

Vision Sensor FH/FZ5 Series Vision System

User's Manual

FH-1□□□

FH-3□□□

FZ5-L35□

FZ5-6□□

FZ5-11□□



Introduction

Thank you for purchasing the FH/FZ5.

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



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

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

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FH/FZ5 Manual Configuration

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

Cat. No.	Manual name	Contents	Main applications
2285550-0	FH Image Processing System Instruction Manual	Provides FH-series specifications, dimensions, part names, I/O information, mounting information, and wiring information.	Checking I/O and other specifications and performing installation and wiring
9524422-4 (FZ5-6□□/11□□)	FH5 Image Processing System Instruction Manual	Provides FH5-series specifications, dimensions, part names, I/O information, installation information, and wiring information.	
9910002-2 (FZ5-L3□□)			
Z340 (This manual)	Vision System FH/FZ5 Series User's Manual	Describes the software functions, settings, and operations for using FH/FH5-series Vision Sensors.	Any application other than the above applications and communications
Z341	Vision System FH/FZ5 Series Processing Item Function Reference Manual	Describes the functions, settings, and operations of the processing items that you can use with the FH/FH5-series Vision Sensors.	Checking information on processing items when designing or manipulating measurement flows Use this manual together with the <i>User's Manual</i> .
Z342	Vision System FH/FZ5 Series User's Manual for Communications Settings	Describes the functions, settings, and communications methods for communicating between FH/FH5-series Vision Sensors and external devices (e.g., a PLC). The following communications protocols are included. Parallel, PLC Link, EtherNet/IP, EtherCAT, and Non-procedure	Checking information on communications functions
Z343	Vision System FH Series Operation Manual for Sysmac Studio	Describes the operating procedures for setting up and operating FH-series Vision Sensors from the Sysmac Studio FH Tools.	Communicating with an NJ-series Controller via EtherCAT communications

Conventions Used in This Manual

Symbols

The symbols used in this manual have the following meanings.

IMPORTANT Indicates relevant operational precautions that must be followed.

Note Indicates operation-related suggestions from OMRON.

Use of Quotation Marks and Brackets

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

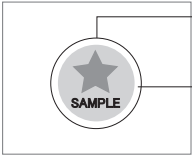
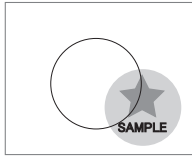
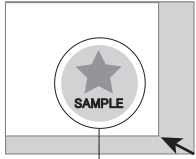
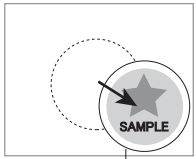
[] Menu Indicates the menu names or processing items shown in the menu bar.

" " Item name Indicates the item names displayed on the screen.

Definitions of Basic Terms

Term	Definition
measurement flow (abbreviated as "flow")	A continuous flow of measurement processing. A measurement flow consists of a scene created from a combination of processing items.
measurement processing	Executing processing items for inspections and measurements.
processing item	<p>Any of the individual items for vision inspections that are partitioned and packaged so that they can be flexibly combined.</p> <p>These include the Search, Position Compensation, and Fine Matching items.</p> <p>Processing items can be classified for image input ([Input image]), inspection/measurement ([Measurement]), image correction ([Compensate image]), inspection/measurement support ([Support measurement]), process branching ([Branch]), results external output ([Output result]), resulting image display ([Display result]), etc.</p> <p>You can freely classify processing items to handle a wide range of applications.</p> <p>A scene (i.e., a unit for changing the measurement flow) is created by registering the processing items as units.</p>
scene	<p>A unit for changing the measurement flow that consists of a combination of processing items.</p> <p>"Scene" is used because of the correspondence to the scene (i.e., type of measurement object and inspection contents) where measurements are performed.</p> <p>A scene is created for each measurement or measurement contents.</p> <p>You can easily achieve a changeover simply by changing the scene when the measurement object or inspection content changes.</p> <p>Normally you can set up to 128 scenes. If you need more than 128 scenes, you can separate them into different groups or use the Conversion Scene Group Data Tool to create a scene group that contains over 128 scenes.</p>
processing unit (abbreviated as "unit")	<p>A processing item that is registered in a scene.</p> <p>Numbers are assigned to processing units in order from the top and they are executed in that order.</p> <p>Processing items are registered for the processing units to create a scene (i.e., a unit for changing the measurement flow).</p>
measurement trigger	<p>A trigger for executing measurements.</p> <p>With a parallel interface, the STEP signal or command 00 (Continuous Measurement) is used. With a serial interface, an Execute One Measurement or a Start Continuous Measurement command is used.</p>
test measurement	<p>A measurement that is performed to manually test (check) measurements under the conditions that are set in the currently displayed scene.</p> <p>Test measurements can be executed on an Adjustment Window. Processing is completed inside the Controller and the measurement results are not normally output on an external interface.</p> <p>However, you can select [Output] in [Test measurement] to output the measurement results after executing measurements.</p>
single measurement	A measurement that is executed only once in synchronization with the trigger input.
continuous measurement	<p>Measurements executed continuously and automatically without a trigger input as soon as each measurement is completed.*1</p> <p>*1: There is actually a small delay between completing a measurement and starting the next measurement.</p> <p>"Continuous measurement" is used as opposed to "single measurement."</p>

Term		Definition
operation modes	Single-line High-speed Mode	A high-speed mode that processes the measurement flow for the first trigger and then processes the measurement flow in parallel for the second trigger to achieve a high-speed trigger input interval. It is used together with the multi-input function.
	Multi-line Random-trigger Mode	A trigger mode that allows you to independently processing multiple measurement flows. With traditional image processing, two or more triggers cannot be acknowledged at the same time. In Multi-line Random-trigger Mode, you can randomly input multiple triggers into one Controller to independently process multiple scenes in parallel.
	Non-stop Adjustment Mode	A mode that allows you to adjust the flow and set parameters while performing measurements. The enables adjustments without stopping the line or stopping inspections.
	High-speed Logging Mode	A logging mode that allows complete parallel processing of measurements and logging. Traditionally, logging was not possible while processing measurements. Either measurements or logging had to be given priority and the other one had to wait. With this mode, you can save the measurement images in external memory without affecting the transaction time.
parallel processing (an option for any of the above operation modes)	Parallel processing splits part of the measurement flow into two or more tasks, and processes each task in parallel to shorten the transaction time. Processing items for parallel processing are used so that the user can specify the required parallel processing.	
multi-input function	A function that is used to consecutively and quickly input images. It allows the next STEP signal to be acknowledged as soon as the image input processing is completed. There is no need to wait for measurement processing to be completed. You can check whether image input processing has been completed with the status of the READY signal. Even if the READY signal is ON when measurement processing is being executed, the next STEP signal can be acknowledged.	

Term	Definition
Position compensation	<p>When the location and direction of measured objects are not fixed, the positional deviation between reference position and current position is calculated and measurement is performed after correcting.</p> <p>Please select processing items that are appropriate to the measurement object from processing items that are related to position compensation.</p> <ul style="list-style-type: none"> ● Reference position Measurement area and objects to be measured are correctly aligned.  <ul style="list-style-type: none"> ● When position of object to be measured is deflected Object to be measured overflows Measurement area.  <p>When position deflection correction is set in advance:</p> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>Measurement will be carried out after moving the image for a corresponding deflection and returning to the reference position.</p>  <p>Measurement will be carried out after measured object enters into Measurement area.</p> </div> <div style="width: 45%;"> <p>Measurement will be carried out after moving the Measurement area for a corresponding deflection.</p>  </div> </div>
Intelligent camera (with lighting function)	<p>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.</p> <p>For details, see Reference: ► Intelligent Camera (with Lighting) (p.69).</p>
Reference position	<p>The point that is always the reference. If the location of the registered model is different from the reference position, the setting should be changed in [Ref. setting].</p>
Model	<p>The image pattern that serves as the inspection target. Characteristics portions are extracted from images of the object and registered as model registration.</p>

Term	Definition
2's complement	<p>Binary numbers are generally used to represent negative numbers. Negative numbers are expressed by "Inverting all bits of a positive number and adding 1 to the result". (Example) "-1" is expressed as 2's complement "-1" can be calculated by "0-1".</p> <p style="margin-left: 40px;">└─ (In the case of 1, minus 1)</p> $\begin{array}{r} \text{00000000 (= 0)} \\ -) \text{00000001 (= 1)} \\ \hline \text{11111111 (= -1)} \end{array} \quad \leftarrow \text{"-1" is expressed with 2's Complement (for 8 bits)}$ <p>There are methods for simple calculation without performing this kind of computation. For instance, "Negative number = inverting all bits of a positive number and then adding 1 to the result".</p> $\begin{array}{l} \text{00000001 (= 1)} \\ \downarrow \text{Invert all bits} \\ \text{11111110} \\ \downarrow \text{Plus 1} \\ \text{11111111 (= -1)} \end{array}$ <p>The first digit is used to judge whether the number is positive or negative.</p> <ul style="list-style-type: none"> • When 0: Positive number (or 0) • When 1: Negative number <p>The advantage of two's complement numbers is that positive and negative numbers can be used as is in calculations. (Example) When $-1+10=9$</p> $\begin{array}{r} \text{11111111 (= -1)} \\ +) \text{00001010 (= 10)} \\ \hline \text{00001001 (= 9)} \end{array}$

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Terms and Conditions Agreement

Read and understand this Manual

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


Errors and Omissions


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

Meanings of Signal Words

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






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

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

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

● Meanings of Alert Symbols

The following alert symbols are used in this manual.

	Indicates general prohibitions for which there is no specific symbol.
	Indicates the possibility of electric shock under specific conditions.
	Indicates the possibility of explosion under specific conditions.
	Indicates the possibility of laser radiation.
	Indicates the possibility of injury by high temperature under specific conditions.

● Alert statements in this Manual

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

WARNING

This product must be used according to the instruction manual. Failure to observe this may result in impairment of functions and performance of the product



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



Never connect the AC power supply with this product. When the AC power supply is connected, it causes the electric shock and a fire.



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



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



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



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



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



CAUTION

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



Precautions for Safe Use

● Installation Environment

- Do not use the product in areas where flammable or explosive gases are present.
- Install the product so that air can flow freely through its cooling vents.
- Clean the vent hole and discharge opening to prevent dust or particles from blocking them. Blocked cooling vents or discharge opening of the fan increasing heat inside, causing malfunction of the product.
- Do not install the product close to high-voltage devices and power devices in order to secure the safety of operation and maintenance.
- Make sure to tighten all installation screws securely.

● Power Supply and Wiring

- Make sure to use the product with the power supply voltage specified by this manual.
- Use the specified wire size (AWG10 to 16).
- Keep the power supply wires as short as possible (Max.2m).
- Use a DC power supply with safety measures against high-voltage spikes(safety extra low-voltage circuits on the secondary side).
- Do the following confirmations again before turning on the power supply.
 - Is the voltage and polarity of the power supply correct? (24VDC)
 - Is not the load of the output signal short-circuited?
 - Is the load current of the output signal appropriate?
 - Is not the mistake found in wiring?
 - Is the voltage and polarity of the encoder power (ENC0 VDD / ENC0 GND / ENC1 VDD / ENC1 GND) supply? (5VDC)

● Ground

- The power supply circuit of the FH sensor controller is insulated from the internal circuit.
- Be sure to use a base to install the camera connected with the FH Sensor Controller. Since the enclosure of the camera main body made of metals is short-circuited with the internal circuit, the internal circuit might be short-circuited with FG if no base is used, so that failures or malfunctions may be caused.
- Perform Class D-class grounding (with a grounding resistance of 100Ω or less).
- Keep the ground line as short as possible by setting the grounding point as close as possible.
- Ground the FH Sensor Controller independently. If sharing the ground line with other devices or connecting it with a building beam, the controller might be adversely effected.
- Check wiring again before turning on the Controller.

● Other

- Use only the camera and cables designed specifically for the product. Use of other products may result in malfunction or damage of the product.
- Always turn OFF the Controller's power before connecting or disconnecting a camera or cable. Connecting the cable with power supplied may result in damage of the camera or peripheral devices.
- For the cable that is flexed repeatedly, use the robotic cable type (flexing resistance type) to prevent damages.
- Do not apply torsion stress to the cable. It may damage the cable.
- Secure the minimum bending radius of the cable. Otherwise the cable may be damaged.
- Do not attempt to dismantle, repair, or modify the product.
- Should you notice any abnormalities, immediately stop use, turn OFF the power supply, and contact your OMRON representative.
- The FH Sensor Controller and camera case are hot while power is supplied or directly after the controller is turned off. Do not touch the case.
- Be sure to dispose of the product as industrial waste.

- Do not drop, impose excessive vibration or shock on the product. Doing so may result in malfunction or burning.
- Since a lithium battery is incorporated, there is a rare case when you are seriously injured due to firing or blowout.

Precautions for Correct Use

● Installation and Storage Sites

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

- Surrounding temperature of 0 to 50°C (–20 to +65°C in storage)
- No rapid changes in temperature (place where dew does not form)
- Relative humidity of between 35 to 85 %
- No presence of corrosive or flammable gases
- Place free of dust, salts and iron particles
- Place free of vibration and shock
- Place out of direct sunlight
- Place where it will not come into contact with water, oils or chemicals

● Orientation of Product

- To keep proper ventilation, install the main unit only the direction as Instruction sheet and manual so that the ventilation holes are not blocked.

● Ambient Temperature

- To keep proper air flow, keep the top of the Controller 50 mm or more apart from other devices. Install the controller with a clearance of 30 mm on the right, left side, and 15 mm for rear planes.
- Do not install the product immediately above significant heat sources, such as heaters, transformers, or large-capacity resistors.
- Do not let the ambient temperature exceed 50°C (122°F).
- Provide a forced-air fan cooling or air conditioning if the ambient temperature is near 50°C (122°F) so that the ambient temperature never exceeds 50°C (122°F).

● Noise Resistance

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

● Component Installation and Handling

- Touching Signal Lines
To prevent damage from static electricity, use a wrist strap or another device for preventing electrostatic discharges when touching terminals or signal lines in connectors.
- Handling a USB Memory/SD card
To remove a USB memory or SD card, make sure that data is not being read or written to it.
- For USB memory, the LED flashes while data is being read or written, so make sure that it is lit steadily before removing the memory.
- For SD card, the SD BUSY LED flashes while data is being read or written, so make sure that it is turned OFF before removing the memory.
- Turning OFF the Power
Do not turn OFF the power while a message is being displayed indicating that processing is being performed. Data in memory will be corrupted, and the product may not operate correctly the next time it is started.

● Maintenance

- Turn OFF the power and take safety precautions before conducting inspections. Electrical shock can result from attempting safety inspections with the power turned ON.
- Clean the lens with a lens-cleaning cloth or air brush.
- Lightly wipe off dirt with a soft cloth.
- Dirt on the CCD must be removed using an air brush.
- Do not use thinners or benzene.

● Communication with High-order Device

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

● Fail-Safe Measures

- If you wish to operate a stage and/or a robot using a measurement result from a sensor controller(e.g. axis movement amount output based on calibration/alignment measurement),always take safety measures so that the measurement result should be checked by the stage/robot if it is within the range of movement of the stage/robot before operation.
- On a sensor controller side, supplementarily use operations and branches of the sensor controller to configure a check flow such as “data should not be externally provided if the data is in a range from -XXXXX to XXXXX “ based on the stage/robot’s range of movement.

Before Operation

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

Overview.....	22
Flow of Application	25
Windows.....	27
Checking the System Configuration.....	38
Saving Settings before Turning OFF the Power and Restarting	43
Initializing the Controller	45

Overview

Basic Mechanism for Measurements

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

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

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

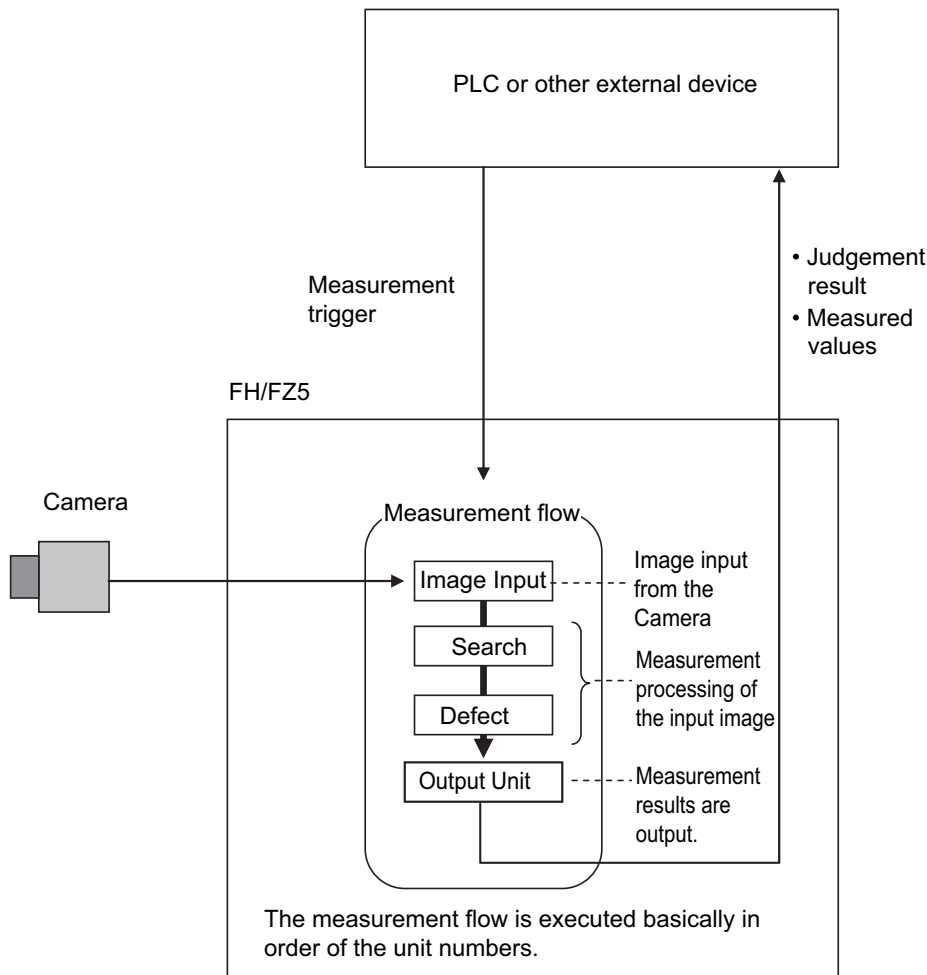
Note

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

Processing items and measurement flows can have more than one setting. You can switch the setting based on the scene to inspect. (Reference: ► Setting Scenes (Measurement Flows) (p.47))

Concept of Measurement Processing

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

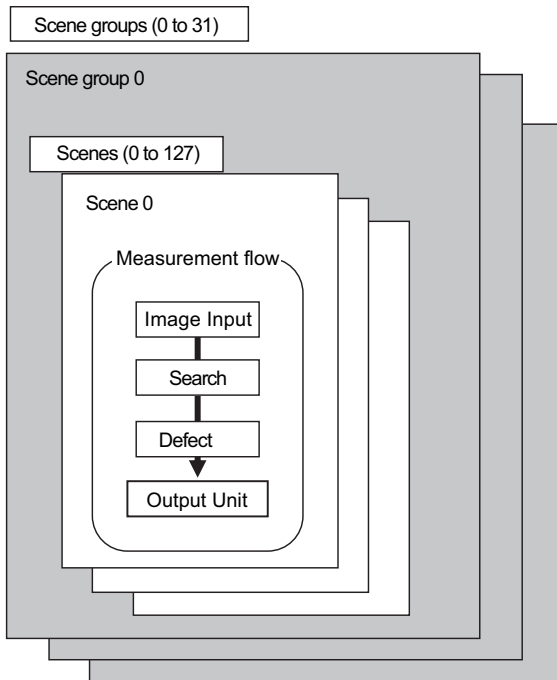


- In the measurement flow, you can change the processing to execute based on the inspection results or input conditions of the vision inspection.
- You can use macro processing to execute pre-packaged processing items and functions in the FH/FZ5 to create original programs. This allows you to create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

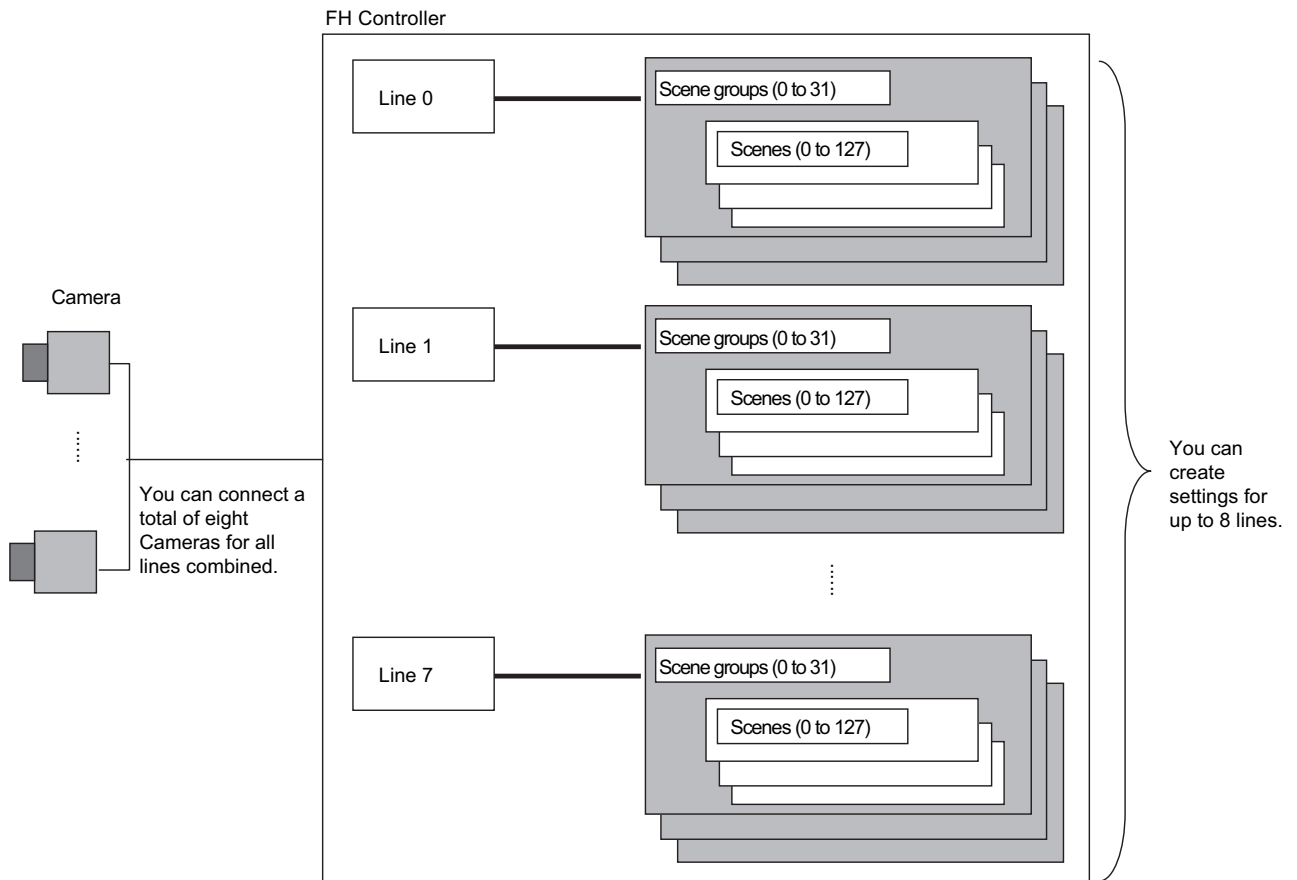
Support for a Variety of Scenes and Measurement Lines

You can have more than one setting for a measurement flow, depending on the inspections. This is called a scene and you can set up to 128 scenes. (Reference: ► What Is a Scene? (p.48))

You can also combine more than one scene into a scene group. Management of scenes by scene groups increases the number of scenes that you can handle. (Reference: ► What Is a Scene Group? (p.51))



If you have more than one measurement line, the FH allows you to selectively execute up to eight measurement lines. This allows you to maintain settings for the scenes and scene groups for every line from 0 to 7. You can connect up to eight Cameras to the FH, (four for the FZ5), and selectively control each Camera. (Reference: ► Multi-line Random-trigger Mode (p.194))



Flow of Application

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

Procedure	Description	Reference
Preparations	Installation and Wiring	FH Instruction Manual FZ5 Instruction Manual
	↓	
	Turning ON Power	FH Instruction Manual FZ5 Instruction Manual
	↓	
	Language Selection in Dialog Box (only when the Sensor Controller is started for the first time)	Reference: ► Selecting the Language: [Language Setting] (p.211)
	↓	
	Main Window (Layout 0) Display	Reference: ► Adjustment Windows and Run Windows (p.66)
	↓	
	Camera Adjustments (Display the settings dialog box for a Camera Image Input processing item.)	Reference: ► Preparing the Controller and Cameras (p.68)
	↓	
	Select [Tool] – [System settings], and then under [Startup setting], set the settings for [Basic], [Communication], and [Operation mode].	Reference: ► Changing the System Environment (p.185)
	↓	
	Click the [Data save] button, and then select [Function] – [System restart].	Reference: ► Saving Settings before Turning OFF the Power and Restarting (p.43) Reference: ► Loading Settings Data from the Controller RAM Disk or an External Memory Device to the Sensor Controller (p.183)
	↓	
Select [Tool] – [System settings], and then set the settings for [Camera], [Communication] and [Other].	Reference: ► Changing the System Environment (p.185)	
↓		
Click the [Data save] button, and then select [Function] – [System restart].	Reference: ► Saving Settings before Turning OFF the Power and Restarting (p.43) Reference: ► Loading Settings Data from the Controller RAM Disk or an External Memory Device to the Sensor Controller (p.183)	

Procedure	Description	Reference
	↓	
Scene Editing	In the Main Window (layout 0), edit the measurement flow. <ul style="list-style-type: none"> • Register processing items. • Set the properties for each processing item. 	Reference: ► Setting Scenes (Measurement Flows) (p.47)
	↓	
	↓	
Testing	Execute test measurements. (In the Main Window (layout 0), click the [Measure] button.)	Reference: ► Performing Test Measurement/Starting Operation (p.65)
	↓	
	Adjust the parameters for each processing item.	Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat. No. Z341)
	↓	
	↓	
Measuring (Operation)	In the Main Window (layout 0), click the [Switch layout] button, and then select [Main Window (Layout 1)].	Reference: ► Performing Test Measurement/Starting Operation (p.65)
	↓	
	In the Main Window (layout 1), check the communications with the PLC.	Vision System FH/FZ5 Series User's Manual for Communications Settings (Cat. No. Z342)
	↓	
	↓	
Management and Analysis	In the Main Window (layout 1), execute commands from the PLC, such as measurement trigger commands.	Vision System FH/FZ5 Series User's Manual for Communications Settings (Cat. No. Z342)
	↓	
	↓	
Management and Analysis	Save and analyze measurement data and images.	Reference: ► Useful Functions for Operation (p.105) Reference: ► Using Tools (p.127)

Types of Windows

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

Layout	Application
Layout 0	Layout 0 is the adjustment window by default. (Reference: ► Main Window (Layout 0): Adjustment Window (Default) (p.66))
Layout 1	Layout 1 is a run window by default. (Reference: ► Main Window (Layout 1): Run Window (Default) (p.67))
Layout 2 to layout 8	Layouts 2 to 8 are for user-defined purposes and are created as they are needed. (Reference: ► Arranging the Window Display (p.88)) For example, if more than one line is being controlled, you can set and use a separate window for each line. (Reference: ► Multi-line Random-trigger Mode (p.194))

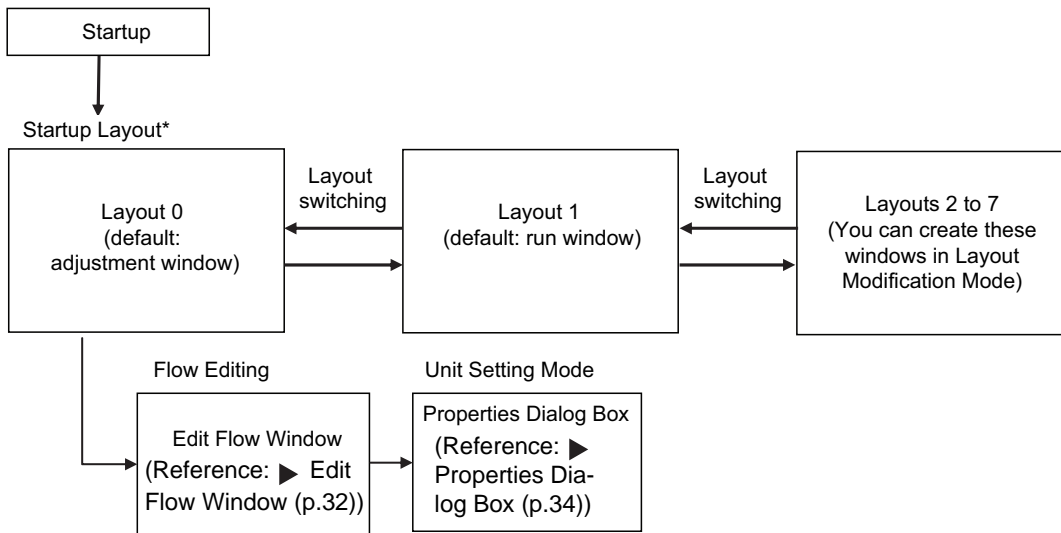
Note

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

IMPORTANT

If the operation mode is set to Multi-line Random-trigger Mode, you must create a layout for each line. (Reference: ► Multi-line Random-trigger Mode (p.194))

Overview of Window Navigation



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

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

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

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

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

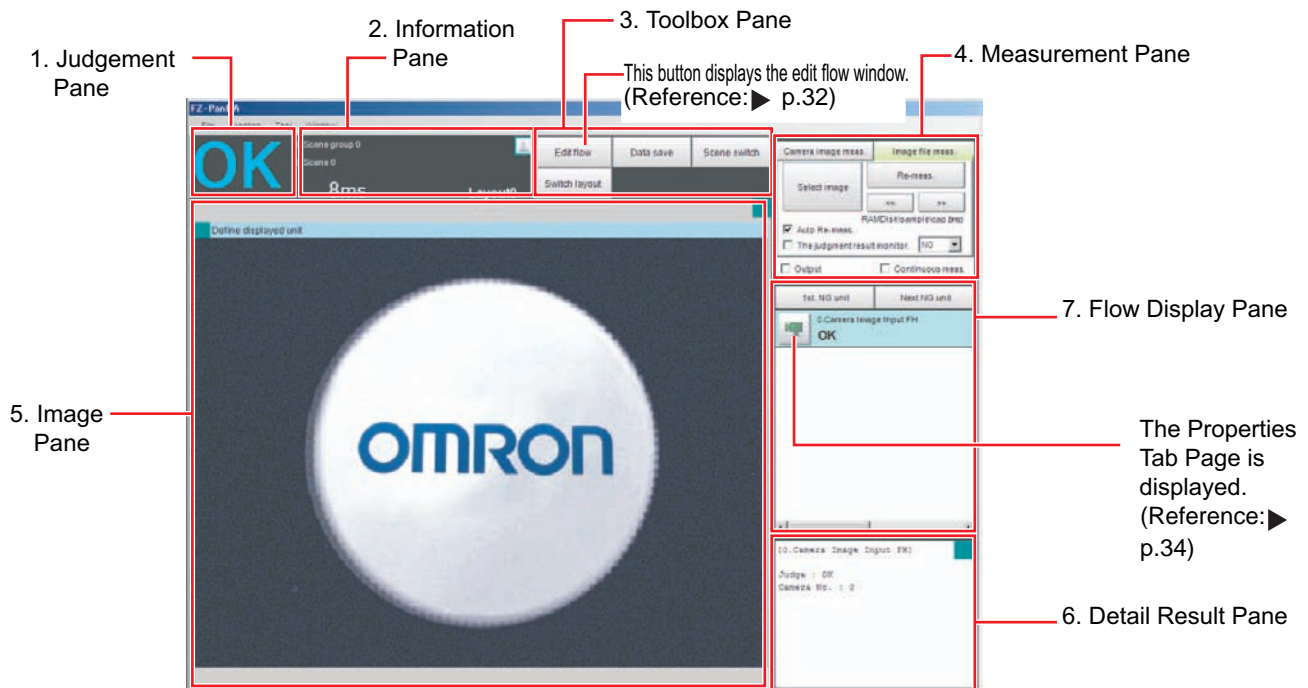
You can manually execute or stop test measurements.

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

Note

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

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



1. Judgement Pane

- **Overall Judgement Result**

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

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

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

2. Information Pane

- **Layout:**
The number of the currently display layout is displayed.
- **Processing time:**
The time required for the measurement process is displayed.
- **Transaction time:**
The time from when the measurement trigger was input until the image was input or the measurement ends is displayed. This is equivalent to the time that "Measuring" is displayed.
- **Scene group name and scene name:**
The scene group number and the scene number of the currently displayed scene are displayed.

3. Toolbox Pane

- **[Edit flow]:**
This button starts the edit flow window that is used to edit flows. (Reference: ► Edit Flow Window (p.32))
- **[Data save]:**
This saves settings data to the flash memory in the Controller. If you make any changes to the settings, make sure to click this button to save the settings.
- **[Switch scene]:**
This button switches between scene groups and scenes:
- **[Switch layout]:**
This button switches the layout number.

4. Measurement Pane

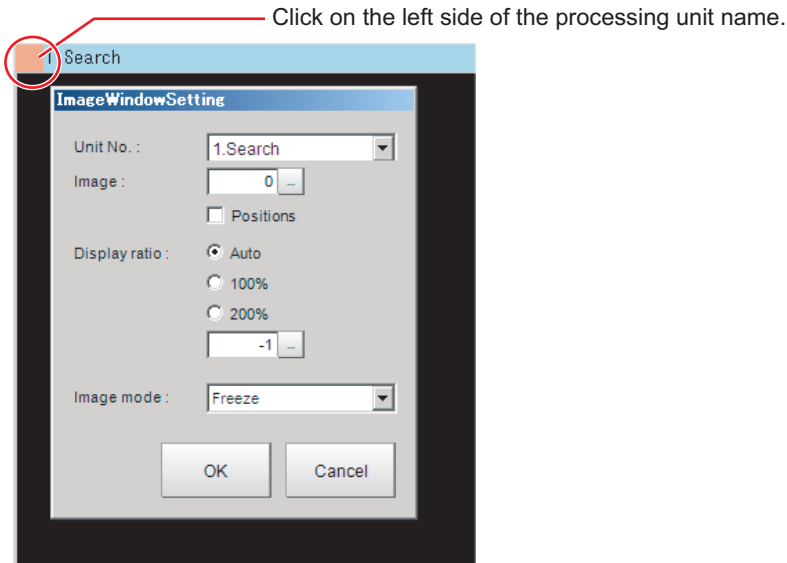
- **Camera image meas.:**
This button performs a test measurement on the Camera image.
- **Image file meas.:**
This button re-measures saved images.
- **Output:**
Select this option to output the measurement results of test measurements that are performed in the Adjustment Window. Do not select this option if you need to perform test measurements on the Sensor Controller but do not need to output the results externally.
This setting menu is used for temporary setting changes while the Main Window is displayed. When the scene or layout is changed, the "Output" setting in the Layout setup is applied without saving the "Output" setting in the Measurement Pane. Use as appropriate for your application.
(Reference: ► Setting the Behavior of Output Signals for Each Layout (Layout Settings) (p.86))
- **Continuous meas.:**
Select this option to continuously perform test measurements in the Adjustment Window.
Select the [Continuous meas.] option and click [Measure] to repeatedly execute measurements.

5. Image Pane

This pane shows the measured image.

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

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



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

(Reference: ► Changing the Image Mode and Other Display Contents (p.88))

- Click the upper corner of the Image Display Pane to display the [Add Image Window] button and [Alignment] button. This allows you to display more than one pane side by side. (Reference: ► Arranging Window Elements (Layout Modification) (p.74))

6. Detail Result Pane

This pane displays the results of test measurements.

