication of the EtherNet/IP standard can be achieved without a user program. Using the tag data link communication, FZ4 sends and receives data that is the same as the parallel interface to and from an external device.
The message communication function is used when communicating with a PLC that does not support tag data link communication or when using functions, such as character string output, that are not supported in tag data link communication. Message communication can be performed either by exchanging the same data as for tag data link communication using AssemblyObjects or by sending and receiving commands equivalent to non-procedure commands using FZ4-specific VisionSystemObjects.

EtherNet/IP communication specification

The EtherNet/IP communication specification is described. The conformance test applies to Ver.A7.
Before establishing the communication, specify the output and input connection settings on the external device. For details, refer to the Instruction Manual of the device being used.

Output connection

Item	Setting description
Communication direction	Originator → Target (FZ4)
Data size [Note]	20 bytes (Command area)

Input connection

Item	Setting description
Communication direction	Target (FZ4) → Originator
Data size [Note]	48 bytes (Response area + Data Output area)

[Note]: Up to 502 bytes of data can be set, but the current version should be used with 20 bytes (default)for output connections and 48 bytes (default)for input connections.

Important

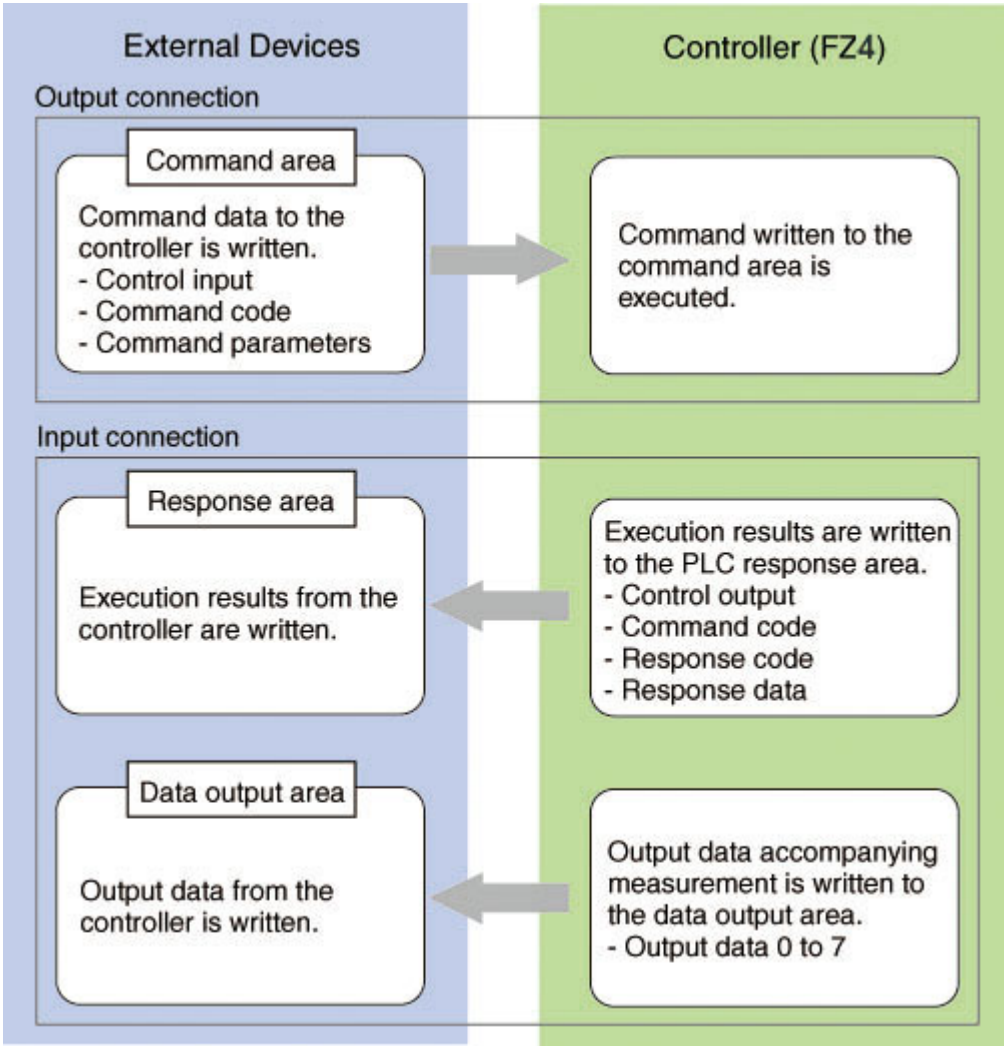
- If instances are to be specified without using the EDS file, an AssemblyObject must be set as specified below. When using the 2-line random trigger mode, be sure to set 102 and 103.

Setting of AssemblyObject

Parameter name	Setting value	Remarks
Instance ID	100	Output connection (for normal control and for line 0 in the 2-line random trigger mode)
	101	Input connection (for normal control and for line 0 in the 2-line random trigger mode)
	102	Output connection (for line 1 in the 2-line random trigger mode)
	103	Input connection (for line 1 in the 2-line random trigger mode)

Communication Processing Flow (EtherNet/IP)

Communication between the external device and FZ4 is performed using the 2 connections indicated below: the output connections and input connections. For output connections, allocate the command area of the FZ4. For input connections, allocate the response area and data output area of the FZ4.
Output connections are used when control commands are sent from the PLC to the FZ4.
Input connections are used when the results of executing control commands or output data accompanying measurement are received.



Important

- The signal timing is equivalent to the standard parallel I/O where command execution and data output are executed independently.

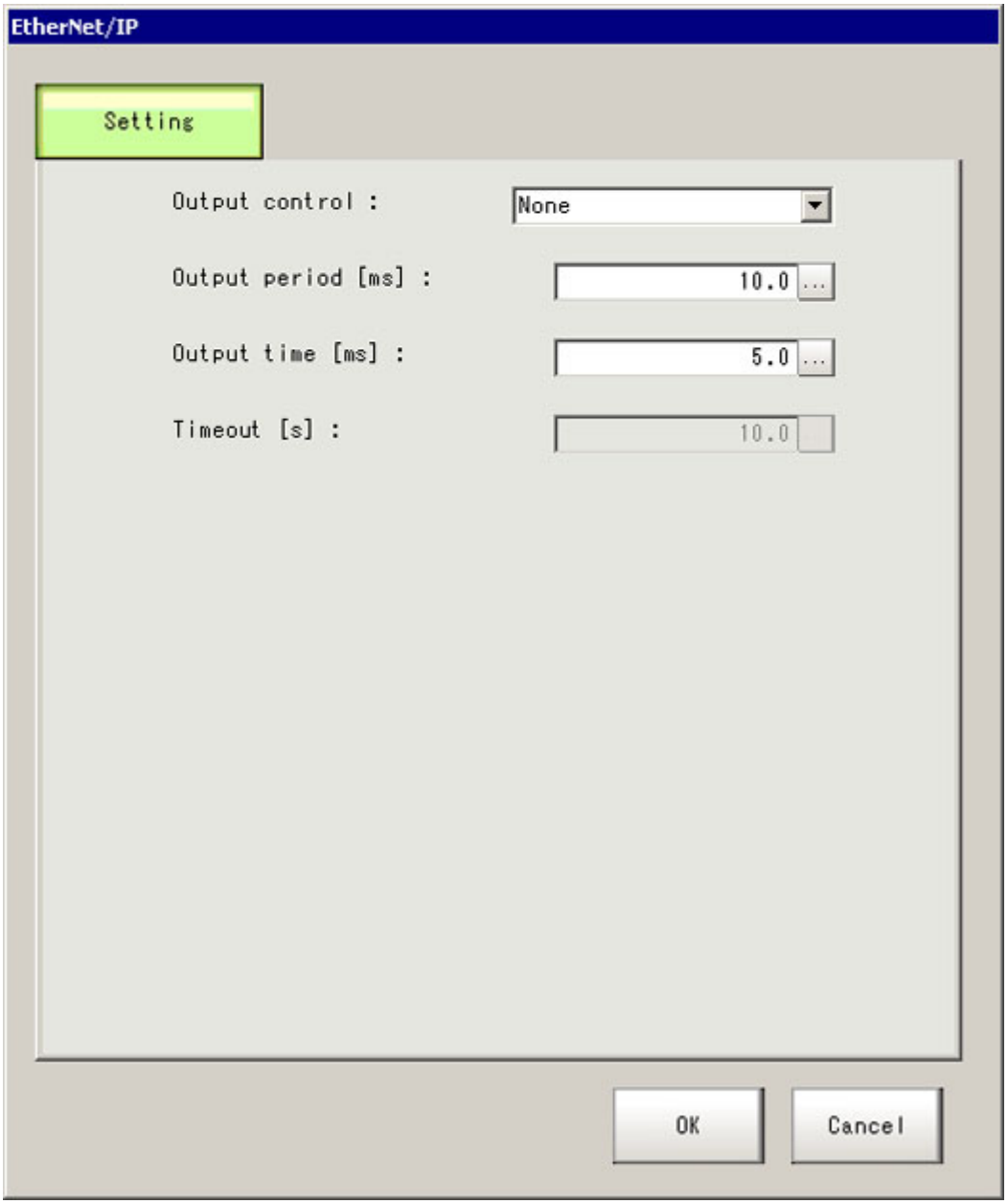
Setting Communication Specifications (EtherNet/IP)

Set the communication specifications, such as the output control.

Important

- Set the communication module to [EtherNet/IP] before setting the communication specifications. Save the setting to the controller and then restart the system. Furthermore, if the operation mode is set to the multi-line random trigger mode, the communication module on line 1 must also be set to "Ethernet/IP."
  Reference: Setting the Start-up Status [Startup Setting] (p.347)
- When using 2-line random trigger mode with the FZ4-11 □ □ /H11 □ □ series, specify different addresses for the sending and receiving areas of line 0 and line 1.
- After the tag data link is set, the controller automatically restarts to reflect the setting.

1. On the Main screen, tap [System] menu → [Communication] → [EtherNet/IP].
   The EtherNet/IP window is displayed.
2. Set the following items.



Setting item	Setting value [Factory default]	Description
Output control	・ [None] ・ Handshaking	Set whether or not to synchronize with an external device when outputting data. None: The controller outputs measurement results without synchronizing with external devices. Reference: For data output (without handshaking) (p.536) Handshaking: The controller outputs measurement results while synchronized with external devices. Reference: For data output (with handshaking) (p.536)
Output period	2.0 to 5000.0ms [10.0ms]	Valid only when [Output control] is set to [None]. Set the cycle by which measurement results are output.
Output time	1.0 to 1000.0ms [5.0ms]	Valid only when [Output control] is set to [None]. Set the GATE signal ON time. Set the time required for external devices to acquire measurement results.
Timeout	0.5 to 120.0s [10.0s]	Valid only when [Output control] is set to [Handshaking]. A timeout error occurs when no response from external devices is received within the time that has been set. A timeout error occurs if the status of each flag does not change within the specified time in the following situations. ・ The DSA flag turns ON after the measurement is completed. ・ The DSA flag turns OFF after the GATE flag turns ON. ・ The DSA flag turns ON after the GATE flag turns OFF.

3. Tap [OK].
   The settings are confirmed and the EtherNet/IP window closes.

Important

- Timeout setting for the PLC connection
  Set the timeout setting so that the PLC timeout period is longer than the measurement processing time.
- Use with the NetworkConfiguration packet interval (RPI) set to at least 4 ms.

Memory Allocation (EtherNet/IP)

Memory allocations for output connections and input connections are explained.

For output connections, specify control inputs, command codes and command parameters that are parameters in the command area.

Output connection

Originator → Target (FZ4)

Command area top channel	Bit																Name
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0								XEXE								EXE	Control input (2CH)
+1																DSA	
+2	CMD-CODE																Command code (2CH)
+3																	

+4	CMD-PARAM	Command parameter (Maximum 6CH)
+5		
+6		
+7		
+8		
+9		

Signal	Signal name	Function
EXE	Command execution bit	Executes commands Reference: ▸ Command Control (EtherNet/IP) (p.532)
DSA	Data output request bit	Requests the next data output Reference: ▸ Data Output (EtherNet/IP) (p.535)
XEXE	Measuring command execution bit	Executes a measuring command
CMD-CODE	Command code	Stores command codes
CMD-PARAM	Command parameter	Stores command parameters

For input connections, execution results and output data from the controller are set. Execution results from the controller (control outputs, command codes, response codes, response data) are output to the response area, while output data from the controller are output to the data output area.

Input connection

Originator ← Target (FZ4)

Response area top channel	Bit																Name
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
+0						XWAIT	XBUSY	XFLG				RUN	OR		BUSY	FLG	Control output (2CH)
+1																GATE	
+2	CMD-CODE																Command code (2CH)
+3																	
+4	RES-CODE																Response code (2CH)
+5																	
+6	RES-DATA																Response data (2CH)
+7																	
+8	DATA0																Output data 0
+9																	
+10	DATA1																Output data 1
+11																	
+12	DATA2																Output data 2
+13																	
+14	DATA3																Output data 3
+15																	
+16	DATA4																Output data 4
+17																	
+18	DATA5																Output data 5
+19																	

+20 +21	DATA6	Output data 6
+22 +23	DATA7	Output data 7

Signal	Signal name	Function
FLG	Command completion bit	Turns ON when command execution is complete.
GATE	Data output completion bit	Turns ON when data output is complete.
BUSY	Command execution in progress bit	Turns ON when command execution is in progress.
OR	Overall judgement	Turns ON when the overall judgement result is NG. (The OR signal is output when the checkbox for [Output] is selected in the ADJUST window.)
XFLG	Measuring command completion bit	Turns ON when measuring command execution is complete.
XBUSY	Measuring command executing bit	Turns ON while a measuring command is being executed.
XWAIT	Measuring command standby bit	Turns ON when a measuring command can be executed.
RUN	RUN window	Turns ON when the controller is set to the RUN window.
CMD-CODE	Command code	Returns the executed command code.
RES-CODE	Response code	Stores the response from the executed command.
RES-DATA	Response data	Stores the response data from the executed command.
DATA0-7	Output data 0 to 7	The data set in the output processing items is output. When there are multiple processing items, data is overwritten to this area while handshaking is performed.

Accessing Communications Areas Using Variables with NJ-series Controllers

With an NJ-series Controller, only variables can be used to access from the user program the I/O memory addresses that are assigned to the communications areas.
Use the following settings.

Using Network Variables for Access

Create user-defined variables that match the structures of the communications areas of the Sensor.
Use the Sysmac Studio to define the variables.
Refer to the Sysmac Studio Version 1 Operation Manual (Cat. No. W504) for Sysmac Studio operatingprocedures.

1. Defining the Data Types of the Variables
   Define data types for variables that match the structures of the communications areas.
   1. Defining a Data Type for Signal Access
      First, define a BOOL array data type to access the control signals and status signals.
      Here, a data type called "U_EIPFlag" is defined.
      Name of data type: U_EIPFlag
      Type of derivative data type: Union

Name of data type		Data type
U_EIPFlag		UNION
	F	ARRAY[0..31]OF BOOL ····· Specifies an array of BOOL data from 0 to 31.
	W	DWORD ····· 32-bit bit string data

2. Defining Data Types for Communications Area Access

Data types are defined to access the communications areas, with one data type for the command area and another data type for the response and output areas.
Here, data types called "S_EIPOutput" and "S_EIPInput" are defined.

・Data Type to Access the Command Area

Name of data type: S_EIPOutput
Type of derivative data type: Structure

Name of data type		Data type
S_EIPOutput		STRUCT
	ControlFlag	U_EIPFlag ····· The data type that was defined above (1)
	CommandCode	DWORD ····· 32-bit bit string data
	CommandParam1	UDINT ····· 32-bit integer data
	CommandParam2	DINT ····· 32-bit integer data
	CommandParam3	UDINT ····· 32-bit integer data

・Assignment Example for Variable Data Type That Matches the Command Area

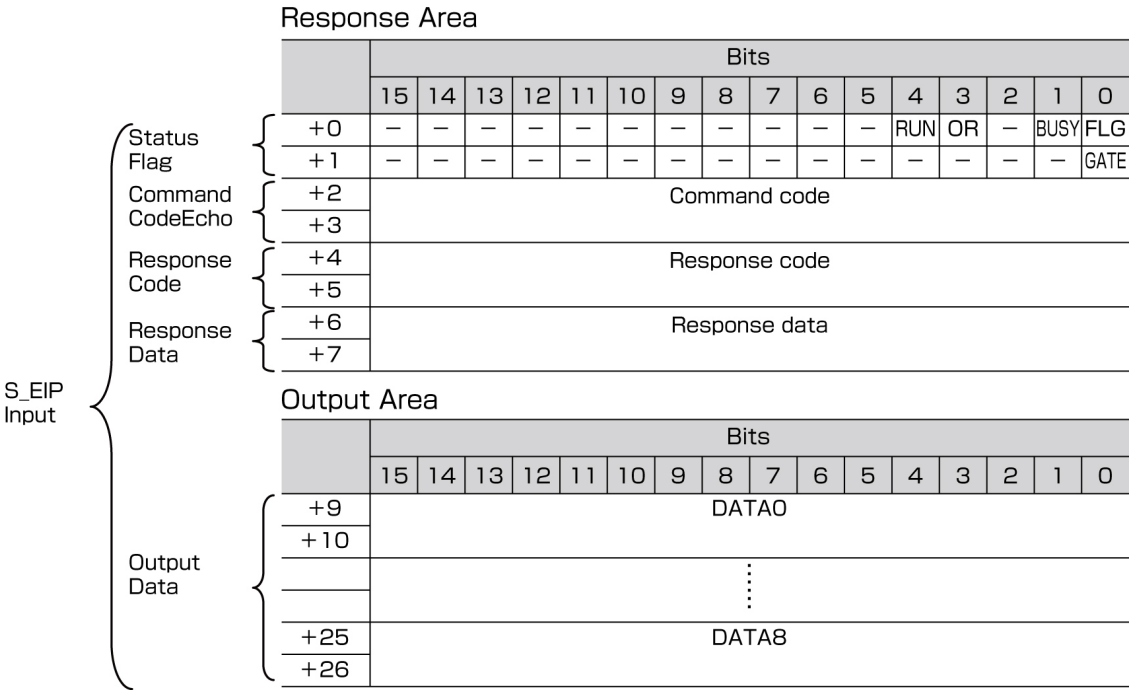
			Bits														
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
S_EIP Output	Control Flag	+0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	EXE
		+1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	DSA
	Command Code	+2	Command code															
		+3																
	Command Param1	+4	Parameter 1															
		+5																
	Command Param2	+6	Parameter 2															
		+7																
	Command Param3	+8	Parameter 3															
		+9																

・Data Type to Access the Response and Output Areas

Name of data type: S_EIPInput
Type of derivative data type: Structure

Name of data type		Data type
S_EIPInput		STRUCT
	StatusFlag	U_EIPFlag …… The data type that was defined above (1)
	CommandCodeEcho	DWORD …… 32-bit bit string data
	ResponseCode	DINT …… 32-bit integer data
	ResponseData	UDINT …… 32-bit integer data
	OutputData	ARRAY[0..7]OF DINT …… Specifies an array of DINT data from 0 to 7.

・Assignment Example for Variable Data Type That Matches the Response and Output Areas



2. Defining the Variables

Define variables for the data links for the communications area data that is used in EtherNet/IP communications.

These variables use the data types that were defined above in procedure 1.

Variable	Variable type	Network Publish attribute	Data type	Application
EIPOutput	Global variable	Output	S_EIPOutput	For data links to the command area
EIPInput	Global variable	Input	S_EIPInput	For data links to the response and output areas

3. Exporting the Variables That Were Defined on Sysmac Studio

Export the variables that you defined so that you can use them on the Network Configurator.

An exported CSV file is created.

4. Network Configurator Settings

1. Import to the Network Configurator the CSV file that you exported from the Sysmac Studio.

   The variables that are imported will automatically be registered as tags.
2. Set the connections as shown in the following table.

Originator device (PLC) settings	Target device (Sensor) settings
Input tag set: EIPOutput	Output tag set: Input101
Output tag set: EIPInput	Input tag set: Output100

5. Accessing the Communications Areas from the User Program

The defined variables are used to access the communications areas for the Sensor using the following notation.

・Command Area

Signal name	Variable name
EXE	EIPOutput.ControlFlag.F[0]
DSA	EIPOutput.ControlFlag.F[16]
Command code	EIPOutput.CommandCode
Command parameter 1	EIPOutput.CommandParam1
Command parameter 2	EIPOutput.CommandParam2
Command parameter 3	EIPOutput.CommandParam3

・Response Area

Signal name	Variable name
FLG	EIPInput.StatusFlag.F[0]
BUSY	EIPInput.StatusFlag.F[1]
OR	EIPInput.StatusFlag.F[3]
RUN	EIPInput.StatusFlag.F[4]
GATE	EIPInput.StatusFlag.F[16]
Command code	EIPInput.CommandCodeEcho
Response code	EIPInput.ResposeCode
Response data	EIPInput.ResposeData

・Output Area

Signal name	Variable name
Output data 1	EIPInput.OutputData[0]
	・ ・ ・
Output data 8	EIPInput.OutputData[7]

Accessing Communications Areas by Specifying I/O Memory Addresses

AT specifications can be set for variables to individually specify the I/O memory addresses that are assigned in the communications areas.

1. Setting Tag Sets (Network Configurator)
   Specify the tag names in the PLC directly by using the I/O memory addresses that are assigned in the communications areas. (Output tags are specified for the input connections to the Sensor and input tags are specified for output connections to the PLC.)

   Setting Examples
   Output tag: D0
   Input tag: D100
2. Setting Variables (Sysmac Studio)
   Define variables with AT specifications to the I/O memory addresses that are assigned in the

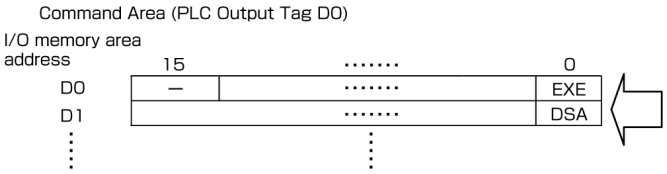
communications areas as shown below.

Setting Examples
Variable: a (AT specification: D0.0)
Variable: b (AT specification: D0.15)
Variable: c (AT specification: D1.0)

3. Setting Connections
Set the connections as shown in the following table.

Originator device (PLC) settings	Target device (Sensor) settings
Input tag set: D0	Output tag set: Input101
Output tag set: D100	Input tag set: Output100

Example: Setting Example for Variables to Access the Command Area



Variables Used to Access the Command Area in the PLC from the User Program

Variable name	Settings	
	AT specification	Data type
a (Assigned to the EXE signal.)	DO.0	BOOL
b (Assigned to the ERCLR signal.)	DO.15	BOOL
c (Assigned to the DSA signal.)	D1.0	BOOL

Command Control (EtherNet/IP)

This section explains each command used in EtherNet/IP.
A command with a description of command area head channel can be executed with both tag data link communication and message communication.
A command without a description of command area head channel can only be executed with message communication (sending and receiving commands equivalent to non-procedure command).

Execute command

Command area top channel		Function	References
+3	+2		
0010	1010	Measurement is performed one time	Reference: Details (p.378)
0010	1020	Starts continuous measurement	Reference: Details (p.378)
0010	1030	Completes continuous measurement	Reference: Details (p.379)
0010	1040	Executes measurement tests on specified units	Reference: Details (p.379)
0010	2010	Clears measurement values	Reference: Details (p.380)
0010	3010	Saves in controller	Reference: Details (p.380)
0010	4010	Re-registers the model data with the current image	Reference: Details (p.381)
0010	5010	Moves the image display position in parallel the specified distance	Reference: Details (p.382)
0010	5020	Zooms in/out the image display by the specified zoom ratio	Reference: Details (p.382)
0010	5030	Returns the display position and display zoom ratio to their initial values	Reference: Details (p.383)
0010	7010	Copies scene data	Reference: Details (p.384)
0010	7020	Deletes scene data	Reference: Details (p.384)
0010	7030	Moves scene data	Reference: Details (p.385)
		Registers specified image data as registered image	Reference: Details (p.536)

0010	8020	Loads the specified registered data as a measurement image	Reference: ▶ Details (p.386)
0010	9010	Returns the input character string as is to output (echo)	Reference: ▶ Details (p.387)
		Adds a user account to a specified group ID	Reference: ▶ Details (p.536)
		Deletes a specified user account	Reference: ▶ Details (p.536)
0010	B010	Branches to the flow head (processing unit No. 0)	Reference: ▶ Details (p.389)
0010	F010	Restarts the controller	Reference: ▶ Details (p.390)

Get state command

Command area top channel		Function	References
+3	+2		
0020	1000	Acquires scene No.	Reference: ▶ Details (p.390)
0020	2000	Acquires scene group No.	Reference: ▶ Details (p.391)
0020	4000	Gets the currently displayed layout number	Reference: ▶ Details (p.391)
0020	5010	Gets the number of the unit currently displayed in the specified display image window	Reference: ▶ Details (p.392)
0020	5020	Gets the number of the sub-image in the specified image display window	Reference: ▶ Details (p.393)
0020	5030	Gets the image mode for the specified image display window	Reference: ▶ Details (p.394)
0020	7010	Gets the input state of an individual communications module: Enabled or Disabled	Reference: ▶ Details (p.394)
0020	7020	Gets the output state to an external device: Enabled or Disabled	Reference: ▶ Details (p.395)
0020	8010	Gets the state of the specified parallel I/O terminal: Active or Inactive	Reference: ▶ Details (p.396)
0020	8020	Gets all the ON/OFF states for terminals other than DI at once	Reference: ▶ Details (p.397)
0020	8030	Retrieves the states of DI terminals in batches: Active or Inactive.	Reference: ▶ Details (p.397)
		Acquires the user name for the currently logged in user account	Reference: ▶ Details (p.536)
		Acquires the affiliation group ID for the currently logged in user account	Reference: ▶ Details (p.536)
0020	A000	Gets the operation log state	Reference: ▶ Details (p.399)

State setting command

Command area top channel		Function	References
+3	+2		
0030	1000	Switching Scenes	Reference: ▶ Details (p.400)
0030	2000	Switch the scene group No.	Reference: ▶ Details (p.400)
0030	4000	Sets a layout number to switch between screens	Reference: ▶ Details (p.401)
0030	5010	Sets the number of the unit displayed in the specified image display window	Reference: ▶ Details (p.402)
0030	5020	Sets the number of the sub-image displayed in the specified image display window	Reference: ▶ Details (p.402)
0030	5030	Sets the image mode for the specified image display window	Reference: ▶ Details (p.403)
0030	7010	Enables/Disables inputs into an individual communications module	Reference: ▶ Details (p.404)
0030	7020	Enables/Disables outputs to external devices	Reference: ▶ Details (p.404)
0030	8010	Sets specified parallel I/O terminals ON/OFF	Reference: ▶ Details (p.405)
0030	8020	Sets all the ON/OFF states for terminals other than DO	Reference: ▶ Details (p.406)
0030	8030	Enables/Disables the D0 terminal in batches	Reference: ▶ Details (p.407)

		Alters the user account used by the user currently logging in	Reference: ▶ Details (p.536)
0030	A000	Sets the operation log state	Reference: ▶ Details (p.408)

Data read command

Command area top channel		Function	References
+3	+2		
0040	1000	Acquires unit data	Reference: ▶ Details (p.409)
		Acquires the current date and time	Reference: ▶ Details (p.536)
		Acquires system version information	Reference: ▶ Details (p.536)
		Acquires settings related to image logging	Reference: ▶ Details (p.536)
		Gets the defined image logging folder name	Reference: ▶ Details (p.536)
		Gets the defined data logging folder name	Reference: ▶ Details (p.536)
		Gets the defined screen capture folder name	Reference: ▶ Details (p.536)
		Acquires the set image logging prefix	Reference: ▶ Details (p.536)
0040	4050	Acquires the set data logging condition	Reference: ▶ Details (p.414)
0040	4060	Acquires the set DI terminal offset data	Reference: ▶ Details (p.415)

Data write command

Command area top channel		Function	References
+3	+2		
0050	1000	Sets unit data	Reference: ▶ Details (p.416)
		Sets the date/time	Reference: ▶ Details (p.536)
		Changes settings related to image logging	Reference: ▶ Details (p.536)
		Gets the defined image logging folder name	Reference: ▶ Details (p.536)
		Gets the defined data logging folder name	Reference: ▶ Details (p.536)
		Gets the defined screen capture folder name	Reference: ▶ Details (p.536)
		Acquires the image logging prefix	Reference: ▶ Details (p.536)
0050	4050	Sets the data logging condition	Reference: ▶ Details (p.421)
0050	4060	Sets the terminal offset data	Reference: ▶ Details (p.421)

File load command

Command area top channel		Function	References
+3	+2		
		Loads the Scene data	Reference: ▶ Details (p.536)
		Loads the scene group data	Reference: ▶ Details (p.536)
		Loads system data	Reference: ▶ Details (p.536)
		Loads System + Scene group 0 data	Reference: ▶ Details (p.536)

File save command

Command area top channel		Function	References
+3	+2		
		Saves the Scene data	Reference: Details (p.536)
		Saves the scene group data	Reference: Details (p.536)
		Saves system data	Reference: Details (p.536)
		Saves image data.	Reference: Details (p.536)
		Saves all the image data in the image buffer (specified with [main unit logging image])	Reference: Details (p.536)
		Saves the last logging image	Reference: Details (p.536)
		Saves System + Scene Group 0 data in a file	Reference: Details (p.536)
		Executes a screen capture	Reference: Details (p.536)

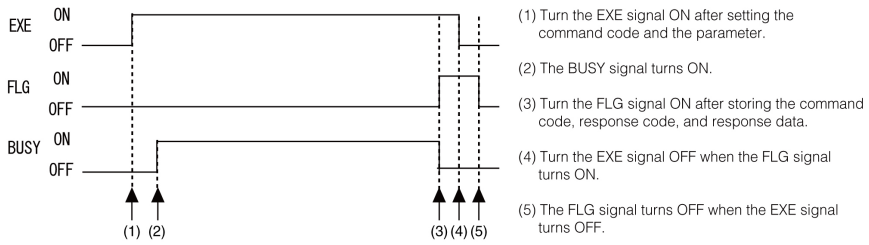
Data Output (EtherNet/IP)

Either fixed point output or floating point output can be selected for data output.
Reference: Fieldbus Data Output (p.586)

Timing Chart (EtherNet/IP)

I/O timing for each command is explained here.
The signal timing through EtherNet/IP is equivalent to parallel IO, and command execution and data output are performed independently. This section explains the timing of command execution and data output through the EXE signal.