7. Flow Display Pane

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

Click the icon of any processing item to display the Properties Dialog Box to set processing item parameters and other settings. (Reference: ► Properties Dialog Box (p.34))

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

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

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

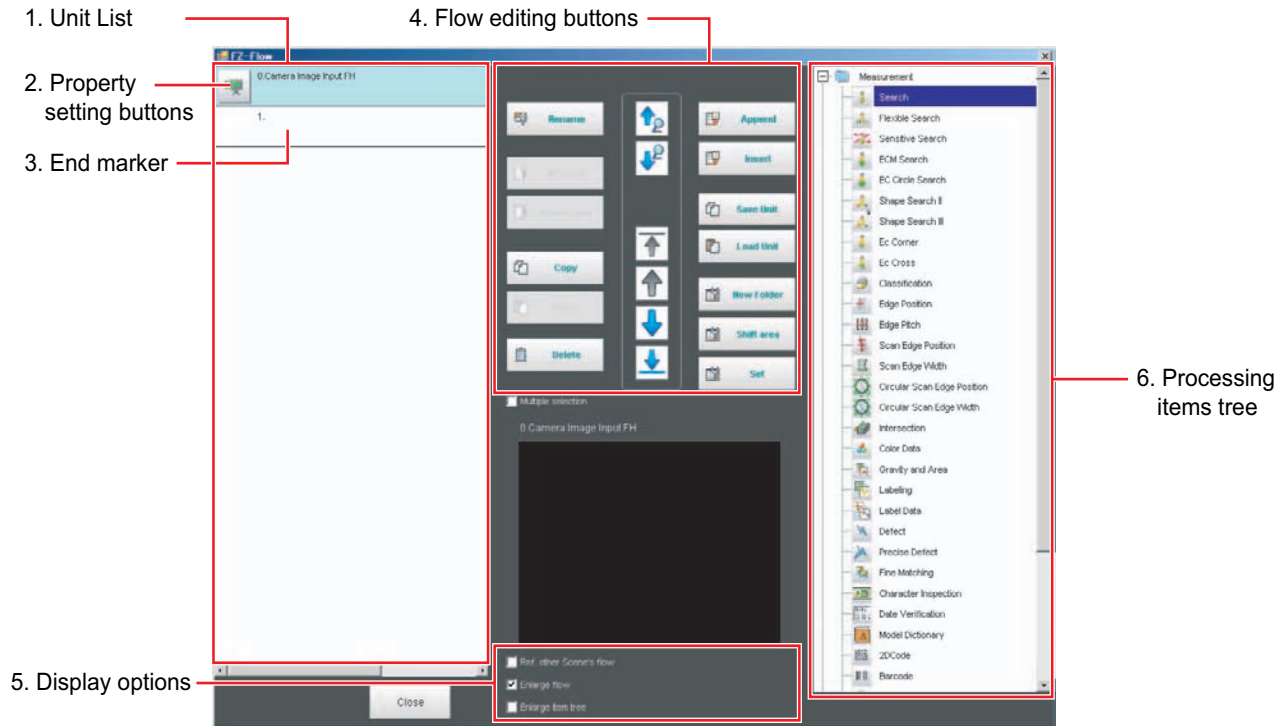
Edit Flow Window

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

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

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

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



1. Unit List

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

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

2. Property Setting Buttons

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

3. End Marker

This marker indicates the end of the flow.

4. Flow Editing Buttons

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

(Reference: ► Editing Processing Units in Scenes (p.53))

5. Display Options

- **Enlarge flow**

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

- **Enlarge item tree**

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

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

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

6. Processing Items Tree

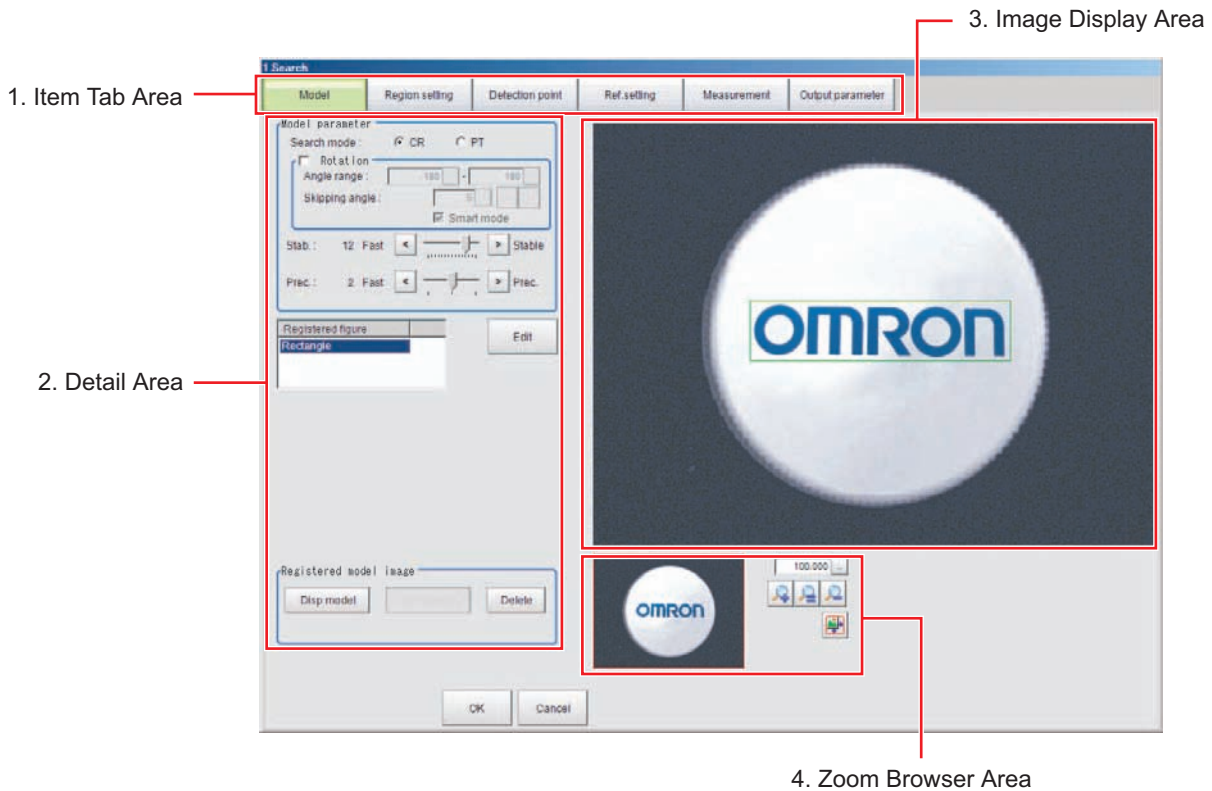
This area allows you to select an item to add to the flow. The items are displayed in tree format that is organized by type.

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

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

Properties Dialog Box

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



1. Item Tab Area

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

2. Detail Area

This area is used to set detail items.

3. Image Display Area

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

4. Zoom Browser Area

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

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

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

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

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

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

Note

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

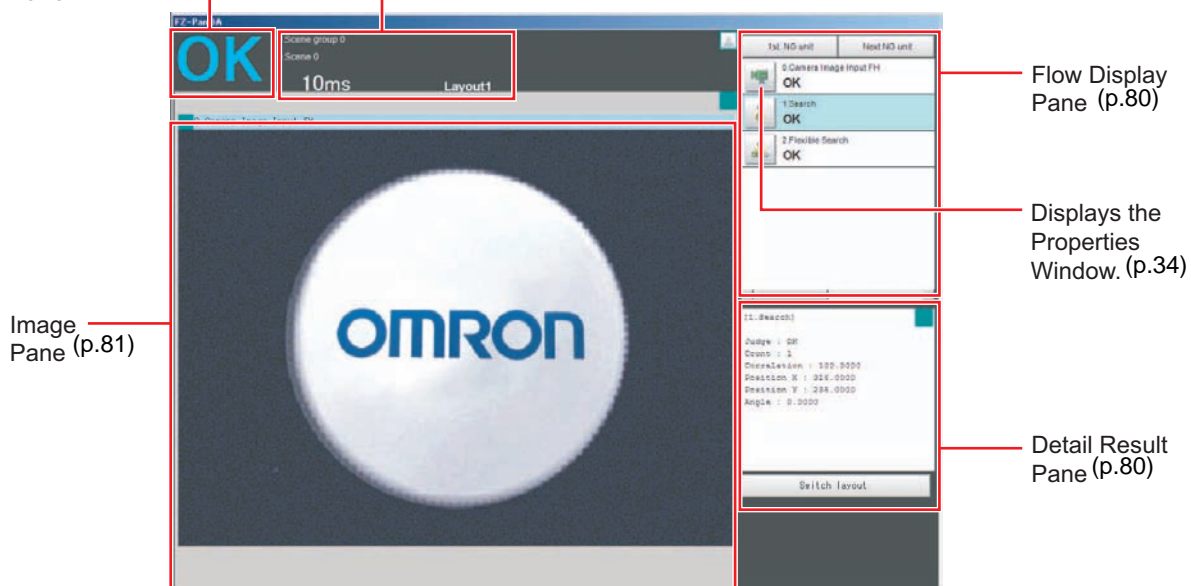
Names of the Parts of the Main Window (Layout 1): Run Window (Default)

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

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

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

Judgement Pane (p.79) Information Pane (p.79)



Menu List

The menu for the Main Window is described below.

Main menu	Command	Description	Reference
File	End	Exits the FH/FZ5 System. After you exit the system, restart the system or turn OFF the power supply.	---
Function	Measure	Executes a test measurement (single or continuous measurement), or a re-measurement.	Reference: ► Executing Test Measurements (p.70) Reference: ► Remeasuring Saved Images (p.105)
	Scene switch	This button switches between scene groups and scenes:	Reference: ► Changing the Scene or Scene Group (p.59)
	Scene maintenance	Used to copy, delete, and rename scenes and scene groups.	Reference: ► Editing Scenes (p.61) Reference: ► Editing Scene Groups (p.63)
	Edit flow	Used to edit measurement flows.	Reference: ► Editing Processing Units in Scenes (p.53)
	Switch layout	Changes the layout number to display.	Reference: ► Arranging Window Elements (Layout Modification) (p.74)
	Clear measurement	Clears the measurement data.	Reference: ► Clearing Measurement Results (p.118)
	Clear logging image	Clears the images that are logged in the Controller.	Reference: ► Clearing Saved Images (p.119)
	Screen capture	Captures the screen that is being displayed.	Reference: ► Capturing Screen Images (p.119)
	Saving last logging image	Logs the most recent input images that are being displayed.	Reference: ► Logging Measurement Values and Measurement Images (p.109)
	Data save	Saves settings data to the flash memory in the FH/FZ5.	Reference: ► Saving Settings before Turning OFF the Power and Restarting (p.43) Reference: ► Saving and Loading Data (p.175)
	Save to file	Saves the settings data, logged images, and logged data to a file. It also copies files between memory devices.	Reference: ► Saving and Loading Data (p.175)
	Load from file	Loads a settings file.	
	System initialization	Restores the Controller to the default settings.	Reference: ► Initializing the Controller (p.45)
	System restart	Restarts the Controller.	Reference: ► Saving Settings before Turning OFF the Power and Restarting (p.43) Reference: ► Saving and Loading Data (p.175)

Main menu	Command	Description	Reference
Function	Transfer data	Transfers (copies) the settings for line 0 to line 1, and then changes to the Non-stop Adjustment Mode.	Reference: ► Non-stop Adjustment Mode (p.199)
	Non-stop data transfer	Transfers (copies) the settings for line 1 to line 0 in Non-stop Adjustment Mode without affecting measurements.	
	Operation log	Saves the operation log of the Controller to a special file.	Reference: ► Using the Operation Log (p.121)
	System information	Displays the Controller's model and software version.	Reference: ► Checking System Information: [System Information] (p.219)
Tool	NG analyzer	Used to analyze NG causes based on image data.	Reference: ► Using NG Analyzer (p.128)
	System settings	Sets settings that are related to the system environment of the Controller. Includes settings such as the startup settings, Camera settings, and communications settings.	Reference: ► Changing the System Environment (p.185)
	Security settings	Used to set accounts and limit access to the Controller.	Reference: ► Using Accounts (p.147)
	User data tool	Sets the initial value for user data that can be shared across scenes and across scene groups.	Reference: ► Using the User Data Tool (p.135)
	Settings download and upload tools	Used to download and upload a list of set values for scene data as a CSV file.	Reference: ► Outputting a List of Scene Data Set Values (p.140)
	Image file save	Saves logged images and image files that are saved in the Controller.	Reference: ► Saving Image Files to a RAM Disk or External Memory Device (p.143)
	Registered image Manager	Used to register the most recent input image, a logged image that is saved in the Controller, or an image file and load it as a measurement image.	Reference: ► Using the Registered Image Manager (p.145)
	Customize I/O command	Creates a user-defined communications unit (i.e., a custom communications command) for the FH/FZ5 to execute in response to an input from the PLC or other external device.	Reference: ► Using Customer Communications Commands (p.161)
	Flow Viewer	Shows the flow of processing for the measurement flow that is currently being edited.	Reference: ► Flow Viewer (p.172)
	Calibration support tool	Graphically displays the relationship of the positions of the Camera coordinates and the actual coordinates.	Reference: ► Calibration Support Tool (p.174)
	Update standard position tool	Used to set or change the reference position for more than one processing unit that you specify in the measurement flow.	Reference: ► Updating the Reference Position (p.133)
	Conversion scene group data tool	Creates a scene group that has more than 129 scenes.	Reference: ► Creating Scene Group Data for More Than 128 Scenes (p.137)
	Custom dialog tool	Used to create customized dialog boxes for setting processing items.	Reference: ► Custom Dialogs (p.90)
Custom dialog	Displays a dialog box that is created with the custom dialog tool.		
Window	Layout modification	Used to change any layout from layout 0 to layout 8.	Reference: ► Arranging the Window Display (p.88)
	Layout setup	Sets whether to use the RUN signal output and external outputs for layouts 0 to 8.	

Checking the System Configuration

System Configuration

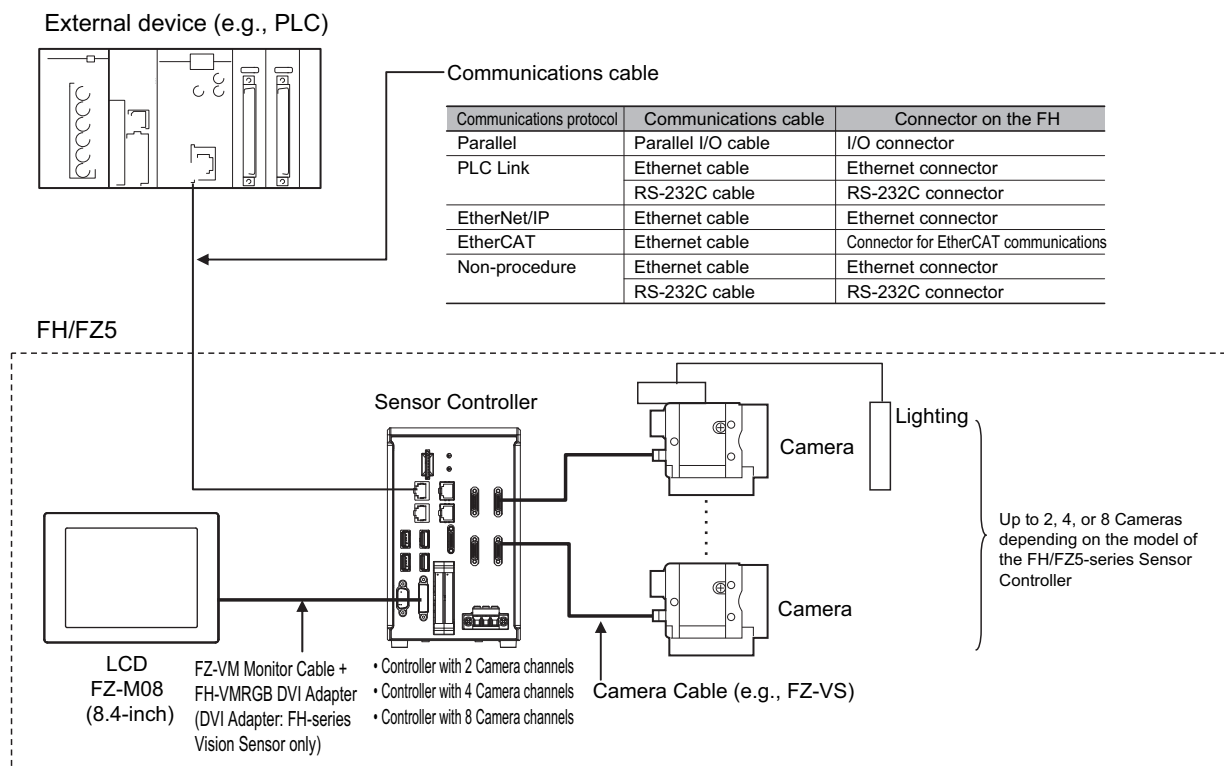
The FH/FZ5 is a Vision Sensor that uses a controller to process measurements of objects that are imaged with a Camera.

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

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

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

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

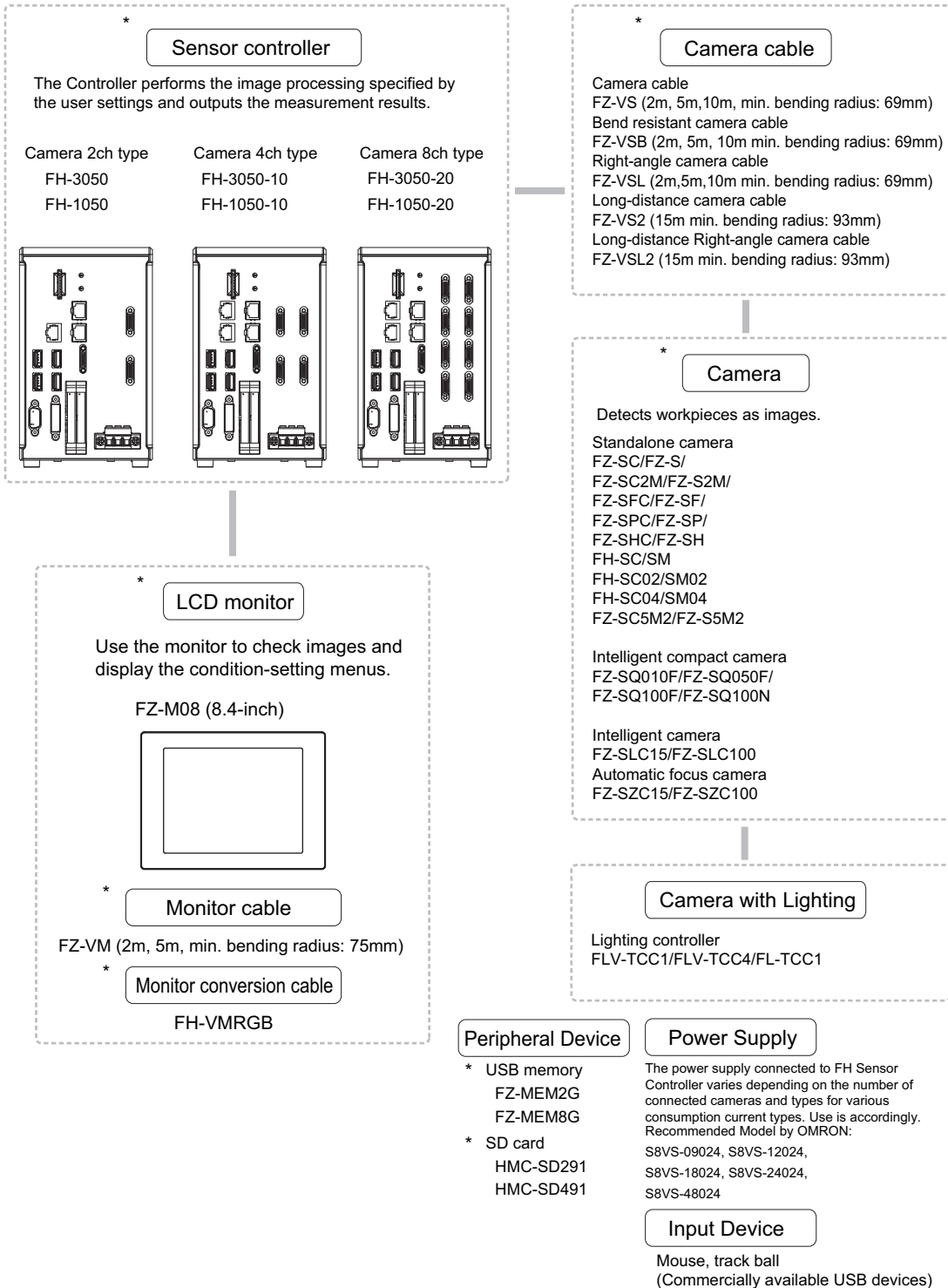


*1. FZ-MEM2G or FZ-MEM8G USB Memory is sold separately.

Basic Configuration Models

FH Basic Configuration

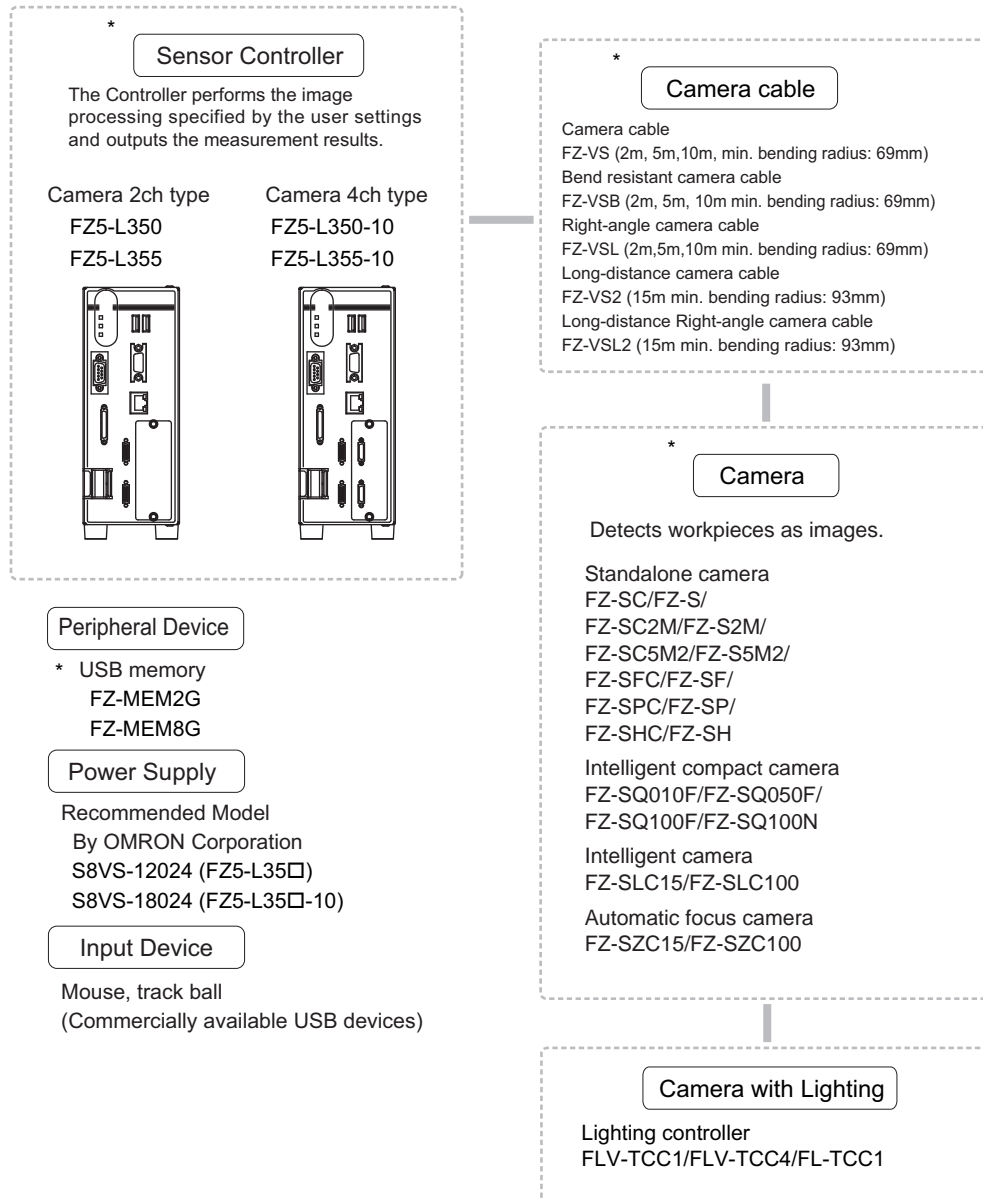
* Items indicated with an asterisk are dedicated items, and cannot be substituted.



FZ5 Basic Configuration

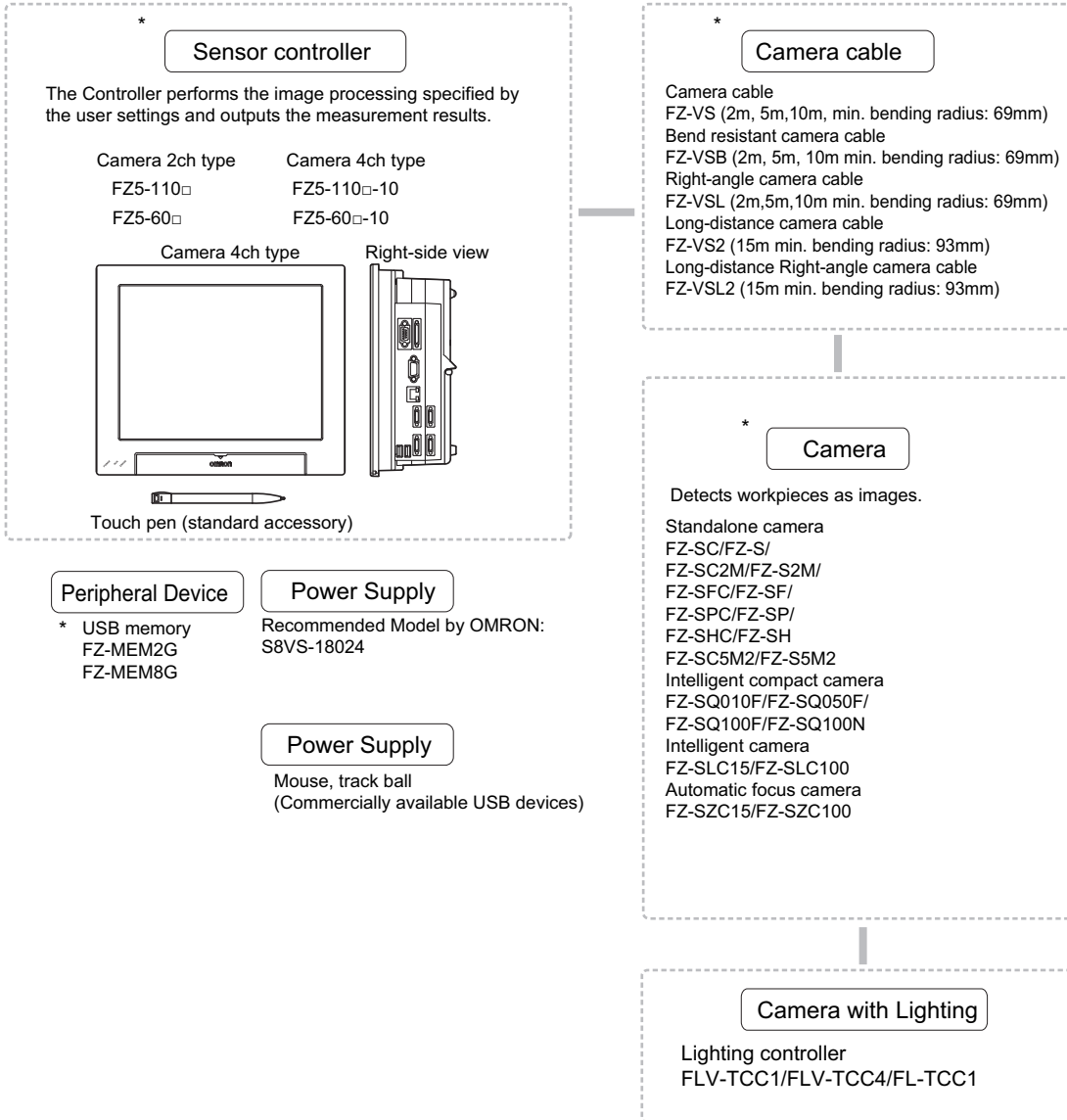
FZ5-L35□

* Items indicated with an asterisk are dedicated items, and cannot be substituted.



FZ5-6□□/11□□

* Items indicated with an asterisk are dedicated items, and cannot be substituted.



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

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

Controller model Function	FH Series			FZ5 Series			
	FH-□050-20	FH-□050-10	FH-□050	FZ5-L35□-10 FZ5-6□□-10	FZ5-L35□ FZ5-6□□	FZ5-11□□-10	FZ5-11□□
Number of Camera connections	8	4	2	4	2	4	2
Operation mode ^{*1}	OK			---		OK	
Number of scenes (number of line process changes)	128 ^{*2}			128 ^{*2}			
Input interface							
EtherCAT	OK			---			
External memory							
USB memory	OK			OK			
SD memory card	OK			---			
Sysmac Studio support	OK			---			
Menu languages	Japanese, English, Simplified Chinese, Traditional Chinese, Korean, German, French, Spanish, and Italian			Japanese, English, Simplified Chinese, and Traditional Chinese ^{*3}		Japanese, English, Simplified Chinese, Traditional Chinese, Korean, German, French, Spanish, and Italian	

*1: With the four-core CPU that is installed, you can set different operation modes to meet different applications.
Reference: ► Setting the Operation Mode (p.190)

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

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

Saving Settings before Turning OFF the Power and Restarting

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

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

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



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

Note

- **Data That Is Saved**
Scene data and system data are saved in the Controller. Logged images and data that are saved in the RAM disk are not saved. Perform any of the following procedures to keep this data.
 - **Copying Data Saved in the RAM disk to External Memory**
Reference: ► Saving Settings Data to the Controller RAM Disk or an External Memory Device (p.180)
 - **Changing the Save Destination for Logged Data to External Memory**
Reference: ► Logging Measurement Values and Measurement Images (p.109)
- **Using the Scene Group Function**
The scene data that is set for scene group 0 is saved in the Controller for models FZ5-L3□□ and FZ5-6□□. The scene data from scene groups 1 to 31 is saved to the external memory and overwrites any previously saved data. (For the FH or FZ5-11□□, all data is saved in the Controller.)

Restarting the Controller: [System Restart]

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

Reference: ► Saving Settings Data to the Flash Memory and Restarting (p.179)

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

The [System restart] dialog box is displayed.

- 2 Click [OK].**

The Controller is restarted.

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

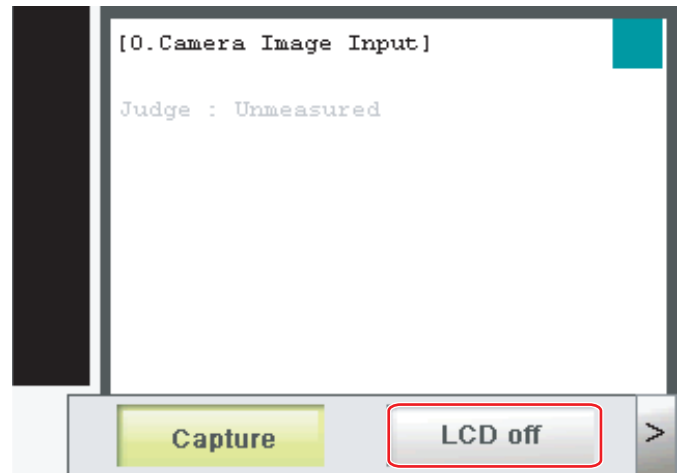
Turning OFF the LCD

(This function is supported only by the FZ5-600/1100-series LCD-integrated Controllers.)

You can turn OFF the LCD without turning OFF the Controller.

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

A confirmation message is displayed.



- 2** Click [OK].

Power to the LCD is turned OFF.

Restoring Power to the LCD

(This function is supported only by the FZ5-600/1100-series LCD-integrated Controllers.)

Click the bottom edge of the LCD.

After a while, the LCD power will turn ON.

Initializing the Controller

You can restore all settings in the Controller to their default settings.

Initializing the Controller: [System initialization]

You can restore the Controller to the default settings. Before you initialize the Controller, back up any required data, such as scene data and system data.

Reference: ► Saving and Loading Data (p.175)

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

The [System initialization] dialog box is displayed.

2 Click [Execute].

A confirmation dialog box is displayed.

3 Click [Yes].

The Controller is initialized and restarted.

Setting Scenes (Measurement Flows)

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

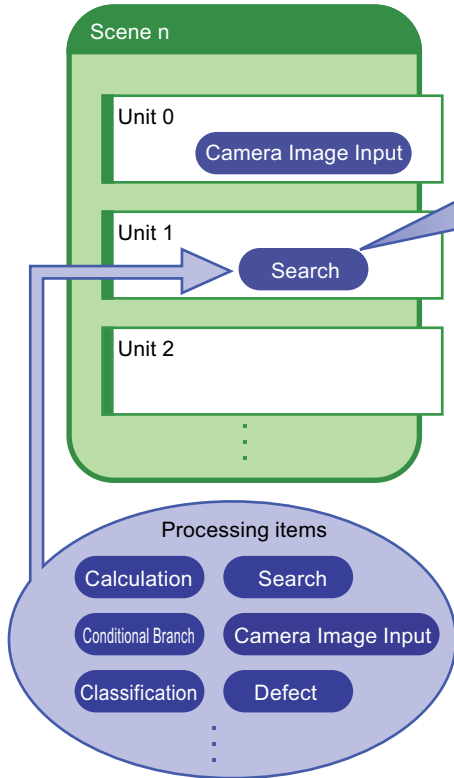
What Is a Scene?	48
What Is a Scene Group?	51
Creating a Scene	52
Editing Processing Units in Scenes	53
Displaying and Checking Processing Branches in a Scene.....	55
Changing the Scene or Scene Group.....	59
Editing Scenes.....	61
Editing Scene Groups	63

What Is a Scene?

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

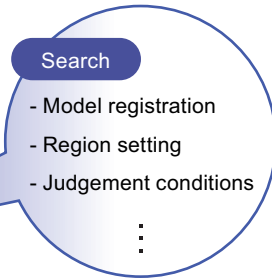
Editing Scenes

Set a processing item for each unit in the flow.



Editing Units

Set the conditions for each unit that forms the flow.



Operations Possible for Units

- Edit the conditions for each processing item.

Operations Possible for Scenes

- Editing scenes
 - Adding or deleting units
 - Moving units
 - Renaming units
- Deleting scenes
- Renaming scenes
- Changing scenes

Changing Processes Using Scenes

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

Reference: ► Changing the Scene or Scene Group (p.59)

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

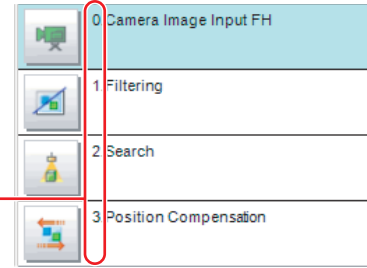
The Using the Conversion Scene Group Data Tool (p.137) allows you to create a scene group that has more than 129 scenes.