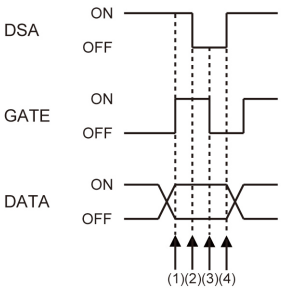
When executing a command with the EXE signal



Important

- Screen operation is not allowed when the EXE signal is turned ON. Make sure to turn the EXE signal OFF after executing a command.

For data output (with handshaking)



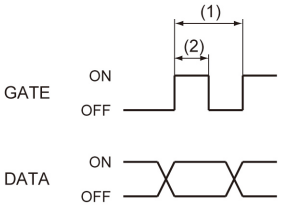
(1) Output data and turn the GATE signal ON when the DSA signal turns ON.

(2) Turn the DSA signal OFF when the GATE signal turns ON.

(3) Turn the GATE signal OFF when the DSA signal turns OFF.

(4) Turn the DSA signal ON when the next data is requested.

For data output (without handshaking)



Output DATA based on the specified output cycle (1) and output time (2) settings.

Turn ON the GATE signal after the DATA is output to guarantee DATA output.

Important

- Set the data output cycle and time so that the following conditions are satisfied.
  - Set the measurement tact interval so that the measurement tact interval is longer than the measurement processing time.
  - Set an output cycle that is longer than the output time, but shorter than the measurement interval.
  - Set the output time that is longer than the PLC cycle time and the EtherNet/IP communication cycle.
- Since a reasonable amount of measurement tact time is required to have stable communications in an operation under high load, verify the operation under the conditions that are to be actually applied.
- Since a large portion of the CPU load is allocated to measurement processing while the multiple input function is being used, a reduction in the performance (such as delayed response and packet loss), or a communication error may occur.
  Do not use EtherNet/IP communication when the multiple input function is being used.
- If the measurement interval is short, a communication error may occur depending on the measurement processing time and the PLC settings.Set a PLC timeout time longer than the measurement processing time, or increase the measurement intervals.

Communicating with the controller with Ethernet/IP message communications

The message communication function is used when communicating with a PLC that does not support tag data link communication or when using functions, such as character string output, that are not supported in tag data link communication.
Message communication can be performed either by exchanging the same data as for tag data link communication using AssemblyObjects or by sending and receiving commands equivalent to non-procedure commands using FZ4-specific VisionSystemObjects.
This document explains centered on AssemblyObjects and FZ4-specific VisionSystemObjects. For information on the procedure for issuing messages, refer to the User's Manual for the PLC you are using.

Object composition

The controller's EtherNet/IP function has the following objects. These objects can be accessed using message communication.

Class (object name)	Class ID	Instance ID
Identity Object	1 (01Hex)	1 (01Hex)
Message Router Object	2 (02Hex)	1 (01Hex)
Assembly Object	4 (04Hex)	100 (64Hex): Output connection (for normal control and for line 0 in the 2-line random trigger mode)?
		101 (65Hex): Input connection (for line 1 in the 2-line random trigger mode)?
		102 (66Hex): Output connection (for normal control and for line 0 in the 2-line random trigger mode)?
		103 (67Hex): Input connection (for line 1 in the 2-line random trigger mode)?
Connection Manager Object	6 (06Hex)	1 (01Hex)
Vision Sensor Object	100 (64Hex)	1 (01Hex): For normal control and for line 0 in the 2-line random trigger mode
		2 (02Hex): For line 1 in the 2-line random trigger mode
TCP/IP Interface Object	245 (F5Hex)	1 (01Hex)
EtherNet Link Object	246 (F6Hex)	1 (01Hex)

Data type

The data type is preset as follows in the EtherNet/IP specifications.

Data type	Description	Range	
		Minimum	Maximum
BOOL	Boolean	0: FALSE	1: TRUE
SINT	Short integer	-128	127
INT	Integer	-32768	32767
DINT	Double precision integer	-2^{31}	$2^{31}-1$
USINT	Unsigned short integer	0	255
UINT	Unsigned integer	0	65535
UDINT	Unsigned double precision integer	0	$2^{32}-1$
BYTE	Bit string: 8 bits	—	—
WORD	Bit string: 16 bits	—	—
DWORD	Bit string: 32 bits	—	—
REAL	Floating point real	Short precision floating point real range	

Note

- All values are stored in little endian order.

ClassID:4 Assembly Object

Used when communicating with a PLC that does not support tag data link communication.

- Setting for information the FZ4 receives

Instance

Setting item	Setting value	Description
Instance	100	For normal control and for line 0 in the 2-line random trigger mode
	102	For line 1 in the 2-line random trigger mode

Attribute

AttributeID	Access	Name	Data type	Description
0x03	Set	Data	BYTE arrangement	Sets the command received by FZ4. The format is the same as for an output connection in tag data link communication. Reference: ▶ Memory Allocation - Output connection (p.525)
0x04	Get	Size	UNIT	Number of bytes: 20

Service

Service code	Name	Details
14 (0EHex)	GetAttributeSingle	Acquires the attribute value.

- Setting for information the FZ4 sends

Instance

Setting item	Setting value	Description
Instance	101	For normal control and for line 0 in the 2-line random trigger mode
	103	For line 1 in the 2-line random trigger mode

Attribute

AttributeID	Access	Name	Data type	Description
0x03	Get	Data	BYTE arrangement	Data sent by FZ4. The format is the same as for input connection in tag data link communication. Reference: ▶ Memory Allocation - Input connection (p.526)
0x04	Get	Size	UNIT	Number of bytes: 48

Service

Service code	Name	Details
14 (0EHex)	GetAttributeSingle	Acquires the attribute value.
16 (10Hex)	SetAttributeSingle	Sets a value for the attribute. Whether or not an attribute can be set depends on the access attribute of the attribute.

ClassID: 100(64Hex) Vision Sensor Object

You can exchange character string data with a format equivalent to non-procedure commands with objects specific to FZ4. This makes possible, for example, output of character strings not supported in tag data links.

Instance

Setting item	Setting value	Description
Instance	0	For normal control and for line 0 in the 2-line random trigger mode
	1	For line 1 in the 2-line random trigger mode

Attribute

AttributeID	Access	Name	Data type	Description
0x01	Set	Data	BYTE arrangement	Sets the command character string sent to FZ4. The commands that can be used are equivalent to non-procedure commands. Reference: Controlling/Outputting through Serial Communication (Non-procedure) - Command List (p.443)

Service

Service code	Name	Details
0x32	SetAttribute	Sets a value for the attribute.

Attribute command character string setting method

- For PLC -> FZ4 send data, set a command character string equivalent to a non-procedure command. Attach 0x00 (null) at the end of the character string. No line feed code etc. is required. The size of the send data includes the 0x00 at the end of the character string.
- As FZ4 -> PLC reception data, character string data equivalent to the non-procedure command reception character string is returned.
  0x00 (null) is inserted in the reception character string delimiter section.
  The size of the reception data includes the final 0x00.
  (Example: Acquiring the number (0) of the scene currently being used)

  (Send data) 0x53('S') 0x00 2 bytes
  ↓
  (Receive data) 0x30('0') 0x00 0x4f('O') 0x4b('K') 0x00 5 bytes

Controlling/Outputting through Parallel Communication

This section describes how to set communication specifications and the I/O format required when communicating with external devices through a parallel interface.

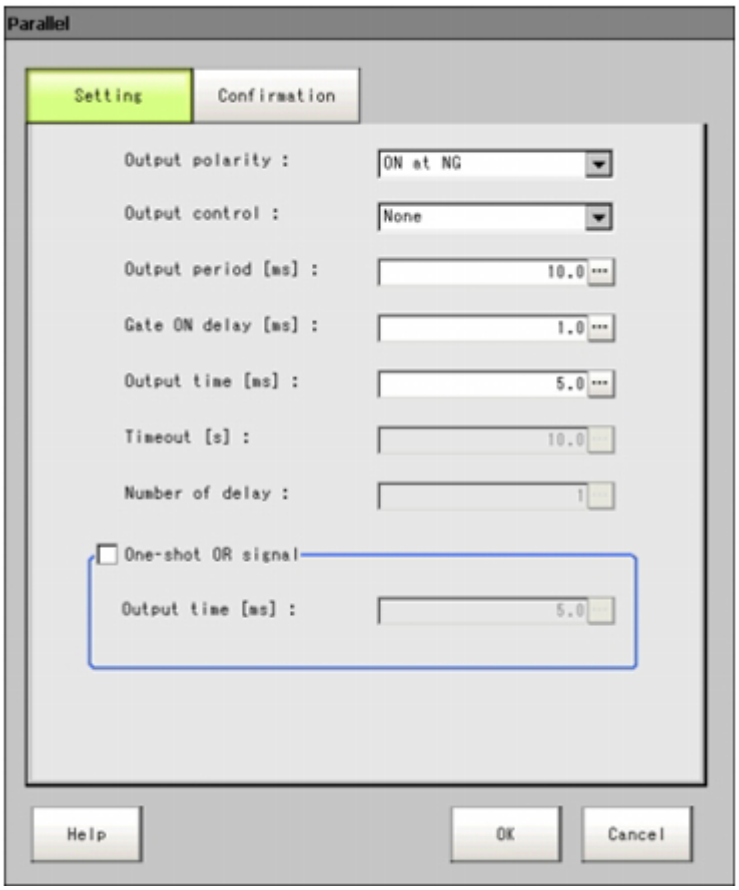
Setting Communication Specifications (Parallel Interface)

Set the controller communication specifications. Use the same communication specification settings for the controller and the external device.

Note

- During setting of communication specifications, input signals cannot be handled. However, the input status can be checked with [confirmation].
  Reference: Checking the Communication Status (Parallel Interface) (p.542)

1. On the Main screen, tap [System] menu - [Communication] - [Standard Parallel I/O].
   The Parallel window is displayed.
2. Tap [Setting] to set communication specifications.



Item		Setting value [Factory default]	Description
Output polarity		・ [On at NG] ・ On at OK	Select whether to turn on OR and DO0 to 15 when judgement result is OK or when it is NG.
Output control		[None]	Method to output measurement results without synchronizing with external devices. Reference: ▶ When "Output Control" Is Set to "None" (p.547)
		Handshaking	Method to output measurement results while synchronizing with external devices. Reference: ▶ When "Output Control" Is Set to "Handshaking" (p.551)
		Synchronization output	Method to output measurement results while synchronizing with line processing timing. The STEP signal is ignored the number of times set in "Number of delay", and measurement results are output when the STEP signal next turns on. If through images are displayed, however, synchronization output cannot be used. Reference: ▶ When "Output Control" Is Set to "Synchronization Output" (p.552)
Output period		2.0 to 5000.0 ms [10.0 ms]	Valid only when "Output control" is set to "None". Set the cycle by which measurement results are output. Set the cycle so that the interval is equal to or longer than "Gate ON delay + Output time" and shorter than measurement interval. If the cycle is longer than the measurement interval, output timing will be delayed while measurement is being repeated.
Gate ON delay		1.0 to 1000.0 ms [1.0 ms]	Set the time from when results are output to the parallel interface to when the GATE signal turns on. Waiting time until data output is stable. Set this so that it is longer than the external device delay time.
Output time		1.0 to 1000.0 ms [5.0 ms]	Valid only when "Output control" is set to "None" or "Synchronization output". Set the GATE signal ON time. Set the time required for external devices to acquire measurement results.
Timeout		0.5 to 120.0 s [10.0 s]	Valid only when "Output control" is set to "Handshaking". A timeout error occurs when no response from external devices is received within the time that has been set.
Number of delay		1 to 15 [1]	Valid only when "Output control" is set to "Synchronization output". Set the number of times that the STEP signal turning on will be ignored before measurement results of the STEP signal are output.
One-shot OR signal		・ ON ・ [OFF]	Select whether to maintain OR signal output for an arbitrary amount of time.
	Output time	0.1 to 1000.0 ms [5.0 ms]	Set the OR signal output time. Valid only when "One-shot OR signal" is set to ON. Set a value that is shorter than the measurement time.

3. Tap [OK].
   The settings are confirmed and the Parallel window closes.

Checking Communication Status (Parallel Interface)

Check the communication status with the external devices that are connected with a parallel interface. You can check whether wiring and communication settings have been performed correctly.

1. On the Main screen, tap [System] menu - [Communication] - [Standard Parallel I/O].
   The Parallel window is displayed.
2. Tap [Confirmation] to check the I/O status.

Display	Description
STEP0,STEP1	The input status of each signal from the external device to the controller is displayed. When a signal is input, the background color becomes red.
DSA0,DSA1	
DI	
RUN	The output status of each signal is displayed. When a signal is output, the background color becomes red. The output status from each signal of the controller to external devices can be specified. Changes between ON and OFF and between 0 and 1 can be simulated without performing measurement.
GATE0,GATE1	
BUSY	
OR0,OR1	
ERR	
READY0,READY1	
DO	

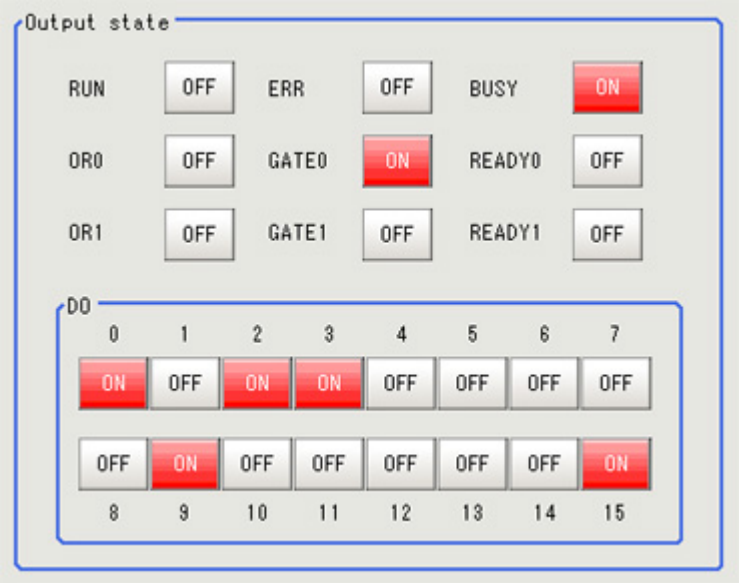
Operation mode = [Multi-line random-trigger mode] (FZ4-11 ☐☐ /H11 ☐☐ series only)

I/O	Multi-line random trigger mode		Other than Multi-line random trigger mode
	Line 0	Line 1	
STEP	STEP0	STEP1	STEP0
DSA	DSA0	DSA1	DSA0
DI	DI0 to DI7	DI0 to DI7	DI0 to DI7
RUN	No output		RUN
GATE	GATE0	GATE1	GATE0
BUSY	BUSY	RUN	BUSY
OR	OR0	OR1	OR0
ERR	ERR (common)		ERR
READY	READY0	READY1	READY0
DO	DO0 to DO7	DO8 to DO15	DO0 to DO15

Important

- That status of each of the parallel terminal signals STEP, DSA, GATE, OR, and READY can be checked on the screen with STEP0, DSA0, GATE0, OR0, and READY0.
- If the operation mode (FZ4-11 ☐ ☐ /H11 ☐ ☐ only) is [Multi-line random-trigger mode], line 0 uses GATE0, OR0, READY0, STEP0 and DSA0, while line 1 uses GATE1, OR1, READY1, STEP1 and DSA1.
- If the operation mode (FZ4-11 ☐☐ /H11 ☐☐ only) is [Multi-line random-trigger mode], the RUN signal cannot be checked.
- If the operation mode (FZ4-11 ☐☐ /H11 ☐☐ only) is [Multi-line random-trigger mode], the ERR signal is used in common.

3. Change the contents to be sent.



When switching between "ON"/"OFF" is performed, the changed contents are displayed on the monitors of external devices. Please verify it.

4. Tap [OK].
The Parallel window closes.

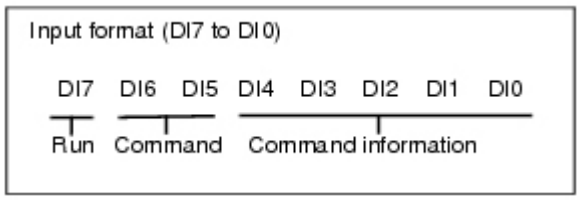
I/O Format (Parallel Interface)

Input Format

When the Main screen is displayed, the following commands can be input.

- STEP signal
Measurement is performed once when STEP signal turns on.
- DSA signal
When "Output Control" is set to "Handshaking", this is a signal to provide notification that the external device is ready to receive data.
Reference: ▶ Setting Communication Specifications (Parallel Interface) (p.540)
- DI signal
Commands can be input in the following format. Set 0 (OFF) or 1 (ON) for each DI signal.
Confirm commands and information, and turn DI7 (execute) ON with an interval of at least 1 ms.

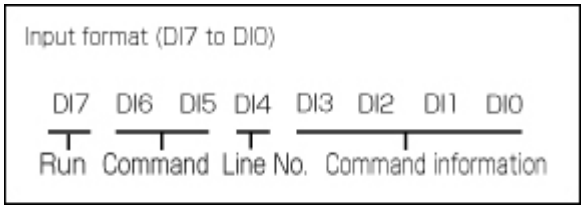
When 1 line is used



Item	Description	Input format (DI7 to DI0)			Input example
		Execute (DI7)	Command (DI6, DI5)	Command information (DI4 to 0)	
Continuous measurement	Measure continuously during input of commands.	1	00	***** The controller does not detect this signal, so a setting of either 0 or 1 makes no difference.	Input example: 10000000
Scene switch	Switch measurement scenes.	1	01	Input "Scene No." in binary format. (0 to 31)	Switch to scene 2. Input example: 10100010
Scene group switch	Switch measurement scene groups.	1	11	Input "Scene Group No." in binary format. (0 to 31)	Switch to scene group 2. Input example: 11100010
Clearing Measurement Values	Clear measurement values. The OR signal and DO signal are not cleared.	1	10	00000	Input example: 11000000
Clear Error	Clear error output. The ERROR indicator is also cleared.	1	10	00001	Input example: 11000001
Clear Parallel OR+DO	Clear the OR signal and DO signal.	1	10	00010	Input example: 11000010

0: OFF 1: ON

Operation mode (FZ4-11□□ /H11□□ only) = [Multi-line random-trigger mode]



Item	Description	Input format (DI7 to DI0)				Input example
		Execute (DI7)	Command (DI6, DI5)	Line No. (DI4)	Command information (DI3 to 0)	
Continuous measurement	Measure continuously during input of commands.	1	00	0 or 1 Specify the line number to send commands to.	***** The controller does not see this signal, so a setting of either 0 or 1 makes no difference.	Continuously measure line 1 Input example: 10010000
Scene switch	Switch measurement scenes.	1	01		Input "Scene No." in binary format. (0 to 15)	Switch line 0 to Scene 2 Input example: 10100010
Scene group switch	Switch measurement scene groups.	1	11		Input "Scene Group No." in binary format. (0 to 15)	Switch line 1 to Scene Group 2 Input example: 11110010
Clearing Measurement Values	Clear measurement values. The OR signal and DO signal are not cleared.	1	10		0000	Clear the measurement values of line 1 Input example:11010000
Clear Error	Clear error output. The ERROR indicator is also cleared.	1	10		0001	Clear the error of line 0 Input example: 11010001
Clear Parallel OR+DO	Clear the OR signal and DO signal.	1	10		0010	Clear the OR signal and DO signal of line 1 Input example: 11010010

0: OFF 1: ON

Reference

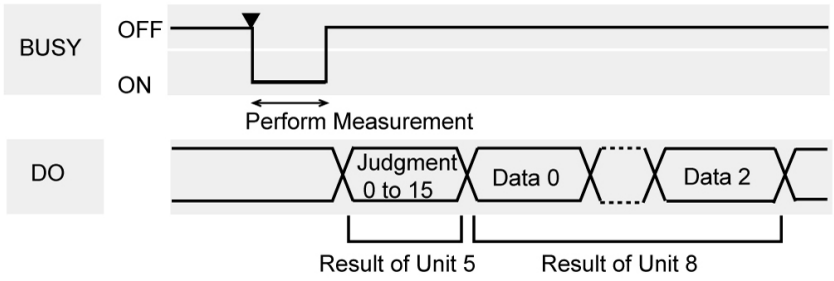
- When the input command is not received correctly, the ERROR signal turns on.

Important

- When parallel continuous measurement is engaged and continuous STEP signal is input, switching of scene group should be avoided. When this is performed, set "Unchecked" in "Save scene group on switch scene" in either of the settings items below.
  - Switch Scene Group window Reference: Switching Scene Groups (p.65)
  - [Measure setting] in the [Measure] menu Reference: Setting Conditions Related to Operation during Measurement (p.344)

Output Format

Each time measurement is performed, the measurement result is output.
Output can be selected to turn on either when the judgement result is OK or when it is NG. The factory default setting is "ON at NG".
Reference: Setting Communication Specifications (Parallel Interface) (p.540)

Signal	Output contents
OR signal	Overall judgement results are output.
DO 0 to 15 signal[Note 1]	Parallel judgement output The judgement results of judgement 0 to 15 set in the processing item [Parallel Judgement Output] are output to DO 0 to 15. Reference: ▶ "Processing Item List Manual", "Parallel Judgement Output" (p.582)
	Parallel Data Output The measurement values set in data 0 to 7 in the processing item [Parallel Data Output] are output in 16-bit format. Reference: ▶ "Processing Item List Manual", "Parallel Data Output" (p.579) ・ Only integers are output. Decimals are rounded up. ・ The range of values that can be output is as follows: Binary format: -32768 to +32768 BCD format: -999 to +999 When measurement values are outside of these ranges, the following apply. Binary format: When -32768 is > measurement value, -32767 is output. When measurement value is > +32768, +32768 is output. BCD format: When -999 is > measurement value, -999 is output. When measurement value is > +999, +999 is output. ・ For the output format, select from a 2's complement binary format or BCD format. For 2's complement, see Reference: ▶ Terminology Explanations (p.590) ・ Output sequence Measurement results are output in sequence starting with the smallest processing unit number. Example) When [Parallel Judgement Output] is processing unit 5 and [Parallel Data Output] is processing unit 8 

[Note 1]: If the operation mode (FZ4-11 □ □ /H11 □ □ only) is [Multi-line random-trigger mode], line 0 uses DO0 to DO7, while line 1 uses DO8 to DO15. For parallel judgement output setting, set the judgement result to be output to expressions 0 to 7 for lines 0 and 1.
Reference: ▶ "Processing Item List Manual", "Parallel Judgement Output" (p.582)
The parallel data output range is between -127 and 127 for binary data, and -9 and 9 for BCD data.

Reference

- After measurement, the data output by the OR signal or DO signal is held until the next measurement is performed. Note that the output status will be maintained even after measurement is complete.
  However, when [One-shot OR signal] is on in Reference: ▶ Setting Communication Specifications (Parallel Interface) (p.540) , the OR signal will turn off after the set output time has elapsed.
- The output signal factory default setting is OFF, but the signal may be ON for approximately 0.5 second when power is turned on. Be careful of signal loading occurring at external devices.

Timing Chart

Here, I/O timings of various commands are described.

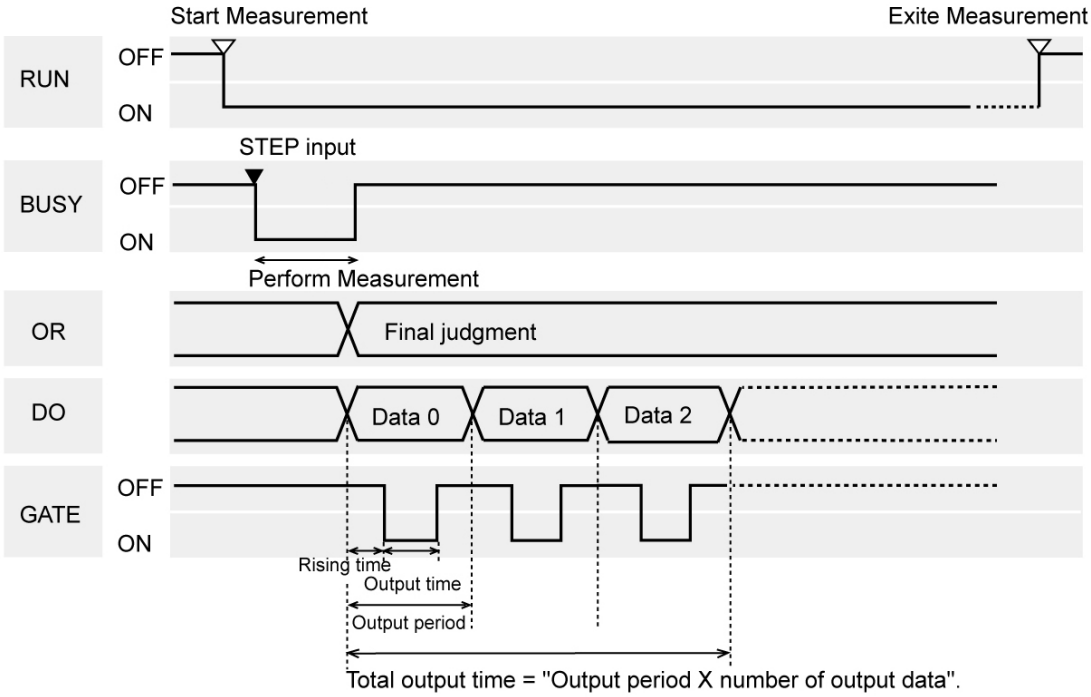
- Reference: When "Output Control" Is Set to "None" (p.547)
- Reference: When "Output Control" Is Set to "Handshaking" (p.551)
- Reference: When "Output Control" Is Set to "Synchronization Output" (p.552)
- Reference: Scene/Scene Group Switch (p.553)
- Reference: Clears measurement value by the parallel command (p.555)
- Reference: Clears the OR and DO signal by the parallel command (p.556)
- Reference: Clears error by the parallel command (p.557)
- Reference: Timing chart at multi-line random trigger mode (p.558)
- Reference: About Multiple Image Input Function (p.559)

When "Output Control" Is Set to "None"

Output the measurement results if controller is not synchronous with external devices. Have the external devices detect the GATE signal of the controller, and load DO signal during ON status.

Inputting a measurement trigger in the STEP signal

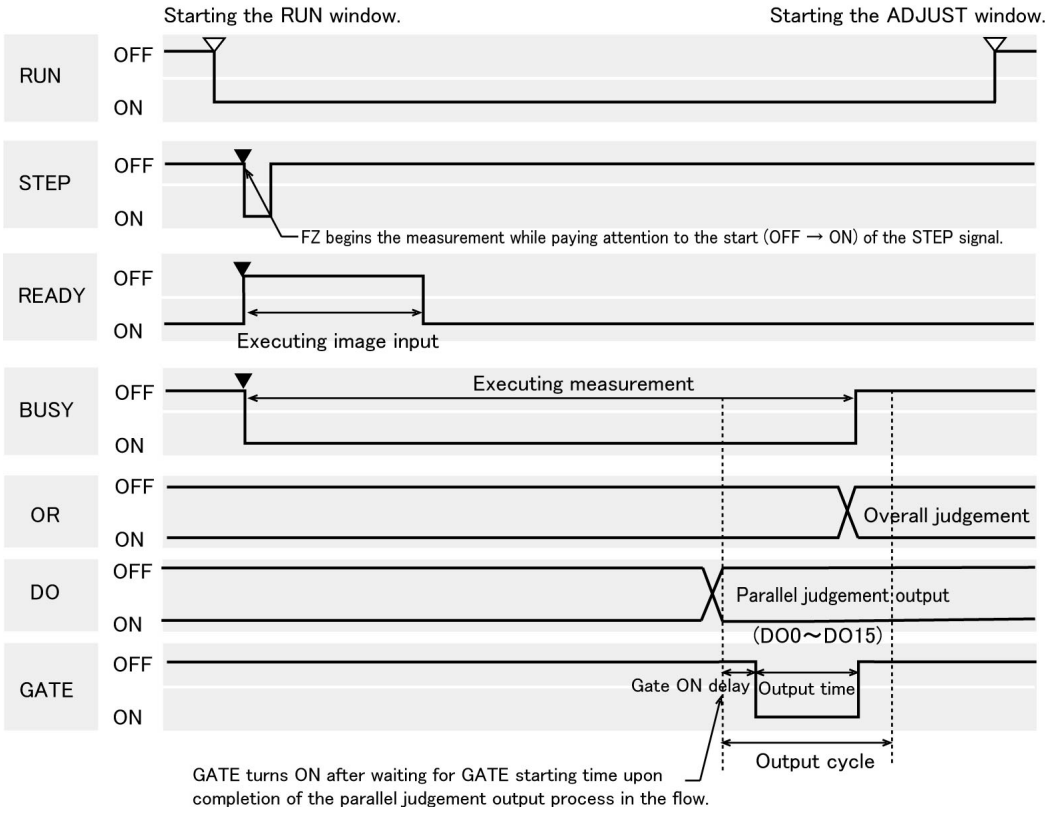
Example 1) When 3 expressions are set in [Parallel Data Output]:



Example 2) If there is a process after a [Parallel judgement output]

■Flow setting example 2

0. Camera Image Input
1. Search
2. Parallel Judgement Output
3. Data Logging



Output signal

Signal	Function
RUN	Turns on when the controller is available for measurement and the RUN window is displayed. It is OFF in the ADJUST window, so switch to the RUN window during operation.
BUSY	Indicates that controller is currently measuring or switching the scene. Do not input next command while the BUSY signal is on. Otherwise, on-going processing or commands that are input will not be performed correctly.
OR	Outputs overall judgement. This is determined when the measurement is completed (BUSY signal ON → OFF). Selection of whether ON occurs during an OK judgement result or NG judgement result can be performed in the communication specifications settings window. Reference: ▶ Setting Communication Specifications (Parallel Interface) (p.540)
DO	Outputs the results for expressions set in the processing item [Parallel Judgement Output]/[Parallel Data Output]. Selection of whether ON occurs during an OK judgement result or NG judgement result can be performed in the communication specifications settings window. Reference: ▶ Setting Communication Specifications (Parallel Interface) (p.540)

GATE	Used to control the loading time of the DO signal to external devices. ON for the time required for external devices to securely load the DO signal. Set the output cycle so that the total output time is shorter than measurement interval (input interval of STEP signal). GATE signal is output only when the [Parallel judgement output] and [Parallel data output] are set in the measurement flow, and the output process begins when the signal passes through the parallel judgement output (parallel data output) point in the flow. Depending on the setting flow, GATE output may be started when the BUSY signal is ON. Note that the OR signal and GATE signal do not necessarily operate simultaneously. Example 2)
READY	ON when STEP signal can be input. When through images are being displayed, the READY signal will turn to OFF, but the STEP signal is received. During the through display, determine whether or not STEP input is allowed based on the BUSY signal.

Input signal

Signal	Function
STEP	Input measurement triggers from external devices such as optic switches, etc. Perform measurement once synchronous with the STEP signal turning on (OFF → ON). Turn the STEP signal ON for at least 0.5 ms. A noise filter (filter initial setting value: 100 µs) is set in STEP input.

Reference

- The following can be changed with regard to the READY signal.
  - Handling of ERROR signal when STEP signal is input during measurement
    Reference: Setting Conditions Related to Operation during Measurement (p.344)

Important

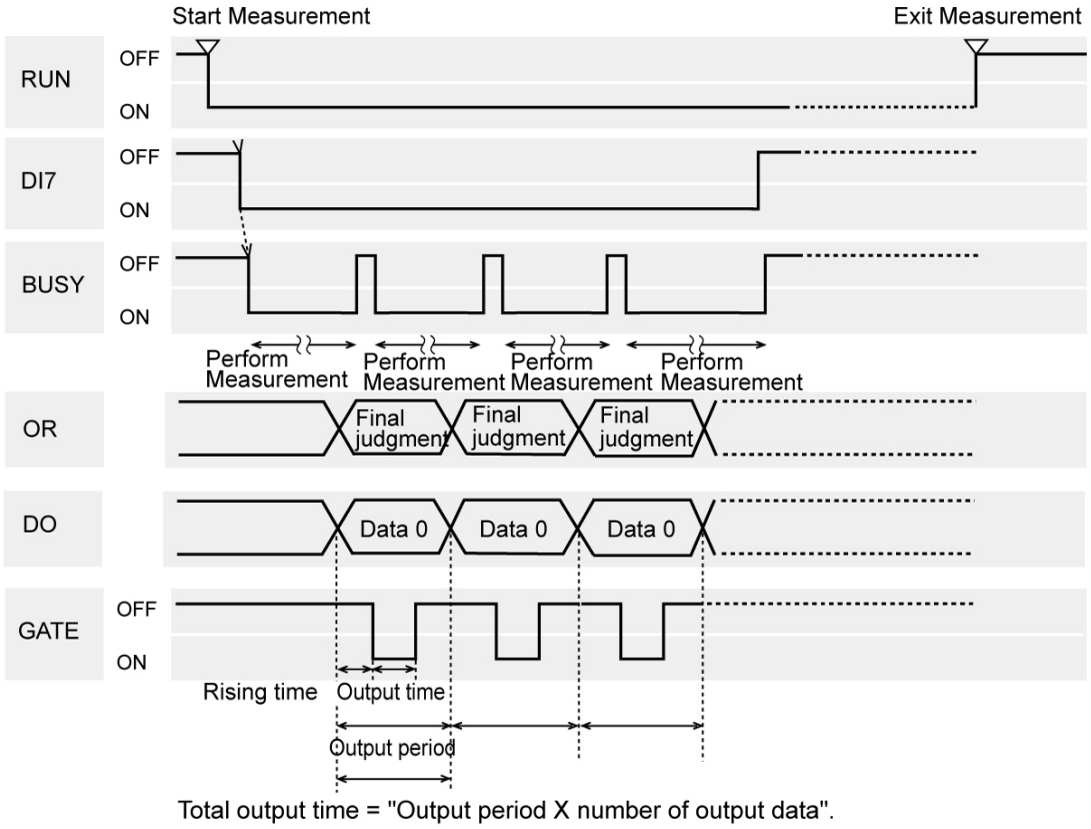
- When parallel continuous measurement is engaged and continuous STEP signal is input, switching of scene group should be avoided. When this is performed, set "Unchecked" in "Save scene group on switch scene" in either of the settings items below.
  - Switch Scene Group window Reference: Switching Scene Groups (p.65)
  - [Measure setting] in the [Measure] menu Reference: Setting Conditions Related to Operation during Measurement (p.344)

Continuous measurement

Important

- Measurement is given priority when continuous measurement is being performed. As a result, the measurement result display (overall judgement, image, judgement for each processing unit in the flow display, detailed results) may not be updated.
  When continuous measurement ends, the measurement results of the final measurement are displayed.

Example) When 1 expressions are set in [Parallel Data Output]:



Reference

- The output signal functions the same as when "Output Control" is set to "None".
  Reference: ▶ When "Output Control" Is Set to "None" (p.547)

Input signal

Signal	Function
DI0 to 6	It turns off while continuously measuring (DI7 being turned on).
DI7	This is the execution trigger. After DI0 to 6 is set, turn DI7 on after an interval over 1 ms. Always have this turned ON during a continuous measurement. Stops continuous measurement when this is turned OFF.

Reference

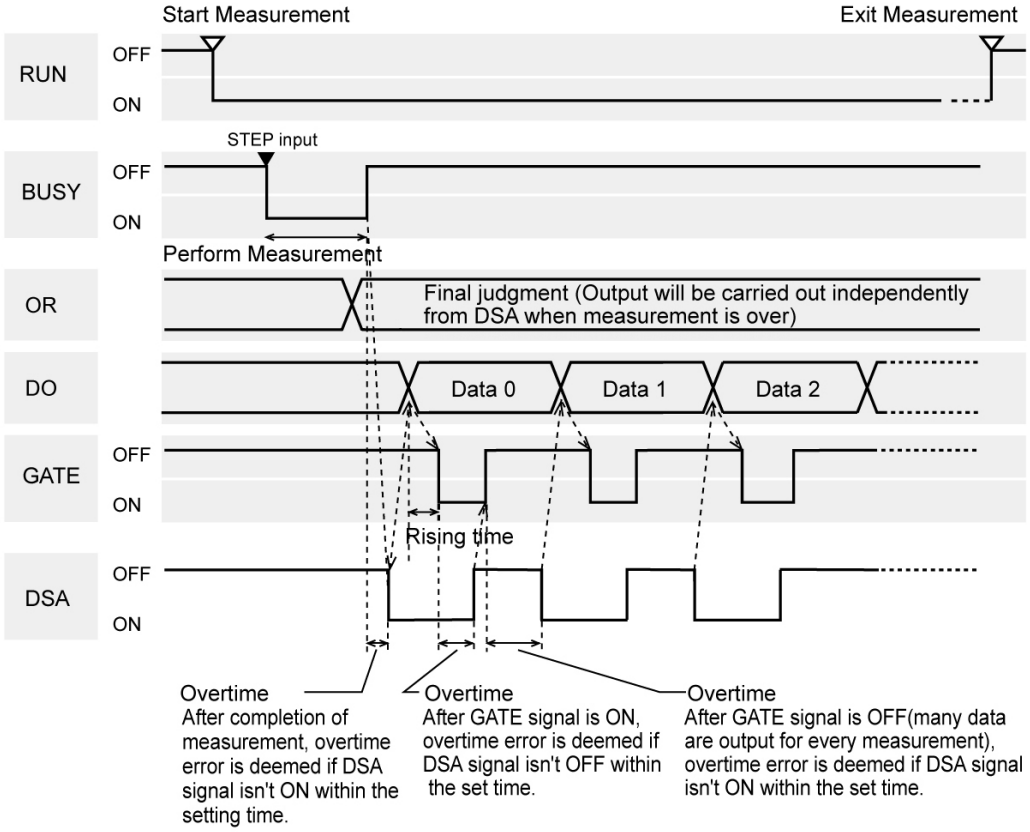
- The ERROR signal turns on when the input command is not correctly performed.
- Acquisition is difficult since the amount of time during which the BUSY signal is turned OFF during a continuous measurement by the parallel command is extremely short at 1 ms or less. Acquires the OR signal at the time when the GATE signal turns ON after adding the parallel judgement output at the end of the flow.

When "Output Control" Is Set to "Handshaking"

Output the measurement results if controller is synchronous with external devices. If this function is used when multiple measurement results are output in sequence, it enables efficient and effective data transfer.

Inputting a measurement trigger in the STEP signal

Example) When 3 expressions are set in [Parallel Data Output]:



Reference

- The output signal functions the same as when "Output Control" is set to "None".
  Reference: ▶ When "Output Control" Is Set to "None" (p.547)

Input signal

Signal	Function
DSA	This signal is used to request the next data transfer from external devices. The controller does not output data until the DSA signal is on. Turn the DSA signal on in the following cases: ・ The receiving system for external devices is complete ・ The controller has completed measurement The BUSY signal is on during measurement. As a result, the timing of when measurement is complete can be understood by observing the BUSY signal.

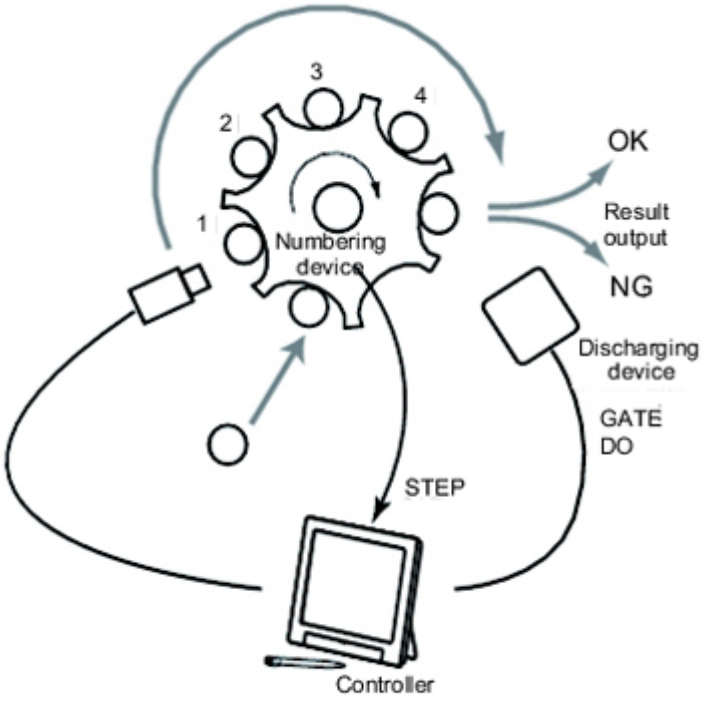
When "Output Control" Is Set to "Synchronization Output"

This method enables synchronization between processing timing on the line and timing for output of controller results. After the STEP signal has turned on the number of times set in "number of delay" in the communication specifications, measurement results will be output the next time the STEP signal turns on.

Reference

- When the communication specification "Output Control" is set to "Synchronization output", levels will be counted according to the number of times the STEP signal turns on. For this reason, perform settings so that results are output only once for each measurement. (1 unit for [Judgement Output], 1 data item for [Data Output])
  Reference: Setting Communication Specifications (Parallel Interface) (p.540)
- Only designate the STEP signal for measurement command input.
  When measurement using serial commands and continuous measurement are performed, the output time will not match and this can cause controller malfunctions.

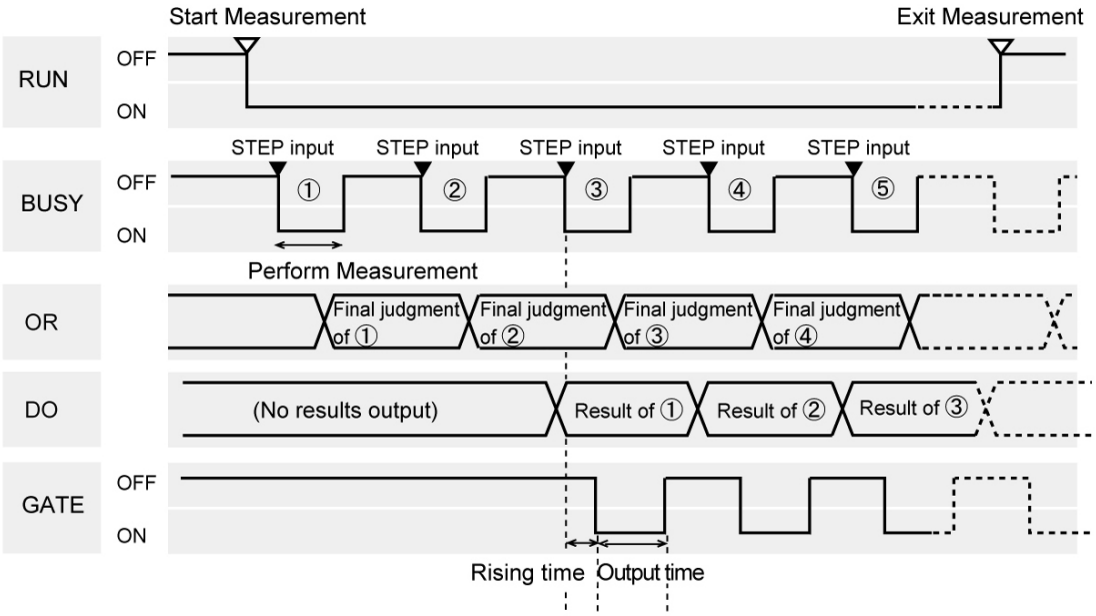
Example) Stepped transmission line utilizing star wheel
The discharge timing for when a defective part is found and the measurement results output timing can be synchronized.



When "Number of delay" is set as "4", measurement results are output after 4 delays.

Inputting a measurement trigger in the STEP signal

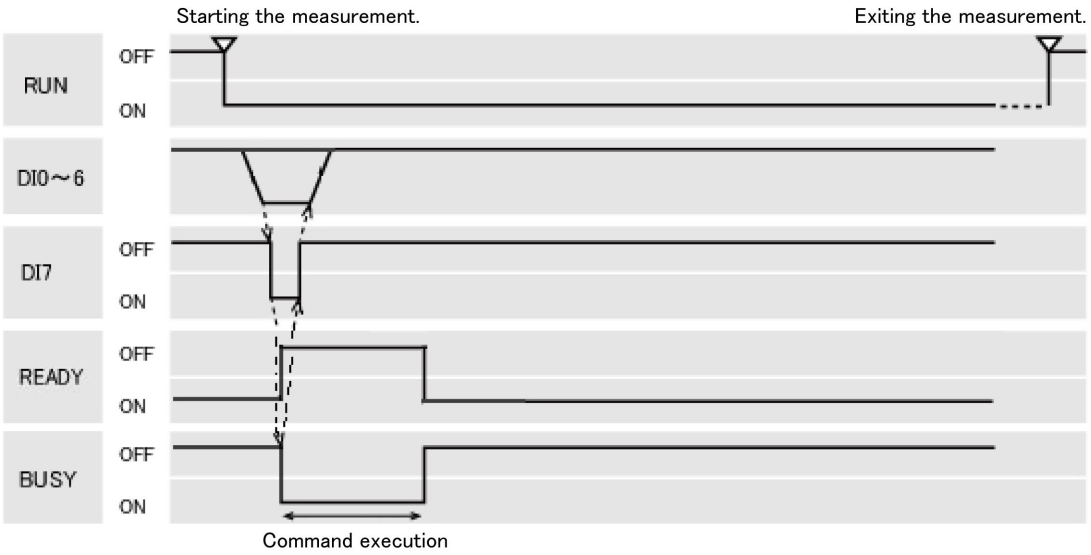
Example) When "2" is set for "Number of delay"



Reference

- The output signal functions the same as when "Output Control" is set to "None".
  Reference: ▸ When "Output Control" Is Set to "None" (p.547)

Scene/Scene Group Switch



Output signal

Signal	Function
RUN	Turns on when the controller is available for measurement and the RUN window is displayed. Turns off in the ADJUST window.
READY	Turns OFF when a scene or a scene group is being switched. Turns OFF as long as the BUSY signal is turned ON.

BUSY	Indicates that the controller is currently switching the scene or scene group. Do not input next command while the BUSY signal is on. Otherwise, on-going processing or commands that are input will not be performed correctly.

Input signal Scene switching

Signal	Function
DI0 to 4	Set scene No. (0 to 31). When a DI terminal offset is set, the setting value is added.
DI5	ON
DI6	OFF
DI7	This is the execution trigger. After DI0 to 6 is set, turn DI7 on after an interval over 1 ms. BUSY signal is on during implementation of commands. If the DI7 signal OFF timing cannot be set faster than the BUSY signal OFF timing on the control side, set the scene switching additional time to lengthen the BUSY signal OFF timing.

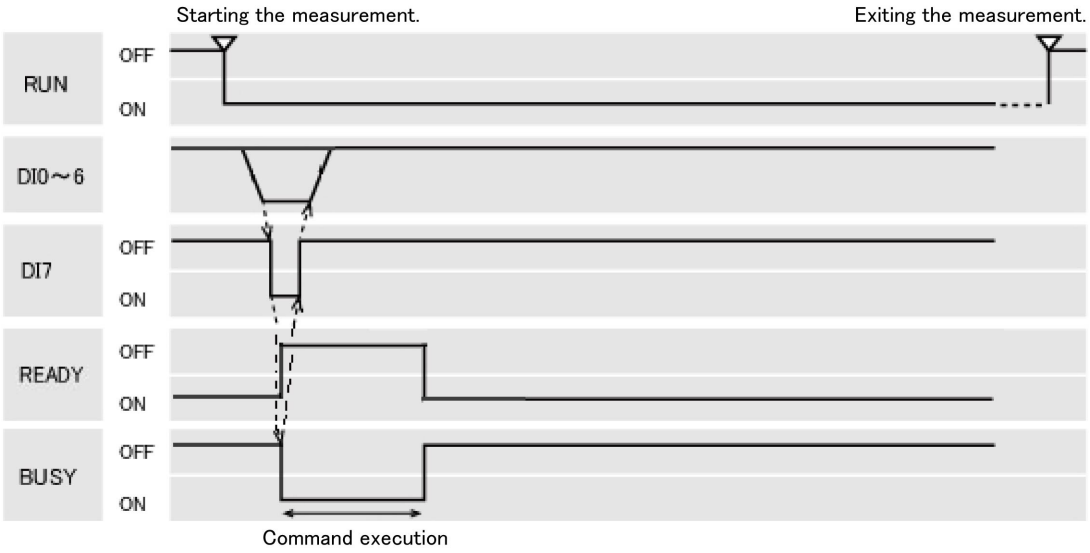
Reference

- The amount of time during which the BUSY signal is turned ON when a scene is switched can be changed.
  [Measurement setting] in the [Measure] menu Setting conditions related to operation during measurement

Input signal Scene group switching

Signal	Function
DI0 to 4	Set scene group No. (0 to 31). When a DI terminal offset is set, the setting value is added.
DI5	ON
DI6	ON
DI7	This is the execution trigger. After DI0 to 6 is set, turn DI7 on after an interval over 1 ms. BUSY signal is on during implementation of commands. After checking that the BUSY signal has turned on, turn DI7 off, and then turn DI0 to 6 off. If the DI7 signal OFF timing cannot be set faster than the BUSY signal OFF timing on the control side, set the scene switching additional time to lengthen the BUSY signal OFF timing.