Reference: ► What Is a Scene Group? (p.51)

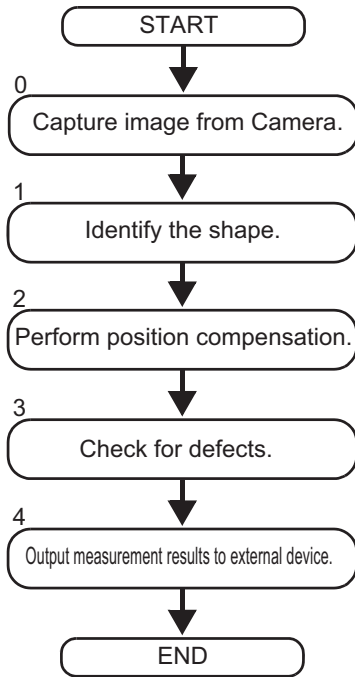
Example of a Scene

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

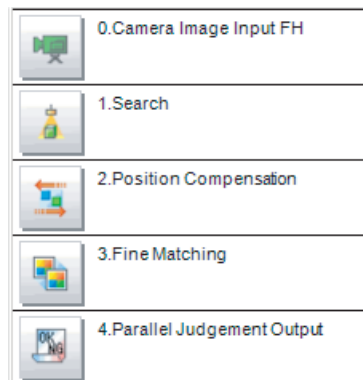
Processing unit numbers



Example: Normal Measurement



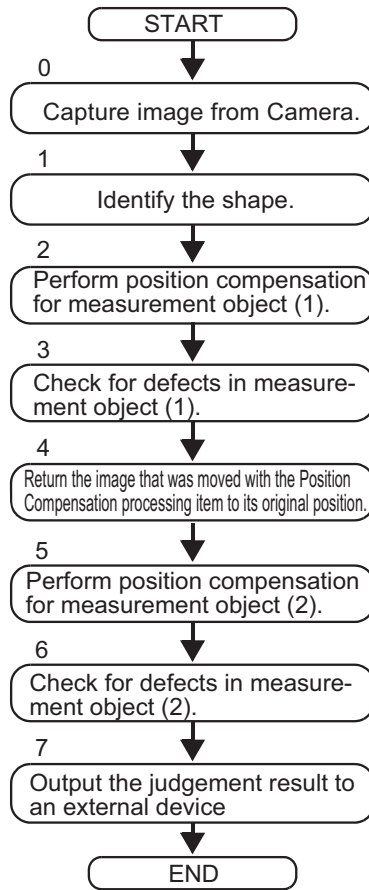
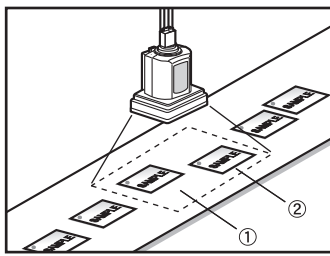
Visual Representation



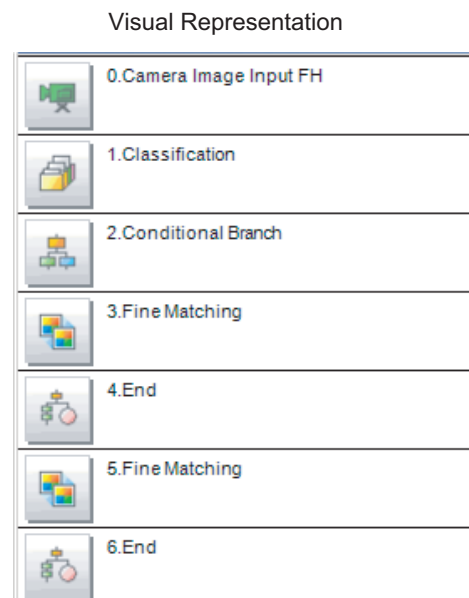
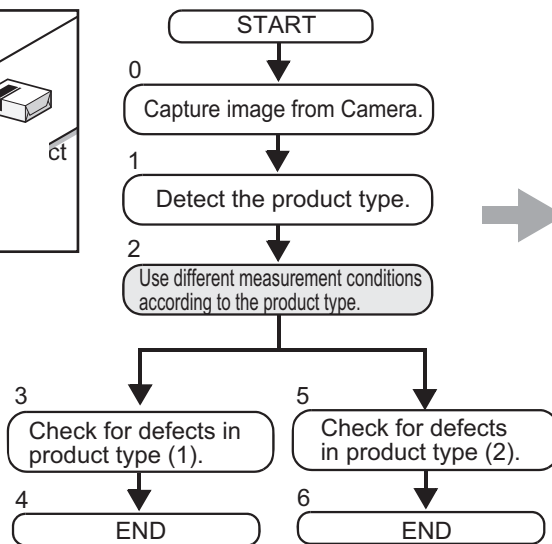
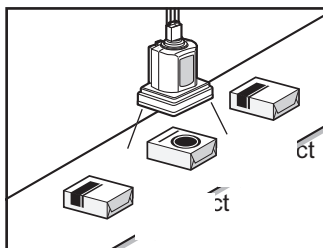
Note

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

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



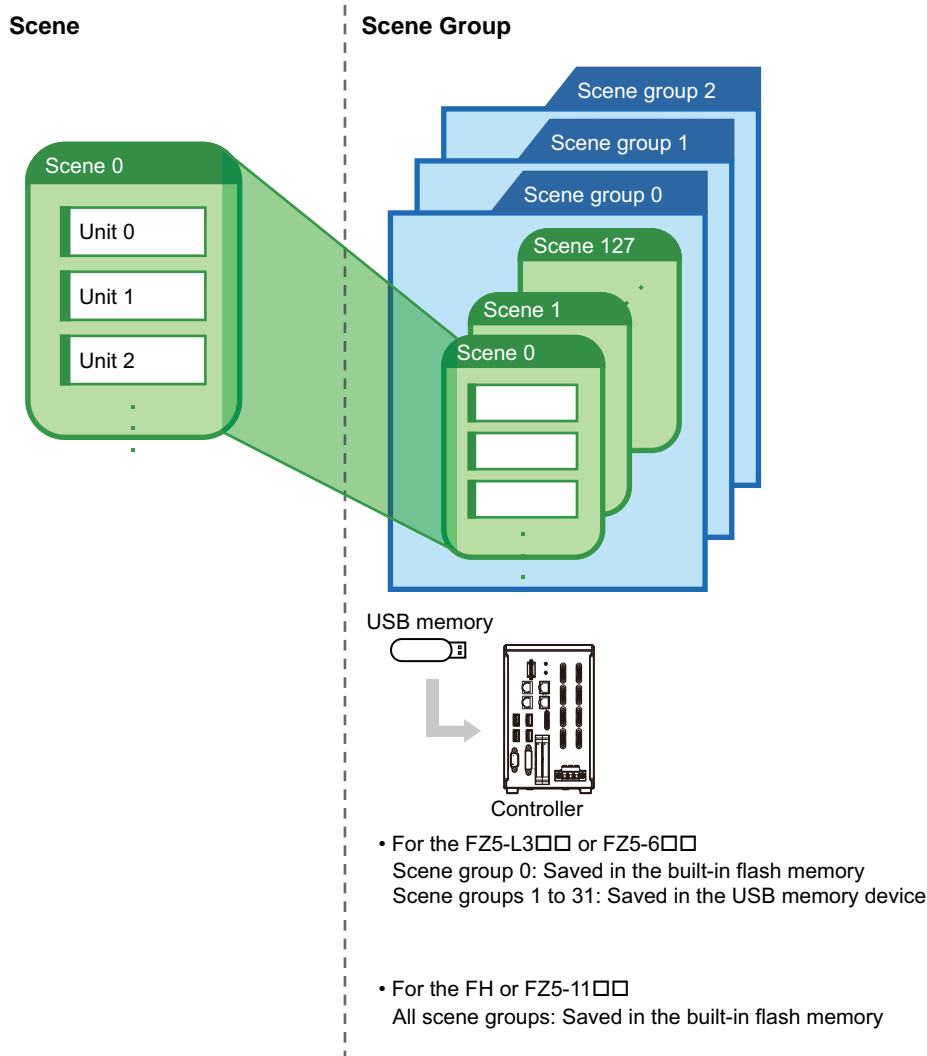
Example: Determining the Product Type from the Image and Branching Later Inspection Conditions According to the Product Type (Branch Processing)



What Is a Scene Group?

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

For the FZ5-L3□□ or FZ5-6□□, a USB memory is required to create scene groups. Scene group 0 is saved in the Controller, while scene groups 1 to 31 are saved in USB memory. (For the FH or FZ5-11□□, all data is saved in the Controller.)



Note

- Up to 128 scenes can be handled as one scene group, and up to 32 scene groups can be set. You can therefore use 128 scenes × 32 scene groups, or 4,096 scenes.
- For the FZ5-L3□□ and FZ5-6□□, the drive name of the USB memory device must be named “USBdisk” for it to be used as the destination for scene groups 1 to 31. The names “USBdisk2” to “USBdisk4” cannot be used for saving. When other USB memory devices are already inserted for the USB disk, perform operations only after removing all USB memory devices other than the one in which the scene group data is stored.
- If the external memory capacity is insufficient for the data size, 4,096 scenes cannot be set. The scene data size depends on the settings.
- The data size that can be set (available data memory) can be checked from the system menu.
Reference: ► Checking System Information: [System Information] (p.219)

Creating a Scene

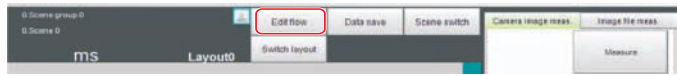
This section explains how to add processing units to a scene.

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

Reference: ► Changing the Scene or Scene Group (p.59)

2 Click the [Edit flow] button.

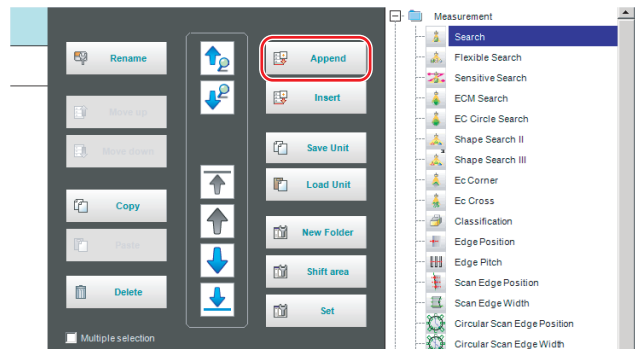
The edit flow window is displayed.



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

4 Click the [Append] button.

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



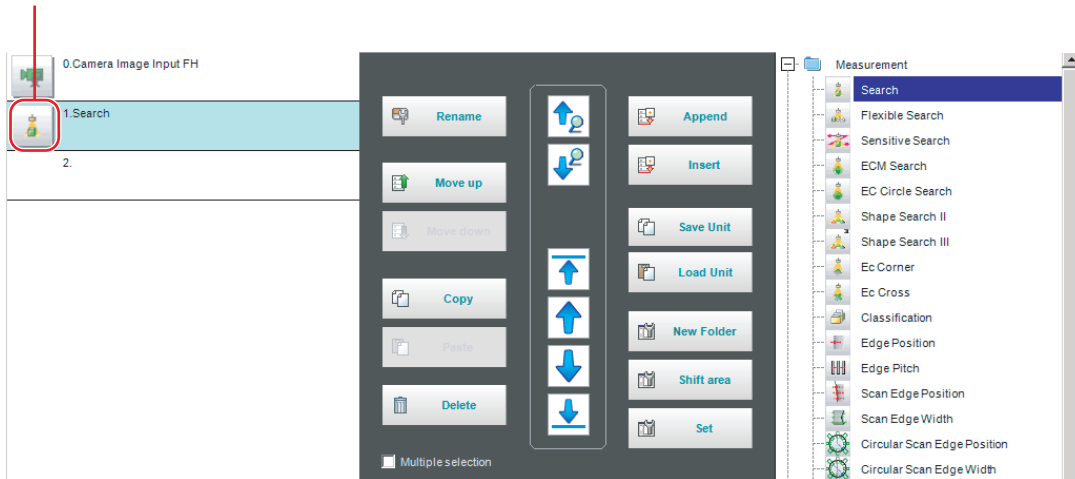
5 Add another processing unit if necessary. Repeat the steps after 3.

Note

- Limitations on Settings
The number of image input processing items that can be used is limited.
Reference: ► About Limits on the Number of Image Input Processing Items Used (p.573)

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

Property setting buttons



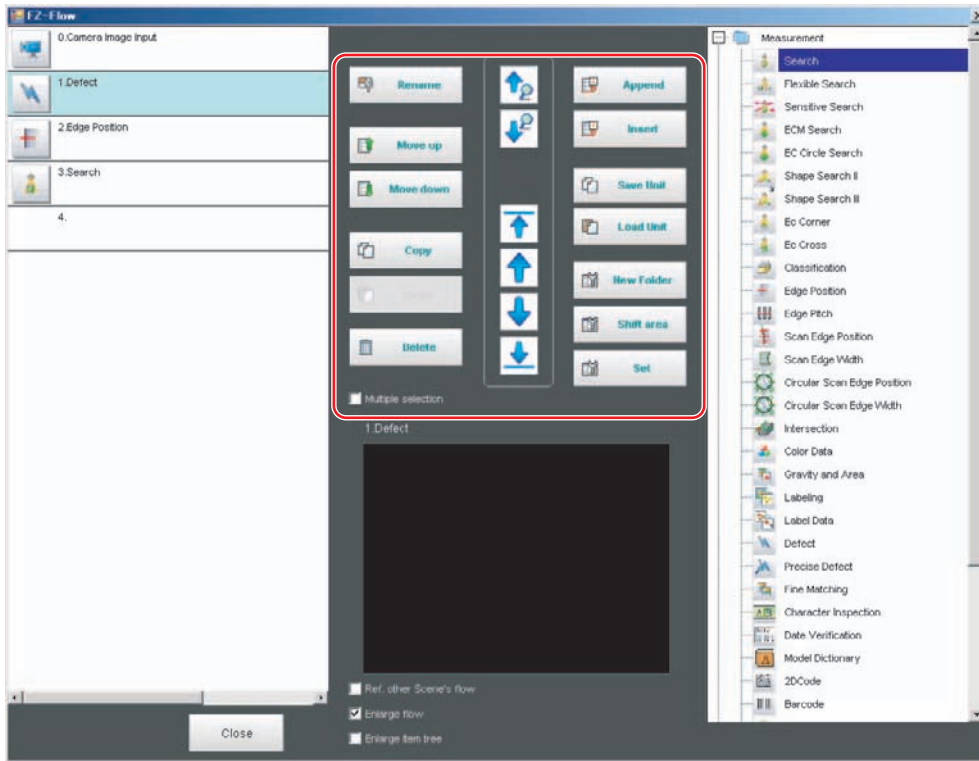
The Properties Tab Page is displayed. Set detailed conditions. The displayed contents depend on the processing item.

7 Set the conditions.

The displayed contents depend on the processing item.

Editing Processing Units in Scenes

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




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

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

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

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

Sets the properties of a processing unit in the scene.

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

Changes the related figure data in one batch.

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

Used when multiple processing units are managed as a group.

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

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



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

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

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



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 clicked after pasting a processing unit, continued pasting of the processing item cannot be performed.
- If a processing unit is deleted, the numbers for the subsequent processing units decrease by one. With processing items related to results output or branch control, the numbers for processing units set as references also automatically decrease by one.
- To hide a specific processing unit in the flow on an adjustment window or run window, insert a "*" (single byte) at the beginning of the processing unit name.
- The number of units that can be set in a flow depends on the available data memory.
With the FH or FZ5-11□□, a warning message is displayed when the amount of available application memory falls below 1 GB. Adjust the inspection flow so that the available memory is more than 1 GB.
Reference: ► Checking System Information: [System Information] (p.219)

Displaying and Checking Processing Branches in a Scene

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

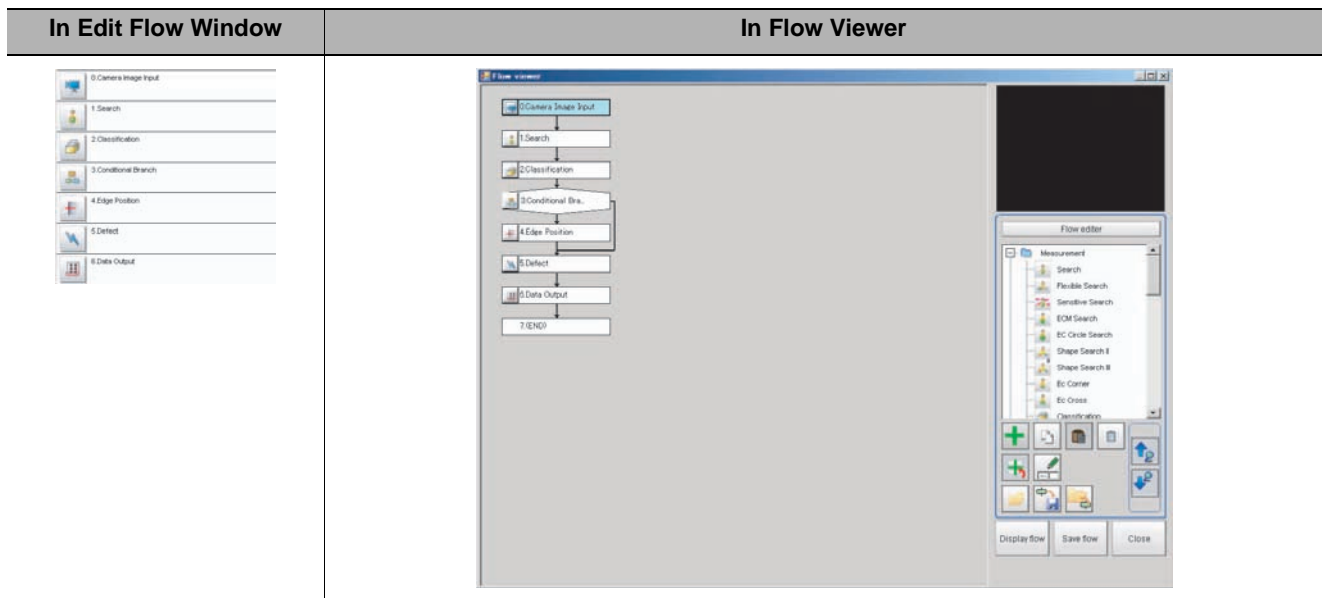
Select [Flow Viewer] from the [Tool] menu.

Overview

The Flow Viewer shows the flow of processing for the measurement flow that is currently being edited. This makes it easy to understand the relationship of branches and folders in the measurement flow. The Flow Viewer allows you to edit the measurement flow, and also allows you to edit, rename, and save processing units in the same way as with the edit flow window.

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

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



Window Configuration

The window configuration for the Flow Viewer is shown below.

Flow Builder View

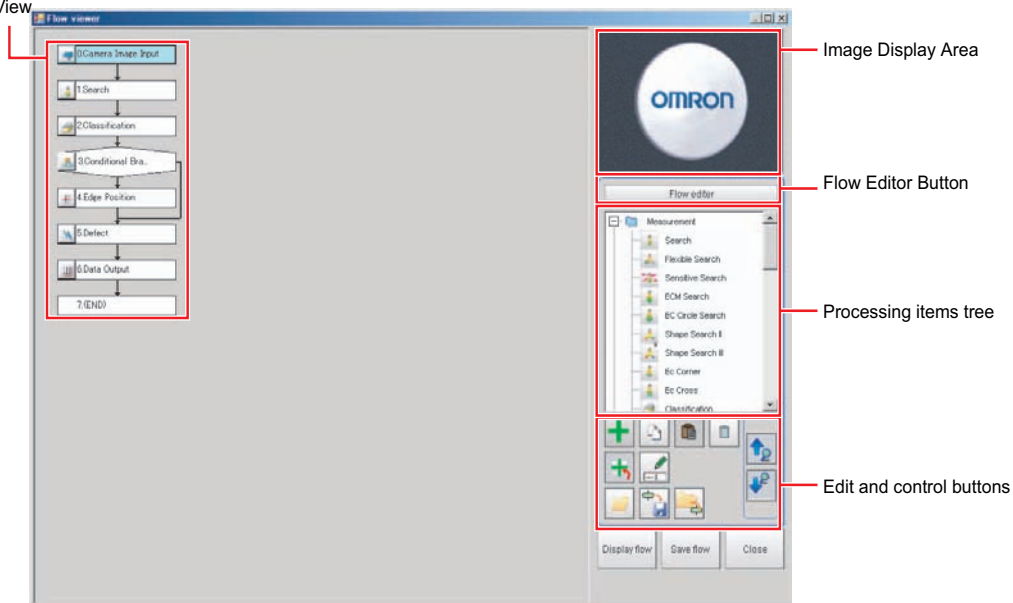


Image Display Area

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

Flow Editor Button

This button starts the edit flow window.

Tree of Processing Items

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

Flow Editing Functions

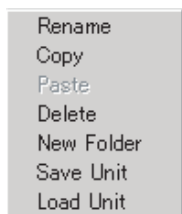
Repositioning a Unit within a Flow

On the Flow Builder, drag the unit to the desired position.

To insert a unit before another unit, drag it onto the desired unit.

Right-click Menu

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



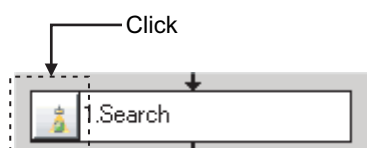
The menu commands perform the same operations as the Edit and Control Buttons.

Edit and Control Buttons

Icon button	Function	Description	Icon button	Function	Description
	Add to End of Flow	Adds the selected item in the item tree to the end of the flow as a new unit.		Save Unit	Saves the settings for the selected unit in the flow to a file (with the extension .unit).
	Add before Current Unit	Adds the selected item in the item tree to the position directly before the selected unit in the flow as a new unit.		Load Unit	Loads the settings for a processing unit from a file (extension .unit) and places it directly before the selected unit in the flow.
	New Folder	Creates a folder directly before the selected unit in the flow. Drag units to edit the contents of the folder.		Search Up	Searches for the selected item in the item tree upward from the selected position in the flow.
	Copy	Copies the selected unit in the flow.		Search Down	Searches for the selected item on the item tree in the downward direction from the selected position in the flow.
	Paste	Pastes the copied unit to the position directly before the selected unit in the flow.		Display Entire Flow	Displays the entire flow in the center of the view. The [Save] button outputs the same image as the [Save flow] button.
	Delete	Deletes the selected unit from the flow.		Save Flow Image	Outputs the entire flow as an image file (extension .jpg).
	Rename	Renames the selected unit in the flow.		Exit Flow Viewer	Closes the Flow Viewer.

Changing the Properties of Units in a Flow

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

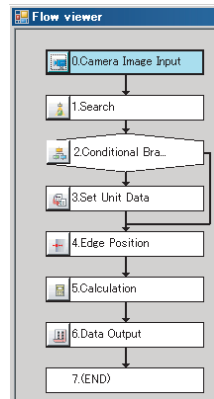


Examples of Branch and Folder Views

Examples:

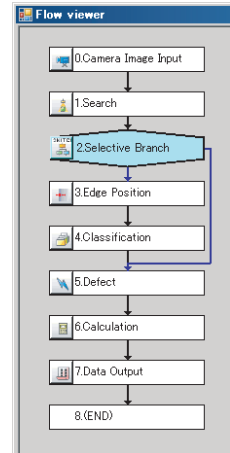
Edit Flow Window

Conditional Branch View

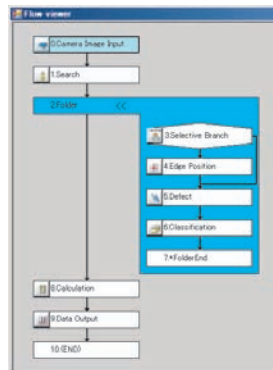
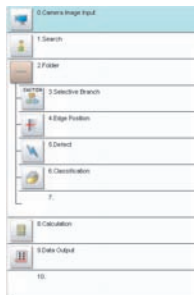


Edit Flow Window

Selective Branch



Folder View



Changing the Scene or Scene Group

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

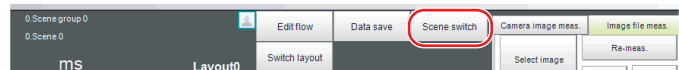
Also, if you use scene groups, you can set up to 4,096 scenes.

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

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

Changing the Scene

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



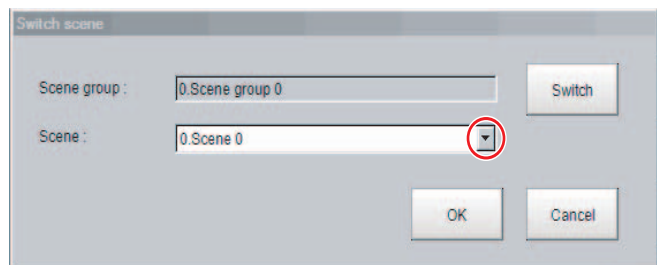
The [Scene switch] dialog box is displayed.

Note

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

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

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



- 3 Click [OK].**

The scene changes.

Changing Scene Groups

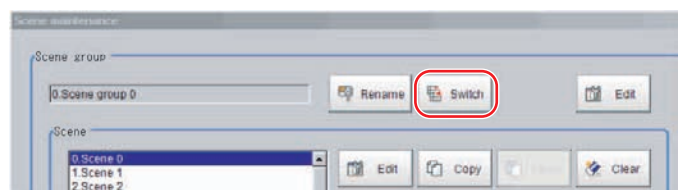
Use the following procedure to change to the scene group in which the scene to be edited is stored.

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

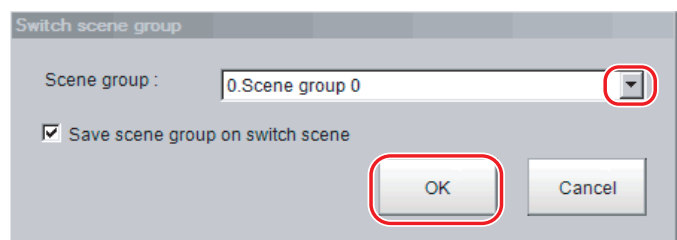
The [Scene maintenance] dialog box is displayed.

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

The [Scene group switch] dialog box is displayed.



- 3 Change to the scene group to edit.**



- 1 Click the [▼] button to select the scene group to edit.**

2 Select whether the scene group should be saved when changing to another scene group.

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

Note

- The setting for whether to save a scene group when changing is linked to the settings of the [Measure setting] dialog box.
Reference: ► Setting the Conditions That Are Related to Operation during Measurement (p.189)

3 Click [OK].

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

IMPORTANT

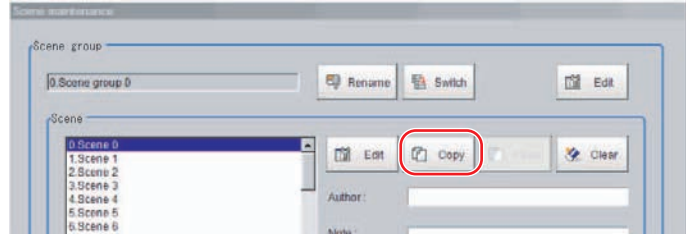
- If you select [Save scene group on switch scene], data may be lost if the power supply is turned OFF while changing the scene group. Make sure that the power supply is not turned OFF while the scene group is being changed.
- If the available external memory is not sufficient to save data when changing the scene group, the data will be initialized if the power supply is turned OFF because the scene group data in the external memory is temporarily cleared during the saving process. To avoid this problem, increase the available external memory without turning OFF the power supply or reduce the scene group data size, and save the data to the external memory again.

Editing Scenes

Copying Scenes

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

- 1 In the Main Window (layout 0), select [Scene maintenance] from the [Function] menu.**
The [Scene maintenance] dialog box is displayed.
- 2 In the scene list, click the scene to copy, and then click [Copy].**

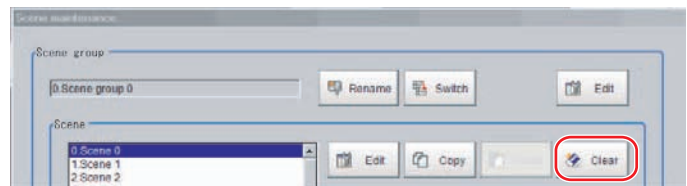


- 3 In the scene list, click the scene where the copy is to be made, and then click [Paste].**
An overwrite confirmation dialog box is displayed.
- 4 Click [Yes].**
The scene selected as the destination is overwritten with the copied scene data.
- 5 Click the [Close] button.**

Deleting Scenes

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

- 1 In the Main Window (layout 0), select [Scene maintenance] from the [Function] menu.**
The [Scene maintenance] dialog box is displayed.
- 2 Click the scene to be deleted from the scene list.**
- 3 Click the [Clear] button.**
A confirmation message is displayed.



- 4 Click [Yes].**
The scene data is deleted.
- 5 Click the [Close] button.**

Renaming a Scene and Adding a Description

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

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

The [Scene maintenance] dialog box is displayed.

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

- 3** Click the [Edit] button.

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

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

The on-screen keyboard is displayed.

- 2** Set the names and a note.

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

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

Note

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

- 5** Click [OK].

- 6** Click the [Close] button.

Editing Scene Groups

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

Note

For the FZ5-L3□□ or FZ5-6□□, make sure to check that a USB memory device has been inserted before performing this operation.

Copying and Deleting Scene Groups

2

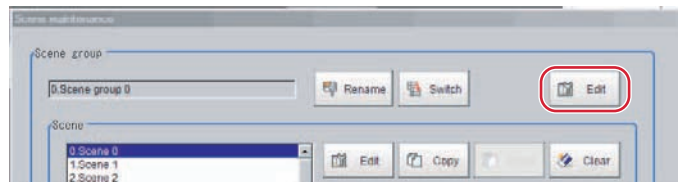
Setting Scenes (Measurement Flows)

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

The [Scene maintenance] dialog box is displayed.

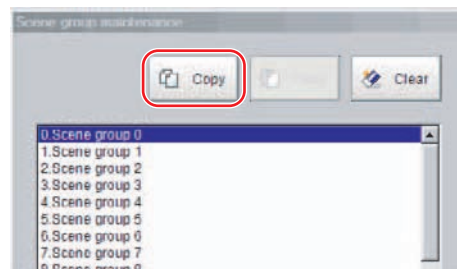
2 Click the [Edit] button.

The [Scene group maintenance] dialog box is displayed.



Copying

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



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

An overwrite confirmation dialog box is displayed.

5 Click [Yes].

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

6 Click the [Close] button.

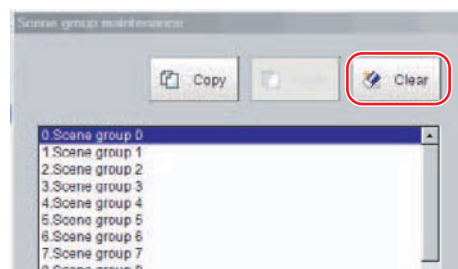
Deleting

The following data is deleted.

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

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

A confirmation message is displayed.



8 Click [Yes].

The scene group data is deleted.

9 Click the [Close] button.

Changing the Scene Group Name

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

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

The [Scene maintenance] dialog box is displayed.

2 Click the [Rename] button.

The [Scene group maintenance] dialog box is displayed.

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

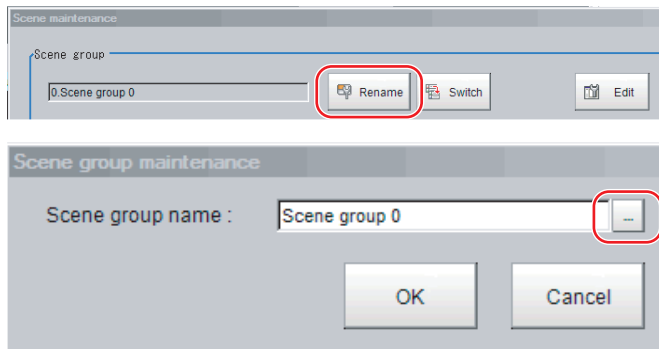
The on-screen keyboard is displayed.

4 Set the name.

Enter 15 characters or less.

5 Click [OK].

6 Click the [Close] button.



Performing Test Measurement/Starting Operation

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

Adjustment Windows and Run Windows.....	66
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Arranging the Window Display	88
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Adjustment Windows and Run Windows

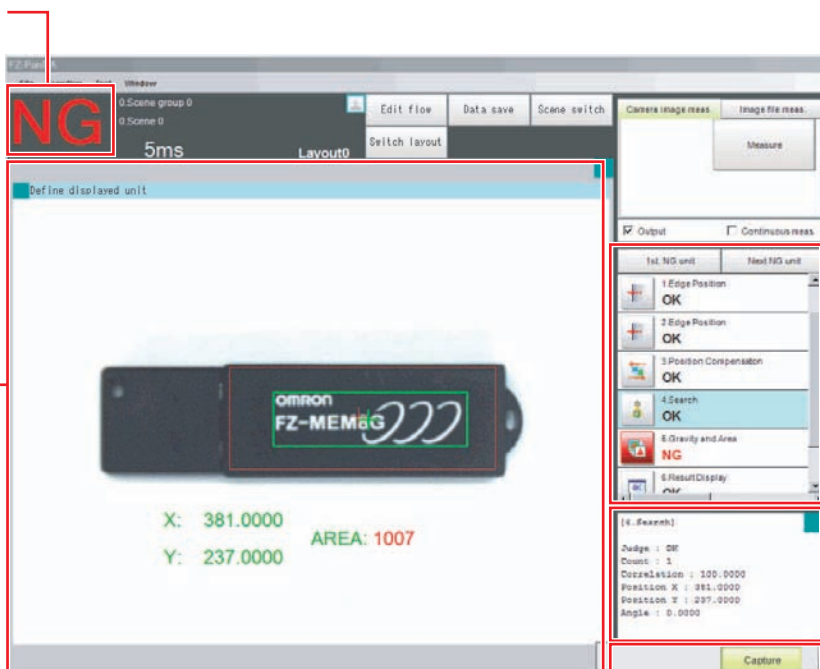
After test measurement and remeasurement are performed on the Main Window (layout 0), check the measurement results. If there are problems, adjust the processing item setting values of the processing units. When the measurement results are stable, change to the Main Window (layout 1) and perform measurements.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

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

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

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

You can overlay the measurement results on the Camera image.



Units with NG results are displayed in red.

Measurement results are displayed in text format.

Measurement Manager Bar

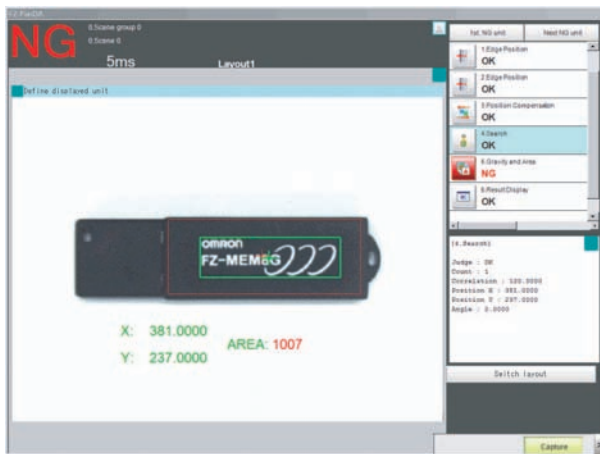
This is displayed regardless of the layer that is displayed.

- [Capture]: Saves the contents that is displayed on the monitor as an image.
Reference: ► Capturing Screen Images (p.119)
- [LCD Off] (Displayed only with LCD-integrated Controllers.)
Turns OFF power to the LCD monitor.
Reference: ► Turning OFF the LCD (p.44)
- [Line] (This is displayed only when the operation mode is set to Multi-line Random-trigger Mode.)
This changes the line.
Reference: ► Multi-line Random-trigger Mode (p.194)
- [Switch Screen] (This is displayed only when the operation mode is set to Non-stop Adjustment Mode.)
This changes to the Non-stop Adjustment Mode Window.
Reference: ► Non-stop Adjustment Mode (p.199)

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

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

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



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

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

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



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

Note

- You can make settings so that the run window is displayed whenever the power supply to the Controller is turned ON.
Reference: ► Setting the Status at Startup: [Startup Settings] (p.212)
- The lighting gradually gets darker if it is used for a long time, so adjust judgement conditions periodically.
- Without stopping the measurement, you can change judgement conditions for a processing unit set for a scene.
Reference: ► Changing Judgement Conditions without Stopping Measurement (p.107)

Main Window (Layout 1): Changing to the Adjustment Window

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



Preparing the Controller and Cameras

Preparing a Controller

No special preparations are required with this Controller because processing items are pre-installed. Please check that the Controller is turned On and that the Main Window is displayed.

For details, refer to the *Instruction Manual*.

The first time the program is started, the Language Setting Dialog Box is displayed. Select the language.
Reference: ► Selecting the Language: [Language Setting] (p.211)

Adjusting the Camera

Check the images that are being taken.

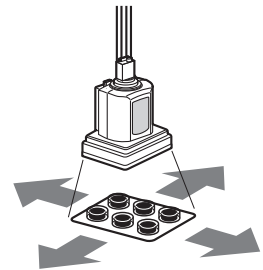
Adjust the position of measurement objects and the focus of the lens.

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

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

Reference: ► Arranging the Window Display (p.88)

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



Adjusting the Position of the Measurement Target

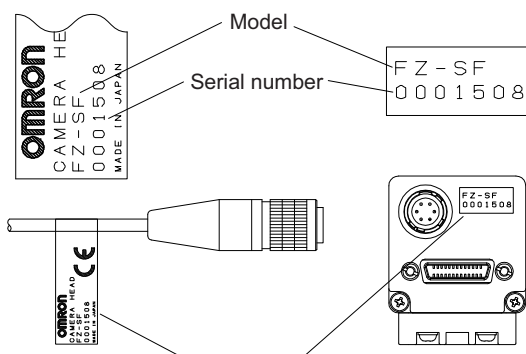
3 Adjust the focal distance of the lens.

When using an Auto-focus Camera or an Intelligent Camera, the focus and the iris can be automatically adjusted.

Note

- If a Camera is used together with a lens, turn the focus ring on the lens to adjust the focus.
Refer to ► *Lens Adjustment Setting* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).
- The light intensity of an Intelligent Camera can be adjusted from the Controller.
Refer to ► *Lighting Control* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

IMPORTANT



Check the model and serial number.

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

Intelligent Camera (with Lighting)

Proper lighting is of crucial importance to a Vision System.

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 the lighting, so lighting can be adjusted depending upon the product type.**
- **Reproducibility of lighting settings is improved.**
- **Settings can be modified without changing the lighting.**

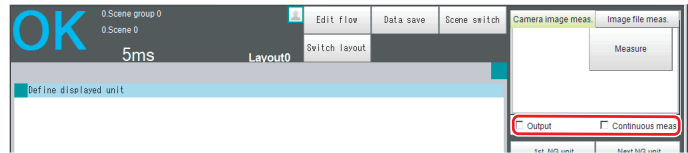
Refer to ► *Screen Adjustment Settings (Camera Image Input)* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

Executing Test Measurements

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

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

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



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

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

The measurement is performed.

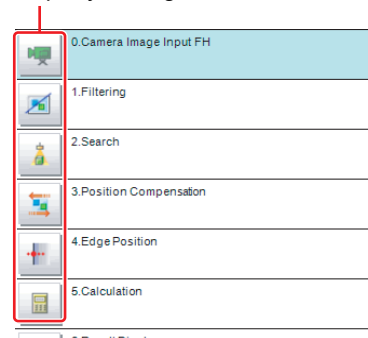
Note

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

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

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

Property setting buttons



Note

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

Reference: ► Logging Measurement Values and Measurement Images (p.109)

IMPORTANT

The measurement interval and display update interval will vary for continuous measurements with test measurement settings and continuous measurements with serial commands or 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 to improve measurement precision and shorten measurement time.