Clears measurement value by the parallel command



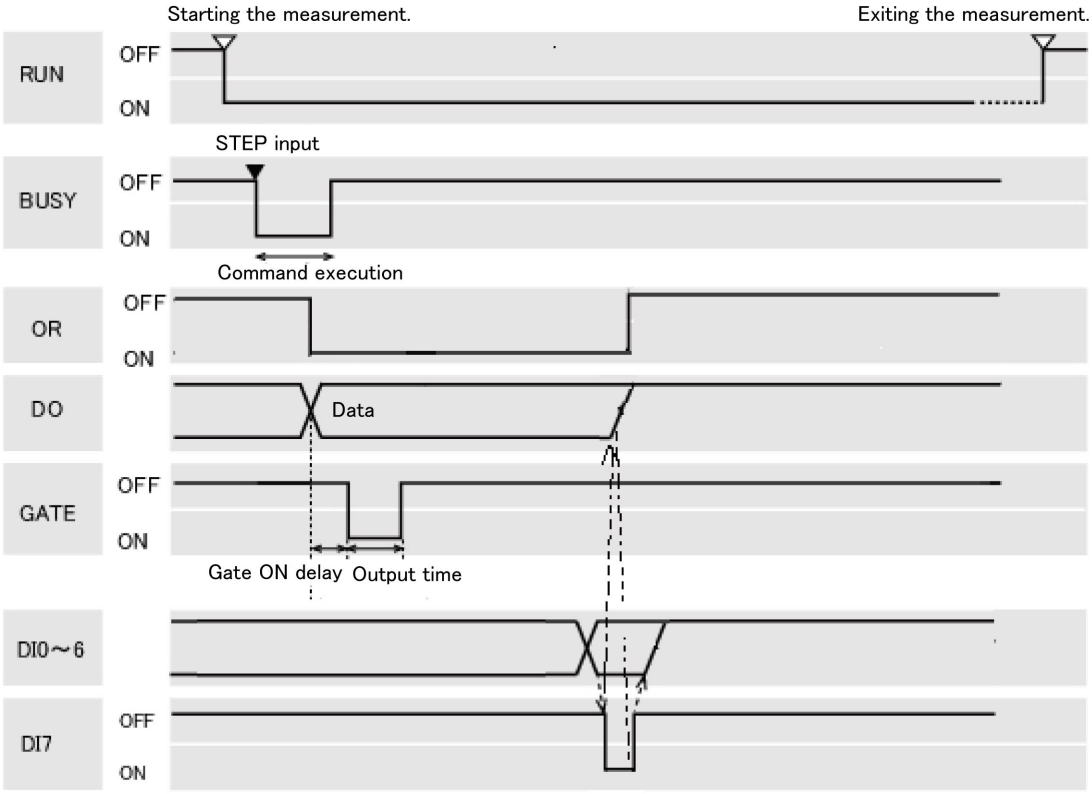
Output signal

Signal	Function
RUN	Turns ON when the controller is set to the RUN window. Turns OFF in the ADJUST window.
READY	Turns OFF when the command to clear the measurement value is being executed. Turns OFF as long as the BUSY signal is turned ON.
BUSY	Turns ON when the measurement value is being cleared. The amount of time during which the BUSY signal is turned ON is approximately 1 ms.

Input signal

Signal	Function
DI0 to 4	Turns the command OFF.
DI5	Turns the command OFF.
DI6	Turns the command ON.
DI7	This is the trigger signal to clear a measurement value. After DI0 to 6 is set, turn DI7 ON after an interval over 1 ms. BUSY signal is ON during execution of commands. After checking that the BUSY signal has turned ON, turn DI7 OFF, and then turn DI0 to 6 OFF. Note, however, that the amount of time during which the BUSY signal is turned ON is approximately 1 ms. If it cannot be recognized whether the BUSY signal is turned ON or not by an external device, control the timing so that the DI7 signal is turned ON for approximately 5 ms.

Clears the OR and DO signal by the parallel command



Output signal

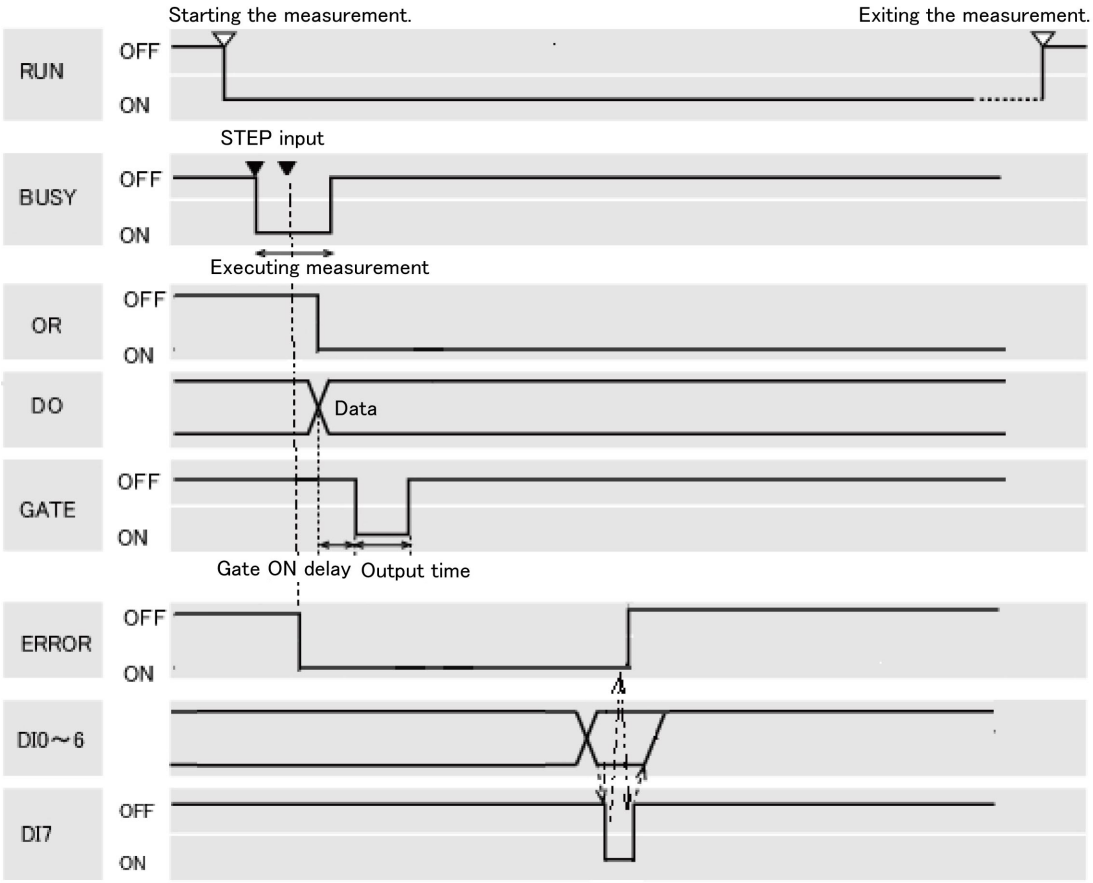
Signal	Function
RUN	Turns ON when the controller is set to the RUN window. Turns OFF in the ADJUST window.
READY	This does not change when the OR and DO signal is being cleared. Do not, however, clear the OR and DO signal when the READY signal is turned OFF. The command will not be executed correctly.
BUSY	This does not change when the OR and DO signal is being cleared. Do not, however, clear the OR and DO signal when the BUSY signal is turned ON. The command will not be executed correctly.
OR	It will turn OFF if it was turned ON.
DO0 to 15	It will turn OFF if it was turned ON.
GATE	This does not change when the OR and DO signal is being cleared. Do not, however, clear the OR and DO signal when the GATE signal is turned ON. The command will not be executed correctly. Or, the DO and GATE will not be output correctly.

Input signal

Signal	Function
DI0	Turns the command OFF.
DI1	Turns the command ON.
DI2 to 5	Turns the command OFF.
DI6	Turns the command ON.

DI7	This is the trigger signal to clear the OR and DO signal. After DI0 to 6 is set, turn DI7 ON after an interval over 1 ms. After checking that the OR or DO signal has turned OFF, turn DI7 OFF, and then turn DI0 to 6 OFF.

Clears error by the parallel command



Output signal

Signal	Function
RUN	Turns ON when the controller is set to the RUN window. Turns OFF in the ADJUST window.
READY	This does not change when an error is being cleared. Do not, however, clear the error signal when the READY signal is turned OFF. The command will not be executed correctly.
BUSY	This does not change when an error is being cleared. Do not, however, clear an error when the BUSY signal is turned ON. The command will not be executed correctly.
OR	This does not change when an error is being cleared.
DO0 to 15	This does not change when an error is being cleared.
GATE	This does not change when an error is being cleared.

Input signal

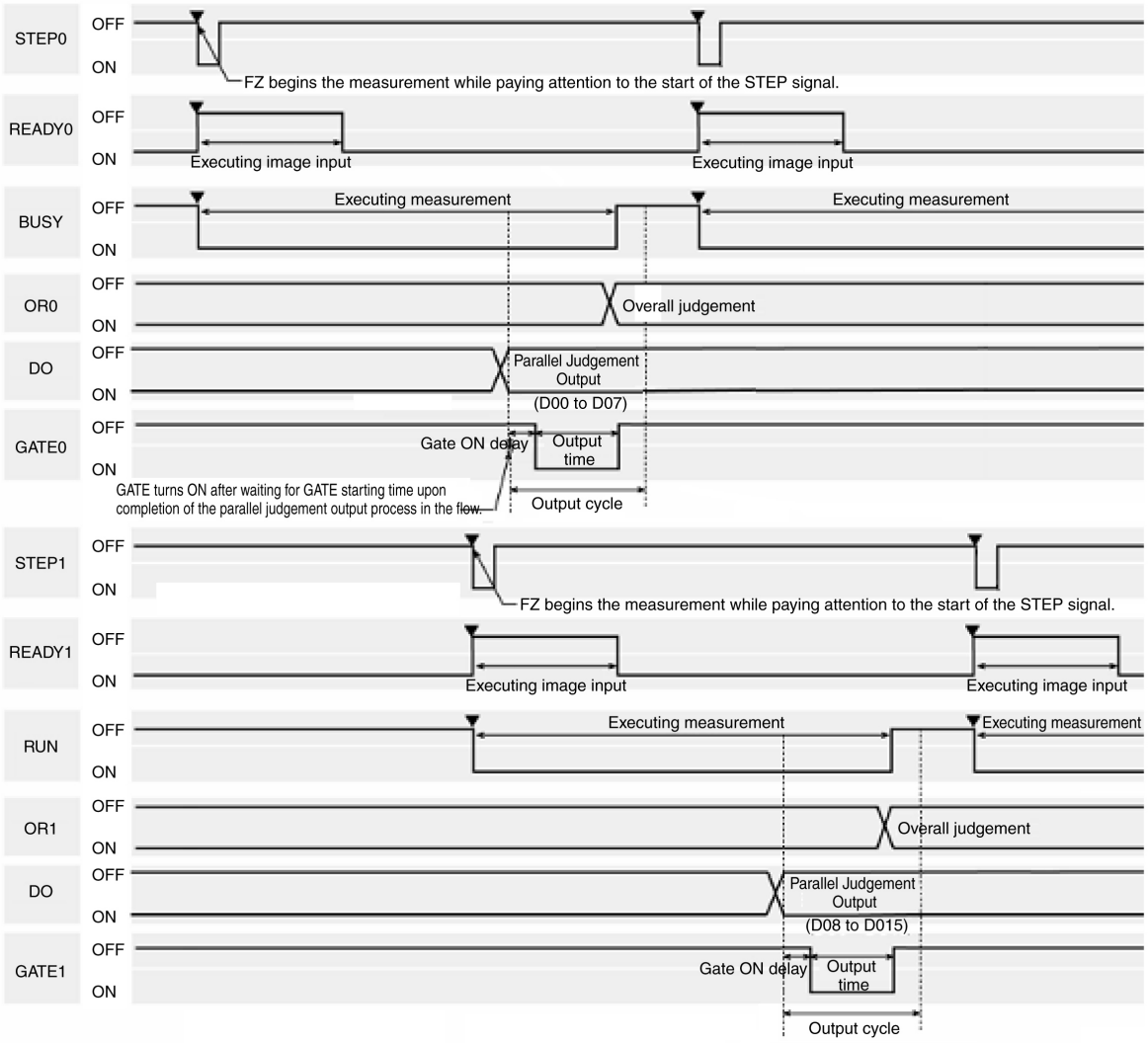
Signal	Function
DI0	Turns the command ON.
DI1 to 5	Turns the command OFF.
DI6	Turns the command ON.
DI7	This is the trigger signal to clear an error. After DI0 to 6 is set, turn DI7 ON after an interval over 1 ms. After checking that the ERROR signal has turned OFF, turn DI7 OFF, and then turn DI0 to 6 OFF.

Timing chart at multi-line random trigger mode

When the flow setting example includes a process after the parallel judgement is output for both lines 0 and 1

Flow Setting Example

0. Camera Image Input
1. Search
2. Parallel Judgement Output
3. Data Logging



Output signal

Signal	Function
READY0 READY1	ON when it is possible to input STEP signal. READY0 and READY1 correspond to line 0 and line 1, respectively. When through images are being displayed, the READY signal will turn to OFF, but the STEP signal is received. During the through display, determine whether or not STEP input is allowed based on the BUSY signal.
BUSY0 (BUSY)	BUSY signal on line 0. Indicates that line 0 is currently measuring or switching the scene. Do not input next command to the line 0 while the BUSY 0 signal is ON. Otherwise, on-going processing or commands that are input will not be performed correctly.
BUSY1 (RUN)	BUSY signal on line 1. RUN signal is output in all modes other than the multi-line random trigger mode. Indicates that line 1 is currently measuring or switching the scene in the multi-line random trigger mode. Do not input next command to the line 1 while the BUSY 1 signal is ON. Otherwise, on-going processing or commands that are input will not be performed correctly.
OR0 OR1	Outputs overall judgement. OR0 and OR1 correspond to line 0 and line 1, respectively. This is determined when the measurement is completed (BUSY signal ON → OFF). Selection of whether ON occurs during an OK judgement result or NG judgement result can be performed in the communication specifications settings window. Reference: ▶ Reference: Setting Communication Specifications (Parallel Interface) (p.540)
DO0 to 7 DO8 to 15	Outputs overall judgement. OR0 and OR1 correspond to line 0 and line 1, respectively. This is determined when the measurement is completed (BUSY signal ON → OFF). Selection of whether ON occurs during an OK judgement result or NG judgement result can be performed in the communication specifications settings window. Reference: ▶ Reference: Setting Communication Specifications (Parallel Interface) (p.540)
GATE0 GATE1	Used to control the loading time of the DO signal to external devices. GATE0 and GATE1 correspond to line 0 and line 1, respectively. ON for the time required for external devices to securely load the DO signal. Set the output cycle so that the total output time is shorter than measurement interval (input interval of STEP signal). GATE signal is output only when the [Parallel judgement output] and [Parallel data output] are set in the measurement flow, and the output process begins when the signal passes through the parallel judgement output (parallel data output) point in the flow. Depending on the setting flow, GATE output may be started when the BUSY signal is ON. Note that the OR signal and GATE signal do not necessarily operate simultaneously.
STEP0 STEP1	Trigger signal to execute a measurement. STEP0 and STEP1 correspond to line 0 and line 1, respectively. STEP0 and STEP1 can be input at different times with no restrictions on the order of input. Perform measurement once synchronous with the STEP signal turning on (OFF → ON). Turn the STEP signal ON for at least 0.5 ms. A noise filter (filter initial setting value: 100 µs) is set in STEP input.

Important

- If STEP is input to line 0 and line 1 at exactly the same time, measurement on one side may be delayed by approximately the time corresponding to the camera image input unit.

About Multiple Image Input Function

The function that enables continuous high speed image input is called the multiple image input function. The next STEP signal can be received at the point when image input is complete. It is not necessary to wait until measurement processing is complete. Whether image input is complete or not can be checked with the status of the READY signal.

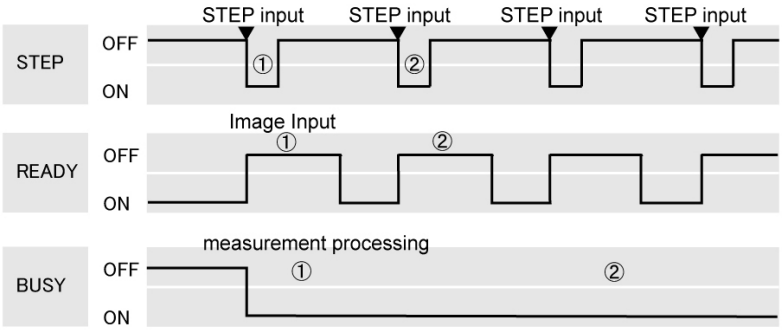
In the case of FZ4-11 □ □ /H11 □ □ where two CPUs are installed, you can use the [Single-line High-speed mode] function that causes the two CPUs to alternately process measurement to shorten the shortest takt time *1 to as much as one half.

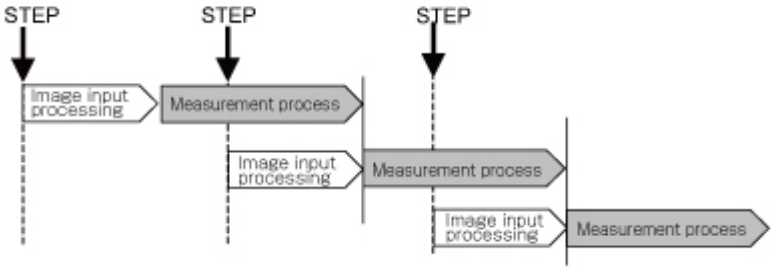
*1: The shortest takt time refers to the shortest time over which a STEP can be accepted without generating a pool of captured images.

Reference: ▶ Single-line High-speed Mode (p.34)

Important

- Set the image mode to "Freeze".
- When loading images continuously at high speed, the number of images that can be loaded is limited. Once the maximum number of images have been loaded, the READY signal will not turn on until the current measurement processing is complete. Accordingly, the next STEP cannot be input.
  Reference: About Max. Number of Loading Images during Multiple Image Input (p.614)
- If STEP is input while READY is off, the ERROR terminal turns on.
- If triggers are input continuously and too quickly for the communication output to catch up, some steps may not be output or measurement delays may occur. Input triggers at appropriate timings that do not cause communication delays.
- The multiple image input function cannot be used in the following cases:
  - Multiple camera input processing units are present in the flow.
  - An Camera Image Input HDR is present in the flow.
  - 1 camera input processing unit is used in multiple processes using the branching function.
  - Measurement triggers are input other than in the parallel mode (such as when non-procedure commands or PLC-link measurement commands are sent).





Externally Outputting Data through FTP

The image logging file and data logging file saved in the controller can be output using FTP protocol.
FZ4 only functions as a FTP server and cannot serve as a FTP client.
FTP uses the FTP passive mode. Use port 21 for FTP control (commands and responses), and use the port specified by the Ethernet I/O setting for FTP data transfer (downloading of ls command results and files).

Important

- When sending or receiving files using the FTP function, make sure to create file names and folder names using one-byte alphanumeric characters.
- An account and a password are required for an FTP connection.
  Account: anonymous
  Password: Email address (Specify a character string that includes @ before and after.)

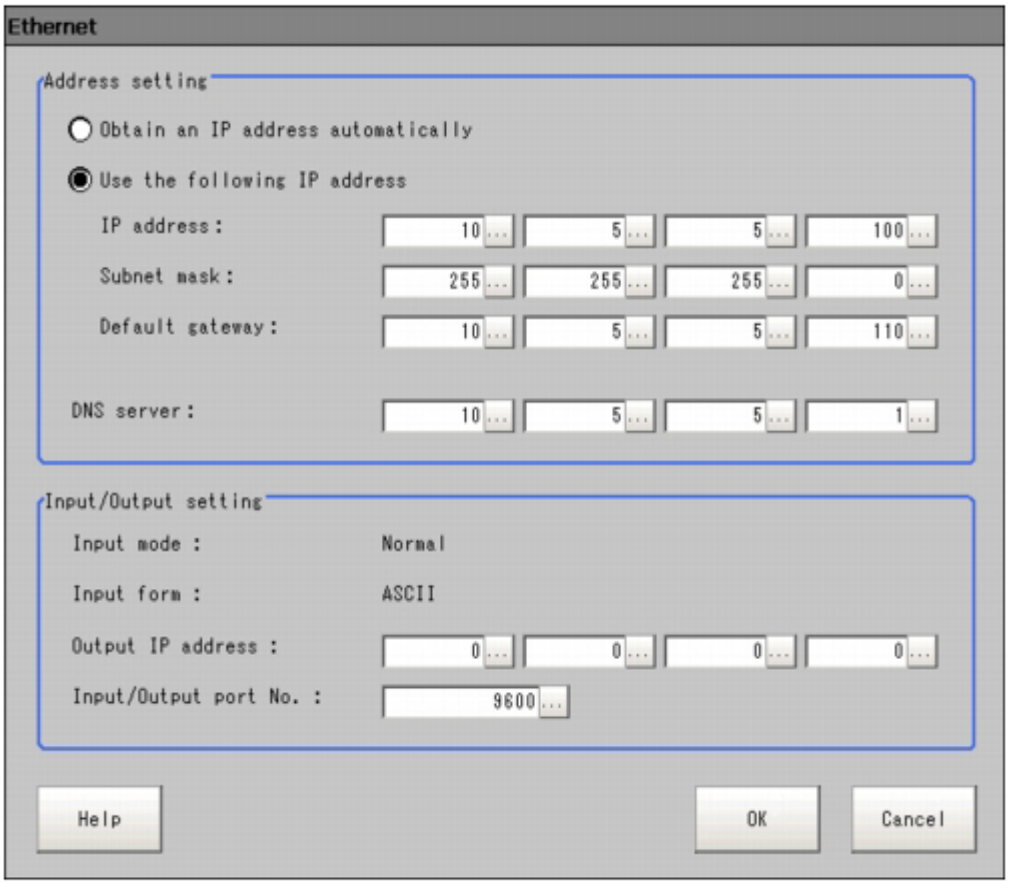
Setting Communication Specifications

Set the communication specifications such as IP address and DNS. In addition, perform input format settings.

Important

- Use the same communication specification settings for the controller and the external device.

1. On the Main screen, tap the [System] menu - [Communication] - [Serial] - [Ethernet].
   The Ethernet window is displayed.
2. Set the following items.



Setting item		Setting value [Factory default]	Description
Address setting			
	・ Obtain an IP address automatically ・ [Use the following IP address]		Set the IP address of the controller. When "Obtain an IP address automatically" is selected, the IP address of the controller will be automatically obtained. When "Use the following IP address" is selected, set the IP address, subnet mask, and the default gateway address.
	IP address	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [10.5.5.100]	Input the controller IP address.
	Subnet mask	0.0.0.0 to 255.255.255.255 [255.255.255.0]	Input the subnet mask address.
	Default gateway	0.0.0.1 to 255.255.255.254 [10.5.5.110]	Input the default gateway address.
	DNS server	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [10.5.5.1]	Input the DNS server address.
I/O setting			
	Input mode	[Normal]	This item cannot be changed.
	Input format	[ASCII]	This item cannot be changed.
	Output IP address	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 [0.0.0.0]	Input the output destination IP address.
	I/O port No.	0 to 65535 [9600]	Set the port No. to use for data I/O with the controller. When PLC link or UDP communication is used in addition to FTP, specify the I/O port number to be used in each communication. Set the same port number on the host side and the FZ side. FTP uses 20 and 21 for I/O ports regardless of the I/O port number settings.

3. Tap [OK].
The settings are confirmed and the Ethernet window closes.

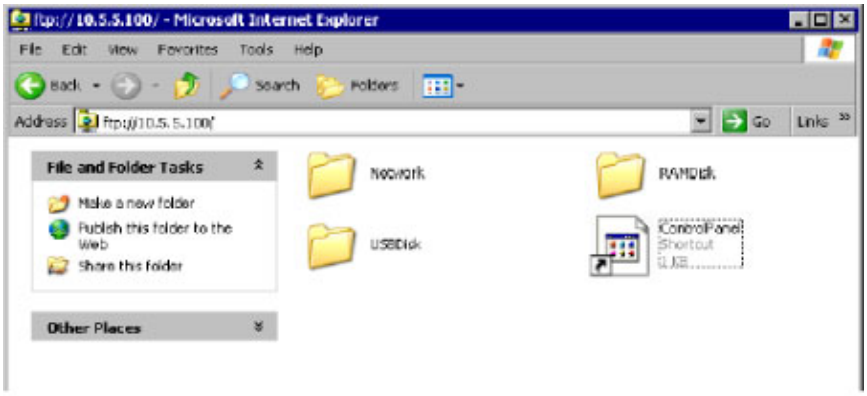
Communication Example

This section introduces methods for outputting logging image files using Internet browsers.

Important

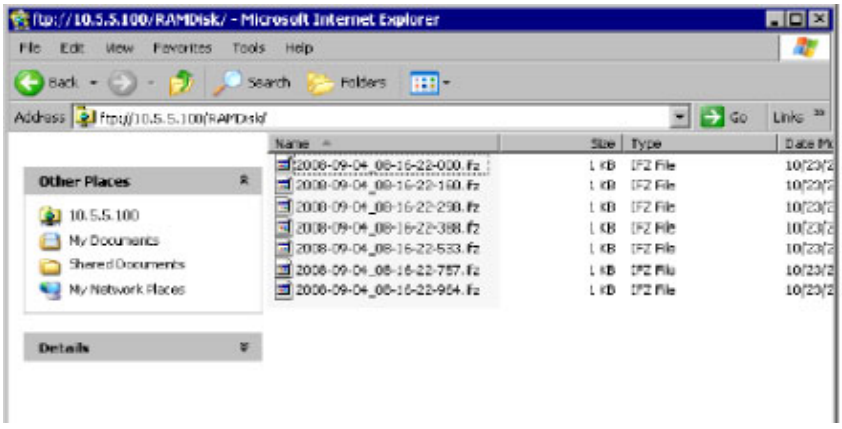
- In the case of FZ4-11 ☐☐ /H11 ☐☐ , only 2 USB memory devices can be accessed.
- Please note that some operations may not be supported by some Internet browser versions.

1. Input the controller IP address in the Internet browser.
   (Here, the default controller address 10.5.5.100 is used as an example of IP address.)
   The folders in the controller are shown.



Folder name	Description
Network	This folder is used for management. Data cannot be saved within this folder.
RAMDisk	This folder is for storing logging images and data files. When the RAMDisk is set as the save destination, files are stored in this folder.
USBDisk	Displayed when a USBDisk is plugged into the controller. When the USBDisk is set as the save destination, files are stored in this folder.
Control Panel.lnk	This file is used for management. Do not delete this file.

2. To view the inside of the RAMDisk, enter RAMDisk at the end of the IP address.
   When the RAMDisk is set as the image logging destination, the logging files are displayed.