Stabilizing Measurements

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

Adjusting Parameters of Each Processing Item



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

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

Processing Images (Filtering)

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

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

<p>When measurement images have irregularities (searching and location positioning are not stable)</p> <p>The Smoothing (Strong and Weak) and Median filter items are both effective.</p> <ul style="list-style-type: none">• Smoothing (Strong and Weak) This processing changes the shade of images so that irregularities are not as easily seen. <p>Weak Smoothing</p> <p>Before Processing After Processing</p>  <ul style="list-style-type: none">• Median In comparison with smoothing, the Median filter item allows for irregularities to be hidden without having to shade the edges of images.	<p>Measurement Images That Contain Noise</p> <p>The Dilate and Erosion filtering items are both effective.</p> <ul style="list-style-type: none">• 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. <p>Erosion</p> <p>Before Processing After Processing</p> 
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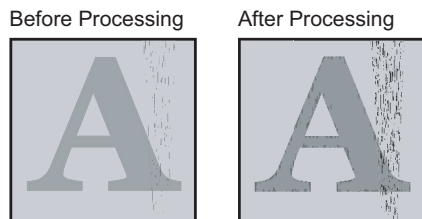
Measurement Images with Low Contrast (Defect Inspection Is Unstable)

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

- **Extract Vertical Edges**

This extracts the vertical edges of an image.

Extract Vertical Edges



- **Extract Horizontal Edges**

This extracts the horizontal edges of an image.

- **Edge Extraction**

This extracts all edges of an image.

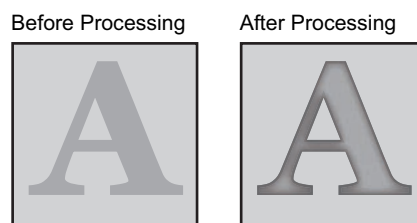
When Unidentifiable Shapes Are Present

The Edge Extraction filtering item is effective.

- **Edge Extraction**

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

Edge Extraction

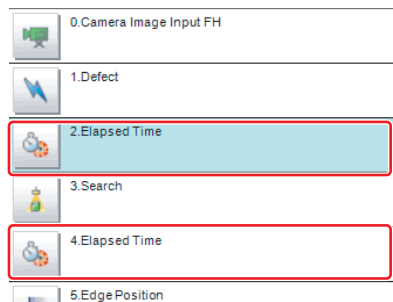


Shortening Processing Time

Checking Processing Times for Each Processing Unit

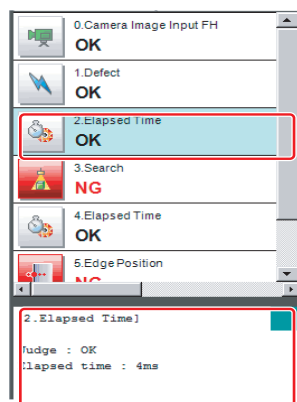
Find out which processing units are taking the most time and adjust the parameters of those processing items.

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



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

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



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

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

Shortening the Processing Time for the Overall Measurement Flow

You can use parallel processing to shorten the processing time.

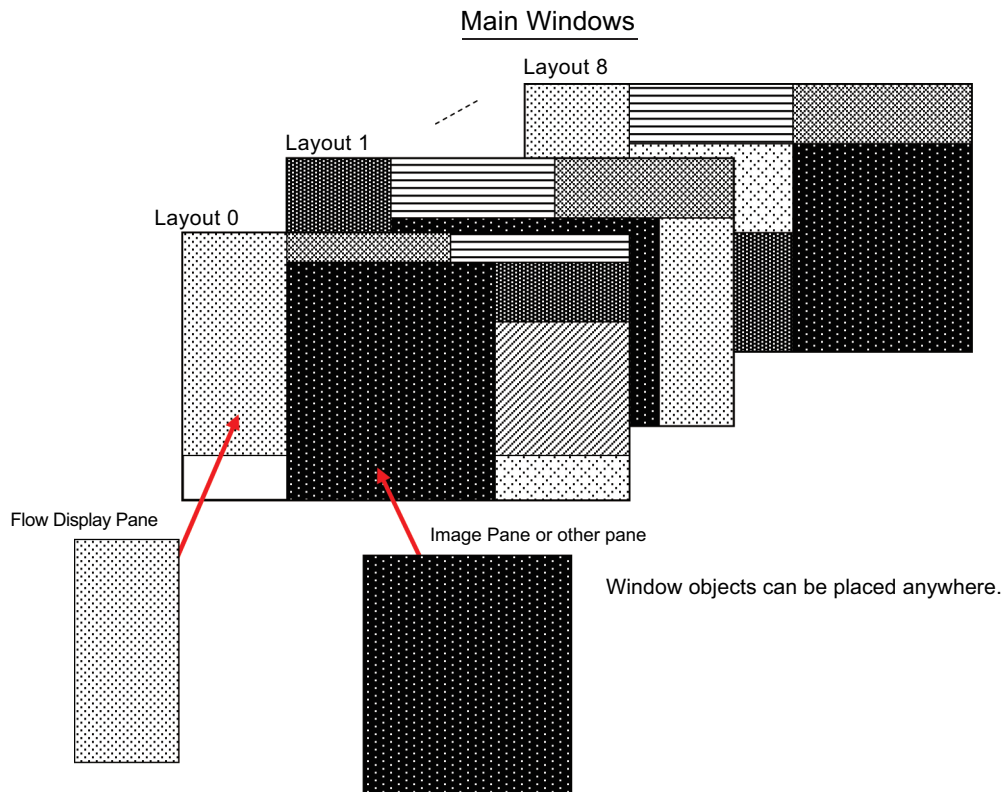
Parallel processing reduces the processing time of the overall measurement flow. It uses more than one CPU to process different parts of the measurement flow in parallel at the same time.

Reference: ► Parallel Processing (p.201)

Arranging Windows

Arranging Window Elements (Layout Modification)

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



Each Layout Window is set as follows by default:

Layout	Default setting	Behavior of output signals	
		RUN signal output	Signal output of results
Layout 0	Layout 0 is set as an adjustment window.	OFF	OFF
Layout 1	Layout 1 is set as a run window.	ON	ON
LAYOUTS 2 TO 7	LAYOUTS 2 TO 7 are for user-defined purposes and are created as they are needed. By default, these layouts have the same settings as layout 0.	OFF	OFF
Layout 8	Layout 8 is set as a remote operation window. When an error occurs in Layout 8, error dialog appears as a text string in the Error Pane instead of in an error dialog box.	OFF	OFF

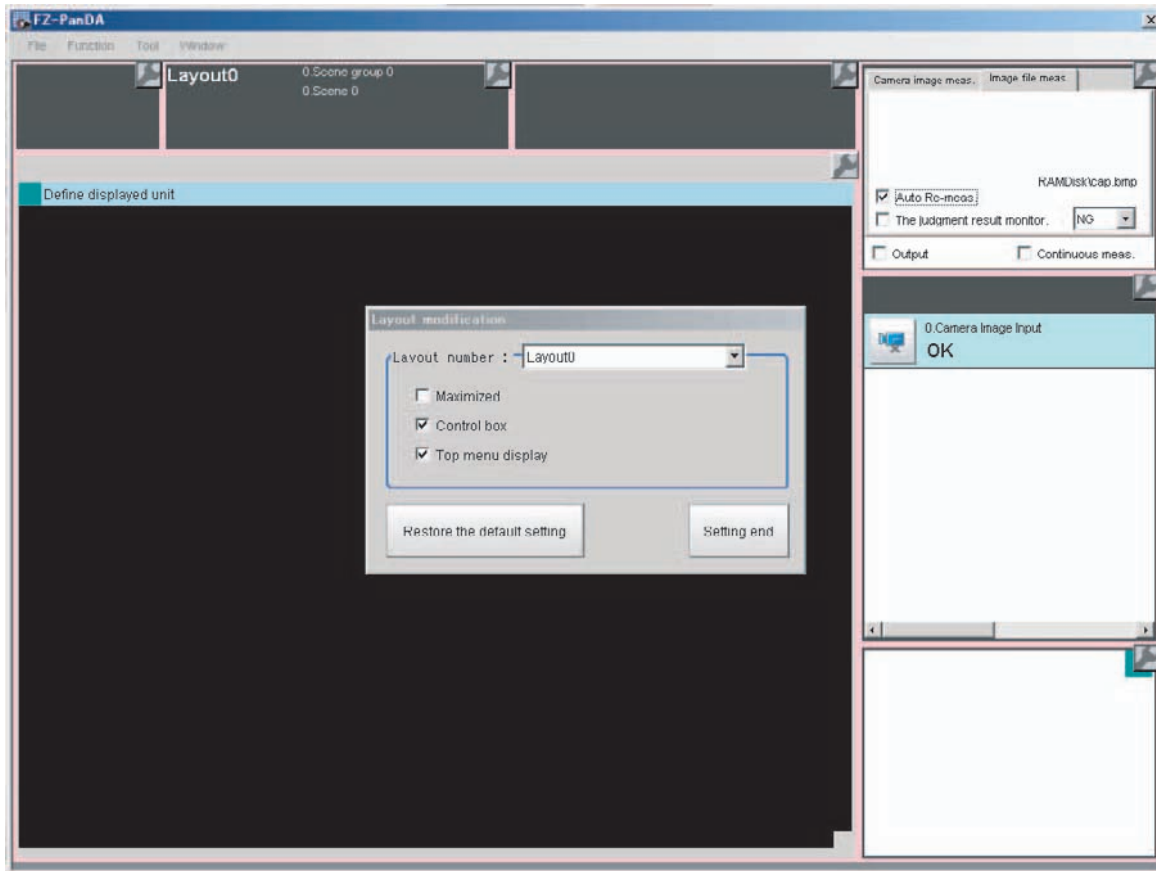
- You can use these layouts to create Main Windows that show only the information that the operator needs, such as a window that shows only the image and the OK or NG status for operation in the field.
- You can change the position and size of the image display, or the processing unit to be displayed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


IMPORTANT

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

Modifying Layouts

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



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



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

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

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

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

You can perform the following operations.

- Click the  icon in the upper right corner of each window object to display the settings dialog box for that object.
- Drag any window object to change its display position.
- Drag the border of any window object to change its size.
With the FZ5, you can drag the  icon in the lower right corner of a window object to size it.

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

Item	Description [Factory default]
Layout number	Select the number of the layout to edit. Layout 0 to layout 8
Maximized	This function is exclusively for an FH Sensor Controller. Specify whether to always display the Main Window at its maximized state. <ul style="list-style-type: none"> Selected: The Main Window will be displayed in its maximized state on the current display. This window cannot be moved. [Not selected]: The Main Window will be set to the size and position that was in effect immediately before it was maximized.
Control box	This function is exclusively for an FH Sensor Controller. Specify whether to display a Minimize Button and a Close Button in the Main Window. <ul style="list-style-type: none"> [Selected]: A Close Button and Minimize Button will be displayed in the upper right corner of the Main Window. Not selected: The Close Button and Minimize Button in the upper right corner of the Main Window will be hidden.
Top menu display	Specify whether to display the main menu at the top of the Main Window. <ul style="list-style-type: none"> [Selected]: A menu will be displayed at the top of the window. Not selected: The menu at the top of the window will be hidden, and changes to the layout will no longer be allowed.
Restore the default setting	The layout for the selected layout number is restored to the default settings.
Setting end	This ends Layout Modification Mode.

Note

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


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

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

IMPORTANT

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

Common Operations for Window Objects

- Click inside a window object and drag it to change its position.
- Click the outer edge of a window object and drag it to change the size of the object.
- Click the  icon that appears on the upper right corner of any window object to open the settings dialog box for that object.

Adding Window Objects

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

Deleting Window Objects

FH/FZ5-11□□

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

FZ5-L35□/FZ5-6□□

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



Restoring a Layout to its Default Settings

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

To Exit Layout Modification Mode

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

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

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

Saving the Layout in the Controller or a File

Saving the Layout in the Controller

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

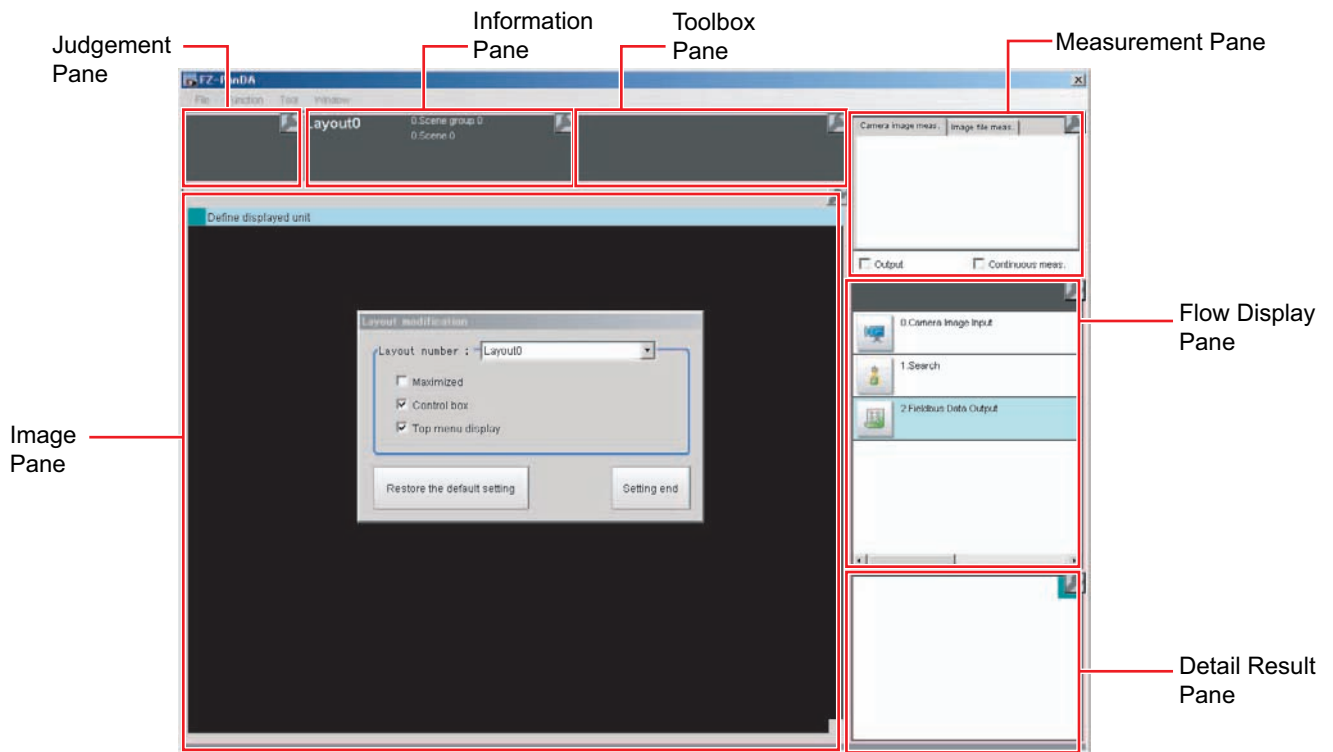
Restart the Sensor Controller to reflect the layout modifications that were saved.

Saving a File

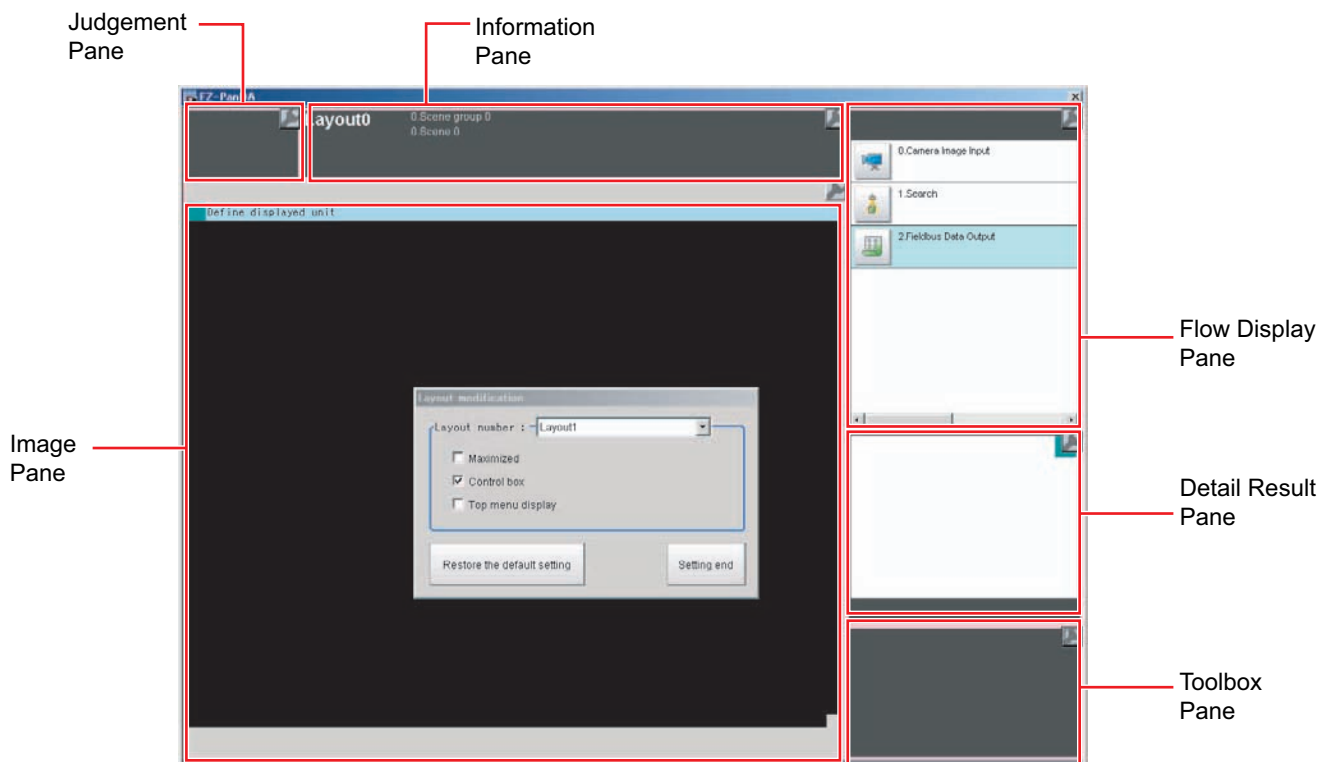
Select [Save to File] from the [Function] menu. Under [Settings data], set the [Data to be saved] to [System data] or [System + Scene group 0], specify the destination, and then click the [OK] button.

Window Objects That Can Be Laid Out or Changed

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



Layout 1 (in Default State)



You can place the following panes anywhere on a single layout.

You cannot have more than one pane of the same type.

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

Judgement Pane

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

Information Pane

This pane shows various information about the measurement and scene.

The following elements are displayed.

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

Editable items	Description [Factory default]
View	Layout Number, Processing Time, Scene Group Number + Scene Group Name, Scene No. + Scene Name, Logging Error, PLC Link Error [All visible]
Layout	Drag to change positions.
Size	1 to 64 (the default size depends on the item)
Load default	Restores the default status.

Toolbox Pane

This pane shows the tool buttons.

The following elements are displayed.

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

Editable items	Description [Factory default]
Add Button	Each click adds one button.
Button size	Sets the size of each button in pixels. 16 × 999, [102 × 40]
Button row	Sets the number of buttons to display per row. 1 to 32, [3]

Measurement Pane

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

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

Flow Display Pane

This pane shows the measurement flow.

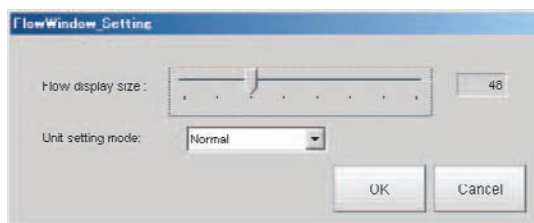
The following elements are displayed.

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

• To Change the Size of the Flow Display Pane

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

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



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

Detail Result Pane

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

The following elements are displayed.

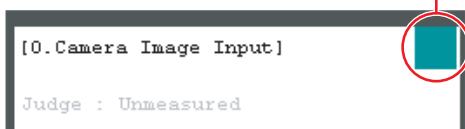
- Processing unit number, Item name
- Judgement

There are no parameters that can be set.

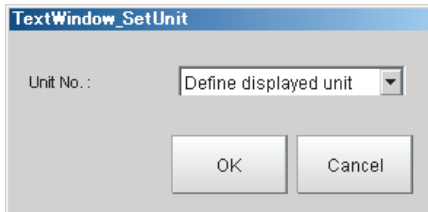
- To Specify the Unit Number in the Detail Result Pane

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

Click the upper right corner.



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



Editable items	Description [Factory default]
Unit No.	[Define displayed unit] or Each unit number

Image Pane

This pane shows the image.

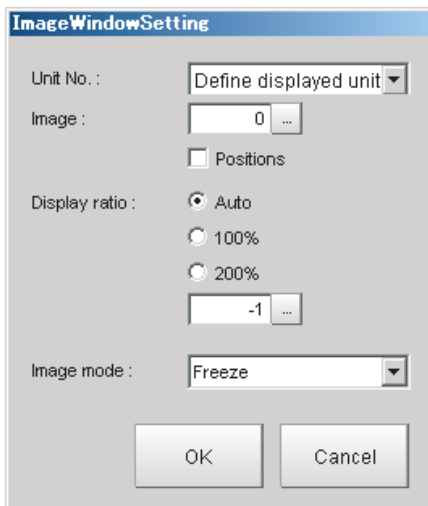
- To Change the Settings for the Image Display Pane

- 1 After you end Layout Modification Mode, click the upper left corner of the Image Display Pane.

Click the upper left corner.



- 2 A settings dialog box for the Image Display Pane is displayed.



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

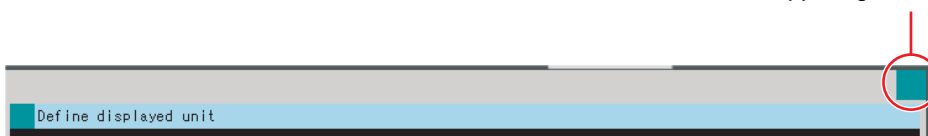
3 Click the [OK] button in the settings dialog box.

- **To Specify the Display Mode (e.g., Multiple Image Panes) of the Image Display Pane**

You can display more than one Image Pane on any layout in the Image Display Pane (default: 0 to 23, you can use layout modification to limit the number of Image Panes).

1 In the state where you have exited layout modifications, click the upper right corner of the Image Display Pane.

Click the upper right corner.



The button that sets the display mode for the Image Display Pane is displayed in the lower left of the Image Pane.

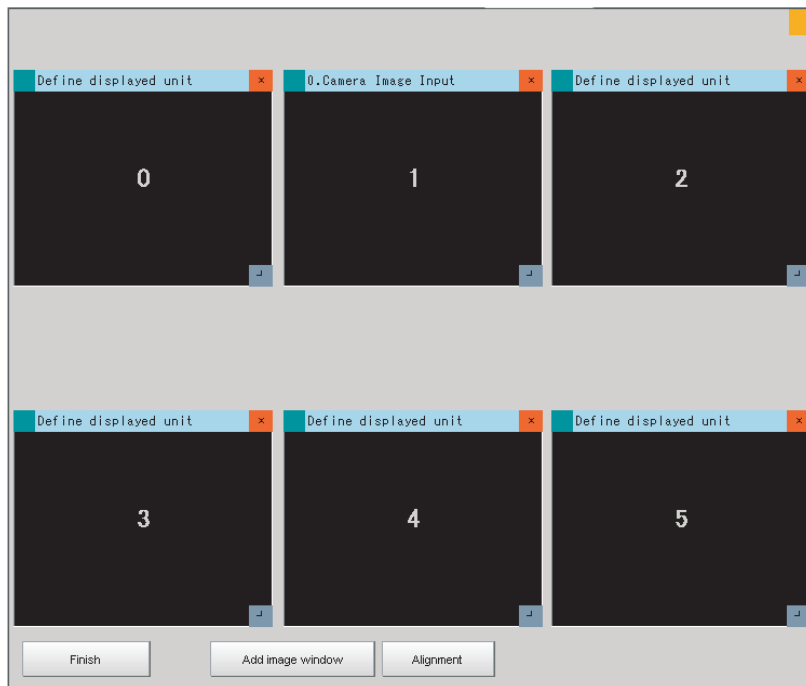
Display modes for Image Display Pane




Button	Description
Add image window	Adds an Image Pane to display. Each click of this button adds an Image Pane with an unused image pane number for display. Click the [Alignment] button to tile the panes.
Alignment	Tiles the Image Panes. Click this button to align and evenly space the displayed Image Panes.
Finish	Ends the settings mode.

- 2 Click the [Add Image Pane] button to add an Image Pane with the specified number to the display. Then click the [Align] button to align the Image Panes.

Example: To display Image Pane numbers 0 to 5.




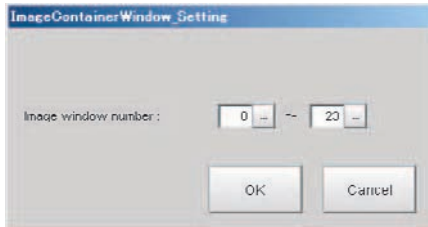
- 3 Drag each pane to move or change its size.

Click the  button in the upper right corner of the Image Pane to delete it.

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

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

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



Editable items	Description
Image window number	You can add up to 24 Image Panes within an Image Display Pane. 0 to 23

Error Pane

This pane shows errors, such as Camera connection errors.

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

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

The Error Pane is assigned to layout 8 by default.

Note

The Error Pane displays error messages for the following errors.

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

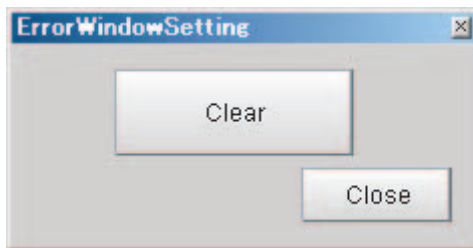
- Clearing the Error Display

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

Click the upper left corner.



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



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

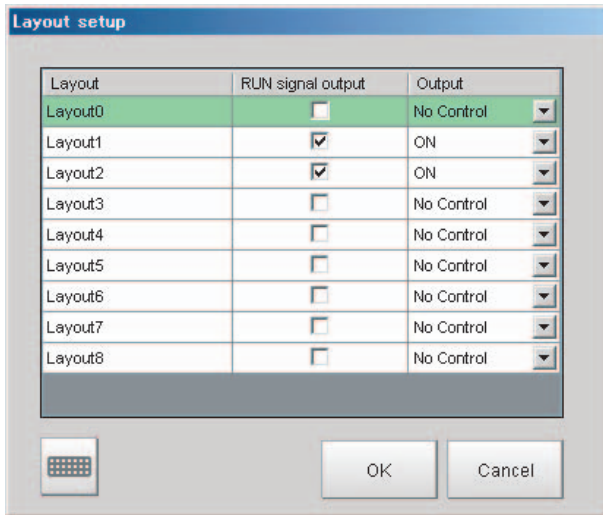
Setting the Behavior of Output Signals for Each Layout (Layout Settings)

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

1 Select [Layout setup] from the [Window] Menu for the main window for layout 0.

2 The following [Layout setup] dialog box is displayed.

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



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

Changing Layout Numbers in the Main Window

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

1 Select [Switch layout] on the [Function] menu or from the tool buttons.

2 Select the layout number to change to and click the [OK] button to close the [Switch layout] dialog box.

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

*1: You can also change the layout number with communications commands.

Troubleshooting

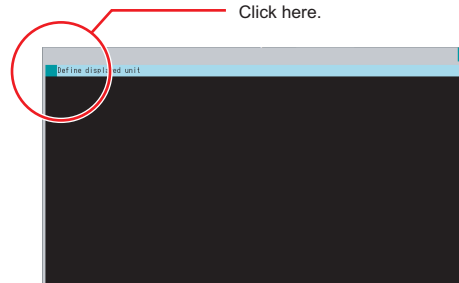
Symptom	Setting	Correction
The RUN signal is not output.	Layout setup	Select [Layout setup] from the [Window] menu and select the [RUN signal output] check box for the layout to be used.
The layout of the Image Display Area cannot be changed.	---	Click the button in the upper right corner of the Image Display Area if the Layout Modification Pane is not visible in the Main Window.
Cannot create a backup of the layout settings.	---	The layout data is included in the system data and saved in the Sensor Controller when you click [Data save]. To save or load the settings to or from a file, click [Save to file] or [Load from file] to save or load the system data and scene group 0 data or the system settings data.
An image of a window object remains in the Main Window when modifying the layout.	Layout modification	When you finish modifying the layout, the display will be updated and window objects will be displayed correctly.
Cannot output measurement results after the layout is changed	Layout setup	When "Output" is set to OFF in the layout setup of the layout that is used, measurement results are not output after startup or after the layout is changed. Even when the "Output" option is selected in the Measurement Pane of the Main Window, the "Output" setting in the layout setup is applied when the layout is changed. Before executing measurement, set "Output" to ON in the layout setup of the layout that is used.

Arranging the Window Display

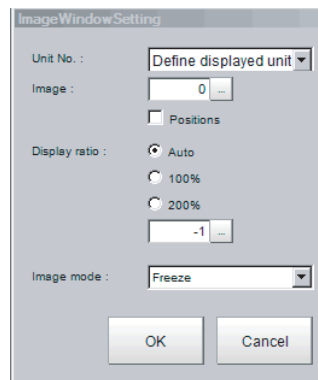
Changing the Image Mode and Other Display Contents

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

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



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



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

Image Mode List

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

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

Note

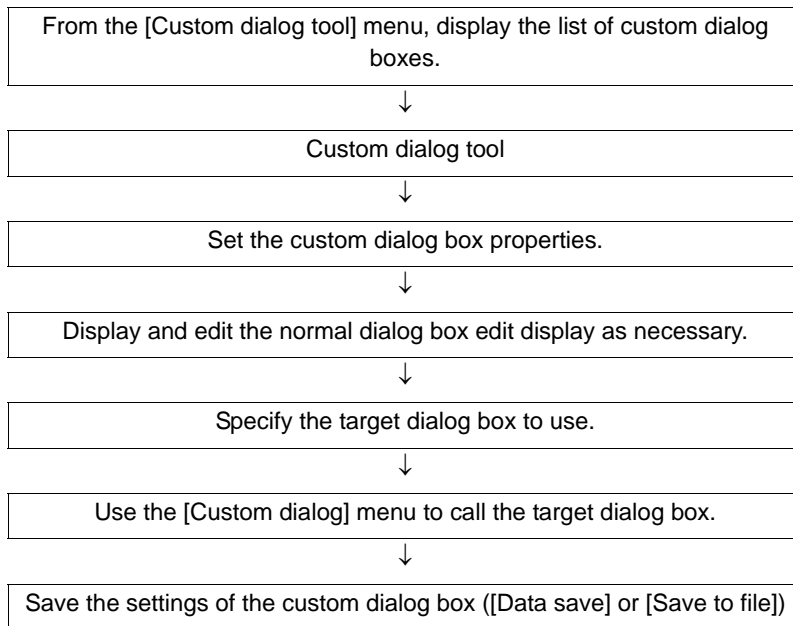
- If a measurement trigger is input while using the multi-input function or immediately after BUSY is turned OFF (such as while the display is being updated), the last NG image cannot be displayed.
- [Display Last NG Image] serves a similar function as a processing item for which error images can be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

Custom Dialogs

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

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

Flow of Use

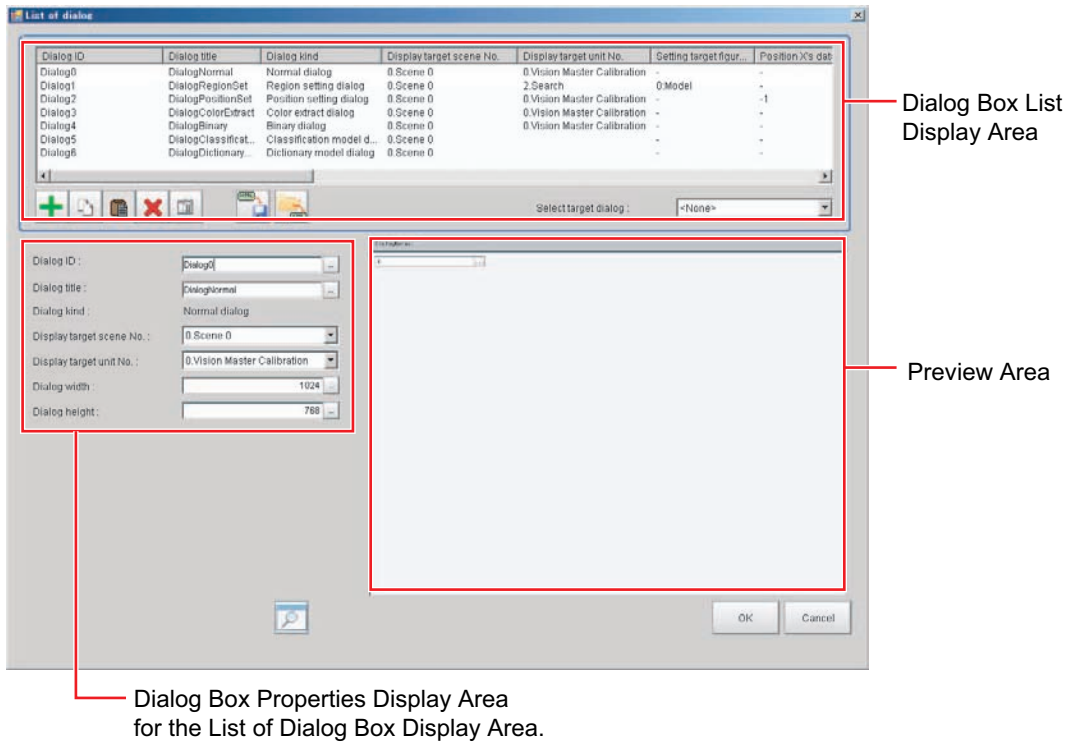


Custom Dialog Tool




Use the following procedure to create a custom dialog box.

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

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

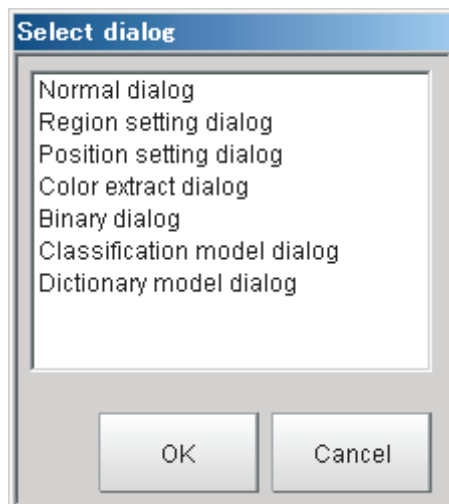


Edit and Control Buttons for the List of Dialog Box Display Area.

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

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

The [Select dialog] list is displayed.



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

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

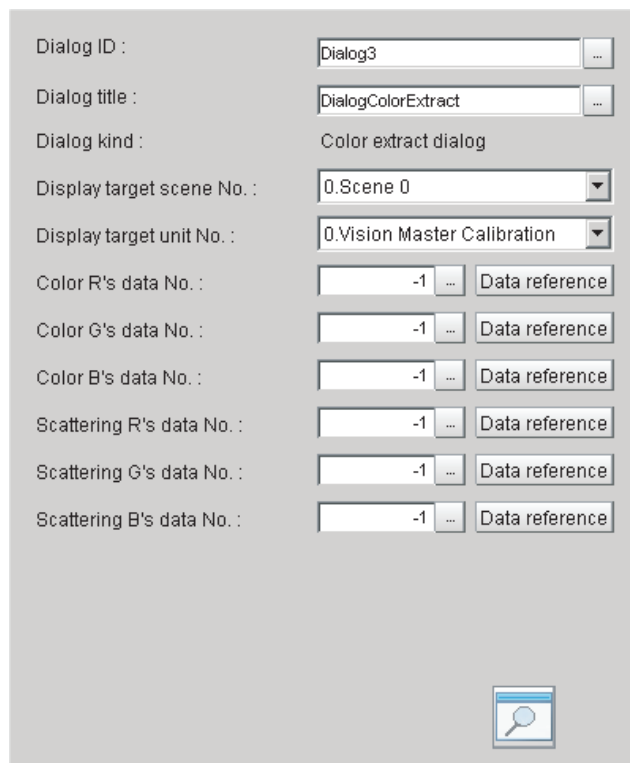
3 Select the kind of dialog box to add, and then click the [OK] button.

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

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


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


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

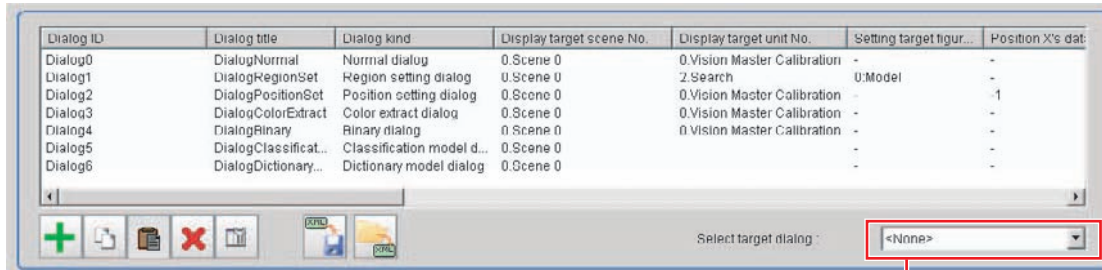


Refer to ► Settings in the Dialog Box Properties Display Area (p.94) for details on individual settings.

Note

If [Dialog kind] is set to [Normal dialog], click the [Edit normal dialog] button () to edit the dialog box.
Reference: ► Editing a Normal Dialog Box (p.97)

- 5** Edit the settings, and click the [Preview] button () as necessary to confirm the edited dialog box.
- 6** Use the [Select target dialog] list to specify the ID of the dialog box to open.





Select the target dialog box.

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

- 7** When you have finished editing, click the [OK] button to exit the List of Dialog Box Display Area.
- 8** Click [Data save] on the Main Window to save the settings.

Note

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

Settings in the Dialog Box Properties Display Area

Common Settings Area

Parameter	Set value [Factory default]	Description
Dialog ID	The dialog box ID is set to a character string that is not assigned to any other dialog box.	The ID for the dialog box. To change the ID, click the [...] button and enter the desired characters.
Dialog title	A title that is based on the dialog box type is assigned.	The title for the dialog box. This appears in the title bar when the custom dialog box is displayed. To change the title, click the [...] button and enter the desired characters.
Dialog kind	---	The dialog box type is displayed.
Display target scene No.	[Scene 0]	This specifies the number of the scene for which to display the dialog box.

Parameter	Set value [Factory default]	Description
Display target unit No.	This is set to the unit that can be selected from the display target scene.	This specifies the number of the unit for which the dialog box is to be displayed instead of the default settings dialog box. The unit that can be specified depends on the type of the dialog box. Immediately after the dialog box is added, the unit with the lowest unit number out of the display target units in the display target scene is selected. If there is no display target unit, unit 0 is selected.

IMPORTANT

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

Individual Setting Region

- **Normal Dialog Box Setting Region**

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

- **Region Setting Dialog Box Setting Region**

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

- **Position Setting Dialog Box Setting Region**

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

- **Color Extract Dialog Box Setting Region**

Parameter	Set value [Factory default]	Description
Color R's data No.	-1 to 999999999 [-1]	Specifies the R's data number for the color to specify for the unit to use for color extraction.
Color G's data No.	-1 to 999999999 [-1]	Specifies the G's data number for the color to specify for the unit to use for color extraction.
Color B's data No.	-1 to 999999999 [-1]	Specifies the B's data number for the color to specify for the unit to use for color extraction.

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

• **Binary Dialog Box Setting Region**

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

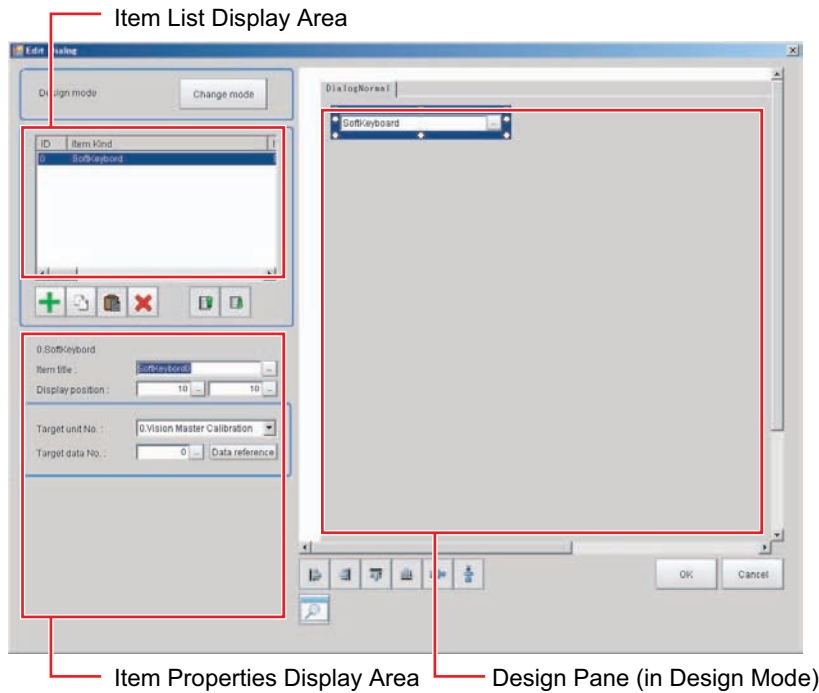
Editing a Normal Dialog Box

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








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

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

The [Edit Dialog] area is displayed.



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

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

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

The following [Select item] list is displayed.




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

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

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








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

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

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

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

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

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

Note

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

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

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

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

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

Example: Item Properties Display Area for a Numeric Box

Refer to ► Settings in the Item Properties Display Area (p.101) that is described later in this section for details on all settings.

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

Settings in the Item Properties Display Area

• Common Settings Area

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

• Individual Setting Region

Numeric Box Setting Region

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

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

Limit Box Setting Region

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

Soft Keyboard Setting Region

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

Radio Button Setting Region

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

Check Box Setting Region

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

Combo Box Setting Region

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

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

Image Button Setting Region

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

IMPORTANT

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

Launching Your Custom Dialog Box

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

Useful Functions for Operation

Remeasuring Saved Images

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

The logging function is used to save images.

Reference: ► Logging Measurement Values and Measurement Images (p.109)

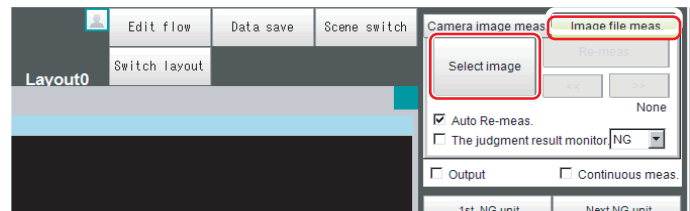
Images that can be remeasured include images saved in the Controller and images saved in external memory.

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

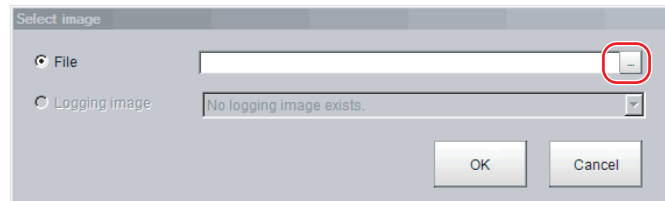
2 In the Main Window (layout 0), click the [Image file meas.] button in the Measurement Pane.

3 Click the [Select image] button.

The [Select image] dialog box is displayed.



4 Click the [...] button and specify the file to display.



Parameter	Description
File	Specify images saved in the external memory or in the RAM disk.
Logging image	Specify images that are logged in the Controller memory.

5 The selected image is displayed at the lower left of the File Explorer Pane.

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



6 Click [OK].

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

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

Measurement of the selected image is performed.

Note

About Automatic Remeasurement

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

IMPORTANT

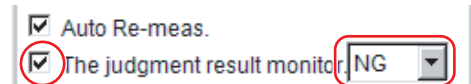
When remeasuring an image with the Controller, it is necessary to have a Camera connected that is appropriate to the image size. For example, if the image file for remeasurement contains 2-megapixel images and a 0.3-megapixel Camera is connected to the Controller or if a Camera is not connected, measurement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

Improving Adjustment Efficiency

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

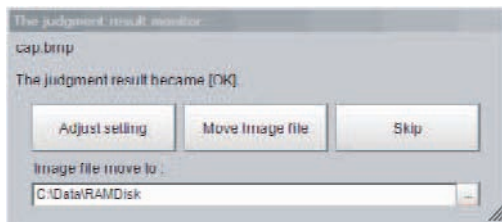
Files in which there are both NG error files and OK files can be continuously remeasured automatically, with the system stopping at images with a specified condition (OK/NG) and moving those files.

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

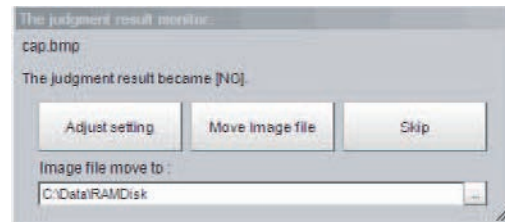


If the specified judgement condition is achieved when continuous measurement is performed, measurement stops and the following message is displayed.

If OK Is Selected



If NG Is Selected



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

Adjusting Flow Settings

Click the [Adjust setting] button.

Moving Images to Specified Folder

Specify the folder to move the image file to.

Click the [Move Image file] button.

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

Changing Judgement Conditions without Stopping Measurement

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

Using the Simplified Non-stop Adjustment Mode

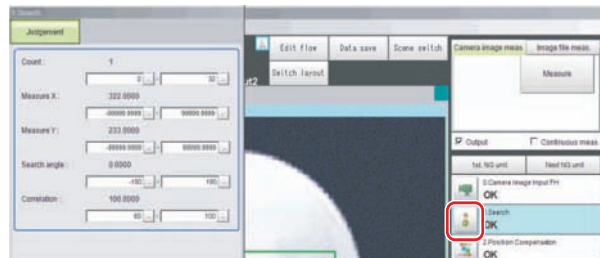
- 1 Select [Layout modification] from the [Window] menu.
- 2 In the Layout Modification Mode, select the layout number to use the Simplified Non-stop Adjustment Mode.
- 3 Click the upper right corner of the Flow Display Pane.
- 4 Change the [Unit setting mode] under [Flow Windows_Setting] to [Simplified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

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

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

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

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



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

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

The changed contents are shown in the displayed scene.

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

Disabling the Simplified Non-stop Adjustment Mode

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

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

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

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

IMPORTANT

While simplified non-stop adjustment is being performed, do not change the scene group or scene.

Changing Regions as a Batch [Shift area]

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

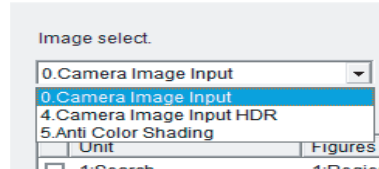
- 1 In the edit flow window, click the [Shift area] button.**

The [Shift area] dialog box is displayed.

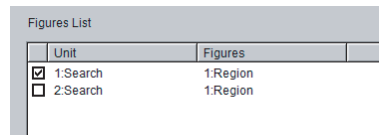


- 2 Select the processing item in which to change the region.**

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

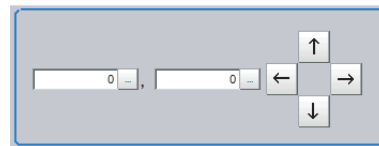


- 3 Select the registration region to change.**



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

Images can also be directly dragged to move them.



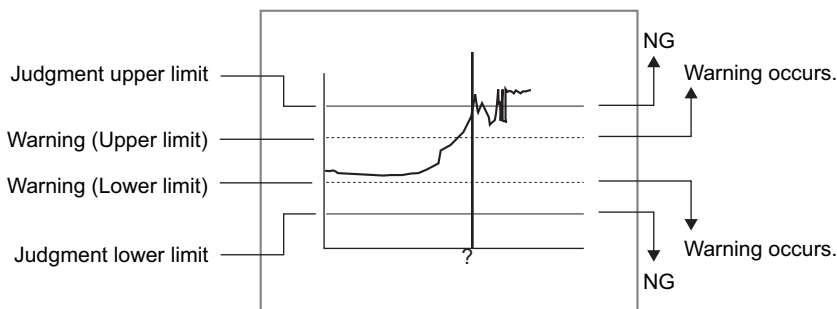
- 5 Click [OK].**

The change is registered.

Monitoring Measurement Value Trends

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

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



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

Logging Measurement Values and Measurement Images

What Is Logging?

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

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

Image Logging

- **System Logging**

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

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

- **Processing Item Logging**

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

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

Data Logging

- **System Logging**

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

- **Processing Item Logging**

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

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

Reference: ► Specifying Logging Conditions for Images (p.116)

IMPORTANT

- If you use logging, the measurement processing time will take longer for the time required for the logging process. If you need to continuously execute measurements that include image logging, allow enough time between measurement triggers after the first trigger to allow time for image processing.
Reference: ► Calculating the Measuring Interval ([Logging]) (p.115) for information on measuring the time for image logging processing.
- Processing item image logging and system image logging cannot be used at the same time.
If you prefer to use the Image Logging processing item, click [System Settings] – [Other] – [Logging setting] – [Image logging], and then select [None].

This section describes system logging in detail.

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

The processing items that can be logged are described below.

Image Conversion Logging

This logging saves Camera images.

Image conversion logging allows you to draw a rectangle around a portion of the image to save. You can also

specify the format of the saved image (BMP or JPG).

Data Logging

Measurement data is saved.

System Logging

There are 2 different logging methods.

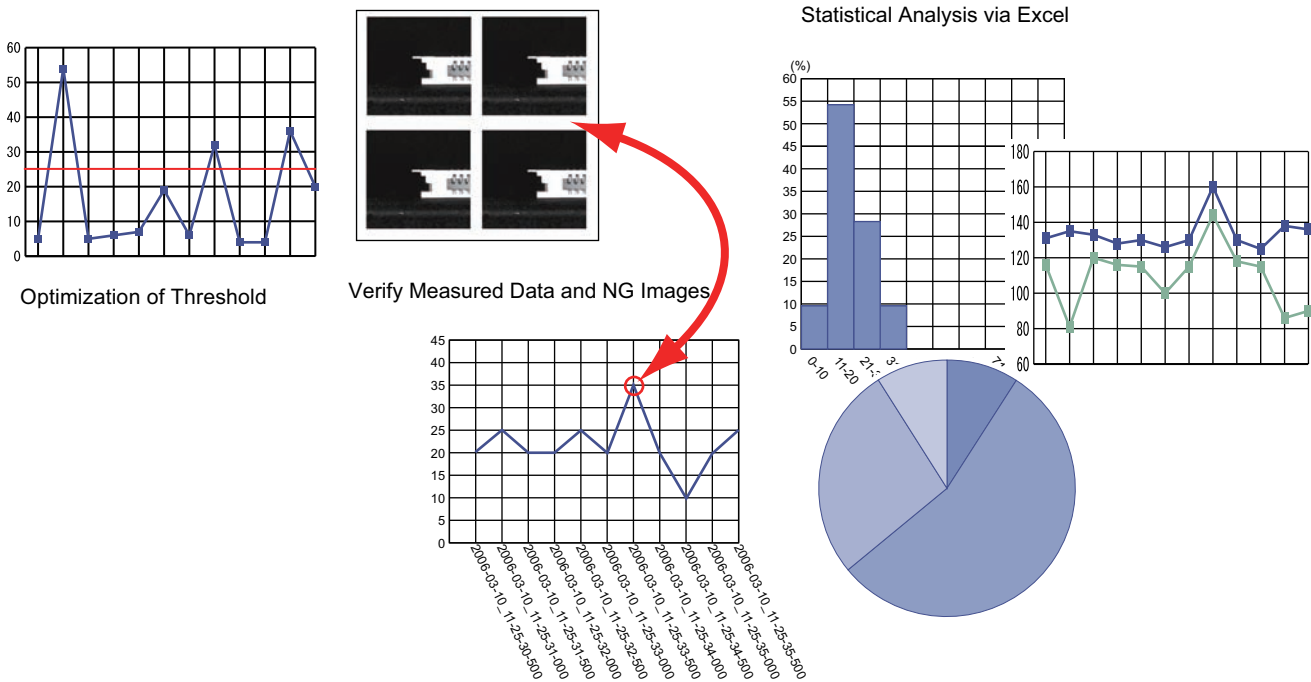
Logging Images That Are Currently Displayed

Reference: ► Logging Current Image [Save Last Logging Image] (p.110)

Automatically Logging Images During Measurements

Reference: ► Setting Logging Conditions [Logging Setting] (p.111)

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



Logging Current Image [Save Last Logging Image]

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

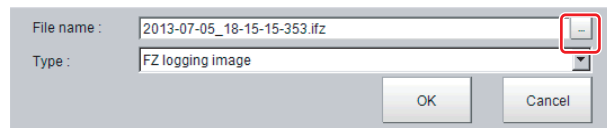
1 In the Main Window, select [Save last logging image] from the [Function] menu.

The File Explorer is displayed.

2 Set the logged image save destination.

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

3 Edit the file name as required.



4 Click [OK].

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

Setting Logging Conditions [Logging Setting]

Set the logging timing and the save destination.

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

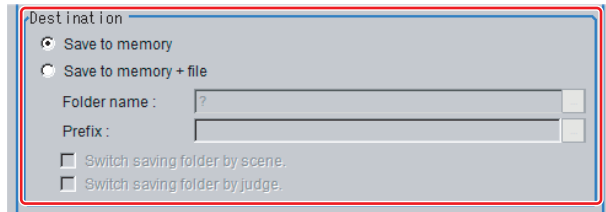
The [Logging settings] dialog box is displayed.

- 2 Set the image logging conditions.



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

- 3 Set the logged image save destination.



Note

In order to perform logging quickly, image files are first saved in the Controller memory (RAM). The Controller memory (RAM) for saving images is a ring memory. 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.571)

Also, the Controller memory is cleared if the power supply is turned OFF.

To keep images, select [Save to memory + file] and save images to external memory.

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

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

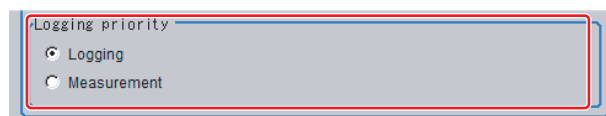
Parameter	Set value [Factory default]	Description
Folder name	<ul style="list-style-type: none"> • [RAM Disk] • Drive name of external memory device 	Specify the image file save destination (RAM disk or external memory). Logged images are saved in the specified save destination folder. (Maximum number of characters: 128 single-byte characters)
Prefix	---	Set the prefix for the saved file name. (Maximum number of characters: 32 single-byte characters) The set character string is added at the beginning of the name of the save file.
Switch saving folder by scene	<ul style="list-style-type: none"> • Selected • [Not selected] 	If this check box is selected, folders that correspond to scene numbers are automatically created and image files are divided by scene and saved.
Switch saving folder by judge	<ul style="list-style-type: none"> • Selected • [Not selected] 	If this check box is selected, OK/NG folders are automatically created and image files are divided by the overall judgement and saved.

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

Setting example	Destination
<ul style="list-style-type: none"> • Folder name: USB disk • Prefix: image_ • [Switch saving folder by scene]: selected • [Switch saving folder by judge.]: Selected 	<p>The settings in the example on the left are applied as shown below.</p> <ul style="list-style-type: none"> • 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.

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



Parameter	Set value [Factory default]	Description
Logging priority	[Logging]	When there is no available space in the Controller memory (RAM), subsequent measurement cannot be received until memory becomes available. All measurement target images are logged, but the measurement takt time becomes longer.
	Measurement	Measurements will continue even if there is no available space in the Controller memory. New logging is not performed until space becomes available in the Controller memory (RAM). The measurement takt time is maintained, but some measurements may not be logged.

Note

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

5 Set the data logging conditions.

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

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

6 Set the logged data save destination.

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

7 Click [Apply].

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.571)
- The data saved in the Controller memory or RAM disk 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.
- If external memory or a network drive is specified as the save destination, the processing time may be longer or may fluctuate. Be sure to check functionality thoroughly before starting operation.
- If images and data are logged to a network drive, the use of the multi-input function and other heavy measurement loads on the Controller may slow down communications and cause logging errors. In this case, set the measurement takt time so that there is some leeway.

Image Logging

- When the number of files in the save destination folder increases, the time needed to save images 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.

Number of Images That Can Be Saved

- This will depend on the size and resolution of the images and the number of Cameras connected.
- The number of images that can be saved on the RAM disk in the Controller or a USB disk depends on available space.
 - If the RAM disk is selected, the memory available in the RAM disk
 - If USB disk is selected, it depends on the USB disk capacity.
- The following restrictions apply to a USB disk. (There is no limit if an NTFS-formatted USB disk is used with the FH/FZ5-11□□.)
 - 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 (e.g., \USBDisk\SUB), 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.

Loading Data to a Computer

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

Calculating the Measuring Interval ([Logging])

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

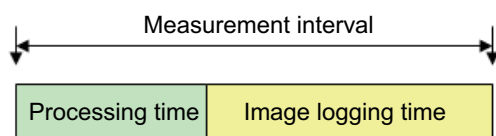
The method that is used to calculate the measurement interval that allows logging without affecting the processing time is described below.

Measurement Interval Conditions

The measurement interval must satisfy the following condition.

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

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



Example:

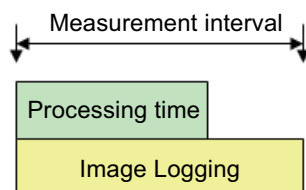
If the processing time is 100 ms and the image logging time is 150 ms, set the measurement interval to at least 250 ms.

Note: If the Operation Mode Is Set to [High-speed Logging Mode]

In High-speed Logging Mode, images can be logged while measurement is in progress.

The measurement interval must satisfy the following condition.

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



• Example:

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

Specifying Logging Conditions for Images

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

Possible Saving Conditions

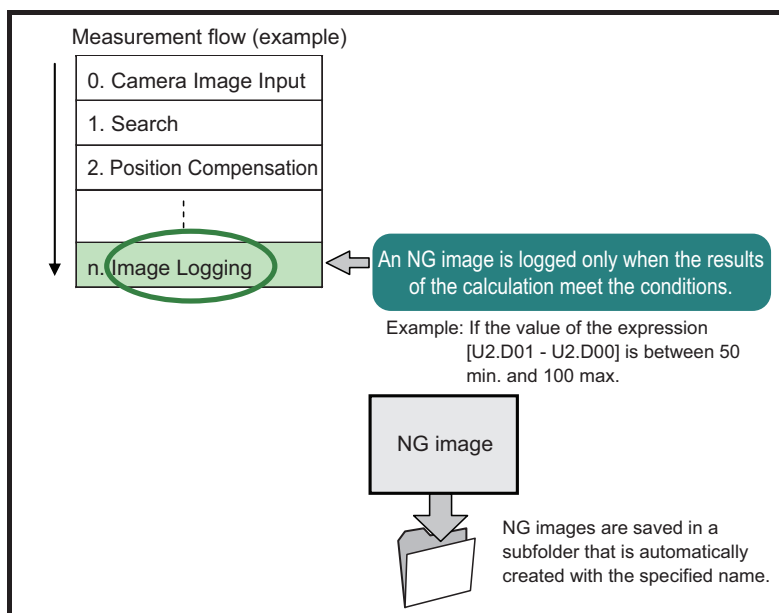
Images can be logged when measurement data or result data of a calculation falls within a specified range.

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

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

Destination of Images

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



IMPORTANT

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

Note

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

Analyzing Logged Data

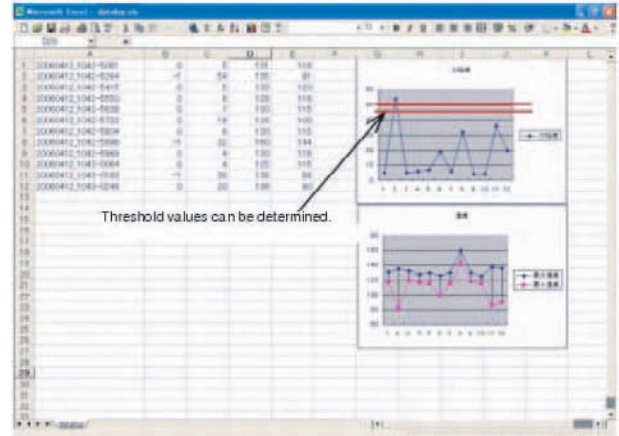
Acquired data is referred to and processed, and settings are analyzed.

Checking Logged Data with a Computer

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

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

Measurement ID	Result of Expression 0	Result of Expression 1	Result of Expression 2
20060412_1042-5001	0	5	131
20060412_1042-5264	-1	54	125
20060412_1042-5415	0	5	133
20060412_1042-5550	0	6	128
20060412_1042-5638	0	7	130
20060412_1042-5732	0	19	126
20060412_1042-5804	0	6	130
20060412_1042-5896	-1	32	160
20060412_1042-5969	0	4	130
20060412_1042-0064	0	4	125
20060412_1043-0183	-1	36	138
20060412_1043-0244	-1	27	134



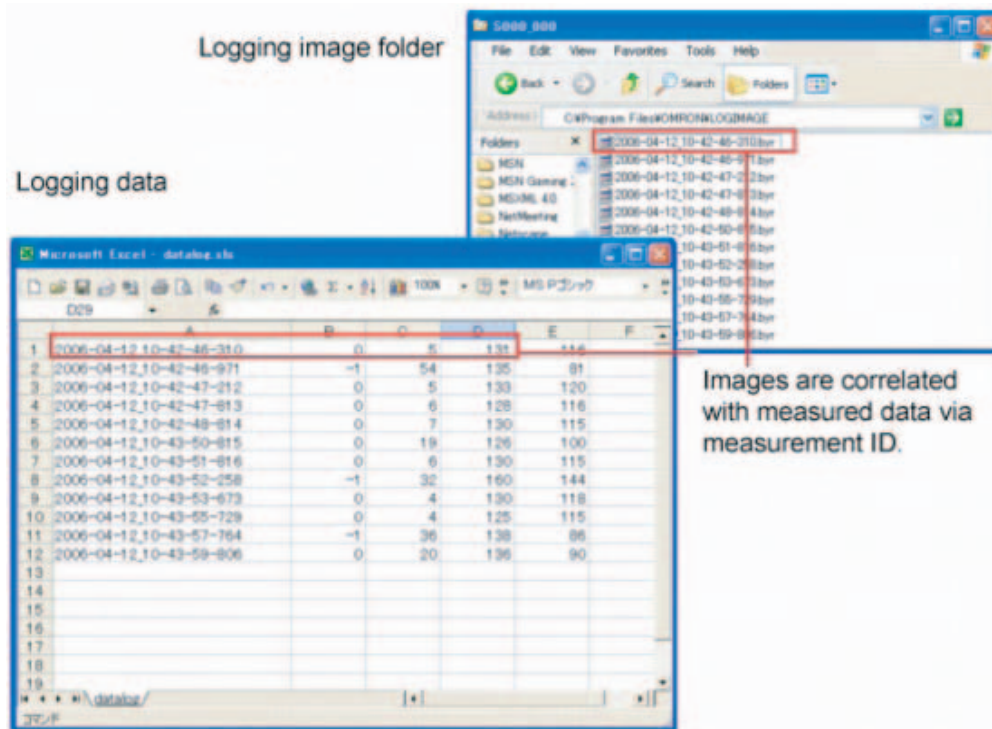
Comparing Logged Data and Logged Images

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

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

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

Verify data with the measurement ID.



	A	B	C	D	E	F
1	2006-04-12 10-42-46-210	0	0	130	116	
2	2006-04-12,10-42-46-971	-1	54	130	91	
3	2006-04-12,10-42-47-212	0	5	130	120	
4	2006-04-12,10-42-47-813	0	6	129	116	
5	2006-04-12,10-42-48-814	0	7	130	115	
6	2006-04-12,10-43-50-815	0	19	129	100	
7	2006-04-12,10-43-51-816	0	6	130	115	
8	2006-04-12,10-43-52-258	-1	32	160	144	
9	2006-04-12,10-43-53-673	0	4	130	118	
10	2006-04-12,10-43-55-729	0	4	125	115	
11	2006-04-12,10-43-57-764	-1	36	138	86	
12	2006-04-12,10-43-59-906	0	20	136	90	
13						
14						
15						
16						
17						
18						
19						

Clearing Measurement Results

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

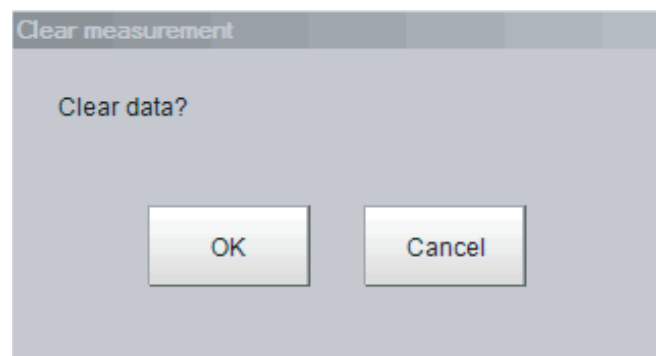
This function sets the expression which calculates the measurement count, and is convenient when that count is to be reset.

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

A confirmation dialog box is displayed.

- 2** Click [OK].

The measurement results are deleted.



Clearing Saved Images

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

- 1 In the Main Window (layout 0), select [Clear logging image] from the [Function] menu.**
A confirmation dialog box is displayed.
- 2 Click [OK].**

Note

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

Reference: ► Saving Logged Images in the Controller Memory (RAM) to a RAM Disk or an External Memory Device (p.181)

Capturing Screen Images

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

Set the destination for captured images.

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

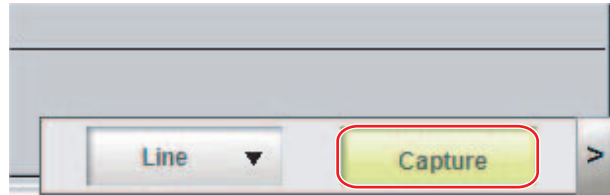
- 1 In the Main Window, select [System settings] – [Other] – [Screen capture setting] from the [Tool] menu.**
The [Screen capture] settings dialog box is displayed.
- 2 Specify the save destination for captured images.**



- 3 Click [Apply].**

Saving Captured Images

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



IMPORTANT

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

Note

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

Captured Image Files

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

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

Note

The following cannot be captured.

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

Using the Operation Log

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

Setting the Operation Log

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

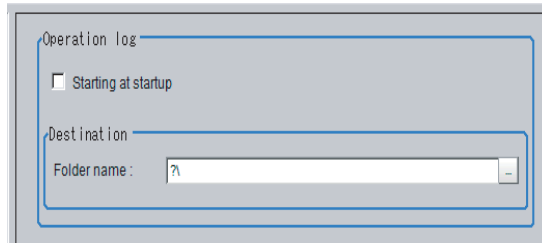
Sample output of an operation log: This log records the date, time, user name, and the operation that was performed.

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

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

The [Operation log settings] dialog box is displayed.

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



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

- 3** Click [Apply].

Checking and Changing the Operation Log Status

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

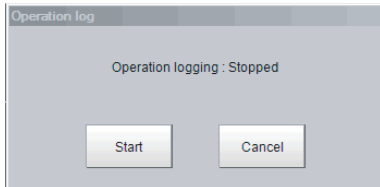
1 In the Main Window, select [Operation log] from the [Function] menu.

The current operation log status is displayed.

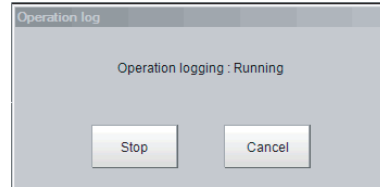
To change the current operation log status, click either [Start] or [Stop].

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

Dialog Box When Operation Log Is Stopped



Dialog Box While Operation Log Is Being Recorded



Loading an Operation Log File

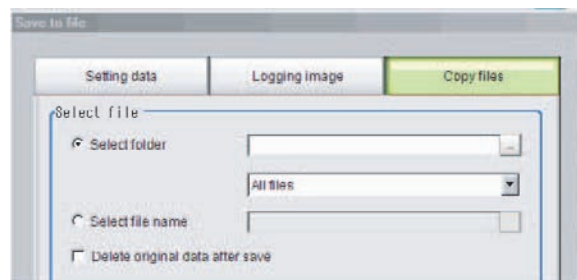
When the log file is set to be saved to the Controller, use the following procedure to load the file.

1 Insert an external memory device into the Controller.

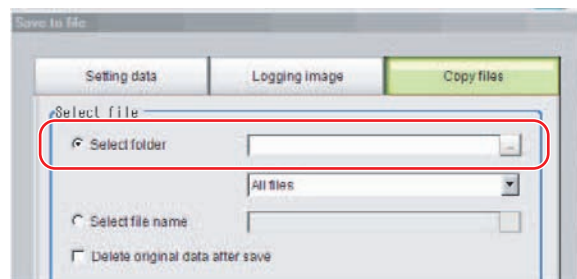
2 In the Main Window, select [Save to file] from the [Function] menu.

The [Save to file] dialog box is displayed.

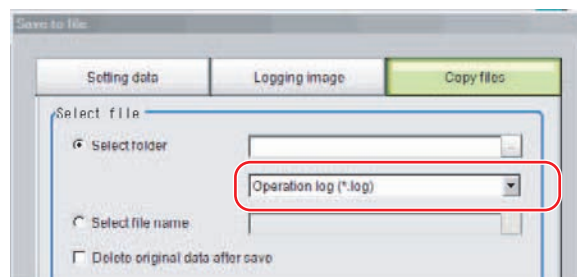
3 Click the [Copy files] tab.



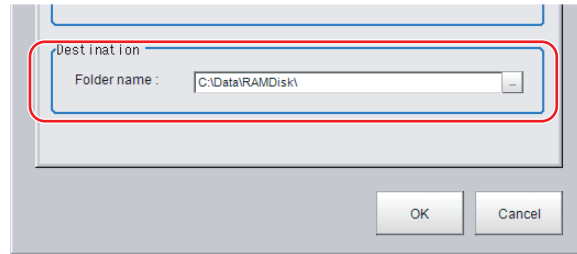
4 Select [Select folder], click [...], and specify the folder.



5 Select the operation log (*.log).



6 Specify the destination.



7 Click [OK].

For details on operation logs, refer to ► Operation Log Format (p.123)

IMPORTANT

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

Operation Log Format

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

YYYY-MM-DD_HH-MM-SS.log (example: 2012-08-20_12-00-00.log)

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

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

(Execution date and time); (user name); (input information); (output information) [LF+CR]

Examples:

2012/08/20 12:00:00;user0;SetSystemData,"XX","YY","ZZ";0

2012/08/20 12:00:01;user0;GetSystemData,"XX","YY";0,"ZZ"

Execution date and time	The date and time at which this API was executed.
Username	The name of user that is currently logged in. If no one is logged in, the character string "no login" is entered.
Input information	The API name is followed by supplemental information (mostly API arguments), delimited with commas.
Output information	The API return value is followed by supplemental information (mostly information gotten by the API), delimited with commas.

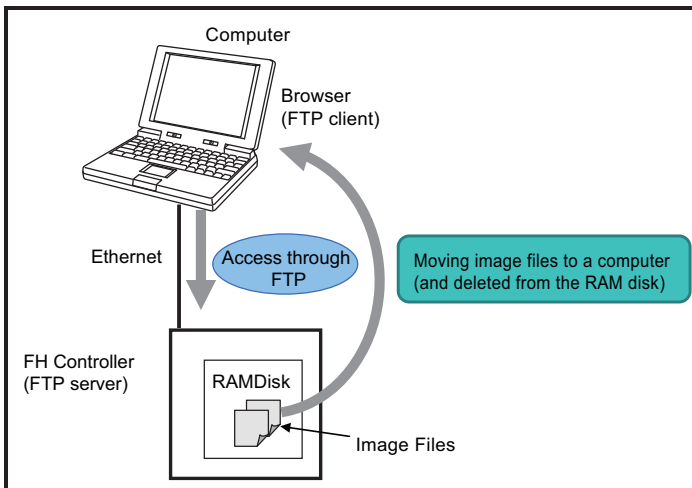
For the operation log input information written in the operation log file, refer to ► Operation log input information list (p.579).

Saving Data to an External Device

To Save Logged Image Files to a Computer (FTP)

The FTP is useful when you need to save logged image files to a computer.

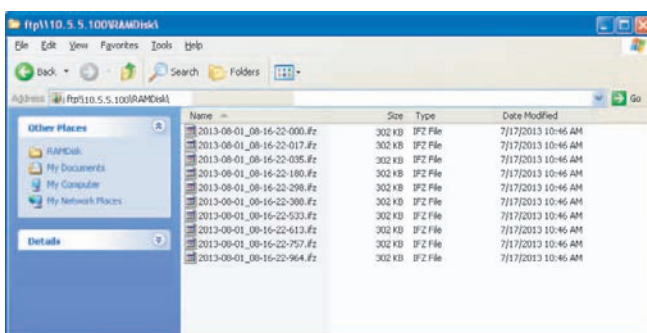
For example, if you need to move logged images to a computer before the RAM disk or external memory device becomes full, you can use the FTP to access the FH Controller through a browser and directly specify the files in the RAM disk or an external memory device to move.



Operating Procedure

Use the following procedure to access the RAM disk in the FH Controller.

- 1** Set up the computer and Controller for communications through Ethernet.
- 2** Start the Explorer on the computer.
- 3** In the address bar, type the IP address and destination and press the Enter Key.
Example: [ftp://10.5.5.100/RAMDisk/]
- 4** The contents of the RAM disk is displayed as shown below.



- 5** Drag files as you would with normal file operations.

IMPORTANT

Use only single-byte alphanumeric characters for the file names of files to send and receive with the FTP.