3. In the same way as with normal file operations, logging images can be output from the controller.

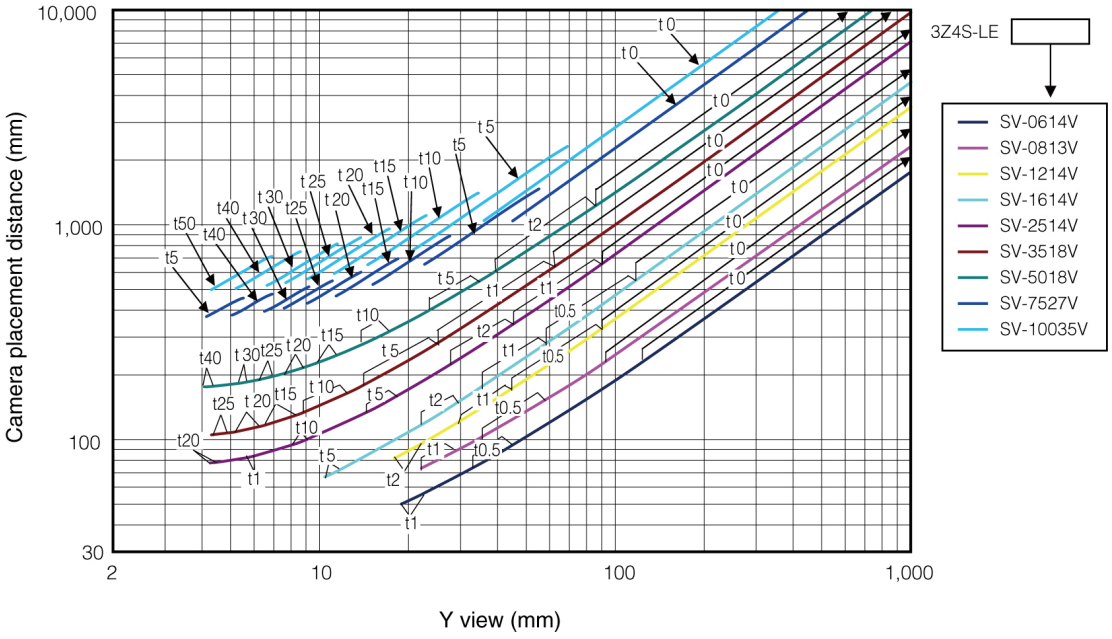
Appendixes

About Lenses

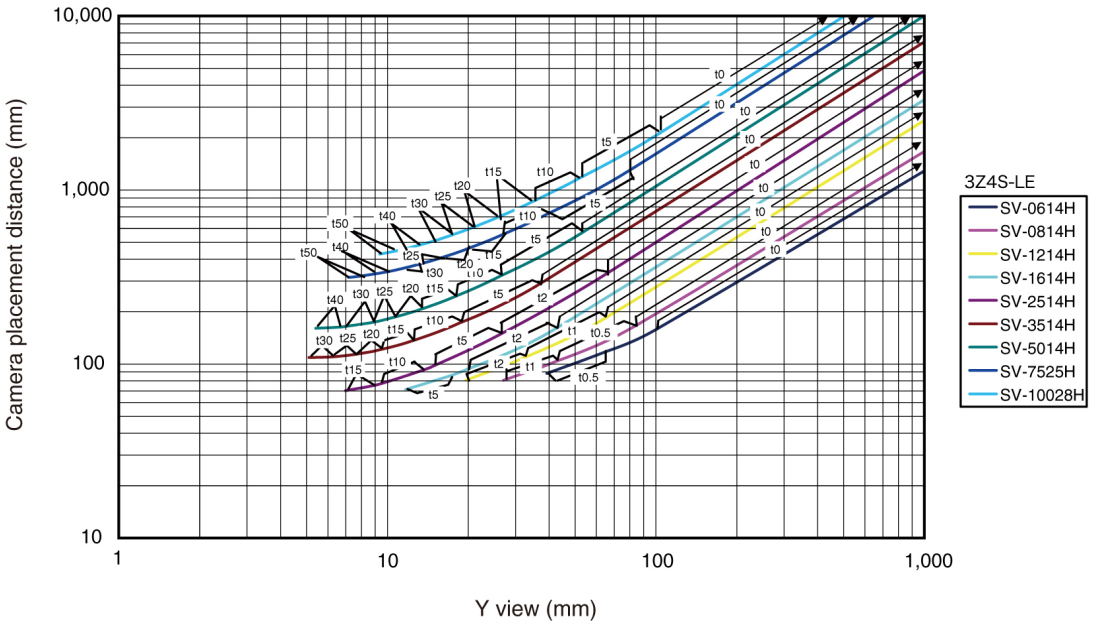
When using a camera (single), refer to the following tables to prepare the lens and extension tube. The lens may vary depending on the size of measurement objects and the camera setting distance.

Optical Diagrams

0.3 megapixel digital camera (stand-alone) FZ-S □



2 megapixel digital camera (stand-alone) FZ-S □ 2M



5 megapixel digital camera (stand-alone) FZ-S □ 5M

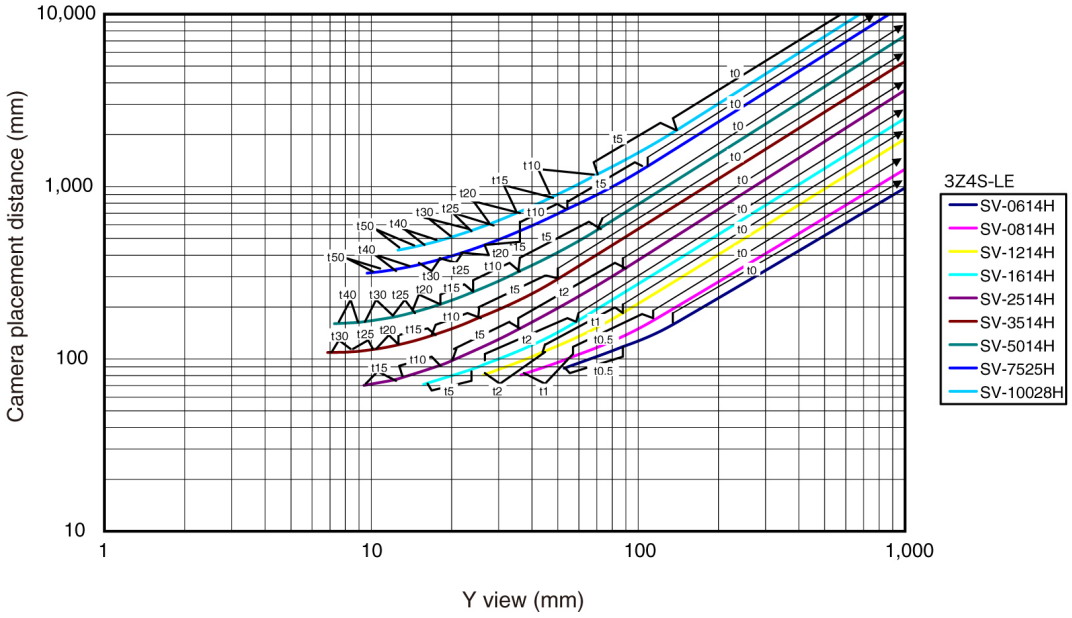
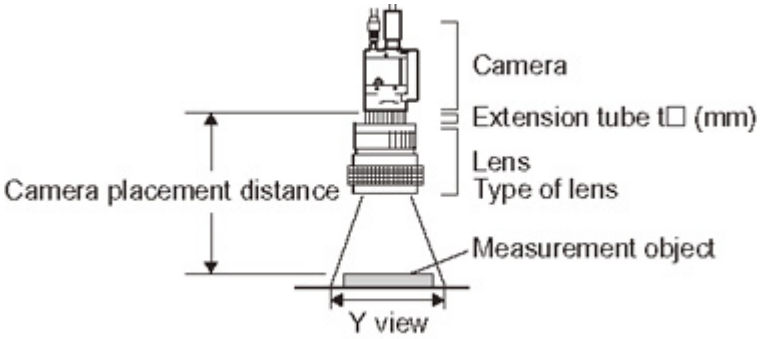


Diagram view

The horizontal axis of the diagram indicates the Y field of view (mm), and longitudinal axis indicates camera setting distance (mm).This diagram shows the relationship between the field of view of lenses and the setting distance for different types. Make sure to verify the lens type when checking the graph as the field of view value is different for each type. Points such as "t5.0" on the graph correspond to the thickness of the extension tube used. "t0" is used if an extension tube is not necessary, and "t5.0 is used if a 5 mm extension tube is used.

(Example)

If the field of view of measurement object is 40 mm, and a 3Z4S-LE SV-5018V lens is used, the camera setting distance is set at 500 mm, and a 5 mm extension tube is required.



Small camera FZ-SF □ /SP □ series

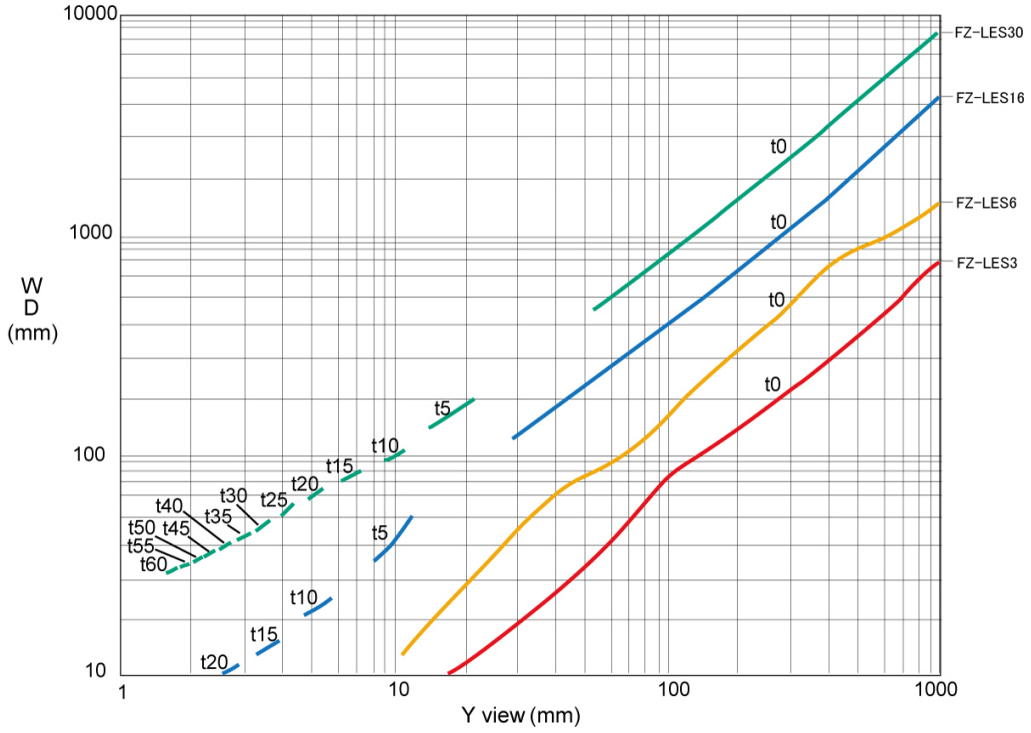
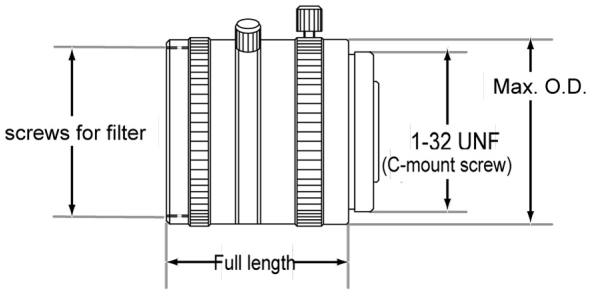


Diagram view

The horizontal axis of the diagram indicates the Y field of view (mm), and longitudinal axis indicates WD (mm).This diagram shows the relationship between the field of view of lenses and the setting distance for different types. Make sure to verify the lens type when checking the graph as the field of view value is different for each type. Points such as "t5.0" on the graph correspond to the thickness of the extension tube used. "t0" is used if an extension tube is not necessary, and "t5.0 is used if a 5 mm extension tube is used.

Lens Types and Outside Diameters



Lens 3Z4S-LE SV series

Lens type	Focal distance	Brightness	Max. O.D.	Full length	Filter size
3Z4S-LE SV-0614V	6.20mm	F1.4	φ28mm	30.0mm	M27 P0.5
3Z4S-LE SV-0813V	8.05mm	F1.3	φ28mm	34.0mm	M25.5 P0.5
3Z4S-LE SV-1214V	12.43mm	F1.4	φ29mm	29.5mm	M27 P0.5
3Z4S-LE SV-1614V	16.34mm	F1.4	φ29mm	24.0mm	M27 P0.5
3Z4S-LE SV-2514V	25.17mm	F1.4	φ29mm	24.5mm	M27 P0.5

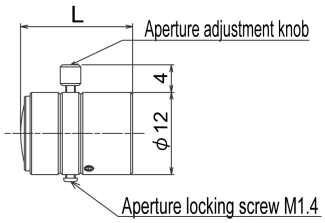
3Z4S-LE SV-3518V	34.75mm	F1.8	φ29mm	33.5mm	M27 P0.5
3Z4S-LE SV-5018V	47.97mm	F1.8	φ32mm	37.0mm	M30.5 P0.5
3Z4S-LE SV-7527V	76.71mm	F2.7	φ32mm	42.0mm	M30.5 P0.5
3Z4S-LE SV-10035V	95.4mm	F3.5	φ32mm	43.9mm	M30.5 P0.5

High resolution and low distortion lens Model 3Z-4S-LE SV-H series

Lens type	Focal distance	Brightness	Max. O.D.	Full length	Filter size
3Z4S-LE SV-0614H	6.1mm	F1.4	φ42mm	57.5mm	M40.5 P0.5
3Z4S-LE SV-0814H	8.0mm	F1.4	φ39mm	52.5mm	M35.5 P0.5
3Z4S-LE SV-1214H	12.3mm	F1.4	φ30mm	51.0mm	M27 P0.5
3Z4S-LE SV-1614H	16.2mm	F1.4	φ30mm	47.5mm	M27 P0.5
3Z4S-LE SV-2514H	25.0mm	F1.4	φ30mm	36.0mm	M27 P0.5
3Z4S-LE SV-3514H	35.01mm	F1.4	φ44mm	45.5mm	M35.5 P0.5
3Z4S-LE SV-5014H	50.0mm	F1.4	φ44mm	57.5mm	M40.5 P0.5
3Z4S-LE SV-7525H	75mm	F2.5	φ36mm	51.0mm	M34.0 P0.5
3Z4S-LE SV-10028H	100mm	F2.8	φ39mm	66.5mm	M37.5 P0.5

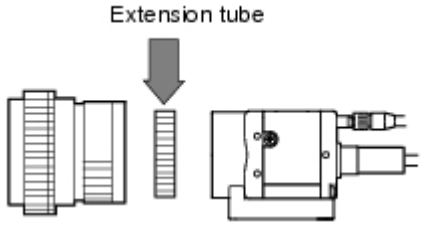
Lens for small digital cameras FZ-LESx series

Lens type	Focal distance	Brightness	Max. O.D.	Full length L
FZ-LES3	3 mm	F2.0	φ12 mm	16.4 mm
FZ-LES6	6 mm	F2.0	φ12 mm	19.7 mm
FZ-LES16	16 mm	F3.4	φ12 mm	23.1 mm
FZ-LES30	30 mm	F3.4	φ12 mm	25.5 mm



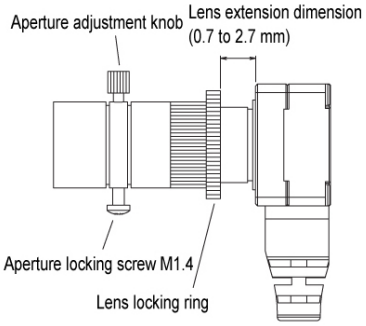
Extension Tube

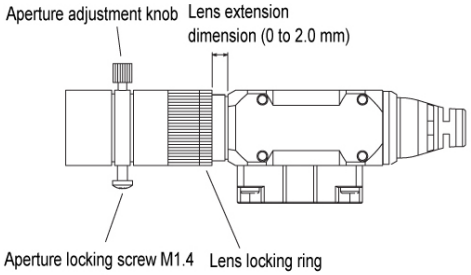
An extension tube, which is installed between lens and camera, is used to adjust focal distance. Different combinations of the 7 tubes can be used to achieve any desired thickness.

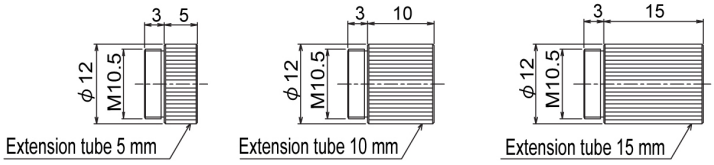


Type	Max. O.D.	Thickness
3Z4S-LE SV-EXR	φ31	7 sets Thickness：0.5mm 1mm 2mm 5mm 10mm 20mm 40mm 

Extension tubes for small digital cameras FZ-LESR





Max. O.D.	Thickness
φ12	 3-piece set

Note

- Do not overlap 2 or more extension tubes (0.5 mm, 1.0 mm, 2.0 mm). Since they are installed between the lens and the threaded section of another extension tube, overlapping them will cause unstable fixation.
- When using an extension tube larger than 30 mm, reinforcement is necessary to avoid being affected by vibration.

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	Remedy
No value set. Please set value.	A value must be set for this item. Please set up value.
Error of the expression.	Do the following errors exist in settings for an expression set up? ・ Different number of open/close parentheses ・ TJG/unit/value/function/operator/comma is lined next to each other. ・ Operator is set at beginning or end of expression ・ The number of function operands is insufficient or there are more than is needed
Cannot add object. Out of range of specified characters of expression.	Incompliant to the conditions of expression. Please check the content. Reference: ▶ "Processing Item List Manual", "Setting (Calculation)" (p.452)
The problem occurred in the camera connection. ERR	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? Please check the contents of [Camera setting], then switch off and restart. Reference: ▶ Setting Conditions for Camera Use (p.342)
Failed to start the window. Memory is insufficient.	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. ・ [Shape search] If shape search+ setup window is opened while the RAMDisk memory is insufficient for image logging, etc. on the RAMDisk, a warning message is displayed. In the case that an image logging file is stored in a RAMDisk, please move the content on the RAMDisk to a USBDisk to open up memory and reopen the set up window.
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: ▶ "Processing Item List Manual", "Judgement conditions (Trend Monitor)" (p.510)
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: ▶ "Processing Item List Manual", "Judgement is NG (Insufficient Memory)" (p.66) ・ [Flexible search] Reference: ▶ "Processing Item List Manual", "Judgement is NG (Insufficient Memory)" (p.77) ・ [Classification] Reference: ▶ "Processing Item List Manual", "Judgement is NG (Insufficient Memory)" (p.148)
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.
Failed to load scene group. Data is corrupted, or memory is insufficient. Scene group data starts with initialized status.	The following causes are suspected: ・ The power may have been cut off during the last data save. ・ Because the operation mode was switched, the required memory size may have increased and memory became insufficient.
The camera connected is not the same as the one used for the last save. Please check.	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.
Cannot read selected file. Confirm selected file once again.	Check the following points. ・ Have you removed the USBDisk from the controller after selecting files on the USBDisk? ・ 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.) In addition, the selected file may be corrupt.
The communication time-out is occurred. 	Switch off controller, verify the following contents and then restart. ・ Is cable connected correctly? ・ Does it comply with communication specifications of external devices? ・ Are external devices functioning normally? If error is not resolved after confirmation, the controller may be damaged. Please discuss this with one of our branches or regional offices. Reference: ▸ Setting Communication Specifications (RS-232C/422-PLC Link) (p.368) Reference: ▸ Setting Communication Specifications (RS-232C/422 - Non-procedure) (p.439)
Failed to transfer data. The free capacity of RAMDisk may insufficient Increase the free capacity of RAMDisk and then perform this operation again.	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.
Error in input range. Please input using the correct range.	Please verify range for setting and set up again.
File name contains invalid character.	Please confirm that characters such as \ / , : ; * ? " < > |& . SPC (space) are not included in the file name.
Failed to save file. Please check.	Check the following points. ・ Is the memory of the save destination sufficient? ・ 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.
Fan/voltage error. 	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. Please turn off the power supply, and confirm the connection of parallel interface.	Turn OFF the power and check the connection state of the parallel interface.
ProcItem 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.	No more scene can be added due to lack of memory.* Review the inspection flow and reduce the memory consumption or switch to another scene group. *) The display varies depending on the controller. The remaining capacity of the application is not sufficient for the FZ4-11 □ □ series. The remaining data memory capacity is not sufficient for the FZ4-L35 □ /6 □ □ /7 □ □ series.
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. ・ Have you deleted the destination folder? ・ For cases where he save destination is the folder in the USBDisk, is the USBDisk connected to the controller? Or, has the USBDisk been detected?
PLC link error	PLC link cannot be established. Check the following points. ・ Are the FZ communication settings correct? ・ Are the PLC communication settings correct? ・ Is cable connected correctly?
Failed to register model	Search, classification, flexible search, shape search+, shape search II Please register higher-contrast images as models.
	Fine matching For the fine matching, the 2 pixels at the edge of the image cannot be registered as the model.
Available memory is insufficient. It may cause insufficient memory depending on the setting.	Available application memory is low. Memory may become insufficient during operation or an error may occur when the operation mode is switched. Review the inspection flow and reduce the memory consumption.
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.

<table>
<tr><td>Region size exceeds. Please narrow region.</td><td>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.
<table>
<tr><th>Processing item</th><th>Region type</th><th>Region size (number of pixels)</th></tr>
<tr><td rowspan="2">Shape search+</td><td>Measurement regions</td><td>5003712</td></tr>
<tr><td>Model region</td><td>995328</td></tr>
<tr><td>Barcodes+</td><td>Measurement regions</td><td>1920000</td></tr>
<tr><td>2D Code+</td><td>Measurement regions</td><td>1920000</td></tr>
</table></td></tr>
<tr><td>Logging error</td><td>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.</td></tr>
<tr><td>The Logon to Network Server screen is displayed.</td><td>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
net config server /autodisconnect:-1,
and disable the automatic disconnection setting.</td></tr>
</table>

Although an error message such as the following, is not displayed, the ERROR signal and the ERR indicator will turn ON.

Cause	Remedy
The STEP signal was input when the READY signal was turned OFF.	・ Input the STEP signal after the READY signal turns ON. ・ Check to make sure that no chattering has occurred in the STEP signal. ・ Noise is superimposed onto the STEP signal. Keep PLC and FZ4 away from the noise source.
A non-existing parallel command was entered.	・ Please enter a correct parallel command.
The parallel scene group switch command was executed when no USB memory was installed. (FZ4-L35□ /6□□ /7□□ only)	・ Switch the scene group with the USB memory installed.

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.

FZ 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 memory 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 a scene group is being saved to or loaded from the USB memory, 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.

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 to be a window that opens separately such as the Edit Flow window and the Scene Maintenance window.

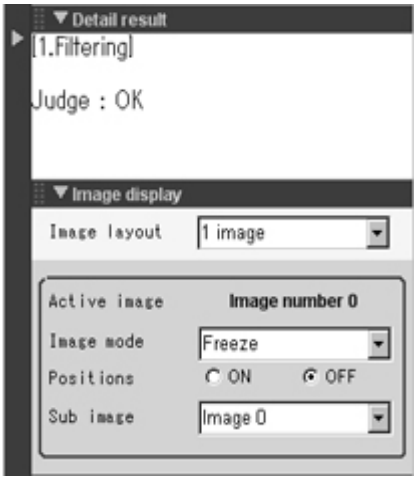
The touch screen responds slowly

- Are you tapping the touch screen continuously and quickly? If yes, the response to operation may be delayed.

"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.612)

In the [Image view setting] of the "Control" area, "Image mode", "Positions" and "Sub image" can not be changed.



- Is the "Detail result" area active?
  Reference: Displaying Flow and Detailed Results (p.85)

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.
  - For example, reduce the memory usage and then save data again to the controller, delete scenes, delete processing units, adjust the processing unit measurement area, or adjust the sizes of registered models.
  - Evacuate the current scene group data to a USB memory.

Tap [Data] 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.

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.

Measurement results in NG as the monochrome setting is changed to color setting on its own

- This occurs when the monochrome processing item setting window is displayed with no image input, such as immediately after the start-up or a scene is switched. When no image is input, measurement NG (incompatible image) will result since it is set to process as a color image by default.
  When no image is input, do not go into the setting window and press the OK button to terminate it.
  To fix the setting, have an image input, and then go into the setting window and press the OK button to terminate it.
  To fix the setting, have an image input, and then go into the setting window and press the OK button to terminate it.

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.

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: ▶ Checking Communication Status (Parallel Interface) (p.542)
- 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: Checking Communication Status (Parallel Interface) (p.542)
- 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" checked on the ADJUST window?
  Measure on the RUN window or measure on the ADJUST window upon checking "Output" in the test measurement settings.

Timing:

- Are the parallel communication settings (output cycle and output time) set to a length sufficient for the PLC to recognize?
- Could the System - Communication - Parallel output control be set to handshaking or synchronization output?
  These settings influence the GATE output timing.
  Reference: Controlling/Outputting through Parallel Communication > Timing Chart (p.547)

About 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 controller?
  You can check the communication status in the Confirmation window.
  Reference: Checking Communication Status (Non-procedure) (p.441)

The 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

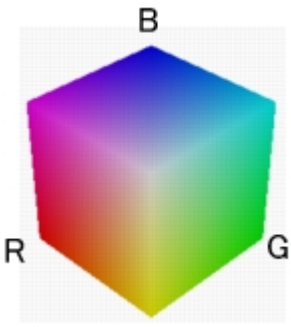
- Are the communication specifications of the external devices compatible with the controller?
- Is "Flow control" in communication specifications set to "None"?
  To save data, set "Flow control" to "None".
  Reference: Setting Communication Specifications (RS-232C/422-PLC Link) (p.368)
  Reference: Setting Communication Specifications (RS-232C/422 - Non-procedure) (p.439)

Measurement Mechanism

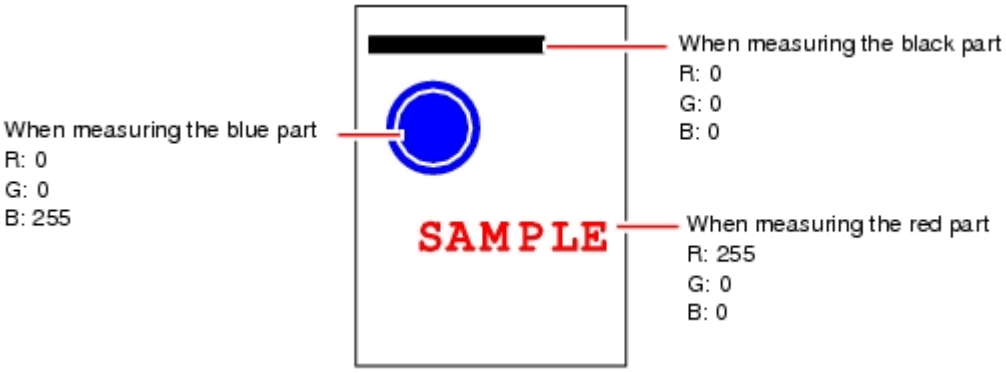
This section describes how to configure measurement in accordance with the images acquired from cameras.
This product is prepared with comprehensive processing capabilities for measuring items. Common processes for various processing items are described here.

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 RGB values.



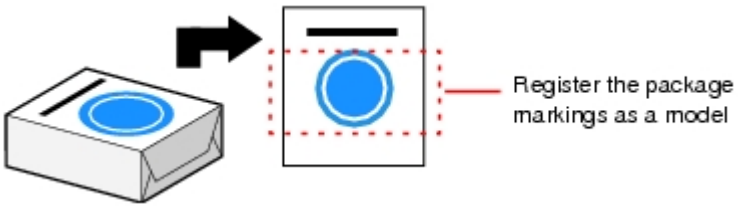
Note

- For monochrome cameras, color processing is not performed.

Search Processing Mechanism

Reference image patterns are registered as models and then search is performed using the parts of input images that most resemble the models. The degree of similarity is represented with a correlation value, and 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.