Note

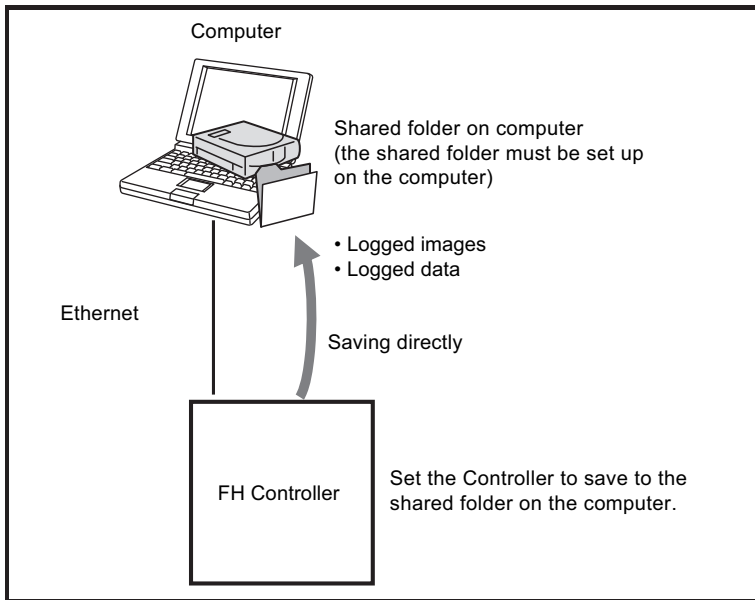
- There are no limitations on when you can perform FTP file transfers.
- Processing of FTP file transfers does not affect the transaction time. However, It does affect the load on the network.

Saving Logged Data Directly to a Shared Folder on a Computer ([Network Drive Function])

The network drive function is useful when you need to log image data or measurement data directly to a computer that is connected by Ethernet.

You can specify the shared folder on a computer that is connected by Ethernet as the destination for logged images or logged data.

Direct reading and writing with the computer eliminates the need for reading and writing through external memory devices. At the same time, it also eliminates the need to stop measurements to insert or remove the external memory device.



Setting Up the Network Drive

Register the shared folder on a network drive with a shared name.

- 1** Select [Tool] menu – [System settings] – [Other] – [Network drive setting].
- 2** Select the shared name to be registered, and click [Edit].
- 3** Enter the information to be allocated to the network drive (shared name), such as the shared folder, user name, and password.
- 4** The shared folder on the connected computer will appear in the [Select file/folder] dialog box.

Specifying a Network Drive as a Logging Destination

To import logging data to a computer, you specify a shared folder on the computer as the logged data destination.

Note

The data saving time depends on the conditions of the network and the destination drive. Be sure to check the operation thoroughly with the actual devices that will be used.

Using Tools

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

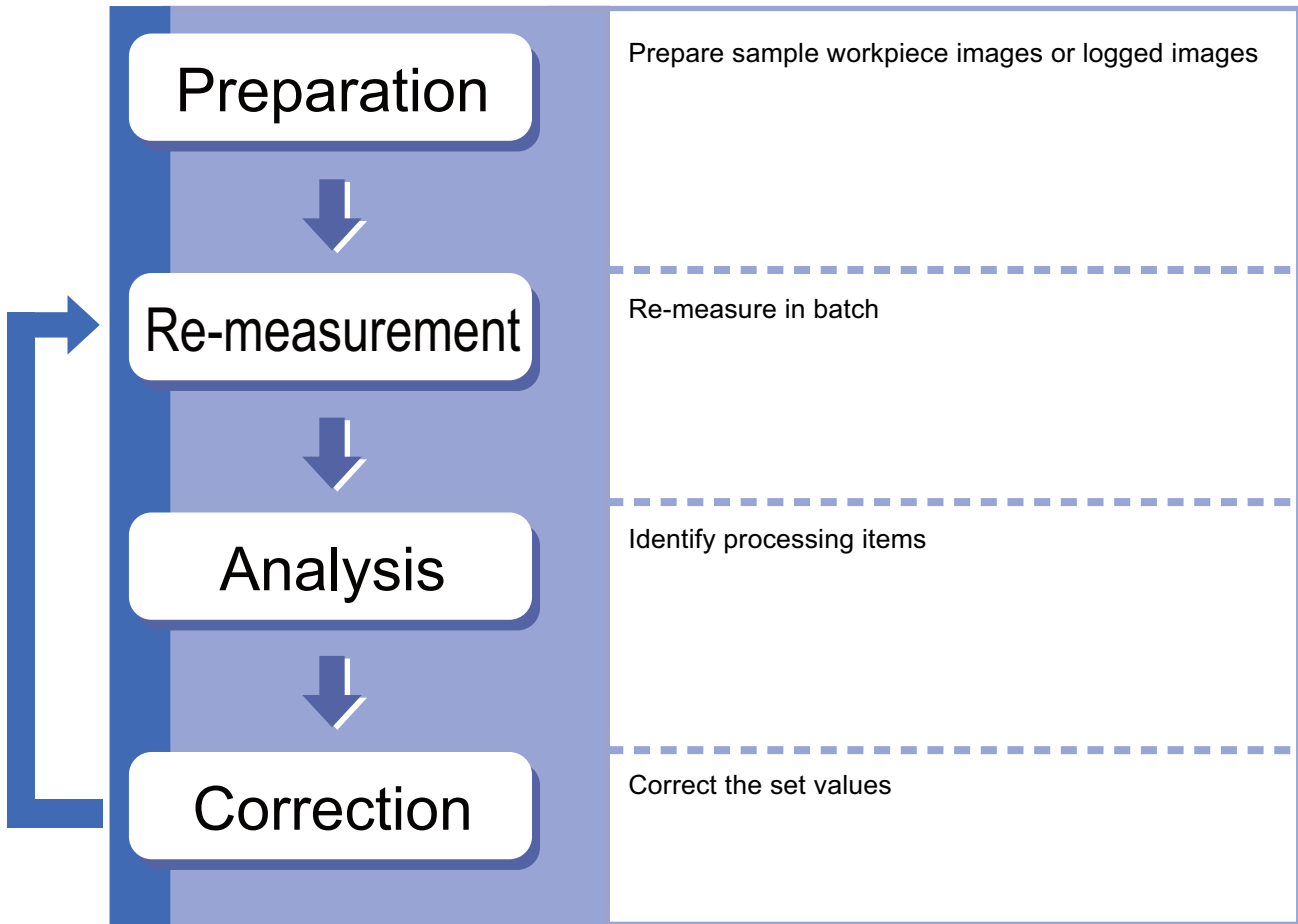
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Using NG Analyzer

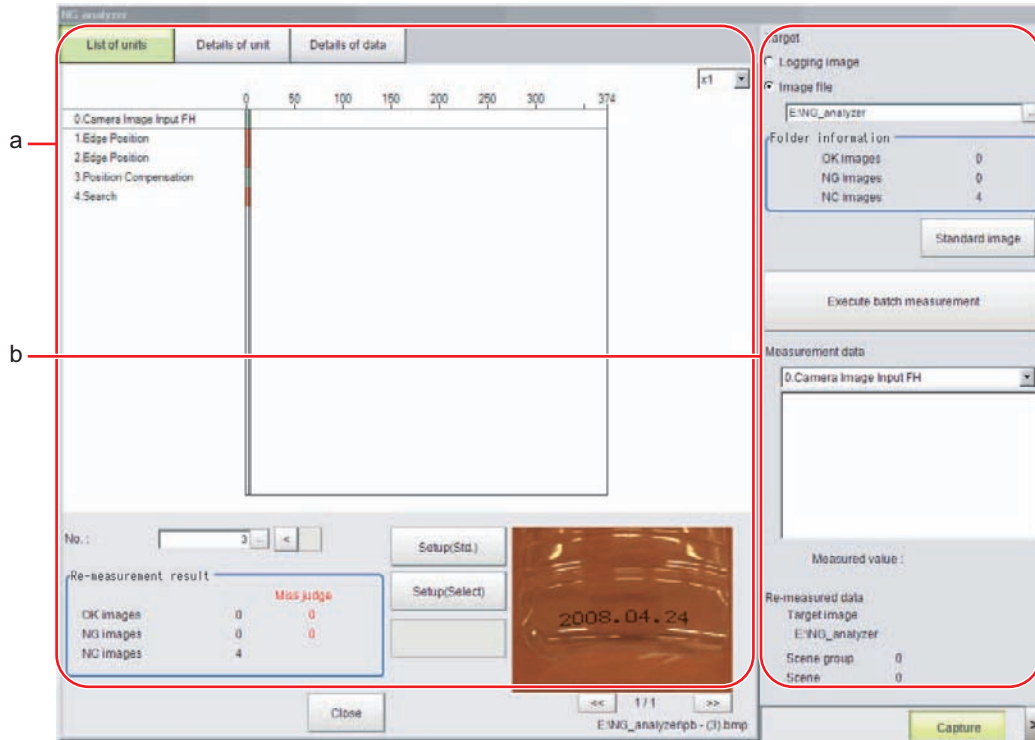
Start the NG analyzer by selecting [Tool] - [NG analyzer] from the Controller menu.
This tool, which analyzes setting flows, is used mainly in 2 ways.

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

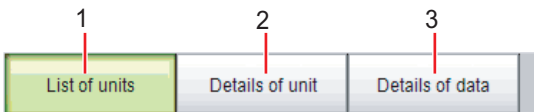
The operation flow is as follows.



Layout of NG Analyzer Window



a. Analysis result display area



1. List of units

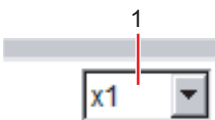
A list of units currently set is shown together with analysis results.

2. Details of unit

Detailed analysis results of each unit are shown.

3. Details of data

Detailed results of analysis data are shown.



1. Display ratio

Sets magnification to display.



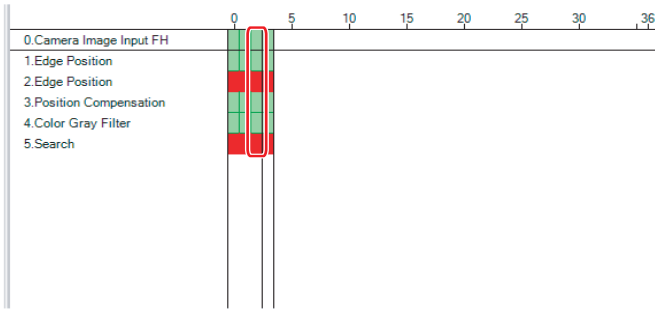
1. Image display area

Displays selected images.

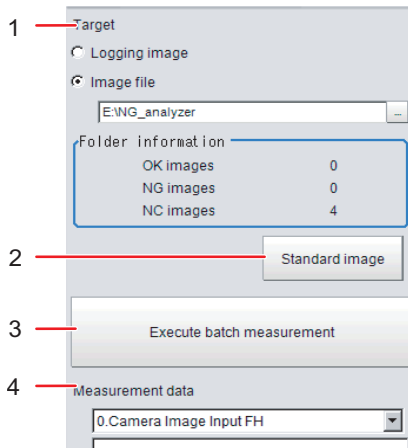
2. Image selection

Selects the image number to be displayed in the image display area.

Images can be displayed by directly clicking the analysis result window.



b. Control area



1. Target

Sets images to be measured.

2. Standard image

Standard image

3. Execute batch measurement

All of the specified target images are measured continuously.

4. Measurement data

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

Using Method of NG Analyzer

IMPORTANT

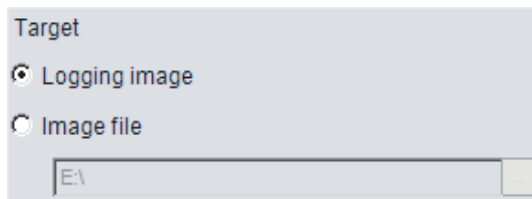
- Classify sample images beforehand into the OK folder containing images you want to judge OK or NG folder containing images you want to judge NG. (The applicable file types are "*.IFZ", "*.BYR" and "*.BMP".)
- Do not input external commands or STEP signals while the NG analyzer is running (excluding during non-stop adjustment).

1 On the Main Window, select [Tool] menu - [NG analyzer].

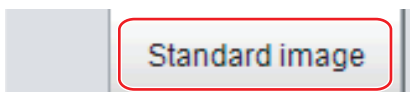
The analyzer window is displayed.

2 Specify the image file.

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



You can also set a reference image to perform adjustment.



3 Click files in the folder are displayed.

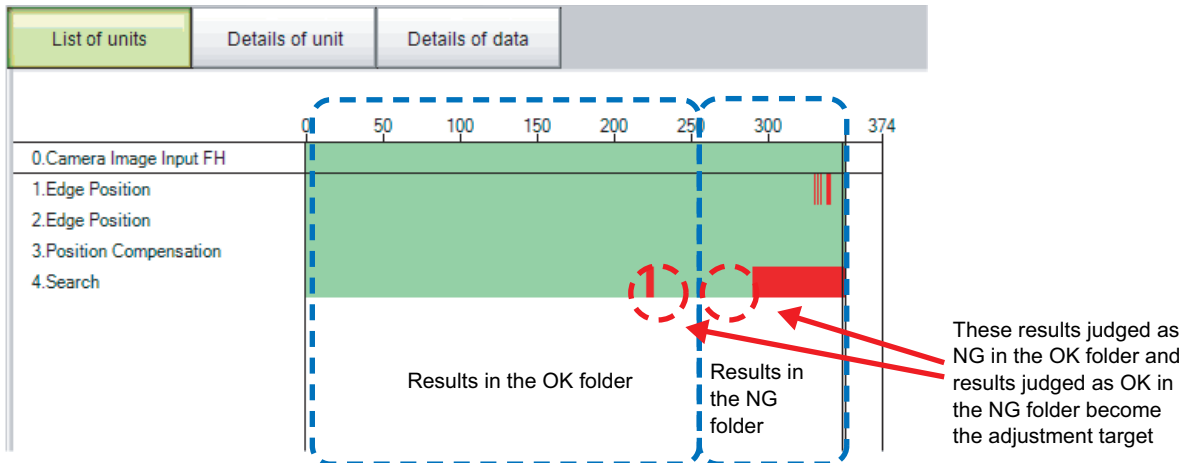
4 Click [Execute batch measurement].

All images in the folder are measured in batch.

Re-measurement result		
		Miss judge
OK images	0	0
NG images	0	0
NC images	0	

5 Measurement results are displayed.

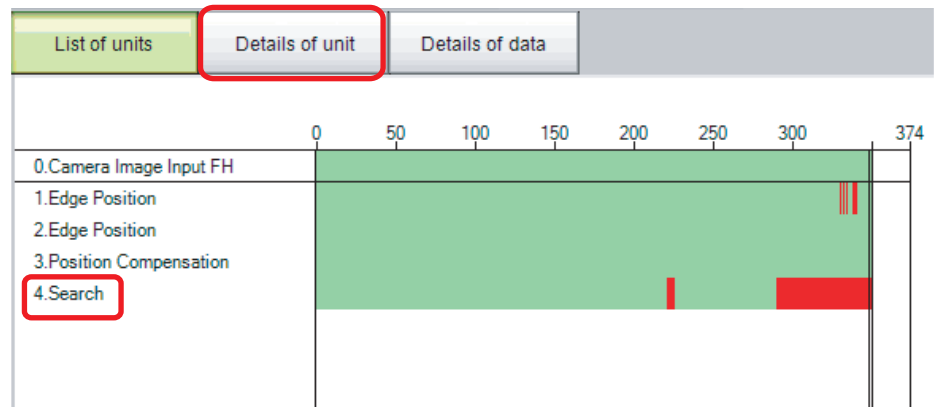
The results in the OK folder are shown first, followed by the results in the NG folder. Green indicates OK, while red indicates NG.



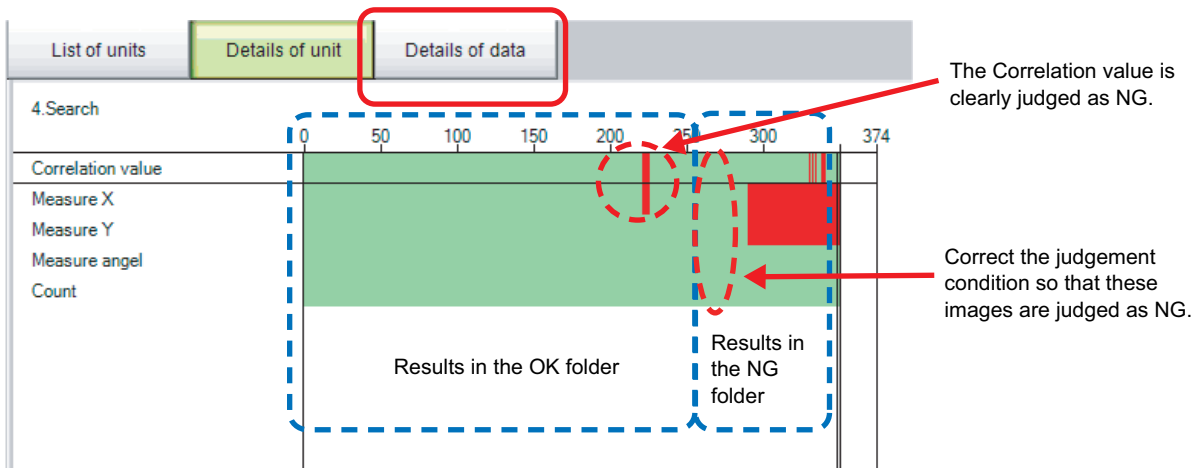
Adjust the set values of each unit until no images are incorrectly judged.

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

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



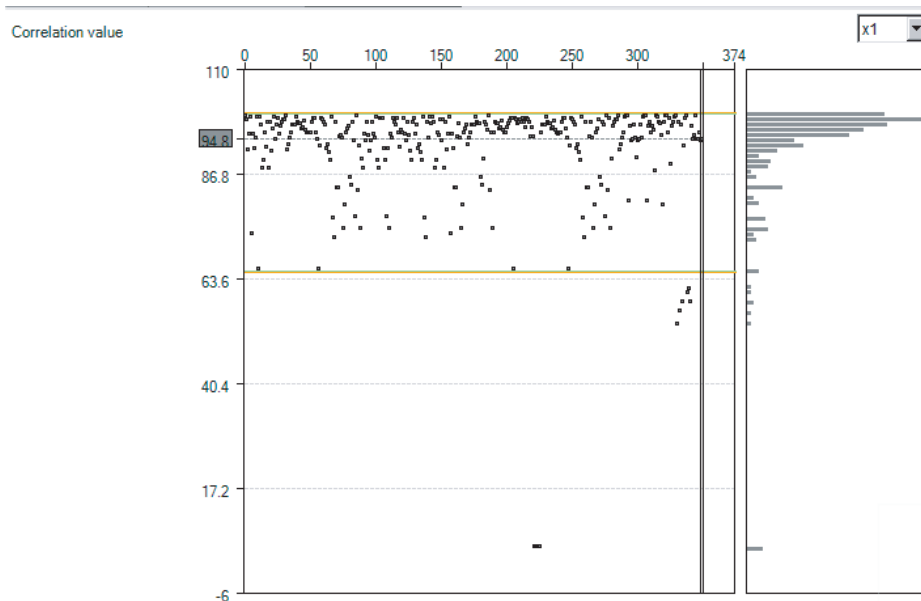
7 The cause of NG is displayed. To check the details of values further, click [Details of data].



8 Adjust the processing item by referring to the displayed content.

In the following example, Correlation values are clearly lower on some images.

Based on the revealed cause of incorrect judgement, use the [Set up(Std.)] and [Set up(Select)] buttons to change the set values of the processing unit.



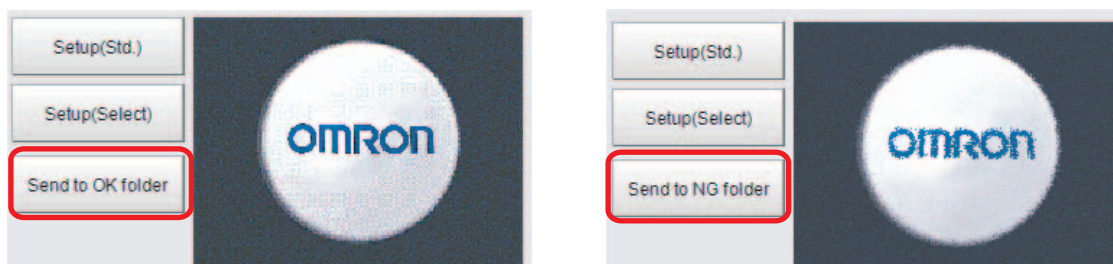
9 Repeat steps 5 to 8 to correct the set values corresponding to all causes of incorrect judgement.

10 Select [Execute batch measurement] to confirm that no images are incorrectly judged.

If there are still incorrectly judged images, repeat the same procedure until a re-measurement finds no incorrectly judged images.

Note

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



Updating the Reference Position

This section describes the use of a table to set or change the reference position for more than one processing unit that you specify in the measurement flow.

To open the Update Standard Position Tool, select [Update standard position tool] from the [Tool] menu.

Items That Can Be Updated with the Update Standard Position Tool

You can specify the following processing items.

- Search
- Sensitive Search
- Shape Search II
- Shape Search III
- EC Circle Search
- ECM Search
- Ec Corner
- Ec Cross
- Edge Position
- Scan Edge Position
- Circular Scan Edge Position
- Intersection
- Gravity and Area
- Labeling

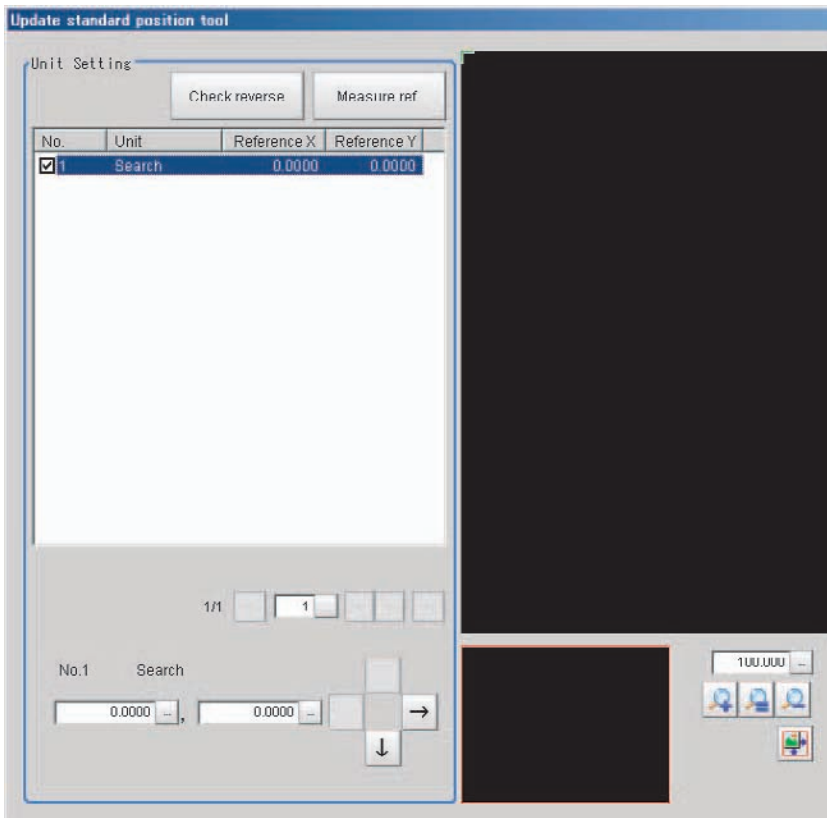
Operating Procedure for the Update Standard Position Tool

You can update the reference position for measurement items in the flow without the need to open the settings dialog box for each item.

For example, you can easily update the reference position that is updated frequently in an alignment application. To update the reference position, display the image to use as the reference in advance.

When you click the [Measure ref.] button, the Controller measures the reference for all units that are selected in the [Unit Setting] list and updates the reference position.

If you click the reference position in the window, or enter the coordinates as a numeric value, the reference positions for the selected units in the [Unit Setting] list are updated with this value.



To Cancel Updating

Click the [Cancel] button. You can return the reference positions to the values that were in effect before you opened this tool.

Note

Most of the measurement items automatically update their reference positions when the model or measurement area is changed.

If you need to change the reference position after it is updated, place the workpiece in the desired position, and then update the reference positions for all measurement units that you wish to change in the measurement flow.

Using the User Data Tool

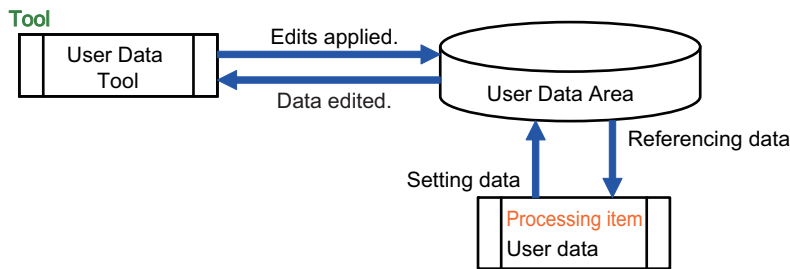
This tool is used to share data within the Controller.

The data set as user data is shared between scenes or scene groups. Data sharing across lines is not allowed in Multi-line Random Trigger Mode. The data variables that are created are stored in the user data region on the Controller.

Use the User Data Tool to edit data, specify initial values, and enter data comments.

Use the User Data processing item to set or reference the values in the data that you set with the User Data Tool.

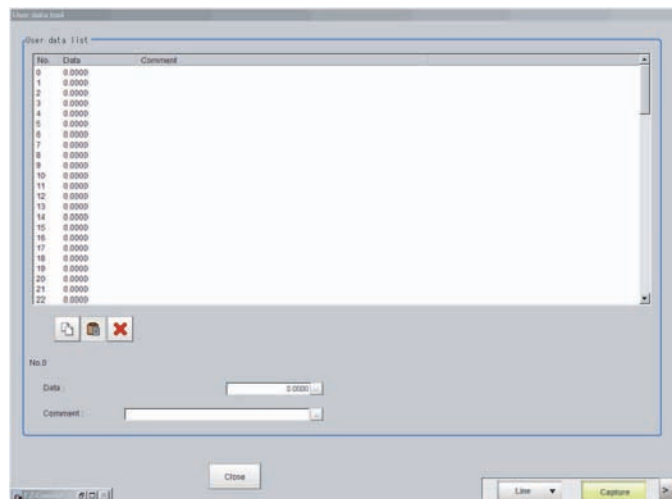
Refer to ► *User Data* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).



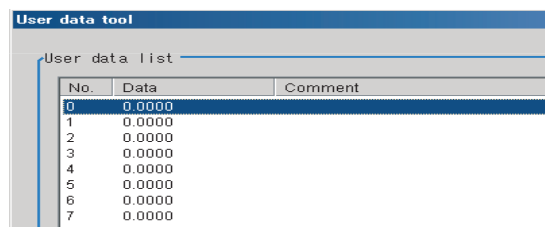
Setting Procedure for User Data

- 1 To set user data, select [User data tool] from the [Tool] menu in the Main Window.

The [User data tool] dialog box is displayed.



- 2 Click the data to set.

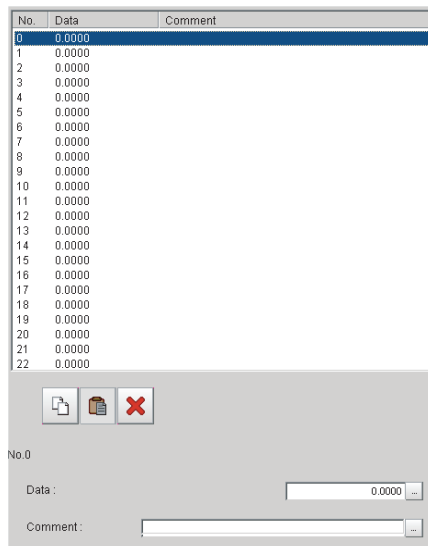


- 3 Set the default value for the data.

Item	Set value [Factory default]	Description
Data	-999999999.9999 to 999999999.9999 [0.0000]	Set the specified user data value.

4 Enter the comment for the data.

The entered comment will be displayed in the [Comment] column of the User Data processing item.



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

5 Repeat steps 2 to 4 to set the user data.

6 To stop the User Data Tool, click [Close].

7 Click [Data save] to save the specified user data to the Controller.

Creating Scene Group Data for More Than 128 Scenes

You can increase the number of scenes in a scene group to more than 128 scenes.
To start the Conversion Scene Group Data Tool, select [Conversion scene group data tool] from the [Tool] menu.

Overview

Normally, there are 128 scenes in a scene group.

For example, if you need to create scenes for each model and there are more than 128 models, you would normally create more than one scene group to manage the scenes.

However, you can use the Conversion Scene Group Data Tool to increase the number of scenes in a scene group to up to 1,024 scenes. A scene group data file (extension *.sgp) is used as the target data.

The ability to manage all of the scenes in one scene group even if there are more than 128 scenes simplifies the PLC control programming and data management.

IMPORTANT

If you increase the data size of a scene group, you may not be able to save the data in the Controller or load the data from a file, depending on the number of scenes and the settings.

If that occurs, change the measurement flow, separate the scene group, or otherwise reduce the data size of the scene group.

Note

For best results, organize the scenes in the scene groups before you use the Conversion Scene Group Data Tool. For example, arrange the scenes in the proper order, delete unnecessary scenes, and assign scene names.

Reference: ► Editing Scenes (p.61)

Using the Conversion Scene Group Data Tool

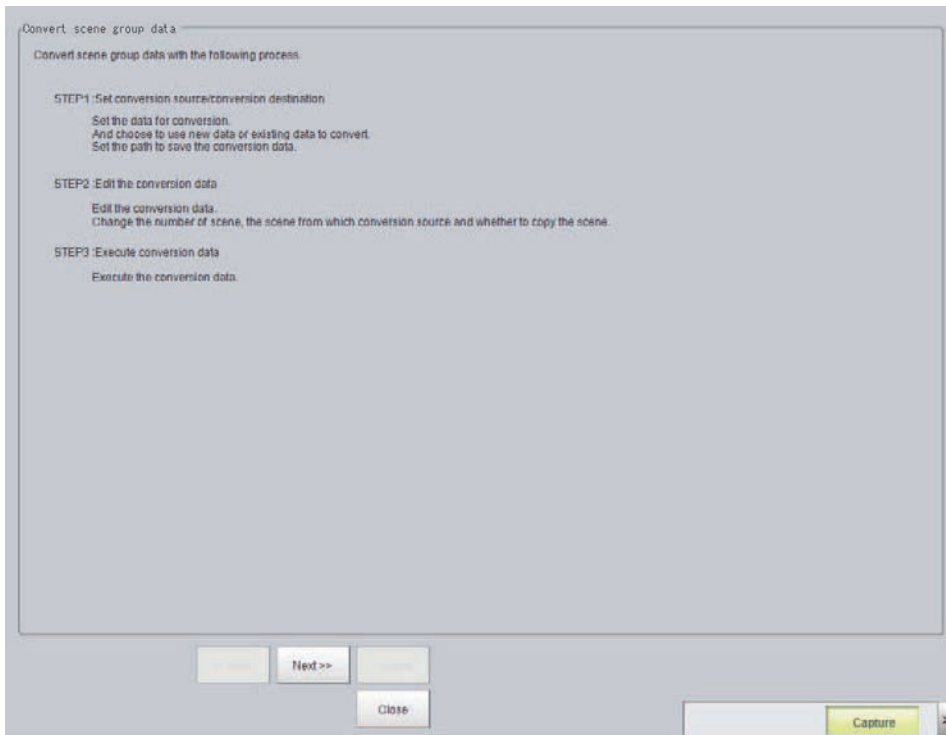
When you start the Conversion Scene Group Data Tool, the following dialog boxes are displayed in order.

You complete the following three dialog boxes as a progressive process that sets, edits, and converts the scene group data.

Step 1: Set the target data to convert.

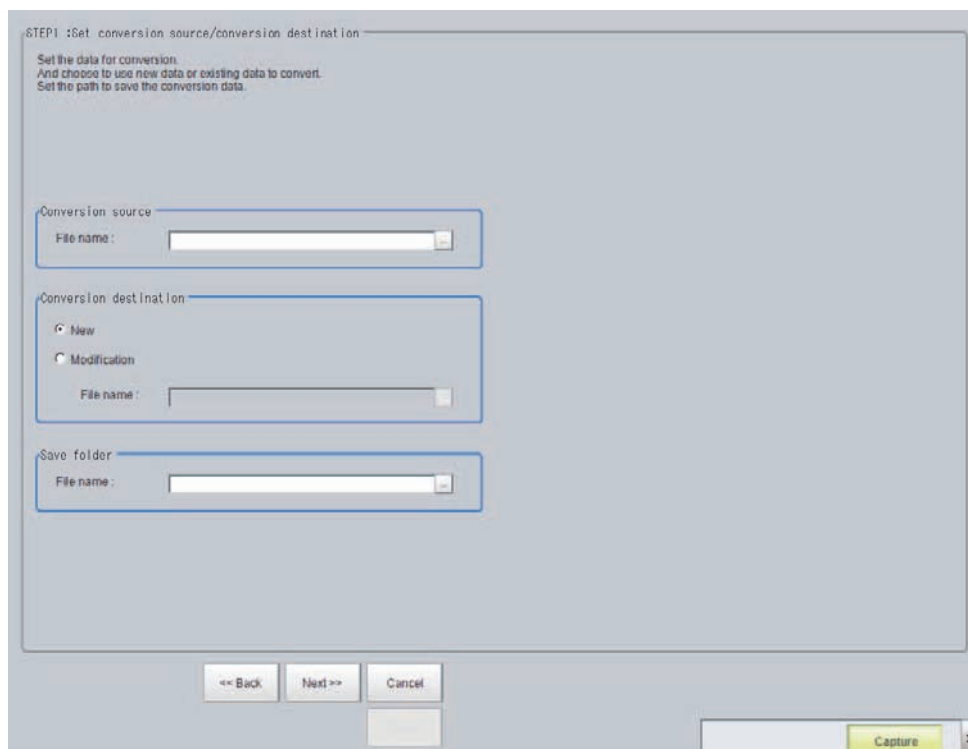
Step 2: Edit the data.

Step 3: Execute the conversion process.

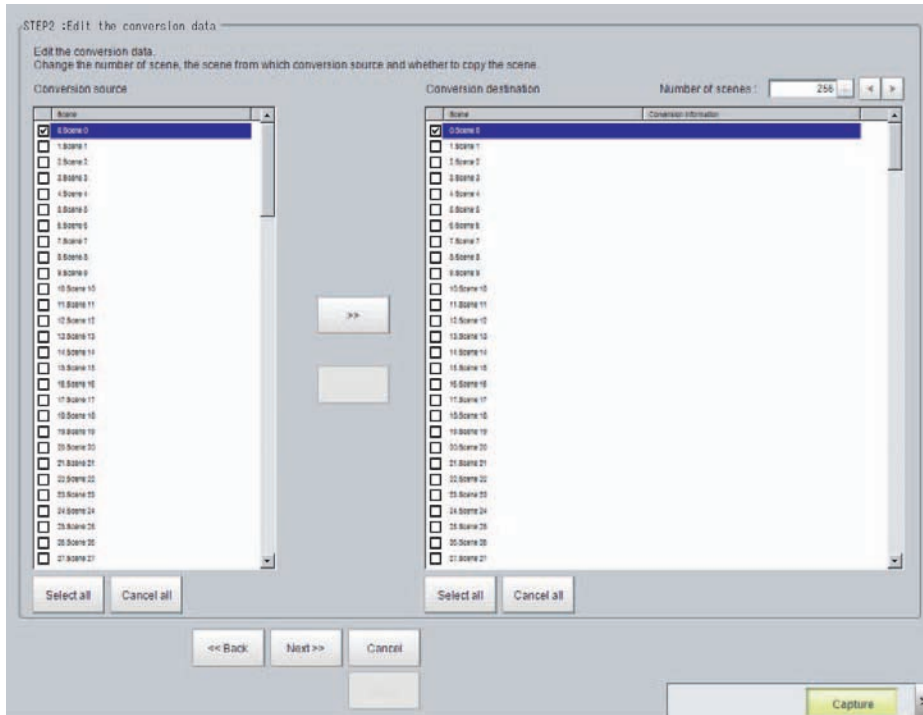


Use the following procedure and the guidance in the dialog boxes to perform the conversion process.