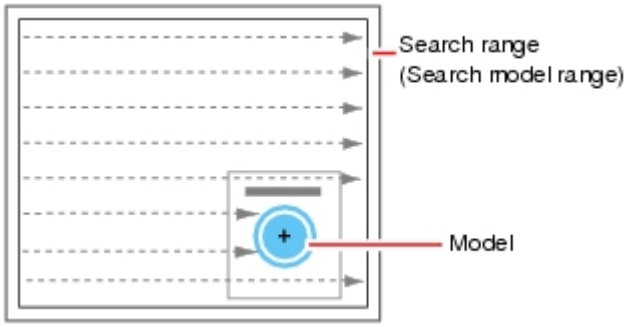


Note

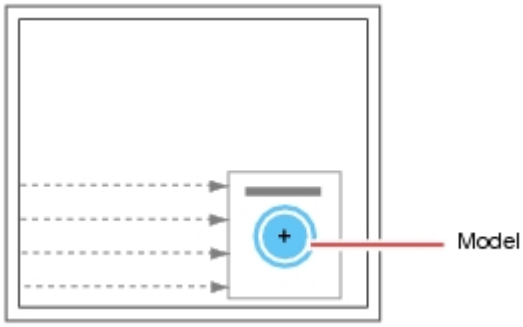
Model Status and Measurement Processing

- 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

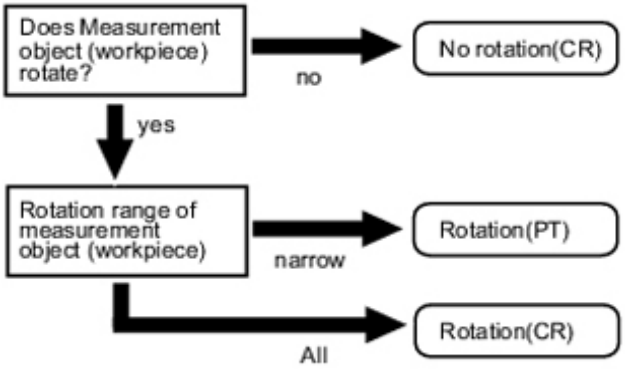
With search processing, there are two types of detection methods: Search by "Correlation (CR)" and search by "Shape (PT)".
The detection method can be selected by changing the "Rotation" settings for each processing item.

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.

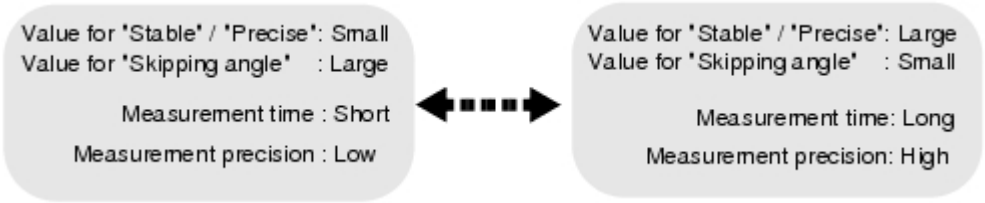
Note

Basic selection flow



Search Speed

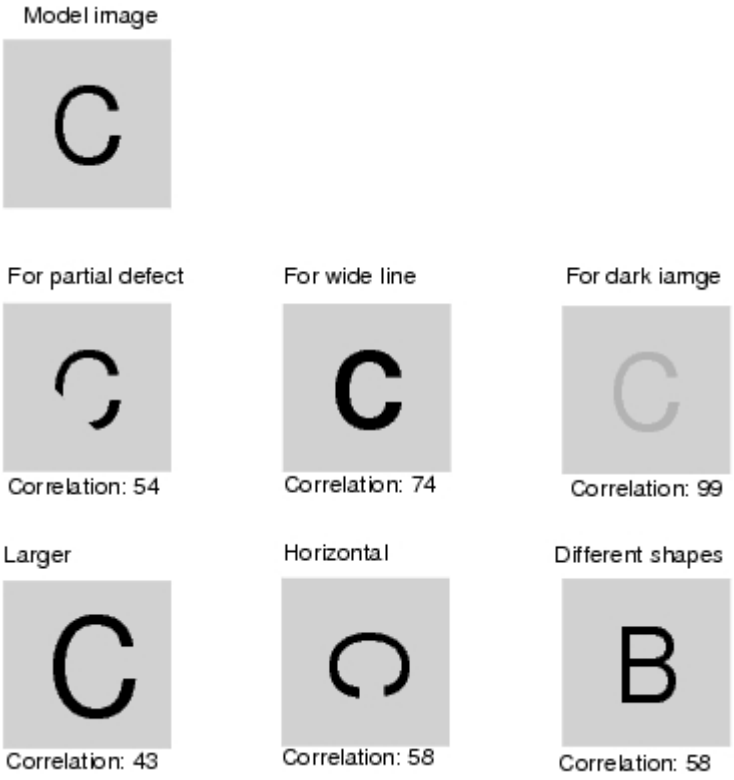
For processing items to perform search processing such as [Search] and [Classification], you can specify the search processing speed by through the model parameter items "Stab.", "Prec.", and/or "Skipping angle". If the value specified for "Stab." or "Prec." is small or if the value for "Skipping angle" 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 "Stab.", "Prec.", 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 a measured image are missing or if shapes are

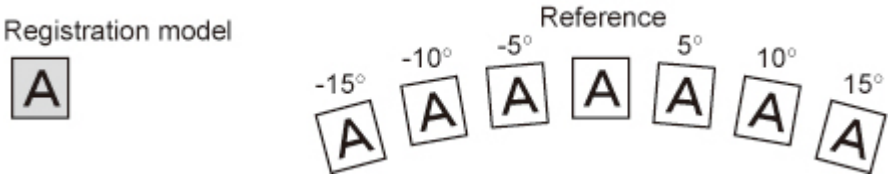
different, the correlation value is lower.



Search Angle Range, Skipping Angle

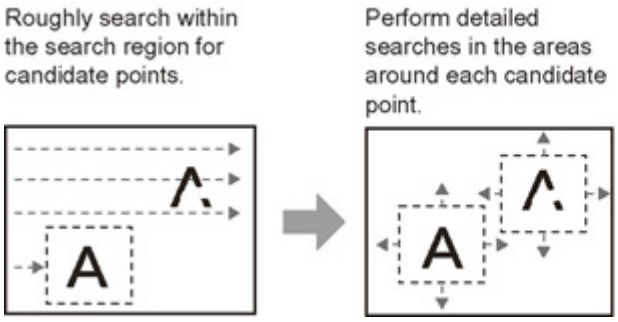
These are values, based on the model registration image, that indicate the allowable rotation interval (skipping angle) and overall maximum rotation range for the model (angle range).Search is performed for objects that most resemble these acceptable models.

Example: When angle range is 15 ˚ and skipping angle is 5 ˚



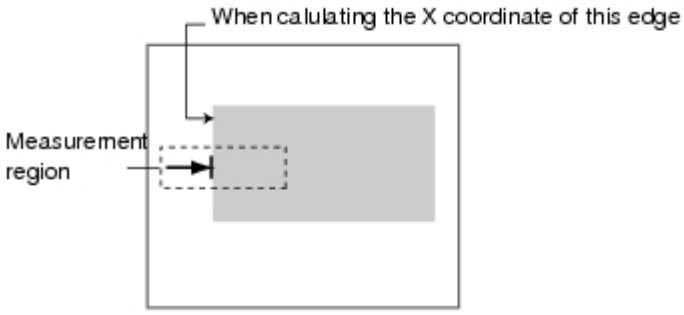
Candidate Point Level

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.



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.
It finds edges using color changes in the measurement region.

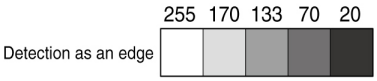


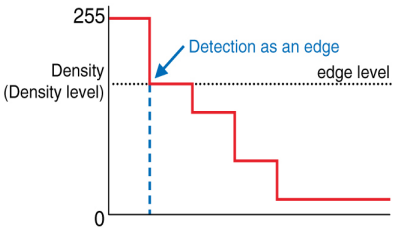
Edge Detection Method

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.

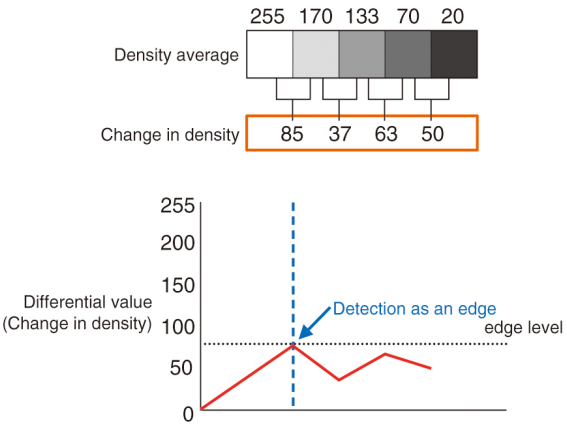




With an image with high noise level or image with blurry edges, the density method is suitable as it allows you to specify the density and color of the edges to be detected.

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.

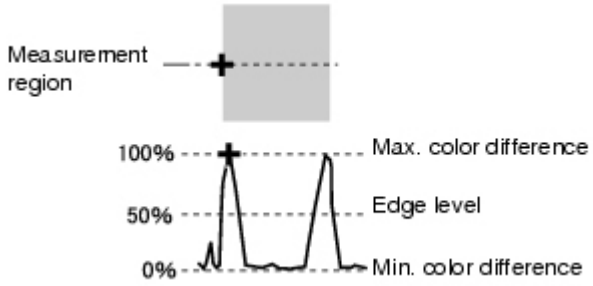
Note

- The value 0 to 100 for the edge level indicates the edge intensity.It is not related to color differences in the original image.

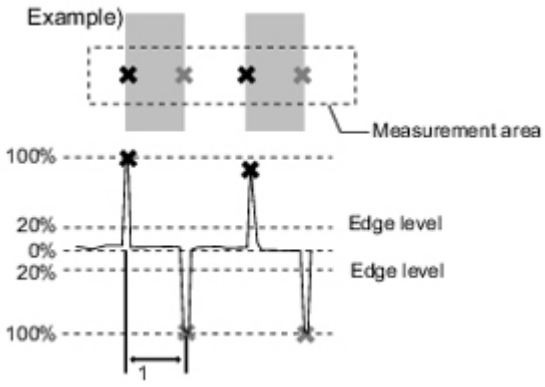
For case of measurement using relative position (%) with regards to width of color difference

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

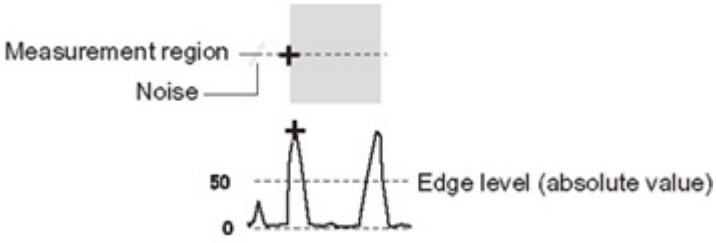


Edge Pitch



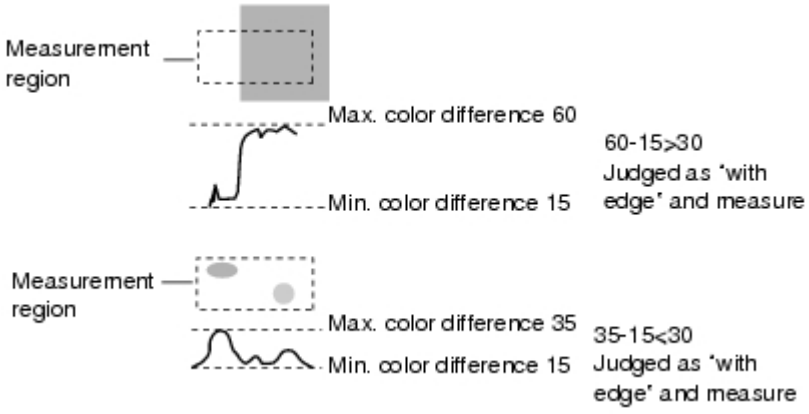
When performing measurement using color difference value

Edge level is set using color difference absolute value.



Noise Level

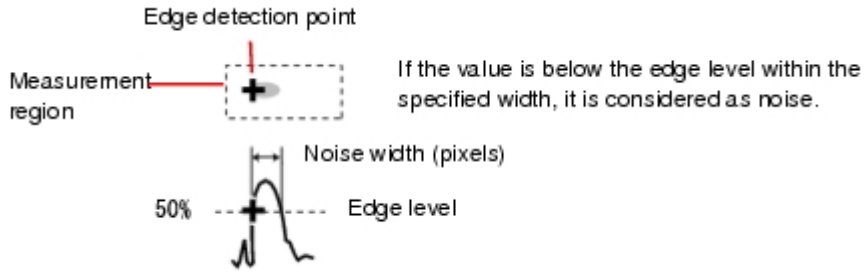
This level judges whether an edge is present or not.
The maximum value and minimum value for color difference in the edge detection area are determined and if the difference is less than the noise level, it is judged that there is no edge. When detection is affected by noise, increase this value.
(within 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.

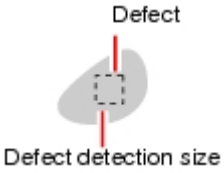
- When no color is specified
  If another edge is detected within the width range starting from the point where an edge was first detected, the newly detected point is considered noise.
- When a color is specified
  If the color difference distributions again falls below the edge level within the width range starting from the point where an edge was first detected, the newly detected point is considered noise.



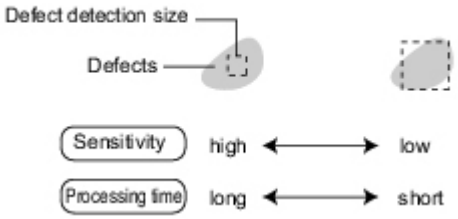
When points are mistakenly detected as edges due to noise, increase the color difference value.

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.

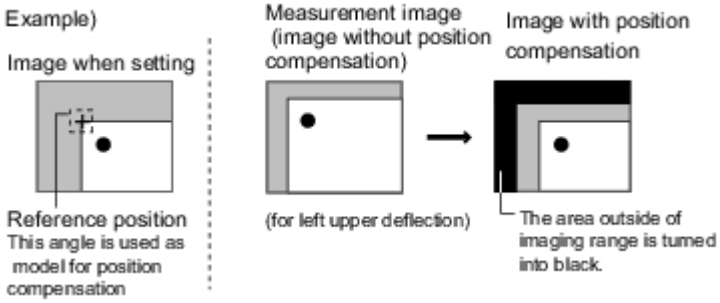
Setting item	Description
Upper Lower	Specify the upper and lower limits of defect detection size based on the size of scratch or contamination to be detected. The larger the difference between upper and lower limits, the easier it is to detect scratches or contamination of various sizes. For both upper and lower limits, higher values for defect detection size limits leads to weaker detection sensitivity and shorter processing time. 

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" or "Calibration".

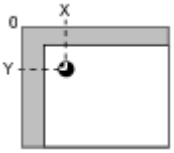
Output Coordinates

Select coordinate types to be output to external devices.



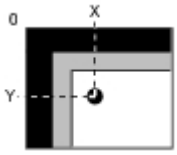
Before position compensation

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.
Reference: Calibration (p.591)

Calibration: ON

Calibration is performed during output and measured values after calibration are output.

Calibration: OFF

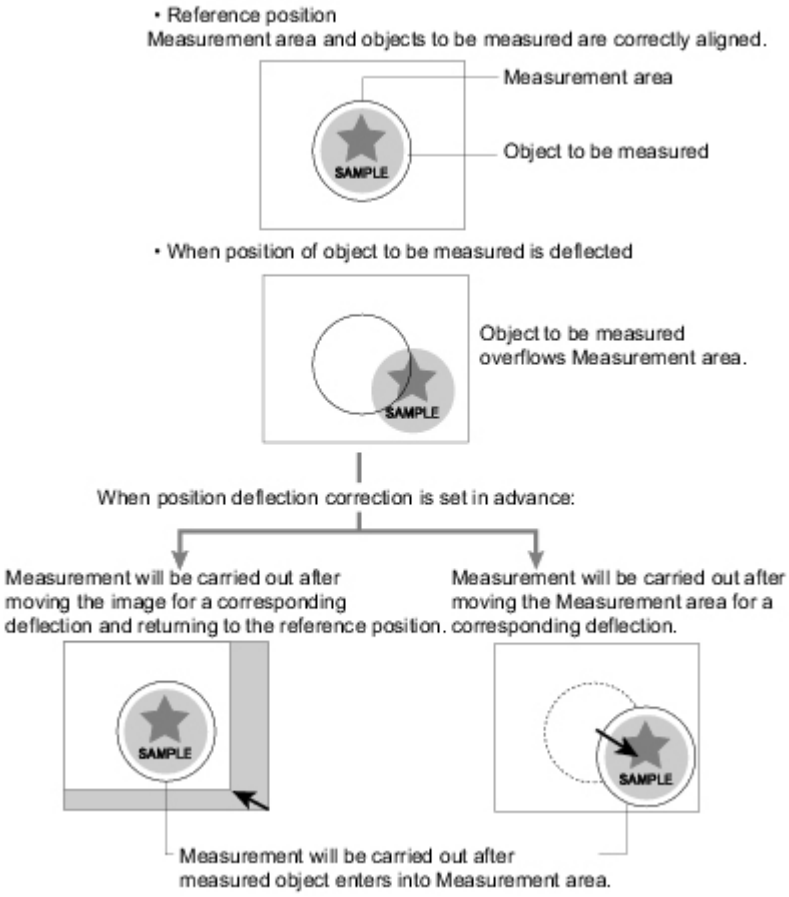
Calibration is not performed during output, and coordinate values from camera images are output.

Terminology Explanations

This section gives descriptions of terms.

Position compensation

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. Please select processing items that are appropriate to the measurement object from processing items that are related to position compensation.



Intelligent camera (with lighting function)

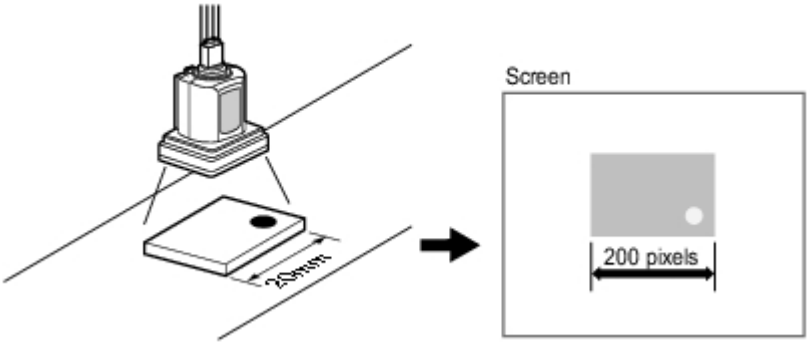
Cameras with a dome-shaped light can also be controlled with the controller. This is beneficial when the effects of ambient light are to be avoided and when it is desirable to shorten the lighting setting time.
For details, see Reference: "Intelligent Camera (with Lighting Function)" (p.24) .

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. position].

Calibration

This refers to conversion of measured pixel unit dimensions to actual dimensions.Setting the relationship between actual coordinates and camera coordinates enables conversion of measurement results in pixel units to actual dimensions.
To output measured values converted by calibration to external devices, set "Calibration" in "Output parameter" of each unit to "ON".
For example, in the case of an object that measures 20 mm wide and has a 200-pixel width in the measured image, calibration is performed as follows.
20 (mm) / 200 (pixel) = 0.1 (mm/pixel)
In other words, 1 pixel (pix) in the camera coordinates corresponds to 0.1 mm in actual size.



Measurement flow

A measurement processing series is called a measurement flow. You can combine processing items to create measurement flows.

Detection point

This is the point that specifies the coordinates of which part of the model are to be output by the search and ECM search processing item. The initial value is at the center of a model.

Candidate

With regards to search based processing items (search, flexible search, ECM search, classification, character inspection, model dictionary), both a rough search, which is a search over the entirety of the measurement region, and a detailed search, which is a search in areas of the rough search where correlation was high are performed. The candidate point is the point at which an area becomes a candidate for "Detail search". The candidate point level represents the rough search correlation value. If stable search of a model is not possible, set the candidate point level lower.

Sub-pixel

Points that are formed finer than pixels.In the case of search processing, if sub-pixel processing is turned on for measurement parameters, interpolation measurement is performed using sub-pixel units.

Scene

Measurement processing that is created with a combination of units. Preparing a scene for each measurement object or measurement content makes it easy to change measurements.
Reference: What Is a Scene? (p.42)

Scene group

32 units are incorporated into a scene for sorted measurement.This is convenient for managing scenes on a per category basis.
Reference: What Is a Scene Group? (p.46)

Center of gravity

The images with white pixels are cut into paper of a certain thickness, and when one point is used to support the paper, the point which enables the paper to balance is called the center of gravity. The center of gravity of a circular object is the center of the circle, the center of gravity of a rectangle is the intersection of two diagonal lines.

Processing item

Single units that constitute measurement processing. Scenes (measurement flow) are created by registering processing items in units.

Processing unit

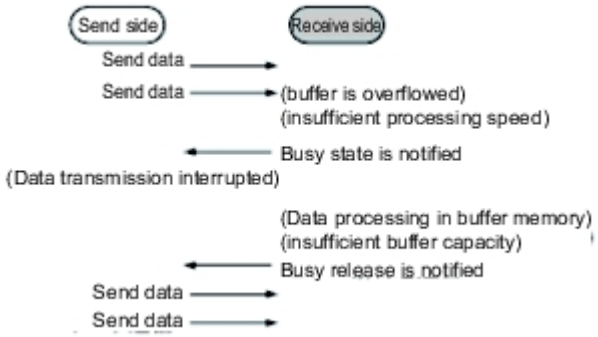
A unit that constitutes measurement processing.Scenes (measurement flow) are created by setting processing items in processing units.
Reference: Creating a Scene (p.47)

Correlation value

0 to 100 are used to represent the degree of similarity with an acceptable object.Namely, higher values indicate higher degrees of similarity.

Flow control

If the processing speed of the receiving side is slower than that of the sending side when data is being transferred, the receiving side will send interruption commands to the sending side or send re-admittance commands and then adjust the transmission speed.



There are two flow control methods: "Hardware Flow Control" and "Software Flow Control". With this product, "Software Flow Control" is used to adjust transmission speed.

Model

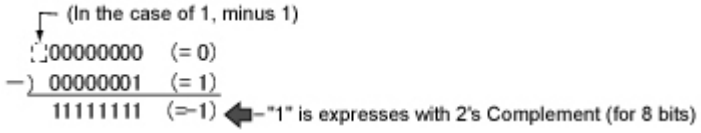
The image pattern that serves as the inspection target. Characteristics portions are extracted from images of the object and registered as model registration.

Unit

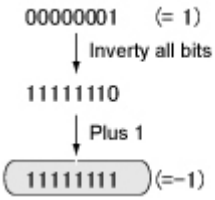
Reference: ▸ Processing unit (p.592)

2's complement

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".



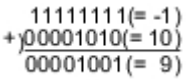
There are methods for simple calculation without performing this kind of computation.
For instance, "Negative number = inverting all bits of a positive number and then adding 1 to the result".



The first digit is used to judge whether the number is positive or negative.

- When 0: Positive number (or 0)
- When 1: Negative number

The advantage of two's complement numbers is that positive and negative numbers can be used as is in calculations.
(Example) When -1+10=9



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
  This is used for input of specific values.
- 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. Tap [...] in the item in which a value is to be set.

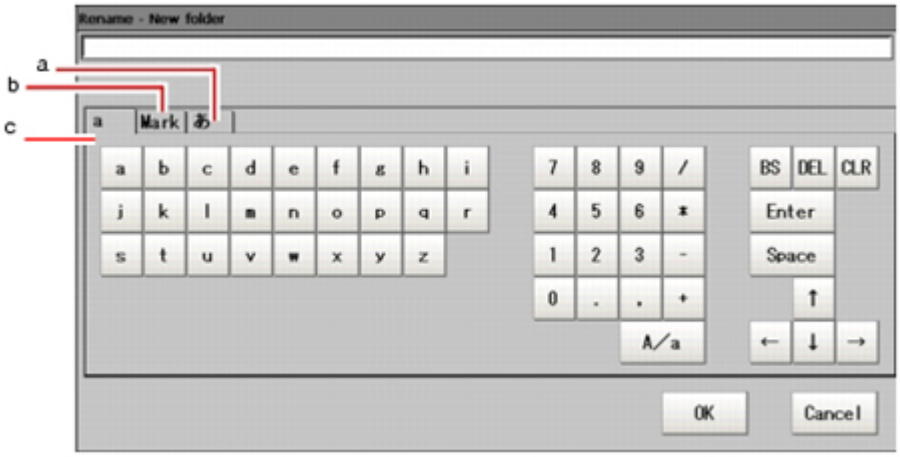
   The numeric keyboard is displayed.
2. Tap the numeric keys to input values.

   The numerical value is input.
3. Tap [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.



a. Japanese Input Mode
   Japanese is input using kana input.

   To toggle between uppercase and lowercase mode, tap [A/a].
b. Symbol (one-byte characters input mode)
c. a (Alphanumeric Input Mode)
   To switch between uppercase and lowercase mode, tap "A/a". The default state is lowercase input mode.

Operation Method

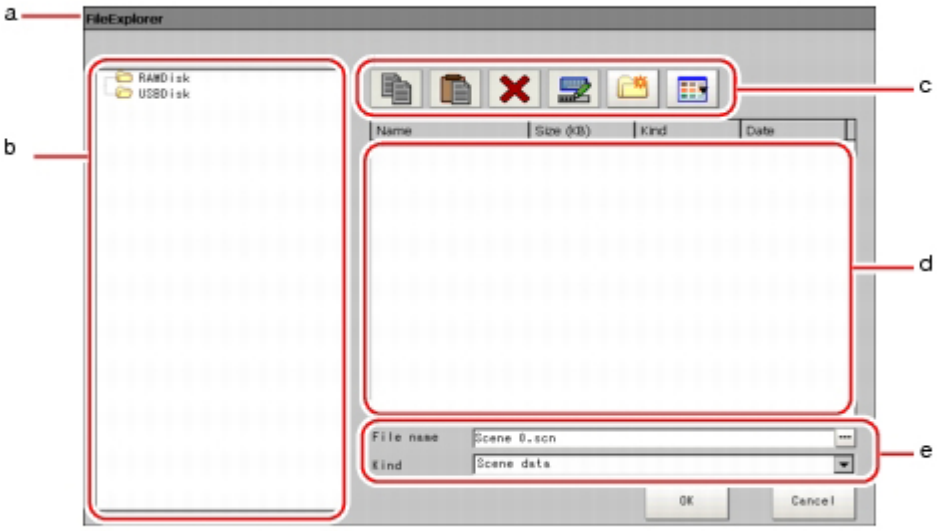
1. Tap [...] in the item in which a character string is to be set.

   The soft keyboard is displayed.
2. Switch the tabs as needed and tap the character that is to be input.
3. Tap [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 RAM disk and folders in the mounted USB memory is displayed. At the root of the tree, the drive names of all accessible USB memory devices are displayed (ex. "USBDisk", "USBDisk2").

c. Toolbar

- Copy

  Reference: ▸ Enabled when a folder or file is selected in the List View area (p.597) .When tapped, the file that is selected is copied and [Paste] ( ) becomes enabled.

- Paste

  Enabled when copying is performed. Pastes copied files or folders.

- Delete

  Reference: ▸ Enabled when a folder or file is selected in the List View area (p.597) . If tapped, the Deletion Confirmation window is displayed.

- Rename

  Reference: ▸ Enabled when a folder or file is selected in the List View area. (p.597) If tapped, the Rename window is displayed.

- New folder

  Creates a new folder.

- Toggle list view

  Reference: ▸ Switches the display format of the List View area. (p.597)

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 tapped.

e. File Name View Area

- File name
  Reference: ▸ Names of files selected in the List View area (p.597) are displayed.
- Kind
  Reference: ▸ Specifies the types of the file displayed ("Scene data", "System data", etc.) in the List View area. (p.597)

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. Tap the folder or file that you want to copy in the List View area.
   The file or folder will be selected.
2. Tap [Copy] () .
3. Select the target folder and tap [Paste] () .

Renaming a Folder or a File

1. Tap the name of the file or folder to be renamed from the List View area.
   The file or folder will be selected.
2. Tap [Rename] () .
   The soft keyboard is displayed.

3. Enter a new name.

Character input method: Reference: ▸ Inputting Text (p.594)

Note

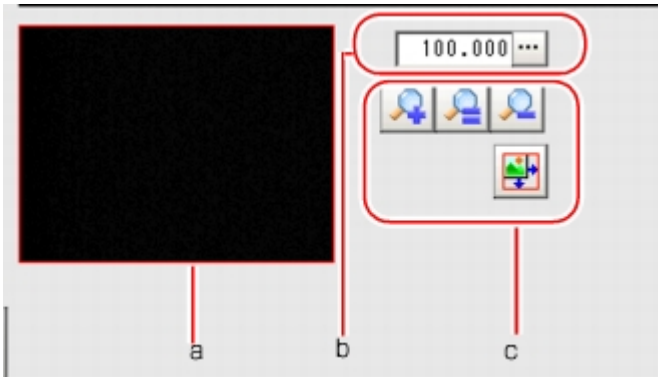
- When a file or folder with the same name exists within the folder, an error message will display telling you that you cannot change the name.

Deleting a Folder or File

1. Tap the name of file or folder to be deleted from the List View area.
   The file or folder will be selected.
2. Tap [Delete] ( ) .
   A confirmation window is displayed.
3. Tap [OK].
   The selected file or folder will be deleted.

Using the Zoom Function

Specifies the magnification settings of the image displayed in the Properties window.



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 input.

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

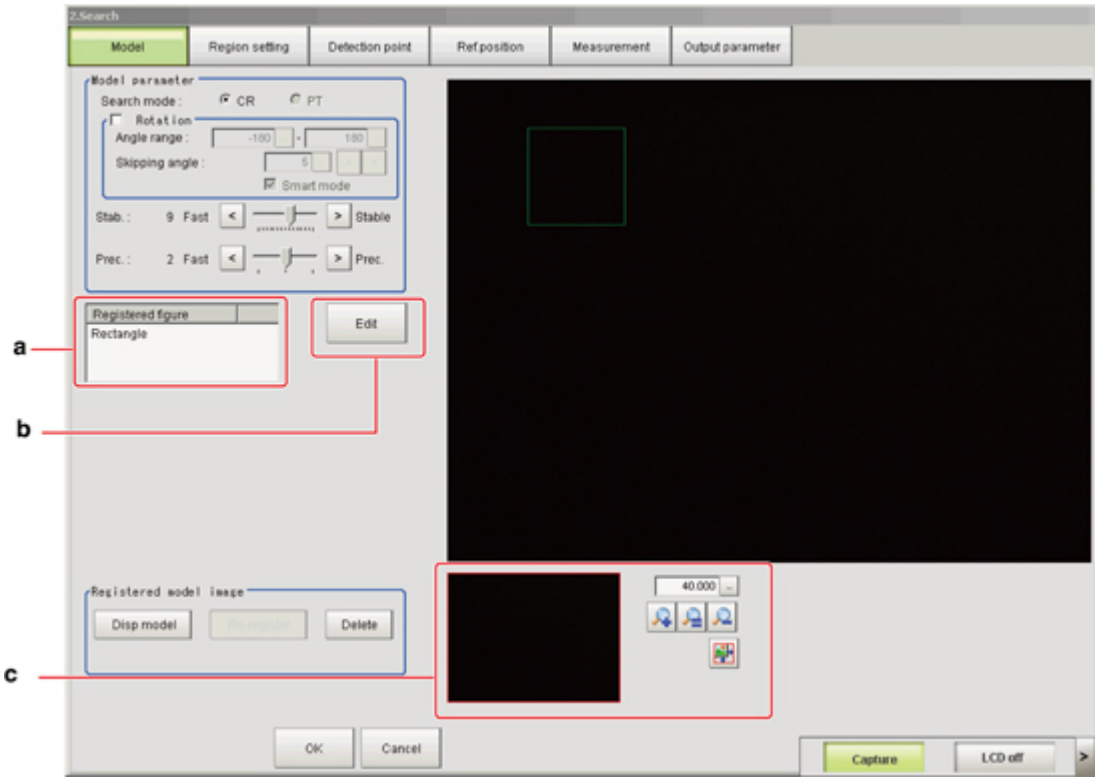
  Enlarges the zoom browser to the entire screen and returns it to its original size.

Setting Figures

This section describes the setting method for objects (figures and text) when registering models or specifying measurement regions.
The type and number of objects varies depending on different setting options.

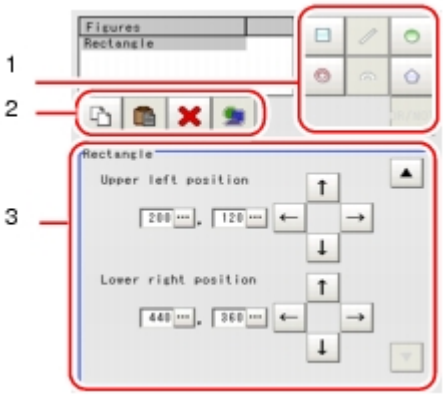
Layout of Figure Setting Area

Window for registering figures when registering or setting areas or models as measurement objects.



a. Figures
Displays a list of names of objects that have been 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]
Used to edit a figure. The following figure editing tool is displayed.



1. Drawing tool buttons
   Sets 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. Zoom Browser Area
Magnifies the Image Display area by the selected magnification factor.

Setting Methods

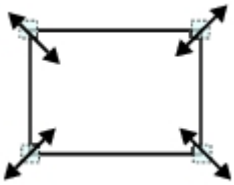
Rectangle

- **Image selection status**

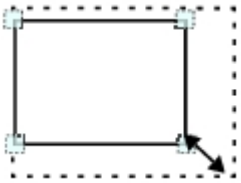
Points are displayed at each of the four corners.

- **Dimension Adjustment**

Drag the points.

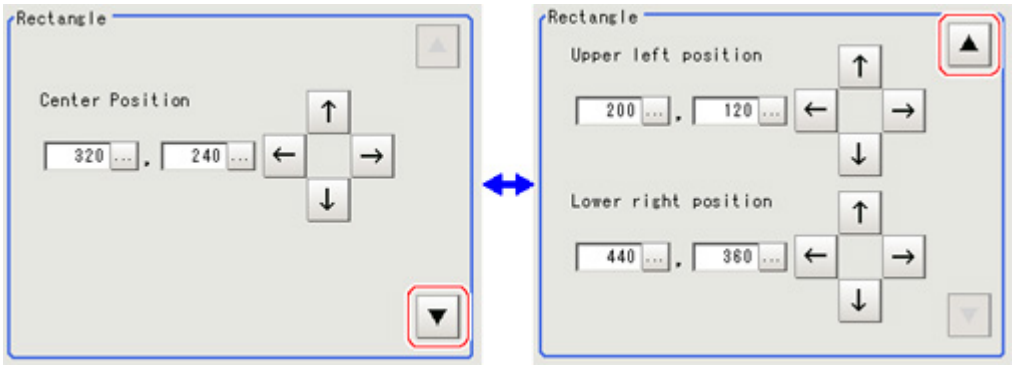


  - Example) When enlarging
    Drag the lower right point down in a diagonal direction.



- **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**

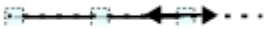
Points are displayed at the starting point, ending point, and midpoint of lines.

- **Dimension Adjustment**

Drag the points.

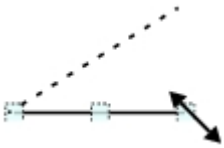
- Example) When changing the length of a line

  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.

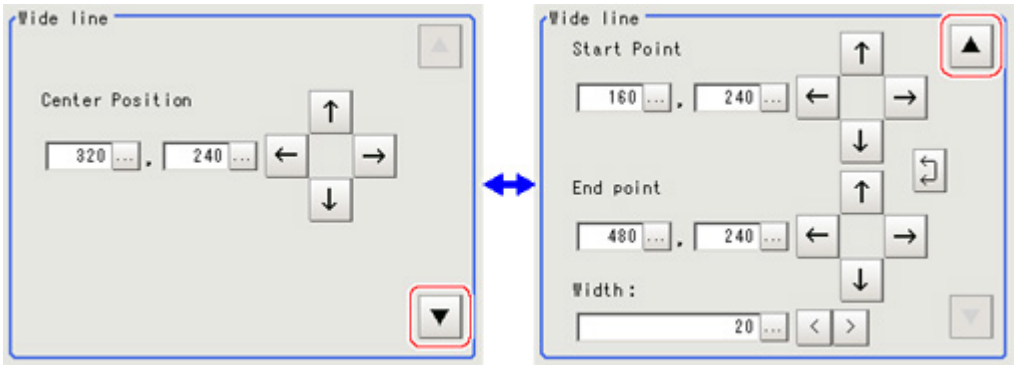


- Example) When changing the line width

  Drag the center point of the line in a direction perpendicular to the line.

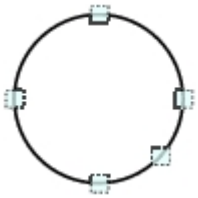
- **Using numbers for setting**

The window for settings is split into two.Setting is performed through input of numbers or through tapping on the arrows.



Circle/Ellipse

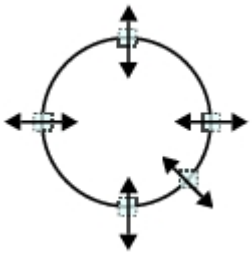
- **Image selection status**



Points are displayed on the top, bottom, left, right, and lower right of the circle.

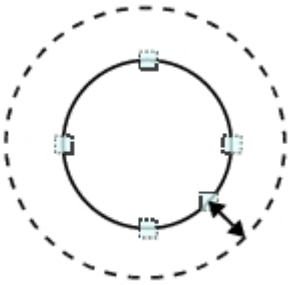
- **Dimension Adjustment**

Drag the points.



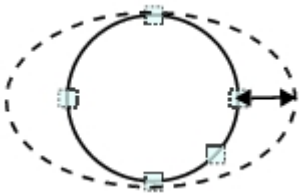
- Example) When zooming in on a circle

  Drag the point on the lower right of the circle.



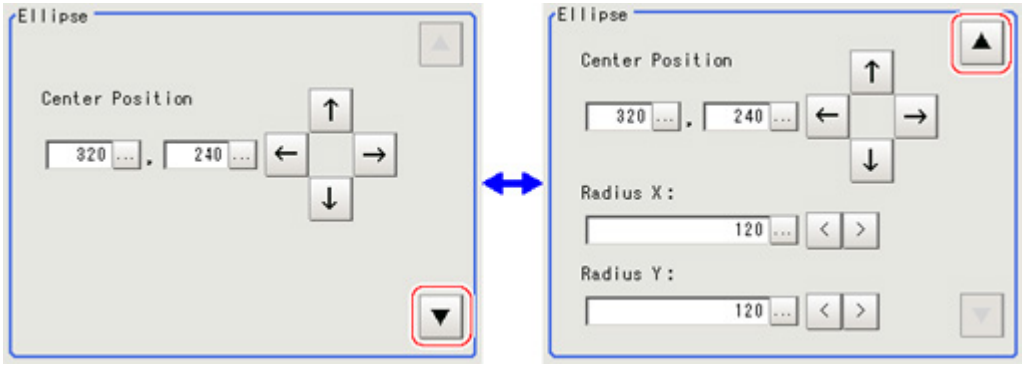
- Example) When transforming a circle into a long horizontal ellipse

  Drag the point on the right of the circle to the right.



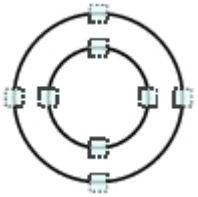
- **Using numbers for setting**

The window for settings is split into two.Setting is performed through input of numbers or through tapping on the arrows.



Circumference

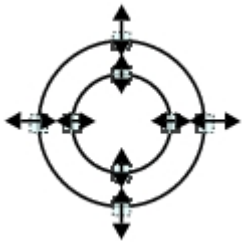
- **Image selection status**



Points are displayed on the top, bottom, left, and right of both the inner and outer circles.

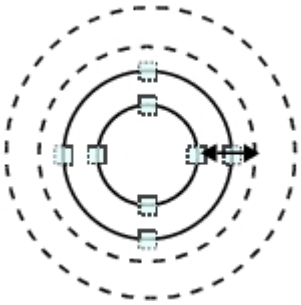
- **Dimension Adjustment**

Drag the points.

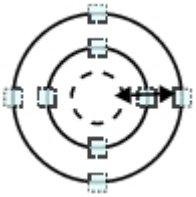


- Example) When enlarging the entire circumference

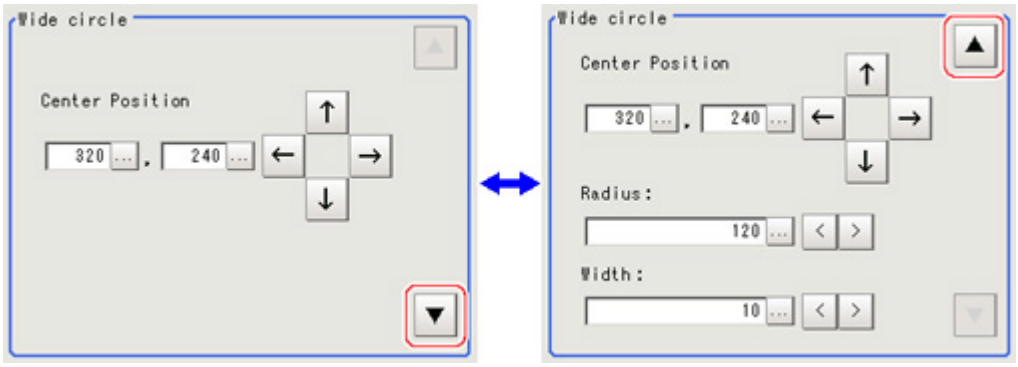
  Drag a point on the outer circle.



- 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.

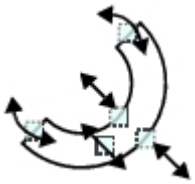


Arc

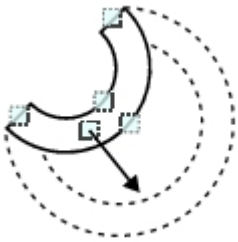
- **Image selection status**

Points are displayed on two lines at both ends of the arcs, on the inner arc, on the outer arc, and inside the closed arc shape.

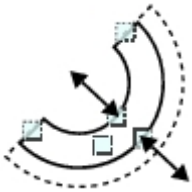
- **Dimension Adjustment**
  Drag the points.



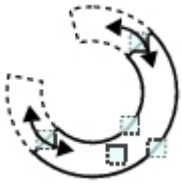
- Example) When enlarging an arc
  Drag the point inside the arc outward.



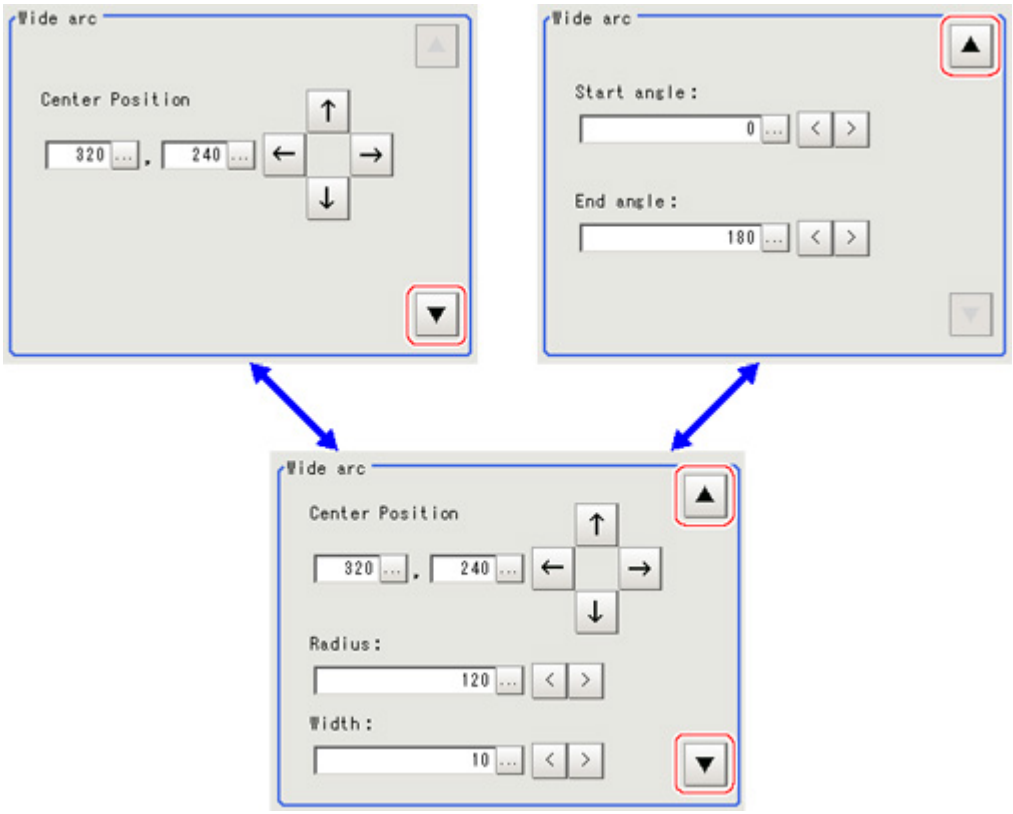
- Example) When adjusting the width of an arc
  Drag a point on the inner or outer arc inward or outward.



- 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.



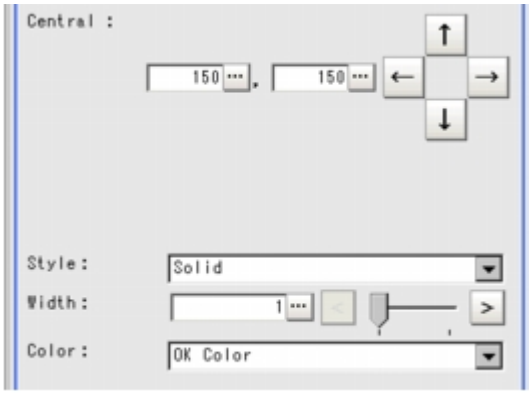
Crosshair Cursor

- **Image selection status**

Entire image is selected.

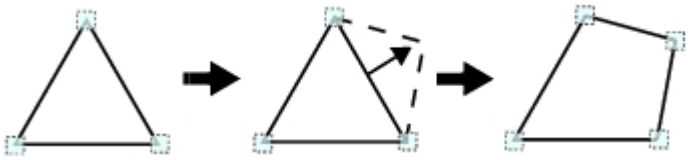
- **Using numbers for setting**

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)

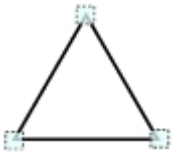
- **Drawing methods (for drawing a quadrilateral)**



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 vertexes is not within 3 to 10, the image cannot be confirmed as a polygon.

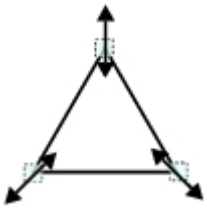
- **Image selection status**



Points are displayed at the vertexes of the figure.

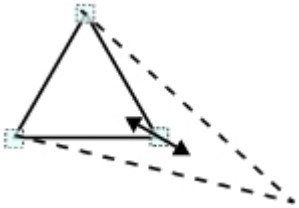
- **Dimension Adjustment**

Drag the points.



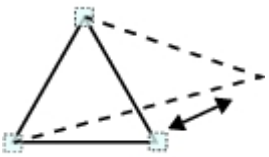
- Example) When changing the angle of one point

Drag point (arbitrarily).



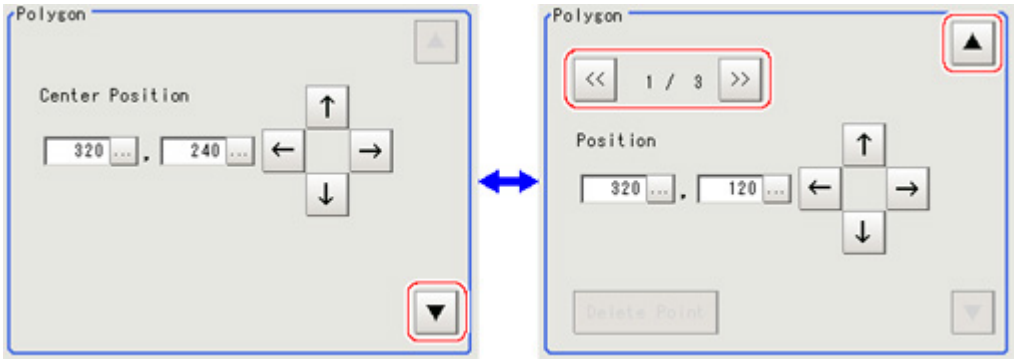
- Example) When changing the region

Drag point (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

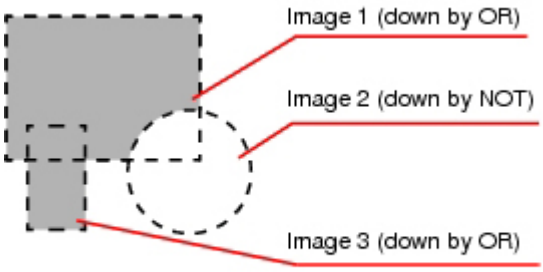
The OR setting/NOT setting is used when multiple images are combined.
Areas with complex shapes can be drawn through combining figures, and unnecessary parts can be excluded form the area.Each time [OR/NOT] () is tapped, the setting of the selected figure toggles between OR and NOT.

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(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 the 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 the NG color. The area outside of the NOT image is registered as the region.

(Example) The grey parts are measurement regions.



About Number of Logging Images

The maximum number of logging images (I_MAX) that can be stored in the controller's memory varies depending on the type of the controller in use and the type and number of connected cameras.

For color cameras:

Type of controller	0.3 megapixel camera				Intelligent compact camera				2 megapixel camera				5 megapixel camera			
	1 camera	2 cameras	3 cameras	4 cameras	1 camera	2 cameras	3 cameras	4 cameras	1 camera	2 cameras	3 cameras	4 cameras	1 camera	2 cameras	3 cameras	4 cameras
FZ4-L35 □	270	135	90	67	232	116	77	58	40	20	13	10	11	5	-	-
FZ4-6 □ □ FZ4-H6 □ □ FZ4-7 □ □ FZ4-H7 □ □									43	21	14	10				
FZ4-11 □ □ FZ4-H11 □ □													16	8	5	4

Intelligent compact camera: 752 pixels x 480 pixels

0.3 megapixel camera: 640 pixels x 480 pixels

2 megapixel camera: 1600 pixels x 1200 pixels

5 megapixel camera: 2432 pixels x 2044 pixels

For monochrome cameras:

Type of controller	0.3 megapixel camera				2 megapixel camera				5 megapixel camera			
	1 camera	2 cameras	3 cameras	4 cameras	1 camera	2 cameras	3 cameras	4 cameras	1 camera	2 cameras	3 cameras	4 cameras
FZ4-L35 □	252	126	84	63	40	20	13	10	11	5	-	-
FZ4-6 □ □ FZ4-H6 □ □ FZ4-7 □ □ FZ4-H7 □ □												
FZ4-11 □ □ FZ4-H11 □ □	272	136	90	68	43	21	14	10	16	8	5	4

0.3 megapixel camera: 640 pixels x 480 pixels
2 megapixel camera: 1600 pixels x 1200 pixels
5 megapixel camera: 2432 pixels x 2044 pixels

About Limits on the Number of Image Input Processing Items Used

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 megapixel color camera	81
0.3 megapixel monochrome camera	245
Intelligent compact camera (FZ-SQ)	69
2 megapixel color camera	13
2 megapixel monochrome camera	39
5 megapixel color camera	6
5 megapixel monochrome camera	19

Image input related processing items

Target processing items are as follows.

Item	Processing item
Loading images	Camera Image Input
	Camera Image Input HDR
	Camera Switching
Performing image compensation	Position Compensation
	Trapezoidal Correction+
	Filtering
	Background Suppression
	Brightness Correct Filter
	Color Gray Filter
	Extract Color Filter
	Anti Color Shading
	Stripes Removal Filter+
	Stripes Removal Filter II
	Halation Cut+
	Panorama+ [Note 1]
	Polar Transformation [Note 2]
Display results	Display Image File [Note 3]
	Display Last NG image [Note 4]

[Note 1]: When using a panorama+, each image input related unit after panorama+ may consume up to a maximum of 5 items.
[Note 2]: When using a Polar Transformation, each image input related unit after Polar Transformation may consume up to a maximum of 2 items.
[Note 3]: Image file display consumes the number of image setting value items per unit.
[Note 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 FZ4-11 □ □ /H11 □ □ , the number of processing items is not limited and as many processing items as permitted by the memory can be registered. Note, however, that a warning message is displayed when the available memory drops to below 1 GB. In this case, adjust the inspection flow to ensure at least 1 G of available memory.

About Max. Number of Loading Images during Multiple Image Input

The function that enables continuous high speed image input is called the multiple image 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
FZ4-L35 □	16 (Camera0,Camera1) 32 (Camera2,Camera3)	4 (Camera0,Camera1) 8 (Camera2,Camera3)	1 (Camera0,Camera1) 2 (Camera2,Camera3)
FZ4-6 □ □ FZ4-H6 □ □ FZ4-7 □ □ FZ4-H7 □ □	32	8	2
FZ4-11 □ □ FZ4-H11 □ □	32	8	2

[Note 1]: 2 megapixel cameras can be used with software version 3.30 or later.

Important

- The multiple input function cannot be used when the built-in lighting of an intelligent compact camera, FZ-SQ □ □ □ □ , is used.
- The maximum number of images loaded does not change even if partial reading of camera images is selected.

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 (of recognized character) = Output value
(Examples) If the recognized character is "2", "50" is output.
If the recognized character is "C", "67" is output.