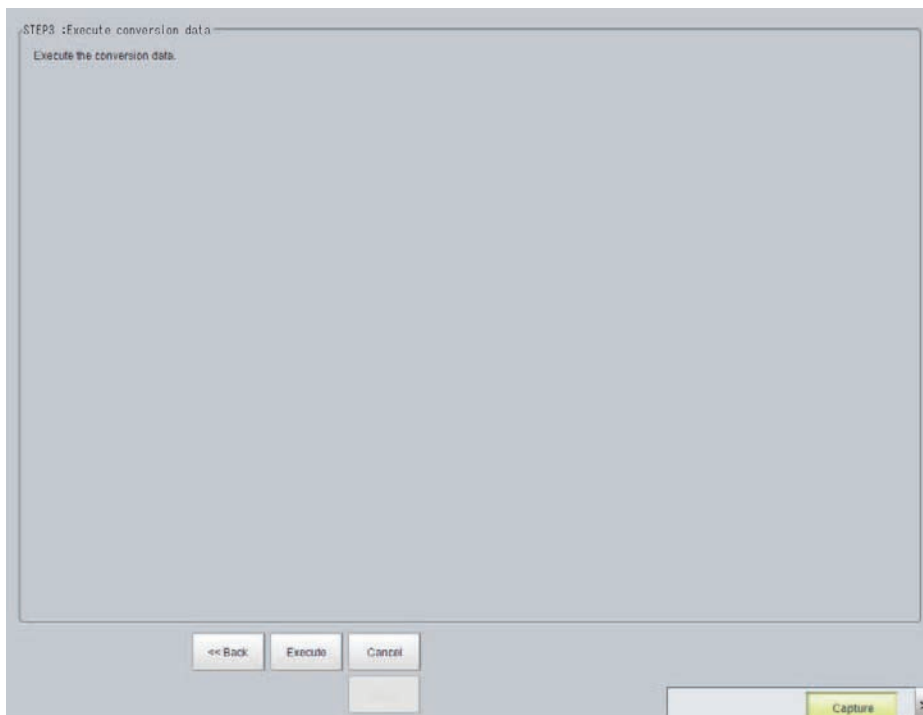
- 1** Select [Conversion scene group data tool] from the [Tool] menu.
The Conversion Scene Group Data Tool is started.
- 2** Click the [Load] button. The [STEP 1] dialog box is displayed.



- 3** Specify the target data file to convert, the destination data file, and the destination. Then click the [Next >>] button. The [STEP 2] dialog box is displayed.



- 4** Edit the scene in the converted scene group.
Click the [>>] button to copy the conversion source to the conversion destination. Click the [<<] button to copy the conversion destination to the conversion source.
When you are done editing, click the [>>] button. The [STEP 3] dialog box is displayed.



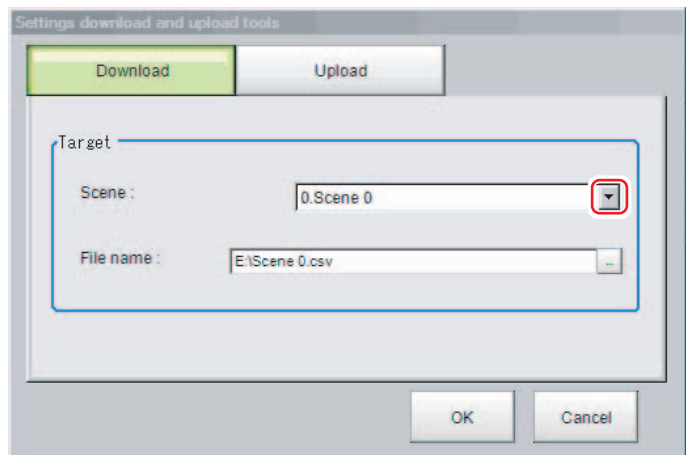
- 5** Specify the destination for the converted file, and then click the [Execute] button. A progress bar is displayed and the conversion is executed.

Outputting a List of Scene Data Set Values

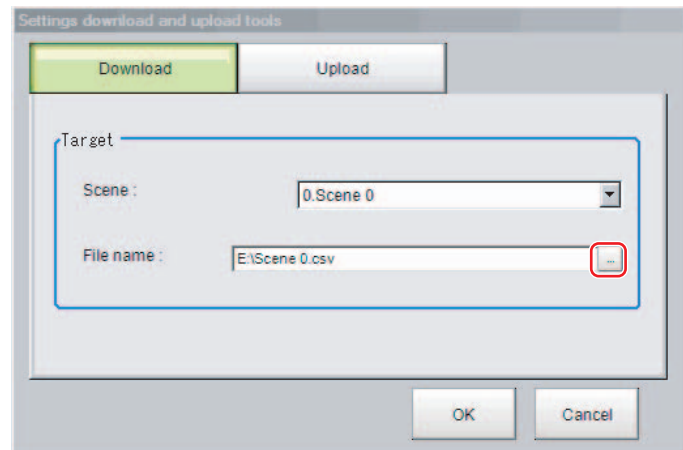
To create a list of the set values for scene data, use the Settings Download and Upload Tools. With the set value download function, the specified scene data set values can be output to a CSV file. Different set values in multiple scene data can be easily checked by opening the CSV files in an editor. (Only data that can be read and written can be downloaded.) The Setting Values Upload Tool allows you to upload a CSV file with confirmed set values.

Downloading Set Values

- 1 Change to the scene group that contains the scene with the set values to download.
- 2 When saving data to external memory, insert an external memory device into the Sensor Controller.
- 3 In the adjustment window (layout 0), select [Settings download and upload tools] from the [Tool] menu.
- 4 Click [Download] and select the scene with the set values to download.



- 5 Specify the save destination folder and file name, and click [OK].
- 6 Click [OK].
The data will be saved to the save destination.



About Downloaded CSV Files

The character code of the downloaded CSV file is Unicode (UTF-8). You can open this file with the Notepad in Windows. When using another editor to open the file, set the character code to Unicode (UTF-8).

The CSV file format is as follows:

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

Double-byte characters are enclosed in the double quotation marks (").

Refer to the individual processing items and the external reference tables in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for the parameters for all data. Only data that can be read and written can be downloaded.

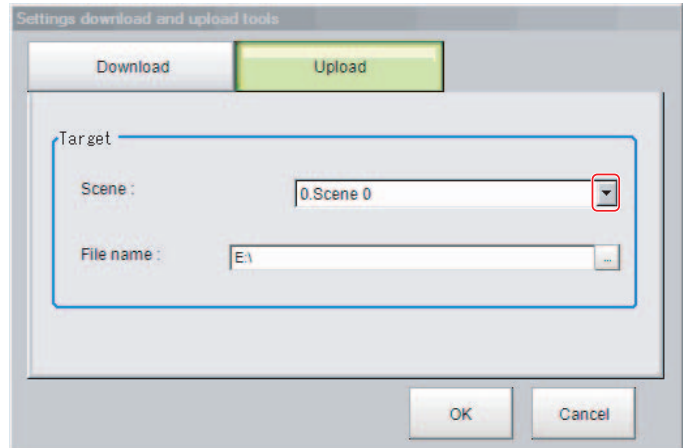
Output Example of CSV File:

SceneTitle	Scene 0	
#0	Camera image	Camera Image Input
#1	Search	Search
outputCoordinate	Output coordinates	0
calibration	Calibration	0
overallJudge	Reflect to overall judgement	0
searchMode	Search mode	0
rotation	With/without rotation	0
endAngle	Upper limit of the rotation angle	180
startAngle	Lower limit of the rotation angle	-180
angleSkip	Skipping angle	5
smartMode	Smart mode	1
stability	Stab.(CR)	12
accuracy	Prec.	2
searchSpeed	Stab.(PT)	3
referencePosX	Reference X	0
referencePosY	Reference Y	0
detectionPosX	Detection point X	0
detectionPosY	Detection point Y	0
subPixel	Sub-pixel	0
candidateLevel	Candidate Point Level	70
upperX	Upper limit of measure X	99999.9999
lowerX	Lower limit of measure X	-99999.9999
upperY	Upper limit of measure Y	99999.9999
lowerY	Lower limit of measure Y	-99999.9999
upperAngle	Upper limit of the angle	180
lowerAngle	Lower limit of the angle	-180
upperCorrelation	Upper limit of corr.	100
lowerCorrelation	Lower limit of corr.	60
savemdlimg	Save registered model	0
thersDetail	Candidate Point Level	75
sort	Sort condition	1
searchNo	Search No.	0
upperCount	Upper limit of count judgement	32
lowerCount	Lower limit of count judgement	0
isMulti	Multiple output	0

Uploading Set Values

Use the following procedure to upload the CSV file to which you downloaded the set values.

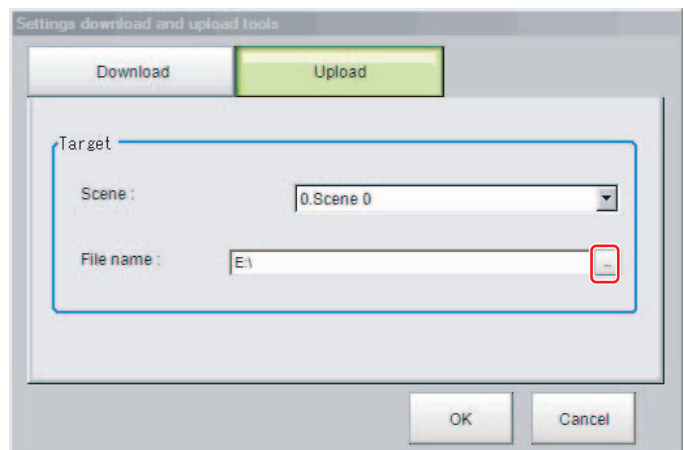
- 1** Change to the scene group that contains the scene with the set values to be uploaded.
- 2** When reading from external memory, insert an external memory device into the Sensor Controller.
- 3** In the Main Window, select [Settings download and upload tools] from the [Tool] menu.
- 4** Click [Upload] and select the scene with the set values to be uploaded.



IMPORTANT

To upload the file, set the character code to Unicode (UTF-8) with the Windows Notepad or another application, and save the file in CSV format.

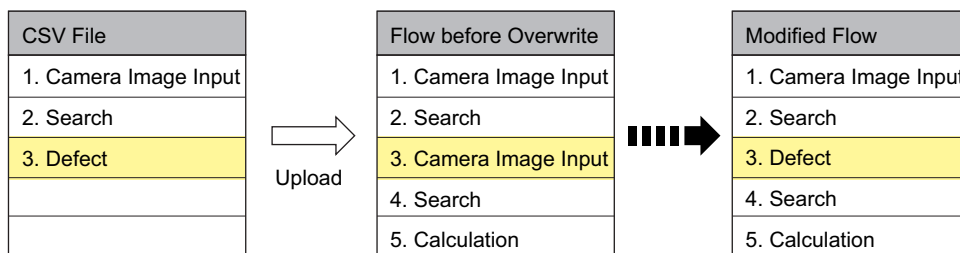
- 5** Specify the folder and the name of the file to be loaded, and click [OK].
- 6** Click [OK].
The data is uploaded.



IMPORTANT

- If data with fewer units than the scene data to be loaded is uploaded, the parts that do not exist in the CSV file will not change.

Example:



In this example, the processing item for unit 3 will be changed from Camera Image Input to Defects. The parts that do not exist in the CSV file (4. Search processing item and 5. Calculation processing item in the flow) will not change.

Saving Image Files to a RAM Disk or External Memory Device

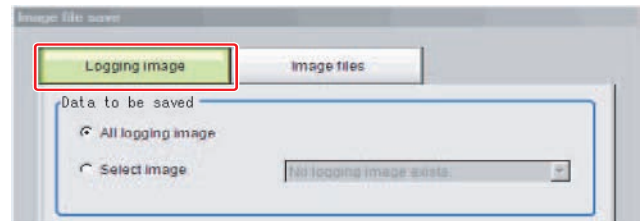
This section describes how to save logged images and image files that are saved in the Controller to a RAM disk or external memory device in the Controller. The storage format (bitmap or Jpeg) can be specified when the images are saved.

IMPORTANT

During saving, do not restart, turn OFF the power supply, or remove the external memory device. The data may be corrupted.

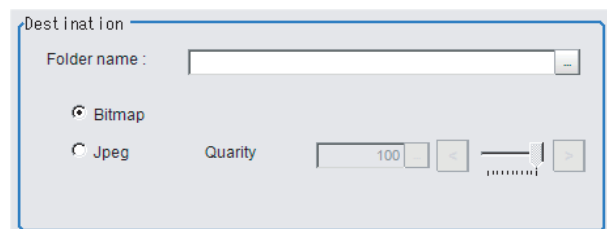
Saving Logging Images

- 1** When saving data to external memory, insert an external memory device into the Sensor Controller.
- 2** In the Main Window, select [Image file save] from the [Tool] menu.
The [Image file save] dialog box is displayed.
- 3** Click [Logging image] and select the logged image to save.



Parameter	Set value [Factory default]	Description
Data to be saved	[All logging image]	All logged images are saved.
	Select image	The selected logged images are saved. Click [▼] to select the image to save. When [Latest measurement] - [logging image] is selected, the save file name will be LoggingImage000.ifz.

- 4** Specify the destination folder name and file type.



Parameter	Set value [Factory default]	Description
Folder name	---	Specify the destination folder name.
Format	<ul style="list-style-type: none"> • [Bitmap] • Jpeg 	Select the image format in which to save the image.
Quality	0 to 100 [100]	Specify the quality of the Jpeg image to save

- 5** Click [OK].

The image is logged in the selected destination. If a file with the same name already exists in the destination folder, the newly saved file overwrites the old one.

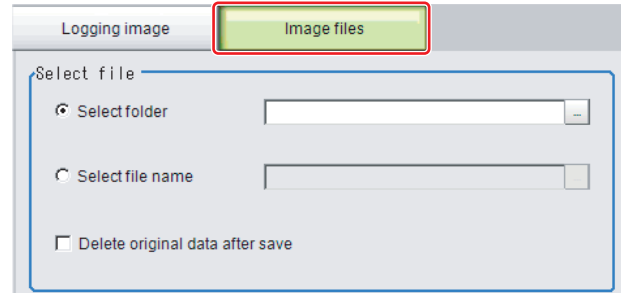
Saving Image Files

1 When saving data to external memory, insert an external memory device into the Sensor Controller.

2 In the Main Window, select [Image file save] from the [Tool] menu.

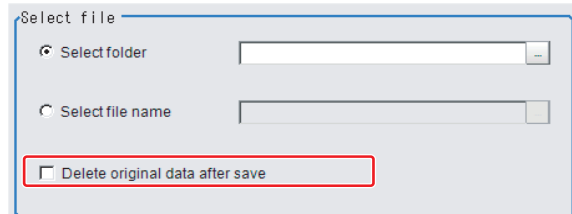
The [Image file save] dialog box is displayed.

3 Click the [Image files] tab to select the image files to save.



Parameter	Set value [Factory default]	Description
Select file	[Select folder]	Saves multiple files in a folder. Click the [...] button and specify the source folder to copy or move.
	Select file name	Saves the selected image file Click the [...] button and specify the file name.

4 To delete the source file after saving a copy to external memory, select [Delete original data after save].



5 Specify the destination folder name and file type.



Parameter	Set value [Factory default]	Description
Folder name	---	Specify the destination folder name.
Format	<ul style="list-style-type: none"> • [Bitmap] • Jpeg 	Select the image format in which to save the image.
Quality	0 to 100 [100]	Specify the quality of the Jpeg image to save

6 Click [OK].

The image is logged in the selected destination. If a file with the same name already exists in the destination folder, the newly saved file overwrites the old one.

Note

The save file name is the original file name and the extension.

Using the Registered Image Manager

You can save images used for model registration and reference registration as registration images and can reference them later and use them for re-registration and adjustment of reference positions. You can register the [Latest logging image], [Logging image], and [Image file].

IMPORTANT

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

Registering Images

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

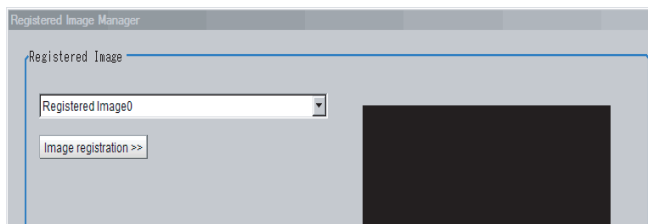
Registering Images

Use the following procedure to register images. You can register up to 1,000 images.

- 1 Insert a USB memory device into the Sensor Controller.**
- 2 In the Main Window, select [Registered Image Manager] from the [Tool] menu.**
The [Registered Image Manager] dialog box is displayed.

- 3 Select an index number for the image to register.**

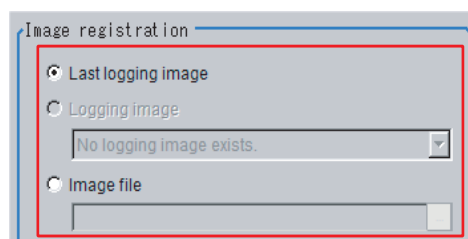
The number can be selected from 0 to 999.



Note

- If an image already exists, it will be displayed.
- If a number that has been assigned to an existing image is selected for the image to register, the existing image will be replaced by the new image.

- 4 Click the [Image registration>>] button.**
- 5 Select the image to register.**



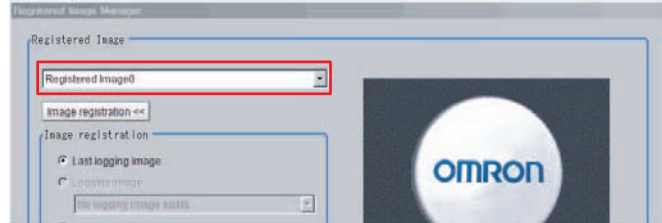
Parameter	Set value	Description
Image registration	Last logging image	Registers the most recent image used for measurements.
	Logging image Registration	Registers a logged image that was saved in the main memory. Click [▼] to select the image to register.
	Image file	Registers an existing image file.

- 6 Click the [Registration] button.**
In step 3, if you select a registered image number that is already registered, an overwrite confirmation dialog box is displayed. If you want to replace the existing image with a new image, click [Yes].
- 7 Click the [Image registration<<] button.**

Deleting Images

Use the following procedure to delete registered images.

- 1 In the Main Window, select [Registered Image Manager] from the [Tool] menu.**
The [Registered Image Manager] dialog box is displayed.
- 2 Click the [Image registration>>] button.**
- 3 Select the registered image number of the image to delete.**



Note

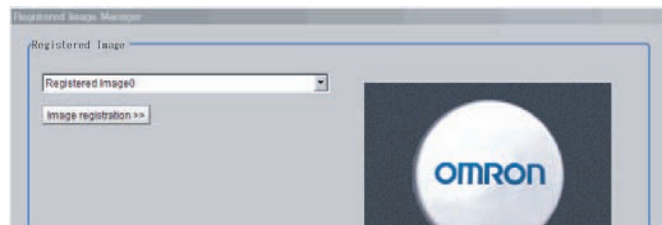
When more than one image is included in the registration images, click the [<<] or [>>] buttons under the Preview Area as necessary to move forward or back to the desired image.

- 4 Click the [Delete] button.**
A deletion confirmation dialog box is displayed.
- 5 Click [Yes].**
The selected image is deleted.
- 6 Click the [Image registration<<] button.**

Loading an Image

A registered image can be loaded as a measurement image.

- 1 In the Main Window, select [Registered Image Manager] from the [Tool] menu.**
The [Registered Image Manager] dialog box is displayed.
- 2 Select the registered image number of the image to load.**



Note

When more than one image is included in the registration images, click the [<<] or [>>] buttons under the Preview Area as necessary to move forward or back to the desired image.

- 3 Click the [Read] button.**
The selected image is loaded as a measurement image.
The [Registered Image Manager] window is closed and the display returns to the Main Window.

Using Accounts

You can restrict access to the Sensor Controller for specific users and user groups. Because you can set a password for each user and can enable or disable operations for each user group, you can flexibly manage users to match the way they use the system, for example system administrators, onsite managers, and system operators.

It is also possible to link to the operation log and get operation records for the currently logged-in user.

Setting Accounts (Account List)

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

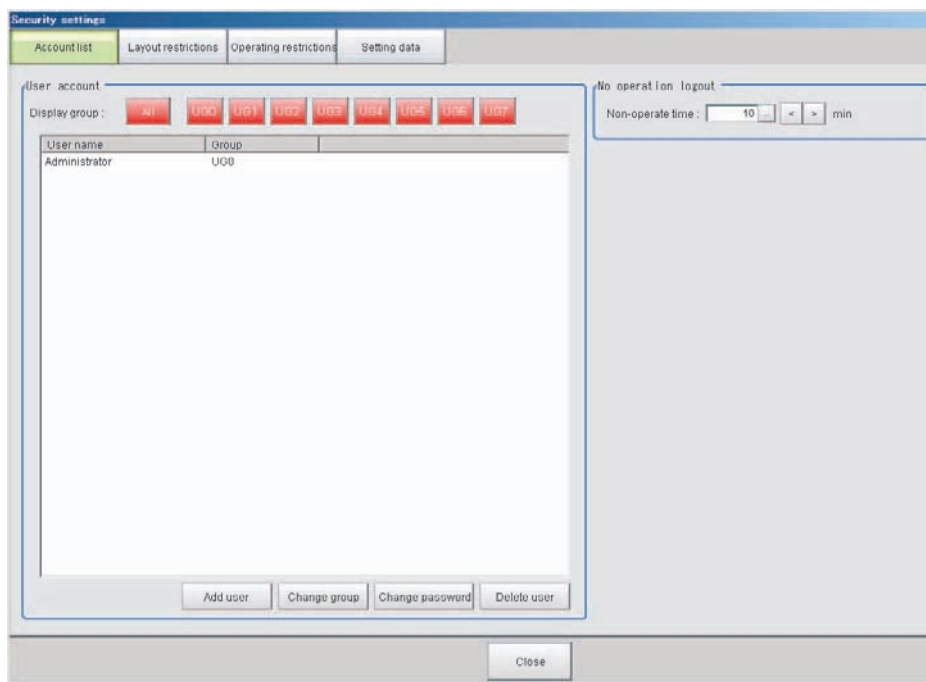
IMPORTANT

In order to add, edit, or delete a user account, you must be logged in with a user account belonging to group UG0. The default user name and password are both "Administrator".

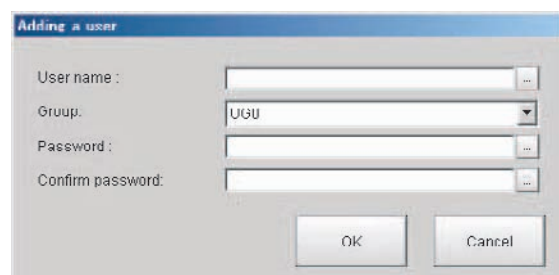
Adding Accounts

Use the following procedure to add a user account.

- 1** In the Main Window, select [Security settings] from the [Tool] menu.
The [Security settings] dialog box is displayed.
- 2** Click [Account list] in the Item Tab Area.



- 3** Click the [Add user] button.
- 4** Set the user information.



Parameter	Description
User name	Enter a user name of 1 to 20 single-byte alphanumeric characters. The names are case sensitive.
User group ID	Select the user group (UG0 to UG7) to which the user being added will belong. If you select [UG0], the user can use all functions. Reference: ► Setting User Group Operation Restrictions (p.150)
Password	Enter the login password for the user being added. The password for the new user must have one or more characters. The password for a transferred user may also be 0 characters.
Confirm password	Enter the login password again.

5 Click [OK].

The user account is added and displayed in the user account list.

Editing an Account

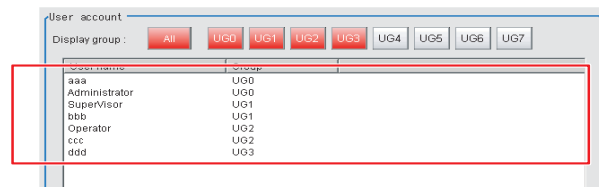
Use the following procedure to change the user group or password for the user account.

1 In the Main Window, select [Security settings] from the [Tool] menu.

The [Security settings] dialog box is displayed.

2 Click [Account list] in the Item Tab Area.

3 Click the user to change the user group or password for.



4 Click the [Change group] button or the [Change password] button.

5 Change the user group or password.

6 Click [OK].

The user information is changed.

Deleting an Account

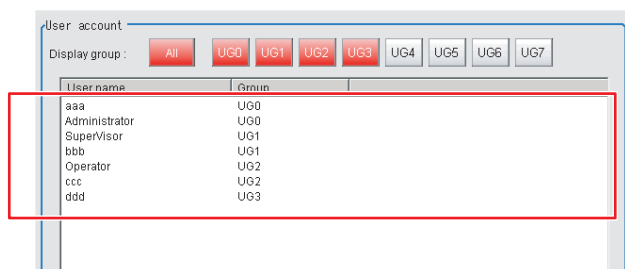
Use the following procedure to add a user account.

1 In the Main Window, select [Security settings] from the [Tool] menu.

The [Security settings] dialog box is displayed.

2 Click [Account list] in the Item Tab Area.

3 Click the user to delete.



4 Click the [Delete user] button.

A confirmation message is displayed.

5 Click [Yes].

The user account is deleted.

Setting Automatic Logout

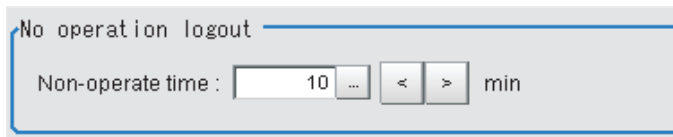
Use the following procedure to set the length of time before an account is automatically logged out when no operation is performed.

- 1 In the Main Window, select [Security settings] from the [Tool] menu.**

The [Security settings] dialog box is displayed.

- 2 Click [Account list] in the Item Tab Area.**

- 3 In the [No operation logout] area, set the non-operation time.**



Parameter	Set value [Factory default]	Description
Non-operate time	1 to 999 [10]	Set the length of time before an account is automatically logged out when no operation is performed. Set the time in minutes.

Setting Layout Restrictions

Set the right to change the layout for each user group.

You can restrict the functions that can be used by each user group.

The layouts that can be restricted are as follows:

Security setting items
Use of layout 0
Use of layout 1
Use of layout 2
Use of layout 3
Use of layout 4
Use of layout 5
Use of layout 6
Use of layout 7
Use of layout 8
Switch layout
Layout modification
Layout setup

- 1 In the Main Window, select [Security settings] from the [Tool] menu.**

The [Security settings] dialog box is displayed.

2 Click the [Layout restrictions] tab in the Item Tab Area.



3 The layout restriction settings are changed.

4 Click the [Close] button.

Setting User Group Operation Restrictions

You can restrict the functions that can be used by each user group.

You can set restrictions for the following items.

Security setting item
End
Measure
Scene switch
Scene maintenance
Edit flow
Clear measurement
Clear logging image
Screen capture
Save last logging image
Data save
Save to file
Load from file
System initialization
System restart
Transfer data
Nonstop data transfer
Start/stop of operation log
System information
NG analyzer
System settings
Registered image management
Customize I/O command
Unit setting mode starting
Nonstop adjustment mode starting
Image window layout setting

Security setting item/
Information window setting
Tool button setting
Image container window setting
Flow window setting
Image window setting
Text window setting
Error window setting
Output
Continuous meas.
Select image
Auto Re-meas.
The Judgement result monitor
Re-meas.
LCD off
User data tool
Setting download and upload tools
Image file save
Flow Viewer
Calibration support tool
Update Standard position tool
Conversion scene group data tool
Custom dialog tool
Custom dialog

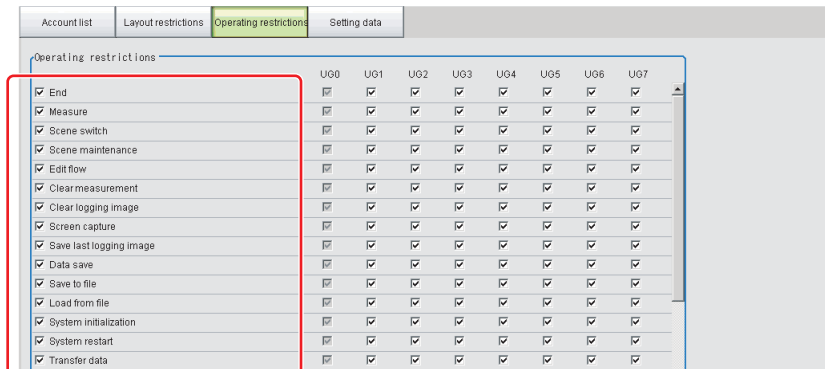
1 In the Main Window, select [Security settings] from the [Tool] menu.

The [Security settings] dialog box is displayed.

2 Click the [Operating restrictions] tab in the Item Tab Area.

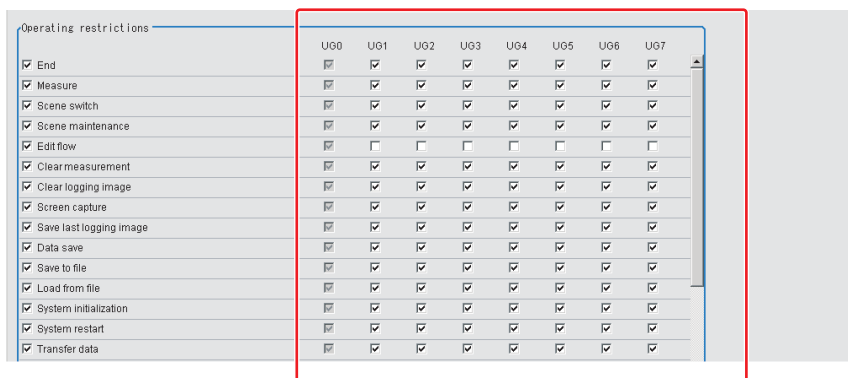
3 Select the operations to restrict.

Operations that are not selected are not restricted.



4 Select the operations to be permitted by user groups (UG1 to UG7) on the right side

Operations that are not selected cannot be used by users belonging to that group.



5 Click the [Close] button.

Operation restrictions are set for the user groups.

Saving/Loading/Deleting the Security Settings

You can save user account and user group settings (security settings). You can load or delete saved settings. Account setting data is not included in BKD files.

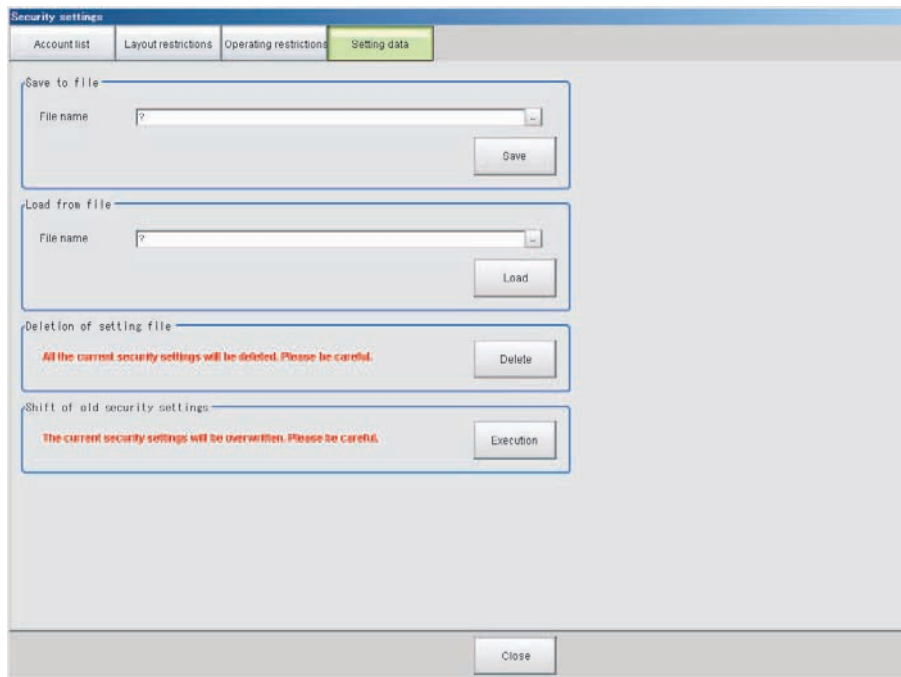
Saving Security Settings

You can save user account and user group settings to a RAM disk or an external memory device.

IMPORTANT

- During data transfer to external memory, do not remove the external memory device until the transfer is completed. Data and the external memory may be corrupted.
- Timing for Saving Data in the Controller
Data is saved to the Controller only when the [Security setting] dialog box is closed with the [Close] button. When the login window is ended by selecting [Cancel], data is not saved to the Controller. The set contents or loaded contents are cleared by when the Controller is restarted.
- Remote Operation Security
The security settings are synchronized, but for users who are logged in, the security settings are managed separately on the local side and remote side. Therefore, even if users are logged in on the local side, they must log in again on the remote side.

- 1** When saving data to external memory, insert an external memory device into the Sensor Controller.
- 2** In the Main Window, select [Security settings] from the [Tool] menu.
The [Security settings] dialog box is displayed.
- 3** Click the [Setting data] tab in the Item Tab Area.



- 4** Specify the destination folder and file name in the [Save to file] area.
- 5** Click the [Save] button.

Loading Security Settings

Use the following procedure to load a saved user account and user group settings into the Sensor Controller.

- 1** If the settings were stored in external memory, insert the external memory device containing the security settings to load into the Sensor Controller.
- 2** In the Main Window, select [Security settings] from the [Tool] menu.
The [Security settings] dialog box is displayed.
- 3** Click the [Setting data] tab in the Item Tab Area.
- 4** Select the file to load from the [Load from file] area.
- 5** Click the [Load] button.

Deleting Security Settings

Use the following procedure to delete saved user accounts and user groups settings.

IMPORTANT

The current security settings are all deleted.

- 1 In the Main Window, select [Security settings] from the [Tool] menu.**
The [Security settings] dialog box is displayed.
- 2 Click the [Setting] tab in the Item Tab Area.**
- 3 Click the [Delete] button in the [Deletion of setting file] area.**
The security settings are deleted and the following message is displayed.
"User info logging in was changed now. Please log in again."
- 4 Click [OK].**
The [Login] dialog box is displayed.
Enter the default user and password "Administrator".
If the login dialog box is canceled, the [Security setting] dialog box is closed.

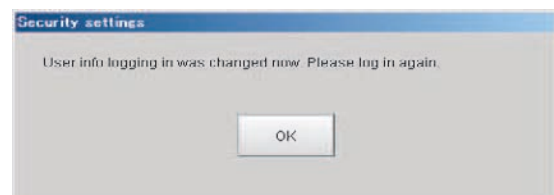
Transferring Old Security Settings

Password settings that were made in FZ4 version 4.12 or earlier can be inherited.

IMPORTANT

This procedure will overwrite the current security settings.

- 1 In the Main Window, select [Security settings] from the [Tool] menu.**
The [Security settings] dialog box is displayed.
- 2 Click the [Setting] tab in the Item Tab Area.**
- 3 Click the [Execution] button in the [Shift of old security settings] area.**
The confirmation message, "The settings will be transferred and saved in the Controller. OK?" is displayed.
- 4 Click [Yes].**
The security settings are changed.
- 5 Click [OK].**
Enter the user name and password to log in again.



Changing between User Accounts

After a user account is set up, you can log in and log out with the registered user account. If you try to execute an operation you do not have the right to use, the login dialog box is displayed even though you are already logged in. In that case, log in with a user account that has the right to execute that operation.

Logging in

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



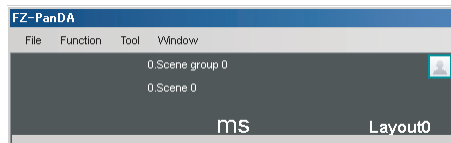
Logged out



Logged in

1 Click the [Login] icon in the Measurement Information Display Area.

The [Login] dialog box is displayed.



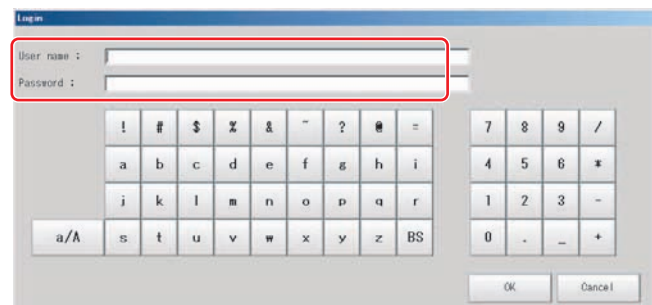
2 Enter the user account and password.

If the login fails, “The user name or the password is wrong” is displayed.

Enter the correct user name and password.

3 Click [OK].

The login icon switches to the logged-in state.



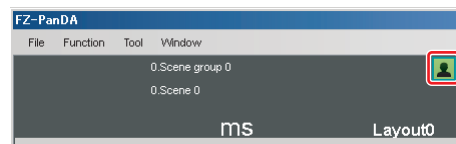
Logging Out

Note

- If an automatic logout time is set, you will be automatically logged out if you do not perform any operations at all for the set time period.
- If you do not perform any operation, such as changing the display, after an automatic logout, the [Login] icon will still appear in the logged in state.
The icon display will be updated if you change from the Main Window to a settings dialog box or an operating dialog box, or if you change to another layout.

1 Click the [Login] in the Measurement Information Display Area.

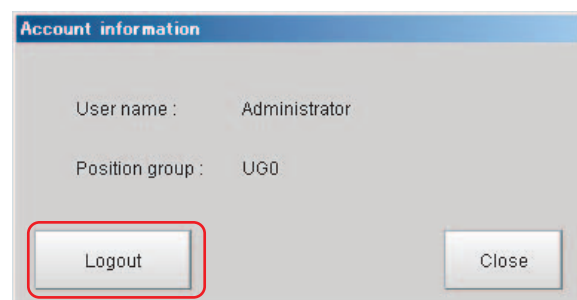
The [Login] dialog box is displayed.