Upper 4 bits

Lower 4 bits	0	1	2	3	4	5	6	7
0		DE		0	@	P	`	p
1	SH	D1	!	1	A	Q	a	q
2	SX	D2	”	2	B	R	b	r
3	EX	D3	#	3	C	S	c	s
4	ET	D4	$	4	D	T	d	t
5	EQ	NK	%	5	E	U	e	u
6	AK	SN	&	6	F	V	f	v
7	BL	EB	’	7	G	W	g	w
8	BS	CN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SB	*	:	J	Z	j	z
B	HM	EC	+	;	K	[	k	{
C	CL	→	,	<	L	¥	l	¦
D	CR	←	-	=	M	]	m	}
E	SO	↓	.	>	N	^	n	~
F	SI	↑	/	?	O	_	o	

Upper Limits of Processing Item Parameters

For processing items where the upper limit value is changed based on the image size of the camera being used, the description of the upper limit value is expressed using "_MAX".Upper limit values for each camera are as follows.

Parameters	Description	For 0.3 megapixel cameras:	For 2 megapixel cameras:	For 5 megapixel cameras:
X_MAX	The max value in the X-axis orientation	639	1599	2447
Y_MAX	The max value in the Y-axis orientation	479	1199	2043
W_MAX	Maximum width	239 (straight line W = 319)	599 (straight line W = 799)	1021 (straight line W = 1223)
R_MAX	Maximum radius	239 (circle/ellipse R1=319)	599 (circle/ellipse R1=799)	1021 (circle/ellipse R1 = 1223)
A_MAX	Maximum area	(X_MAX+1) * (Y_MAX+1) = 307200	(X_MAX+1) * (Y_MAX+1) = 1920000	(X_MAX+1) * (Y_MAX+1) = 5003712
Y_PMAX	Maximum number of lines that can be loaded	479	1199	2043

About Memories Usable with FZ Series

The following types of memory can be used with FZ.

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 memory.
However, capacity is a fixed 40 MB (256 MB for FZ4-11 ☐☐ /H11 ☐☐) . 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 (FZ4-6 ☐☐ /H6 ☐☐ , FZ4-7 ☐☐ /H7 ☐☐ only)

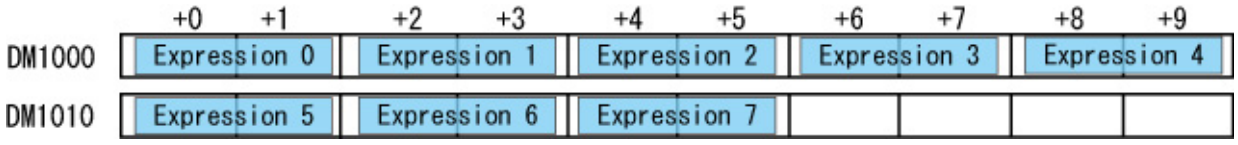
This is an area for holding current settings details of scene group data.
If this capacity is exceeded, adding units and copying scenes cannot be performed in edit flow.
Available data memory can be confirmed from the system menu.
Reference: ▸ Checking System Information [System Information] (p.358)

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.

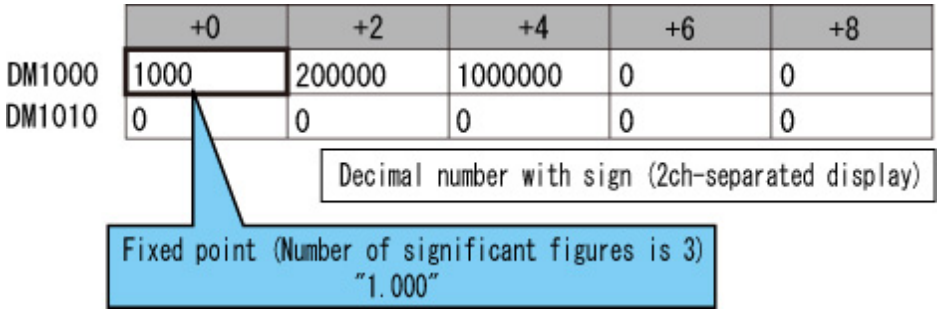
Data storage image (Data Output area DM1000)

When the PLC link Data Output area is set to DM1000, data is stored as follows in the PLC I/O memory.
*: 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.



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.

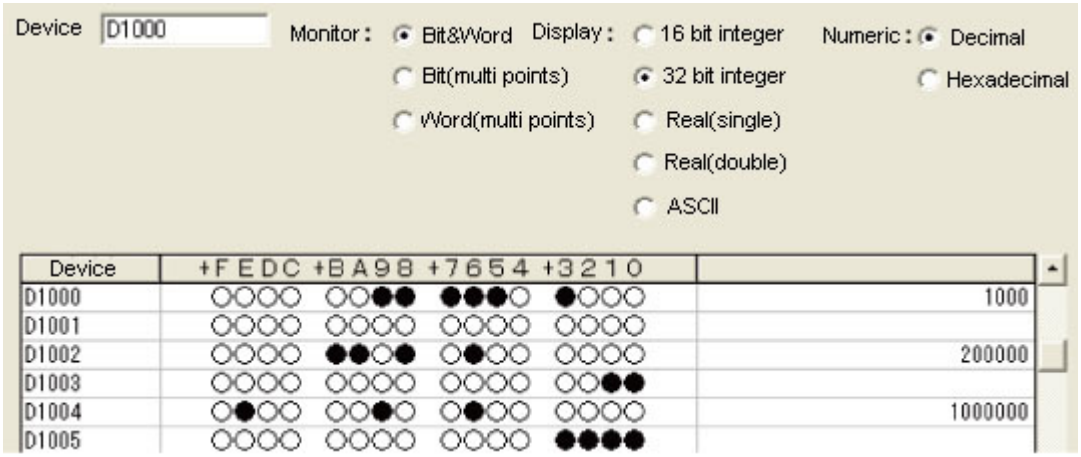


*: Data is stored to the PLC I/O memory as follows for a decimal number per channel.

	+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.



*: 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

1-1 01h Identity Object

Class Attribute

ID	Access	Name	Data type	Description	Attribute value
1	Get	Revision	UINT	Revision of objects	1
2	Get	Max Instance	UINT	Maximum instance number	1
3	Get	Number of Instances	UINT	Number of generated object instances	1
6	Get	Maximum ID Number Class Attributes	UINT	Attribute ID number of class attribute	7
7	Get	Maximum ID Number Instance Attributes	UINT	Attribute ID number of instance attribute	7

Instance Attribute

ID	Access	Name	Data type	Description	Attribute value
1	Get	Vendor ID	UINT	Vendor ID number	47
2	Get	Device Type	UINT	General device type	0
3	Get	Product Code	UINT	Product ID code	1
4	Get	Revision	Structure	Revision of Identify objects	1
5	Get	Status	WORD	Current status of devices	
6	Get	Serial Number	UDINT	Serial number	
7	Get	Product Name	SHORT-STRING	Product name	"FZ-Application Adapter"

Service

Code	Service name	Class	Instance	Remarks
01h	Get_Attribute_All	Yes	Yes	
05h	Reset	No	Yes	Parameter : 0,1
0Eh	Get_Attribute_Single	Yes	Yes	

1-2 02h Message Router Object

Class Attribute

None

Instance Attribute

None

Service

None

1-3 06h Connection Manager

Class Attribute

None

Instance Attribute

None

Service

Code	Service name	Class	Instance	Remarks
54h	Forward Open	No	Yes	
4Eh	Forward Close	No	Yes	

1-4 F5h TCP/IP Interface

Class Attribute

None

Instance Attribute

ID	Access	Name	Data type	Description	Attribute value
1	Get	Status	DWORD	Interface status	
2	Get	Configuration	DWORD	Interface function flag	
		Capability			
3	Set	Configuration	DWORD	Interface function flag	
		Control			
4	Get	Physical	STRUCT of:	Path to physical layer link object	
		Link Object			
		Path size	UINT	Path size	2
		Path	Padded	Segment specifying physical layer link object	20 F6 24 01
			EPATH		
5	Get	Interface Configuration	STRUCT of:	TCP/IP network interface setting	
		IP Address	UDINT	Device IP address	
		Network Mask	UDINT	Device network mask	
		Gateway Address	UDINT	Default gateway address	
		Name Server	UDINT	Primary name server	
		Name Server 2	UDINT	Secondary name server	
		Domain Name	STRING	Default domain name	
6	Get	Host Name	STRING	Host name	

Service

Code	Service name	Class	Instance	Remarks
01h	Get_Attribute_All	No	Yes	
02h	Set_Attribute_All	No	Yes	
0Eh	Get_Attribute_Single	No	Yes	
10h	Set_Attribute_Single	No	Yes	

1-5 F6h Ethernet Link

Instance Attribute

ID	Access	Name	Data type	Description	Attribute value
1	Get	Revision	UINT	Revision of objects	3
2	Get	Max Instance	UINT	Maximum instance number	3
3	Get	Num Instance	UINT	Number of ports where instance is created	2

Instance Attribute

ID	Access	Name	Data type	Description	Attribute value
1	Get	Interface Speed	UDINT	Interface communication speed	
2	Get	Interface Flags	DWORD	Interface status flag	
3	Get	Physical Address	ARRAY of 6 USINTs	MAC layer address	

Service

Code	Service name	Class	Instance	Remarks
01h	Get_Attribute_All	No	Yes	
0Eh	Get_Attribute_Single	Yes	Yes	

1-6 04h Assembly Object

Class Attribute

ID	Access	Name	Data type	Description	Attribute value
1	Get	Revision	UINT	Revision of objects	2

Instance Attribute (O → T) Instance ID : 100

ID	Access	Name	Data type	Description	Attribute value
3	Set	Data	BYTE arrangement	Byte data (The data format is defined on the application side.)	LINE 0
4	Get	Size	UINT	Number of bytes	Size : 20

Instance Attribute (T → O) Instance ID : 101

ID	Access	Name	Data type	Description	Attribute value
3	Get	Data	BYTE arrangement	Byte data (The data format is defined on the application side.)	LINE 0
4	Get	Size	UINT	Number of bytes	Size : 48

Instance Attribute (O → T) Instance ID : 102

ID	Access	Name	Data type	Description	Attribute value
3	Set	Data	BYTE arrangement	Byte data (The data format is defined on the application side.)	LINE 1
4	Get	Size	UINT	Number of bytes	Size : 20

Instance Attribute (T → O) Instance ID : 103

ID	Access	Name	Data type	Description	Attribute value
3	Get	Data	BYTE arrangement	Byte data (The data format is defined on the application side.)	LINE 1
4	Get	Size	UINT	Number of bytes	Size : 48

Service

Code	Service name	Class	Instance	Remarks
0Eh	Get_Attribute_Single	Yes	Yes	
10h	Set_Attribute_Single	No	Yes	

Operation log format

- The operation log is stored with 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, from the first record over 100 KB, the log is written into a new file.
  - 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.
  - The log file character code is UTF-8 with BOM.

- Basically, information is saved when the API (application program interface) is executed. The information for one API information is written into the log file as one record.

  The format for each record written into the log file is as follows. The four data items of the execution date and time, user name, input information, and output information is expressed delimited with semicolons. At the end of the record, 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	Date and time at which this API was executed.
User name	Name of user currently logged in. If no one is logged in, the character string "no login" is entered.
Input information	Following the API name is supplemental information (mostly API arguments), delimited with commas.
Output information	Following the API return value is supplemental information (mostly information gotten by the API), delimited with commas.

For API information written in the operation log file, see API List.
Reference: API List (p.626)

API List

Measurement Control Related

API name	Function	References
ClearImageLogCount	Clears the logging count information.	Reference: Details (p.630)
ClearMeasureData	Clears the measurement results for the processing unit.	Reference: Details (p.190)
ClearMeasureData_S	Clears the measurement results for the processing unit.	
GetImageLogInfo	Acquires the specified image logging information.	Reference: Details (p.633)
GetMeasureOut	Acquires the measurement result output yes/no.	Reference: Details (p.213)
ImageLogging	Executes image logging.	
ImageUpdate	Updates image data.	Reference: Details (p.223)
LockMeasureStop	Sets measurement trigger input to disabled.	Reference: Details (p.636)
Measure	Executes measurement processing.	Reference: Details (p.239)
MeasureStart	Sets measurement trigger input to enabled.	Reference: Details (p.239)
MeasureStop	Sets measurement trigger input to disabled.	Reference: Details (p.240)
MeasureStop2	Sets measurement trigger input to disabled.	—
Remeasure0	Executes remeasurement processing.	
Remeasure1	Executes remeasurement processing.	
SetMeasureOut	Sets whether or not measurement results are output.	Reference: Details (p.271)
UnLockMeasureStop	Sets measurement trigger input to enabled.	Reference: Details (p.643)

System Setting Control Related

API name	Function	References
AddSystemData	Adds system data.	Reference: Details (p.184)
GetSystemData	Acquires the system data.	Reference: Details (p.215)
SetSystemData	Sets the system data.	Reference: Details (p.274)

Data Save/Load Related

API name	Function	References
ClearSettingData	Clears setting data.	Reference: Details (p.631)
LoadBackupData	Loads scene data.	Reference: Details (p.235)
LoadScene	Loads scene data.	Reference: Details (p.235)
LoadSceneGroup	Reads scene group data.	Reference: Details (p.236)
LoadSceneGroup0	Executes load processing for scene group data.	
LoadSystemData	Loads system data.	Reference: Details (p.236)
LoadUnitData	Loads processing unit data.	Reference: Details (p.237)
SaveBackupData	Saves scene data.	Reference: Details (p.258)
SaveData	Saves data to the controller.	Reference: Details (p.258)
SaveScene	Saves scene data.	Reference: Details (p.259)
SaveSceneGroup	Saves scene group data.	Reference: Details (p.260)
SaveSystemData	Saves system data.	Reference: Details (p.260)
SaveSystemData0	Saves system data.	
SaveUnitData	Saves processing unit data.	Reference: Details (p.261)

Scene Group Control Related

API name	Function	References
ChangeSceneGroup	Switches to the specified scene group.	Reference: ▶ Details (p.189)
ClearSceneGroup	Clears a scene group.	Reference: ▶ Details (p.630)
CopySceneGroup	Copies a scene group.	Reference: ▶ Details (p.194)
GetSceneGroupCount	Acquires the count of the valid scene groups on the memory card.	Reference: ▶ Details (p.263)
GetSceneGroupNo.	Acquires the current scene group No.	Reference: ▶ Details (p.263)
GetSceneGroupTitle	Acquires the scene group title name.	Reference: ▶ Details (p.264)
SetSceneGroupTitle	Sets the scene group title name.	Reference: ▶ Details (p.273)

Scene Control Related

API name	Function	References
ChangeScene	Switches to the specified scene.	Reference: ▶ Details (p.188)
ClearScene	Clears the scene.	Reference: ▶ Details (p.191)
CopyScene	Copies scene data.	Reference: ▶ Details (p.193)
GetSceneCount	Acquires the count of usable scenes.	Reference: ▶ Details (p.262)
GetSceneDescription	Acquires the count of usable scenes.	Reference: ▶ Details (p.262)
GetSceneMaker	Acquires the scene maker name.	Reference: ▶ Details (p.264)
GetSceneNo	Acquires the current scene No.	Reference: ▶ Details (p.265)
GetSceneTitle	Acquires the scene title name.	Reference: ▶ Details (p.265)
SetSceneDescription	Sets the scene description.	Reference: ▶ Details (p.272)
SetSceneMaker	Sets the scene maker name.	Reference: ▶ Details (p.273)
SetSceneTitle	Sets the scene title name.	Reference: ▶ Details (p.274)

Display Control Related

API name	Function	References
SetImageWindow	Sets the image display window.	Reference: ▶ Details (p.270)
SetJudgeWindow	Sets the display attributes for the judgment results display window.	Reference: ▶ Details (p.641)
SetTextWindow	Sets the text display window.	Reference: ▶ Details (p.275)
SetTimeWindow	Sets the display attributes for the measurement processing time display window.	Reference: ▶ Details (p.642)

Image Processing Related

API name	Function	References
GetDensityProfile	Acquires the image density information.	Reference: ▶ Details (p.633)
GetHistgram	Acquires the image histogram.	Reference: ▶ Details (p.633)

Security Related

API name	Function	References
CheckAccessControl	Checks the operation authority.	Reference: ▶ Details (p.630)
ClearSecurityData	Clears security related parameters.	Reference: ▶ Details (p.630)
DeleteUserAccount	Deletes a user account.	Reference: ▶ Details (p.632)
GetSecurityParameter	Acquires security related parameters.	Reference: ▶ Details (p.635)
LoadSecurityData	Loads security related settings.	Reference: ▶ Details (p.635)

SaveSecurityData	Saves security related settings.	Reference: ▶ Details (p.639)
SetAccessControl	Sets operation restrictions.	Reference: ▶ Details (p.640)
SetSecurityParameter	Sets security related parameters.	Reference: ▶ Details (p.641)
SetUserAccount	Sets a user account.	Reference: ▶ Details (p.642)
UserLogin	Logs in as the specified user.	Reference: ▶ Details (p.643)
UserLogout	Logs out.	Reference: ▶ Details (p.643)

Processing Unit Control Related

API name	Function	References
AssignProc	Assigns units to measurement flows.	—
AssignUnit	Registers a processing unit.	Reference: ▶ Details (p.186)
BeginSetupUnit	Enters into the unit setting screen.	—
CopyUnit	Copies a processing unit.	Reference: ▶ Details (p.194)
CopyUnit2	Copies a processing unit.	—
CopyUnitFigure	Copies the figure data for a processing unit.	Reference: ▶ Details (p.195)
CopyUnitModel	Copies the model data for a processing unit.	Reference: ▶ Details (p.195)
DeleteUnit	Deletes a processing unit.	Reference: ▶ Details (p.199)
EndSetupUnit	Closes the unit setting screen.	—
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.	Reference: ▶ Details (p.217)
GetUnitItemIdent	Acquires the identifier name for a processing item.	Reference: ▶ Details (p.289)
GetUnitItemIdent2	Acquires the identifier name for a processing item.	—
GetUnitTitle	Acquires a processing unit title name.	Reference: ▶ Details (p.291)
GetUnitTitle2	Acquires a processing unit title name.	—
InsertUnit	Inserts a processing unit.	Reference: ▶ Details (p.225)
LoadProc	Executes load processing for unit data.	—
MeasureInit	Executes unit measurement initialization processing.	—
MeasureOut	Executes measurement result output processing.	—
MoveUnit	Moves a processing unit.	Reference: ▶ Details (p.242)
RenumProc	Executes processing for unit number change.	—
SaveProc	Executes save processing for unit data.	—
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.	Reference: ▶ Details (p.276)
SetUnitTitle	Sets a processing unit title name.	Reference: ▶ Details (p.278)

I/O Related

API name	Function	References
GetAll	Executes batch input of parallel I/O and other terminal states.	Reference: ▶ Details (p.632)
GetIoModuleIdent	Acquires the identifier name for an I/O module.	Reference: ▶ Details (p.634)

GetPort	Executes individual input of parallel I/O terminal states.	Reference: ▶ Details (p.634)
IoInitialize	Executes I/O initialization.	Reference: ▶ Details (p.635)
PutAll	Executes batch input of parallel I/O and other terminal states.	Reference: ▶ Details (p.636)
PutPort	Executes individual input of parallel I/O and other terminal states.	Reference: ▶ Details (p.637)
ReceiveData	Executes byte type array data input.	Reference: ▶ Details (p.637)
RunOut	Outputs the RUN state.	Reference: ▶ Details (p.639)
SendData	Executes byte type array data output.	Reference: ▶ Details (p.639)
SendString	Sends a character string.	Reference: ▶ Details (p.640)

Other

API name	Function	References
ExitFzProcess	Exits an FZ process.	Reference: ▶ Details (p.632)
GetLanguageIdent	Acquires the language identifier.	—
SaveImage	Executes save processing for image data.	Reference: ▶ Details (p.259)
ScreenCapture	Captures the screen.	Reference: ▶ Details (p.266)
StartRemoteOperation	Starts remote operation.	—
SystemReset	Executes a system reset.	Reference: ▶ Details (p.643)

Section added in Ver.3.40

API name	Function	References
CreateDirectory	Creates a directory.	Reference: ▶ Details (p.631)
CopyFile	Copies a file.	Reference: ▶ Details (p.631)
RemoveFile	Removes a file or directory.	Reference: ▶ Details (p.638)
RenameFile	Changes a file name or directory name.	Reference: ▶ Details (p.638)

Section added in Ver.3.50

API name	Function	References
RaiseOptionEvent	Issues an option event.	Reference: ▶ Details (p.637)
SetDisplayUnitNo	Sets the specified processing unit number used for image/text display.	Reference: ▶ Details (p.641)

Section added in Ver.3.51

API name	Function	References
NonstopSync	Synchronizes the data for non-stop adjustment settings.	Reference: ▶ Details (p.636)
SyncData	Synchronizes the setting data between Core RA processes.	Reference: ▶ Details (p.642)

Section added in Ver.4.00

API name	Function	References
AddGlobalData	Adds global data.	Reference: ▶ Details (p.183)
ConvertImageFileF	Converts an image file.	
ConvertImageFileM	Converts an image file.	
GetGlobalData	Acquires global data.	Reference: ▶ Details (p.211)
GetImageCountM	Acquires the image count.	
SetGlobalData	Sets global data.	Reference: ▶ Details (p.269)

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 a scene group

ClearSceneGroup

Parameters

sceneGroupNo	Scene group No. to clear

Return value

If the scene group 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.

Ending an FZ process

ExitFzProcess

Parameters

None

Return value

If the FZ process ended successfully, returns 0.
Otherwise, returns value other than 0.

Executing batch input of parallel I/O and other terminal states

GetAll

Parameters

ioIdent	Acquisition destination type - ParallelIo: Parallel I/O - Serial normal: Serial non-protocol communication - UdpNormal: Ethernet UDP non-protocol communication

Return value

Returns the DI0-DI7 terminal states.

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

GetHistgram

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 - ImageLogMaxCount: Maximum number of images that can be logged in controller memory - ImageLogCount: Count of logging images held in the controller memory

Return value

Returns the specified image logging information.

Getting an I/O module identifier name

GetIoModuleIdent

Parameters

ioModuleNo	I/O module number 0: Registers ParallelIo (Parallel I/O). (Fixed) 1: Registers any of the following I/O modules in the module communication system. - SerialNormal: Serial non-procedure communication - SerialNormal2: Serial non-procedure communication (FXXX series method) - SerialPlcLink: Serial PLC link (Omron PLC) - SerialPlcLinkM: Serial PLC link (Mitsubishi PLC) 2: Registers any of the following I/O modules for Ethernet communication system - TcpNormal: TCP non-procedure communication - UdpNormal: UDP non-procedure communication - UdpNormal2: UDP non-procedure communication (FXXX series method) - UdpPlcLink - UDP PLC link (Omron PLC) - UdpPlcLinkM: UDP PLC link (Mitsubishi PLC) 3: Registers one of the following I/O modules or no registration. - EtherCAT0: EtherCAT communication - EtherNetIP: EtherNet/IP communication

Return value

If the I/O module identifier name is acquired successfully (character string), returns 0.
Otherwise, returns value other than 0.

Executing individual input of parallel I/O and other terminal states

GetPort

Parameters

ioIdent	Acquisition destination type - ParallelIo: Parallel I/O - Serial normal: Serial non-protocol communication - UdpNormal: Ethernet UDP non-protocol communication
portNo	Port number to acquire * Parallel I/O DI0 to DI7: 0 to 7 DSA0: 100 STEP0 to 101 DSA1: 102 STEP1: 103

Return value

Returns the state of the specified terminal.

Getting security related parameters

GetSecurityParameter

Parameters

_userName	User name executed
_password	User password executed
dataIdent	Data 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 - ParallelIo: Parallel I/O - Serial normal: Serial non-procedure communication - UdpNormal: Ethernet UDP non-procedure communication

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.

Executing batch input of parallel I/O and other terminal states

PutAll

Parameters

ioIdent	Input destination type - ParallelIo: Parallel I/O - Serial normal: Serial non-protocol communication - UdpNormal: Ethernet UDP non-protocol communication
data	Input data

Return value

If data is input successfully, returns 0.
Otherwise, returns value other than 0.

Executing batch input of parallel I/O and other terminal states

PutPort

Parameters

ioIdent	Input destination type - ParallelIo: Parallel I/O - Serial normal: Serial non-protocol communication - UdpNormal: Ethernet UDP non-protocol communication
portNo	Input port number * Parallel I/O DO0DO7: 0 to 15 GATE0: 100 BUSY: 101 OR0: 102 ERROR: 103 RUN: 104 READY0: 105 GATE1: 108 OR1: 110 READY1: 113
data	Input data

Return value

If data is input successfully, returns 0.
Otherwise, returns value other than 0.

Issuing an option event

RaiseOptionEvent

Parameters

eventNo	Event number
parameter	Parameters

Return value

Commands issuing of an option event to the system.
If the command succeeded, returns 0.
Otherwise, returns value other than 0.

Executing byte type array data input

ReceiveData

Parameters

ioIdent	Input destination type - ParallelIo: Parallel I/O -Serial normal: Serial non-protocol communication - UdpNormal: Ethernet UDP non-protocol communication
inputData	Input data
inputSize	Input size
parameter	Input condition parameter (Can be omitted) - For UdpNormal: Specify the connection IP address (example: "192.168.0.1") for the parameter with a character string. - Other I/O: The parameter specification is disabled; use with it omitted.
parameterSize	Input condition parameter size

Return value

If data is input 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.

RUN state output

RunOut

Parameters

ioIdent	I/O module identifier name
state	I/O state

Return value

If the RUN state is output 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.

Executing byte type array data output

SendData

Parameters

ioIdent	Output destination type - ParallelIo: Parallel I/O - Serial normal: Serial non-protocol communication - UdpNormal: Ethernet UDP non-protocol communication
outputData	Output data - For SerialNormal or UdpNormal, always specifies a byte type array. - For ParallelIo, always specifies an integer type array.
outputSize	Input size

parameter	Output condition parameter (Can be omitted) - For UdpNormal: Specify the connection IP address (example: "192.168.0.1") for the parameter with a character string. - Other I/O: The parameter specification is disabled; use with it omitted.
parameterSize	Output condition parameter size

Return value

If data is output successfully, returns 0.
Otherwise, returns value other than 0.

Sending a character string

SendString

Parameters

ioIdent	I/O module identifier name
outputString	Character string sent

Return value

If data is input successfully, 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 the image/text display regulation processing unit number

SetDisplayUnitNo

Parameters

unitNo	Processing unit number to set	Input

Return value

If the image/text display regulation processing unit number is set successfully, returns 0.
Otherwise, returns value other than 0.

Setting the judgment result display window

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 security related parameters

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

Parameter

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.

Executing system reset

SystemReset

Parameters

None

Return value

If the system is restarted 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

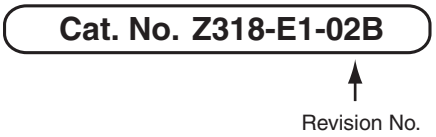
remoteOperation	Logout target

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.



Rev. No.	Rev. Date	Revision Contents	Software Version
01	Nov. 2011	Original production	Ver.4.0
01A	May 2012	Minor corrections	Ver.4.1
02	Nov. 2012	Improvements in communication function and other revisions	Ver.4.2
02A	Mar. 2013	Minor corrections	Ver.4.2
02B	Aug. 2015	Additions corresponding to change of EN standard. Model change.	Ver.4.2

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