2 Click the [Logout] button.

3 Click [OK].

The login icon changes to the logged-out state.



Remotely Operating the Controller (Remote Operation)

Overview

You can remotely edit the processing items that are performed by the Controller or remotely perform actual measurements on the Controller from a network computer. This function is enabled only with Ethernet connection.

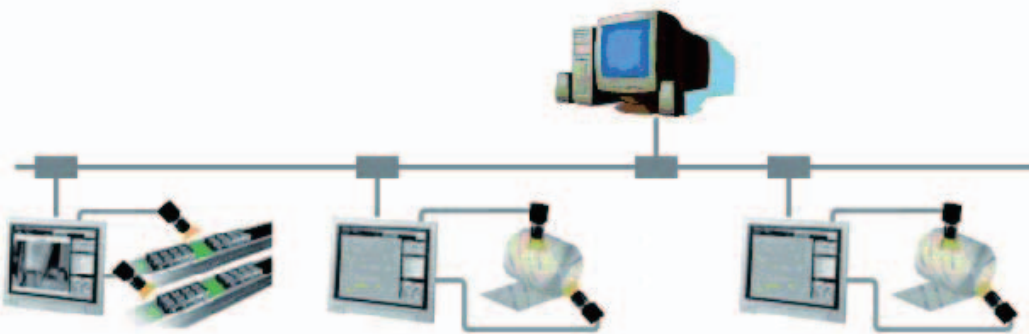
Contact your OMRON sales representative to obtain a copy of the FZ_FH Remote Operation Tool CD-ROM.

IMPORTANT

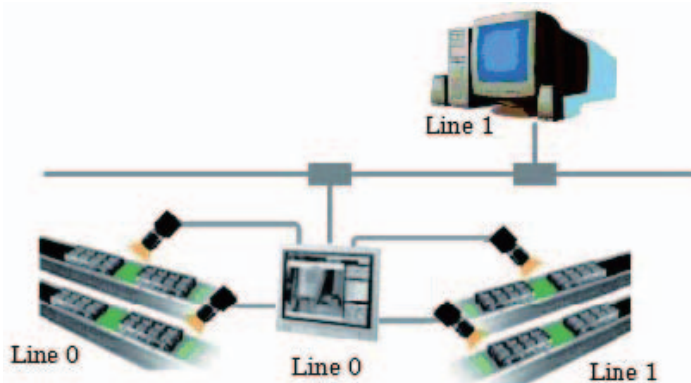
A Controller window cannot be operated or displayed simultaneously on multiple PCs on the network.

For example, the function can be used as follows.

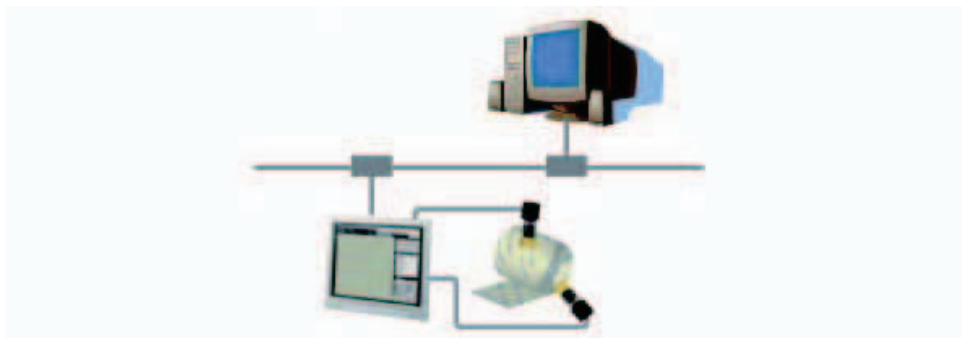
- (1) GUI operations, such as editing multiple inspection and measurement line processing items and changing the settings, can be performed by a single dedicated PC.



- (2) Two measurement windows in Multi-line Random Trigger Mode can each be operated from a different window.



- (3) In the non-stop adjustment mode, adjustments can be made remotely without having to stop the line measurement.



Note that the physical storage location of the data, such as the set data and the data save location, is on the Controller side.

Operation Environment Condition

The following is required on both the Controller and on the remote operation PC to start the remote operation.

- **Controller side = Set up a server to achieve the remote operation.**
- **Remote operation PC side = Prepare a communications environment and a GUI environment for remote operation.**

Install FZ_FH 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, or Windows 7 Professional 32-bit edition
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.

IMPORTANT

For remote operation, use the following ports on the PC to communicate with the Sensor Controller.

9900 + Line number (e.g., port 9900 for line 0)

9910 + Line number (e.g., port 9910 for line 0)

9920 + Line number (e.g., port 9920 for line 0)

Line Numbers: FH: 0 to 7, FZ5: 0 or 1

If you cannot use these ports due to security settings of your PC or the domain security policies, you will not be able to perform remote operation.

Either change the settings of the PC firewall or security software or contact your domain security administrator.

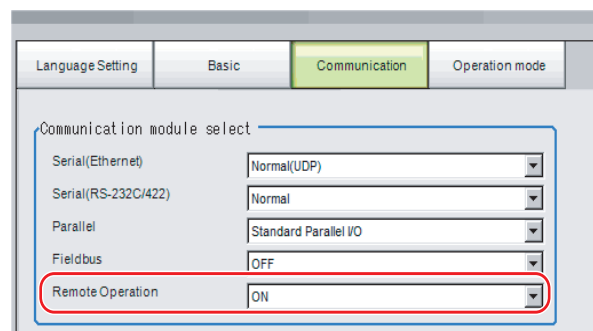
Set the network

Specify the network settings on both the Controller and the remote operation PC.

In the Communications Module, specify the module by serial (Ethernet) and enter the IP address.

1 Set the Communications Module.

In the Main Window, select [System settings] – [Startup] – [Startup settings] from the [Tool] menu, and then select [ON] for Remote Operation in the Communications Module Area.

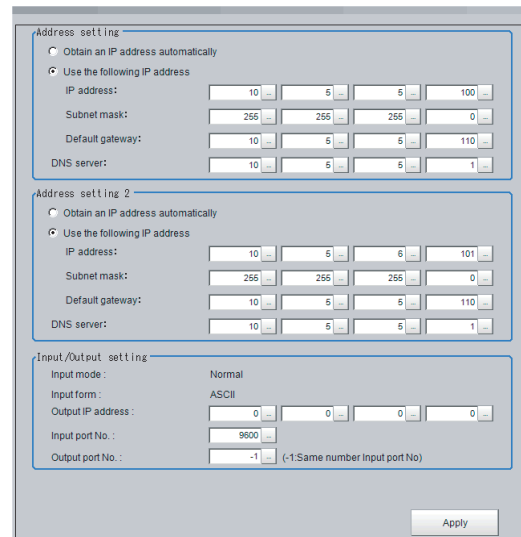


2 Click the [Data save] button to save the settings, and then restart the Controller.

3 Set the IP address.

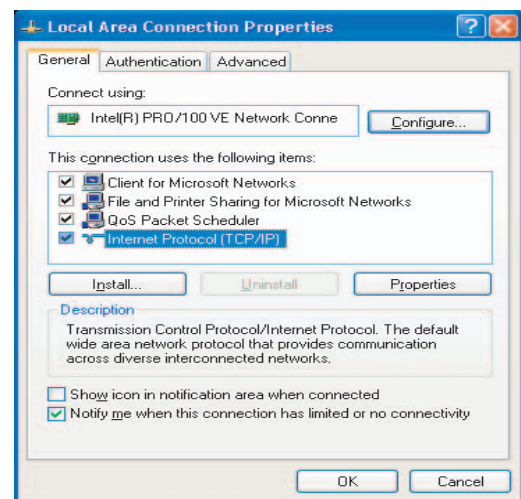
In the Main Window, select [System settings] – [Communications] – [Ethernet (****)] from the [Tool] menu, and then set the IP address.

*1: The “(****)” shows the [Serial (Ethernet)] setting that was set in [Communications] in step 1 above.

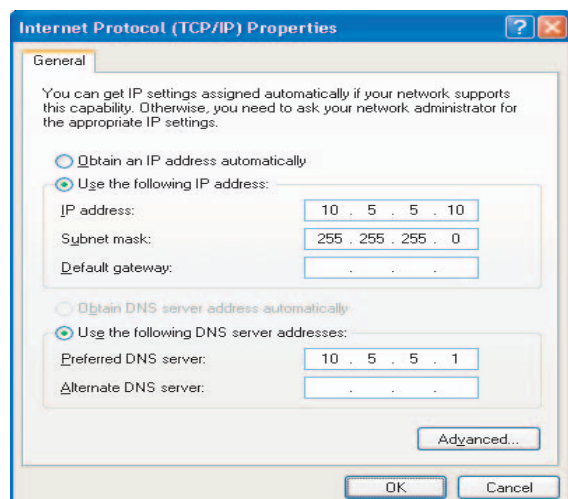


Next, specify the IP address of the remote operation PC.

Open the local area connection properties on the remote operation PC.



Enter the IP address.



How to Start

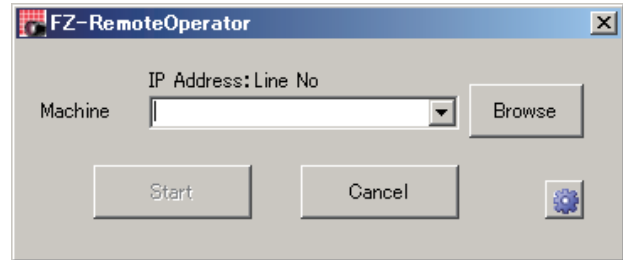
- 1 From the Start button located in the lower left area of the window of the remote operation PC, select [Start] – [All Programs] – [OMRON] – [FZ_FH Simulator] and then select and launch [FZ_FH Remote Operation Tool].

Note that a window that can be measured must be displayed on the Sensor Controller.

IMPORTANT

Do not connect or disconnect [FZ_FH Remote Operation Tool] when a measurement is being performed or the system is running.

- 2 In the dialog box displayed by [FH-RemoteOperator], select or directly enter the IP address and the "Line No" of the Controller to be connected. Press [Browse] to find the IP address and the line number of the Controller that can be connected.




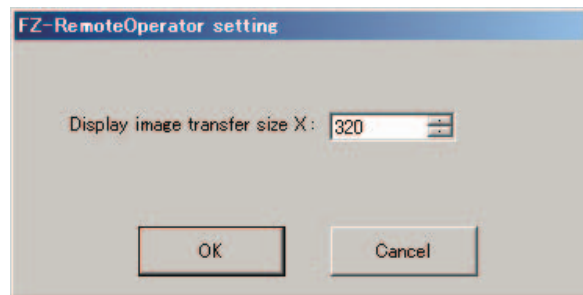
* The "Line No" selected here is one of the following based on the system's operation mode.

Operation mode		Setting
High-speed logging mode		Line No = 0
Parallel-operation 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*1	Line 0 side	Line No = 0
	Line 1 side	Line No = 1
	Line 2 side	Line No = 2
	Line 3 side	Line No = 3
	Line 4 side	Line No = 4
	Line 5 side	Line No = 5
	Line 6 side	Line No = 6
	Line 7 side	Line No = 7

The Sensor Controller cannot be connected if a line number other than above is specified.

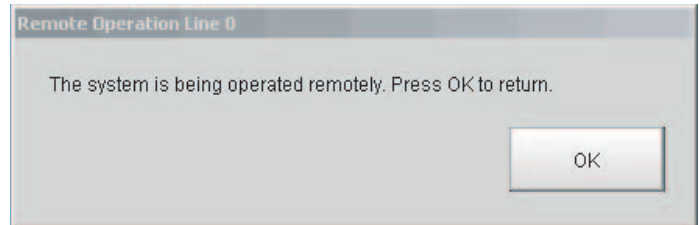
*1: The FZ5 Sensor Controller always has two lines (lines 0 and 1), and the FH Sensor Controller allows you to select as many as eight lines. Set the line numbers based on the number of lines that are set for the Sensor Controller.

- 3 As necessary, change the size of the image to transfer for the remote operation. Select () to set.

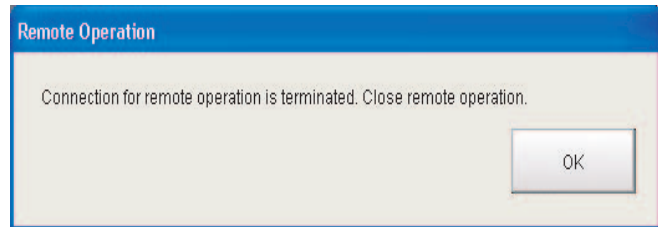


Description	Set value [Factory default]	Description
Display image transfer size (Size of the image to transfer)	4 to 640 [320]	This sets the size of the image to display on the remote operation window.

4 Press the [Start] button. Once a remote operation is established, the remotely operated dialog box is displayed on the Sensor Controller.



Click the OK button on this dialog box to terminate the remote operation from the Sensor Controller. The dialog box on which the remote operation is disconnected is displayed on the remote operation PC.



Note

When either the remote operation PC or the sensor controller is changed to Layout 8 by layout switching, operation on the sensor controller will be possible during remote operation. Note the following when using this feature:

- Switch either the remote operation PC or the sensor controller to Layout 8 with layout switching, not both. If the layouts of both are changed to Layout 8, operation on the sensor controller will not be possible during remote operation and only normal remote operation can be executed.
- The layout can be changed to Layout 8 during remote operation. After changing to Layout 8 on the remote operation PC, close the remotely operated dialog box on the sensor controller. Operation on the sensor controller will be possible while remote operation continues. To exit remote operation from this state, exit the FZ_FH Remote Operation Tool on the remote operation PC.
- In Layout 8, an error dialog is not shown when an error occurs and instead an error string appears in the Error Pane. If an error occurs, check the error in the Error Pane.
- In Layout 8, only the panes below can be used in Layout Modification Mode. To use panes other than these, use a layout other than Layout 8 and execute normal remote operation.
 - Flow Display Pane
 - Image Pane
 - Judgment Pane
 - Error Pane

Differences from Local Operation and Limitations

There is no fundamental difference between local operation on the Sensor Controller and a remote operation. The remote operation PC windows, however, are not the windows of the Sensor Controller themselves, and thus, the following types of operational differences can be caused.

Major differences are listed as follows:

Functions to be noted	Description	
	Sensor Controller side	Remote operation PC side
Controller restart	Automatically restart	The Controller automatically restarts, while the remote operation PC waits to be shut down manually.
Operation mode	All modes can be executed.	All modes, except for the single-line high-speed mode, can be executed.
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.
Macro, Macro Calculation, Customize I/O Command	Program editing is allowed.	Program editing is not allowed.
Number of Image Panes	24 max. (Image Pane numbers 0 to 23)	16 max.

IMPORTANT

- The remote recovery dialog box may be hidden behind a window in the non-stop adjustment mode and the multi-line random trigger mode, both of which contain two windows. Press [Alt+Tab] to switch between the windows.
- The remote operation communications will be disconnected if a network setting (such as the IP address, subnet mask, and default gateway) on the Sensor Controller is modified using the remote operation function. Restart FZ_FH Remote Operation Tool to establish the connection again. The connection may fail immediately after a network setting has been changed. Please wait for a while before reconnecting.

Using Customer Communications Commands

You can define your own communications commands for the Sensor Controller.

You use this to create functionality that is not available in the standard communications commands, or to perform more than one process with a single communications command.

Example: To tell the Controller to change scenes and then execute a measurement from an external device.

Without using custom communications commands	Using custom communications commands
You must send two standard communications commands: the Switch Scene command (scene) and the Measurement command (measure).	Create a measurement command (mymeasure) that is set to execute scene switching followed by measurement processing. One execution of the mymeasure command actually executes two commands, the scene command and measure command, which simplifies the control logic from the PLC or other external device.

User-defined communications commands are registered as a character string of the command name for the non-procedure communications protocol, or as a command number from 0 to 255. These commands are stored in the main memory of the Sensor Controller.

If you send a registered communications command from the external device to the Sensor Controller, the Sensor Controller recognizes it and performs the specified processing.

Specifying Custom Communications Commands

The specified custom communications command is sent from an external device to the Sensor Controller. The method that you use to specify a command depends on the communications protocol.

Non-procedure Protocol

Specify the name of the command as an ASCII character string.

Send the ASCII character string as *Command_name* + (space) + *Numeric_value*.

*1: If you intend to use standard commands, do not use an existing command name.

Example: Specifying the Command Name “mycommand” with a Numeric Value of 18 as the Argument.

Send “mycommand 18”.

Using the Parallel Interface

Specify the command number from 0 to 255 as a binary number.

Specify the command number with the seven bits from DI0 to DI6.

Then, turn ON the Command Execution Bit, DI7. Because the command must be specified with seven bits, the method differs as shown below for command numbers 0 to 127 and command numbers 128 to 255.

- **For 0 to 127: Specify the number as is with the seven bits from DI0 to DI6.**

Example: For command number 120, the binary notation for decimal 120 is 011 1000. Set each bit as follows: DI6: 0, DI5:1, DI4: 1, DI3: 1, DI2: 0, DI1:0, DI0: 0. Then, after 1 ms, change DI7 from OFF to ON to execute the command.

- **For 128 to 255:** Use the terminal offset command **DIOFFSET** to add the difference from 0 to 127 with the seven bits from **DI0** to **DI6**.

Example: For command number 150, the binary notation for 150 is 1001 0110, which requires eight bits. In this case, you use the terminal offset command **DIOFFSET** to add, for instance, half of 150, or 75. Then you can use **DI0** to **DI6** to specify the remaining 75. This procedure is given below.

- 1** Send “**DIOFFSET 75.**”
- 2** The binary notation for decimal 75 is 100 1011. Set each bit as follows: **DI6: 1, DI5:0, DI4: 0, DI3: 1, DI2: 0, DI1:1, DI0: 1**. Then, after 1 ms, change **DI7** from OFF to ON to send the command.
- 3** Send “**DIOFFSET 0.**”
(0: OFF 1: ON)

- **Using PLC Link, EtherCAT, or EtherNet/IP (Except for the Non-procedure Protocol and Parallel Interface)**

Specify the command number from 0 to 255 as a hexadecimal number from 00 to FF hex to represent the command code (CMD-CODE).

Specify the command code in order from the upper digits to the lower digits of the hexadecimal number.

This corresponds to the upper word address and the lower (smaller) word address in the I/O memory in the PLC. In this case, the highest number is FF hex, so we specify a number from 00 to FF hex to the first word in the Command Area + 2, and 0000 hex to the first word in the Command Area + 3.

Example: For command number 120, the hexadecimal notation is 0078 hex. Specify 0078 hex in the first word in the Command Area + 2, and 0000 hex in the first word in the Command Area + 3.

Setting Procedure for Custom Communications Commands

You can create and edit custom communications commands.

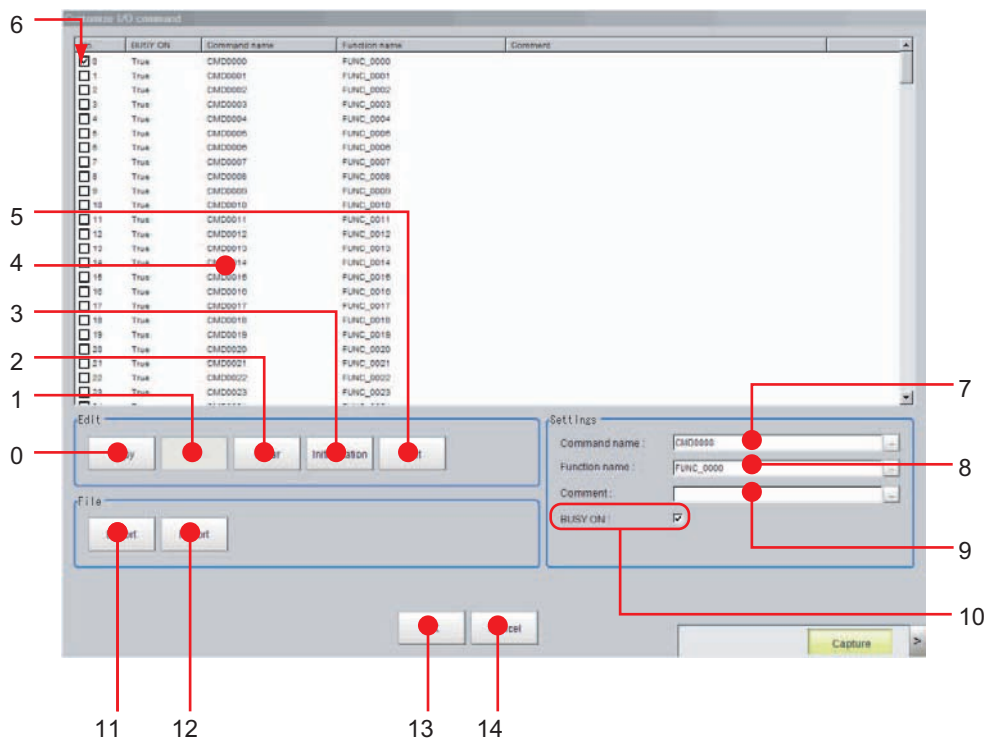
You can create up to 256 (from 0 to 255) custom communications commands.

- Set whether the BUSY flag should be turned ON (TRUE) or OFF (FALSE) when a custom communications command is in execution.
- Edit the processing contents for all custom communications commands.

Refer to ► Common Rules for Macro (p.243) in the appendix for the rules for programming macros for custom communications commands. Refer to ► Macro Command Reference (p.261) for information on the macro commands that you can use .

1 In the Main Window, select [Customize I/O command] from the [Tool] menu.

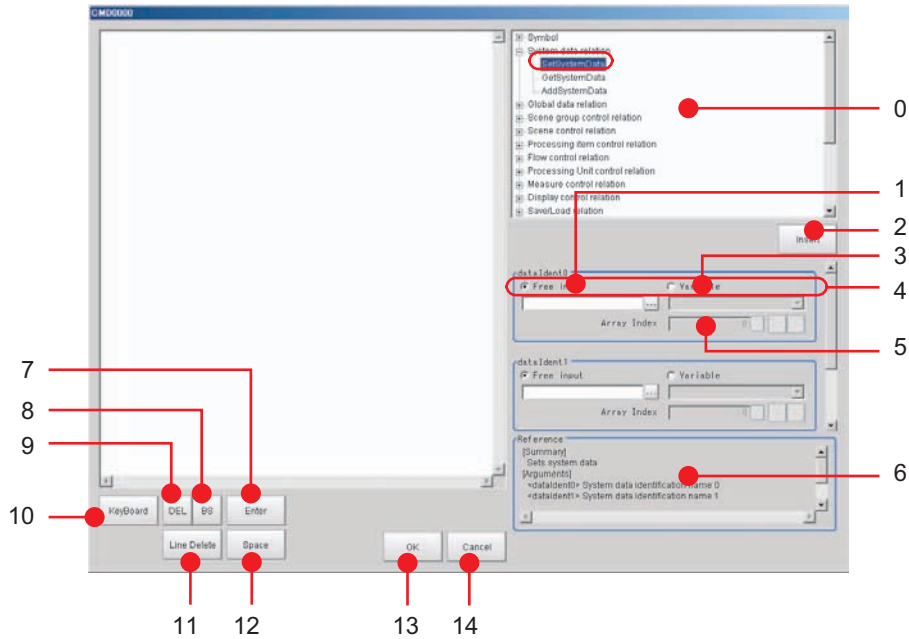
The [Customize I/O Command] dialog box is displayed with a list of custom communications commands.



Descriptions of Dialog Box Objects

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	Enable/Disable	Set/display whether custom command is enabled. If defined but not checked, it is not executed.
7	Command name	Display and edit command name for selected command.
8	Function name	Display and edit function name for selected command.
9	Comment	Display and edit comment for selected command.
10	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.
11	Export	Export the macro program to file.
12	Import	Import the macro program from file. The existing data will be overwritten.
13	OK	Save change and return to Main window.
14	Cancel	Return to Main window without saving.

- 2** Select the command to define in the [No.] column.
Only the command numbers that are selected are enabled.
- 3** Use the **[BUSY ON]** check box in **Settings Area** in the lower right corner to specify whether the **BUSY** flag should be turned **ON (TRUE)** or **OFF (FALSE)** when the custom communications command that is being set is in execution.
- 4** in the **[Command name]** field in the **Settings Area**, enter the command name to use with the non-procedure communications protocol.
- 5** Select a command number and then click the **[Edit]** button in the **Edit Area**.
The following edit dialog box is displayed for every custom I/O command.



Descriptions of Dialog Box Objects

No.	Name	Description
0	List of functions	Show the list of macro functions. Here we can select the function to input.
1	Free input	Select the input method of parameter (Free input or Variable select).
2	Insert	Insert the settings of function input menu on current position of Macro edit window as program line.
3	Variable	Select the variable for selected parameter. This is enabled when "Variable" is selected on "Type of parameter input"
4	Type of parameter input	Input the value for selected parameter directly. This is enabled when "Free input" is selected on "Type of parameter input"
5	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.
6	Reference	Show the function reference.
7	Enter	Insert new line on current position of Macro edit window.
8	BS	Delete previous character of the current position of Macro edit window.
9	DEL	Delete next character of the current position of Macro edit window.
10	KeyBoard	Switch showing / hiding software keyboard.
11	Line Delete	Delete the current line of Macro edit window.
12	Space	Insert blank character on current position of Macro edit window.
13	OK	Save change and return to Customize command list.
14	Cancel	Return to Customize command list without saving.

6 Select a function from the function list on the right, and then click the [Insert] button.

Use the [Enter] button to specify each additional function.

Click the [Keyboard] button to specify parameters and other information.

7 When you are done editing the contents of the command, click the [OK] button.

8 Edit all the other commands in the same way.

To reuse an existing custom command, click the [Copy] button in the Edit Area.

9 When you are done editing the custom communications commands, click the [OK] button to close the [Customize I/O Command] dialog box.

10 Click [Data save] in the Main Window to save the settings in the Sensor Controller.

Note

You can save the data for user-defined communications commands as a custom communications command file (InCommandFile) on a USB memory device or other external memory device.

Click the [Export] button on the [Customize I/O Command] dialog box to create a custom communications command file with the specified name in the specified destination, such as a USB memory device. To load a saved custom communications command file (.mcr), click the [Import] button on the [Customize I/O Command] dialog box.

You can specify a saved custom communications commands file and load it to reuse it.

Troubleshooting

Symptom	Type	Parameter to adjust	Correction
An error message is displayed on the console.	General	---	Refer to the error message list.
The command is not executed.	General	Enable/Disable	Select the check box in the [No.] column to enable the command.
	Non-procedure	Command name	Send the same character string as the command name for the command.
	Not non-procedure protocol	Command name	Send the same hexadecimal number (or binary number for the parallel interface) as the command number for the command.
	Measurement command	BUSY ON	If the processing in the custom command executes measurements with the Measure or Remeasure command, do not select the BUSY ON check box for that command.
Cannot pass arguments	Parallel	Command name	You cannot pass arguments when using the parallel interface.
			Use the processing unit data setting to assign the necessary numeric values to the processing unit, and then get the processing unit data while the command is being processed.
BUSY does not turn ON.	General	BUSY ON	Select the BUSY ON check box.
Saving settings	General	Save	The settings are not saved in the backup data (.bkd). Click [Data save] to save the settings in the Controller, or click the [Export] button on the [Customize I/O Command Tool] dialog box to save the settings in a file.
Standard commands stopped working.	General	Command name	If the custom command is named with a standard command name, execution of the custom communications command takes precedence.
			Change the name of the custom command so that it is not the same as the standard command.

Common Behavior of Custom Commands

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: ► Creating serial command (p.170)
Reference: ► Creating Parallel Command (p.171)
Reference: ► Creating PLC Link Command (p.171)
Reference: ► Creating Field Bus command (p.171)

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)
ChangeSceneArgumentValue#(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
ArgumentsLength&	Integer	Number of parameters
ArgumentString\$()	Array of text string	Array of parameters (string)
ArgumentValue#()	Array of real numbers	Array of parameters converted to number *1: If conversion fails, set to 0.

"AAA param0 param1 param2"

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

ArgumentsLength&: 3 (number of parameters)

ArgumentString\$(0): param0 (String type)

ArgumentString\$(1): param1 (String type)

ArgumentString\$(2): param2 (String type)

ArgumentValue#(0): numeric value converted from param0 (0 when conversion failed)

ArgumentValue#(1): numeric value converted from param1 (0 when conversion failed)

(2): numeric value converted from param2 (0 when conversion failed)

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

SceneChange ArgumentValue#(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 "NG")

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
ResponseCode&	Integer	Command execution result <ul style="list-style-type: none"> • 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
ArgumentsLength&	Integer	Number of parameters
ArgumentValue#()	Array of real numbers	Array of parameters *1: 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 <ul style="list-style-type: none"> • 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
ArgumentsLength&	Integer	Number of parameters
ArgumentValue#()	Array of real numbers	Array of parameters *1: 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 <ul style="list-style-type: none"> • 0 : Command processing successful • -1 : Command processing failed

Flow Viewer

The Flow Viewer shows the flow of processing for the measurement flow that is currently being edited. When you edit a flow, the Flow Viewer is useful when you need to check the relationship of branches and folders.

Refer to the following reference for information on the Flow Viewer.

Reference: ► [Displaying and Checking Processing Branches in a Scene \(p.55\)](#)

Custom Dialog Boxes

You can create a customized settings dialog box and display it instead of the normal settings dialog box that is provided for each processing item.

This allows you to create settings dialog boxes that match your application.

Refer to the following reference for information on custom dialog boxes.

Reference: ► Custom Dialog Tool (p.91)

Calibration Support Tool

The Calibration Support Tool provides a graphic display of the calibration setting results (relationship of the positions of the Camera coordinates and the actual coordinates) when you set the alignment function.

This allows you to check for major errors in the calibration results.

Refer to the following reference for information on the Calibration Support Tool.

Reference: ► Other Alignment Functions (p.236)

Saving and Loading Data

This section explains the methods for saving and loading settings and image data.

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Saving Settings Data to the Flash Memory and Restarting	179
Saving Settings Data to the Controller RAM Disk or an External Memory Device	180
Saving Logged Images in the Controller Memory (RAM) to a RAM Disk or an External Memory Device ..	181
Copying or Moving Files between the Controller RAM Disk and an External Memory Device	182
Loading Settings Data from the Controller RAM Disk or an External Memory Device to the Sensor Controller	183

Saving Data to the FH/FZ5

This section describes how to save and load setting data and logged image data.

About Saving Areas

The following saving areas can be used with the Sensor Controller.

Saving area		Description	Save operation
Controller	Flash memory in the Controller	The settings data (system data, scene data, and scene group data) is saved to this area when you click the [Data save] button. Data is held even after the power supply is turned OFF. When you restart the Controller, the Controller loads and enables the settings data in the flash memory.	[Function] – [Data save] or the [Data save] button
	Controller memory (RAM)	This is the area where images are temporarily stored when logging images using the logging function. This memory is a ring memory. Images will be overwritten starting with the oldest image if the maximum number of save images is exceeded.	
	RAM disk in the Controller	You can use this memory as a temporary file save destination. The data is cleared when you turn OFF the power supply to the Controller. As this is memory inside the Controller, files can be saved and read faster than when using external memory. The FH or FZ5-11□□ has 256 MB, and the FZ5-L3□□ has 40 MB. The capacity cannot be changed. The RAM disk data can be sent to or received from external devices using FTP.	[Function] – [Save to file] or [Function] – [Screen capture]
External memory	USB memory	This memory is used to back up setting data as a precaution, to copy setting data to another Controller, and to load data to a computer.	
	SD memory card (FH only)		
	Shared folder on a computer connected to the network		

The following table shows the data that is retained or cleared and the data that is saved when the power supply is turned OFF.

Saving area		At power OFF	Target data				
			Settings data (system data, scene data, and scene group data)	Logged images	Last input image and last NG image	Logged data (measurement data)	Capture image
Sensor Controller	Flash memory of the Controller	Retained	OK	---	---	---	---
	Controller memory (RAM)	Cleared	---	OK ^{*1}			
	RAM disk	Cleared					
External memory	USB memory	Retained	OK	OK ^{*2}	OK	OK	OK
	SD Memory Card						
	Shared folder on a computer connected to the network						

*1: If images are being logged by the system, select [Other] – [Logging setting] under the System Settings and set the destination for logged images to [Save to memory].

*2: If images are being logged by the system, select [Other] – [Logging setting] under the System Settings and set the destination for logged images to [Save to memory + file].

IMPORTANT

During data transfer, do not turn OFF the power supply.

- When a message indicating that processing such as saving or loading is in progress is displayed, do not restart the Controller or turn OFF the power supply. Data will be corrupted and the system will not work properly at the next startup.
- Do not remove external memory devices while data is being saved or loaded. The operation of the Controller may corrupt the data or external memory.
- Do not change the file name extension of saved files. If you change the extension, the file cannot be loaded as setting data. In addition, if setting data in which the extension was changed is loaded, the system may not work properly later.
- Depending on the settings, saving may fail due to insufficient external memory space. If saving fails and the error message “Please check” appears, check to see if there is unnecessary data in the external memory and save the data after the unnecessary data has been deleted.

External Drive Names

Drive Names for USB Devices

The Controller has four USB connectors. If more than one USB memory device is inserted, specify the USB memory drive that is to be the destination.

- FZ5-L3□□ or FZ5-6□□
The drive names of USB memory devices are USBDisk, USBDisk2, USBDisk3 and USBDisk4 according to the sequence in which devices are inserted into the Controller.
If the Controller, however, is started with more than one USB memory device inserted, drive names 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 are assigned using the following sequence.
 - **Controller with Integrated Panel**
1: Left side on the front - 2: Right side on the front - 3: Front on the side - 4: Back on the side
 - **Box-type Controller**
1: Lower left on the front - 2: Lower right on the front - 3: Upper left on the front - 4: Upper right on the front
- FH or FZ5-11□□
USB devices are assigned as drives E:\, F:\, G:\ and H:\ in the order in which they are inserted.

Drive Name of SD Memory Card

The FH has a slot for an SD memory card. This is a fixed drive and is assigned as drive M:\.

IMPORTANT

Box-type Controllers

If USB memory devices are separately connected to adjacent USB connectors, the contact between USB memory devices may possibly lead to failure or damage.

Using External Memory Devices (FH and FZ5-11□□ Only)

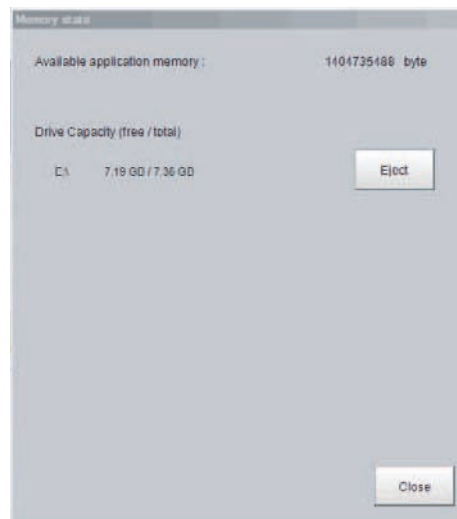
Use the following procedure to remove the external memory device.

1 In the Main Window, select [System information] from the [Function] menu.

The system information is displayed.

2 Information on each drive is displayed in the [Memory state] dialog box.

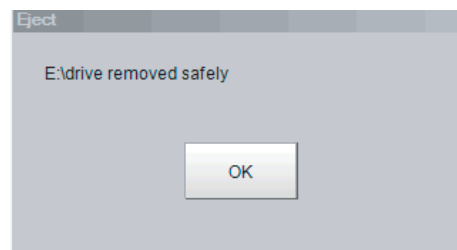
If an external memory device is inserted, the [Eject] button is displayed.



3 To remove the USB memory device, click the [Eject] button.

When the USB Memory Can Be Removed

If the removal failed, wait until the external memory device is no longer being accessed and then try removing the device again.



IMPORTANT

Never try to remove the external memory device while the external memory is being accessed. A critical failure may occur.

Shared folder on a computer connected to the network

You can setup a network drive in the system settings. This allows the Sensor Controller to handle the hard drive on a computer that is connected to the local area network as an external memory device.

Reference: ► Setting a Network Drive: [Network Drive Setting] (p.217)

Saving Settings Data to the Flash Memory and Restarting

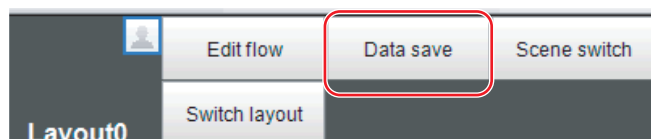
This section describes the procedure to save settings data (system data, scene data, and scene group data) in the flash memory of the Sensor Controller. Make sure to save setting data when settings have been changed. Every time you restart the Sensor Controller, the data in the memory is loaded and enabled.

IMPORTANT

- If [Save to file] is performed for [System + scene group 0 data], the data being saved will also be saved to the Controller's flash memory at the same time. Do not turn OFF the power supply during this process. The Controller may not start up properly the next time it is turned ON.
- During data transfer to external memory, do not remove the external memory device until the transfer is completed. Data and the external memory may be corrupted.

1 For the FZ5-L3□□ or FZ5-6□□, insert an external memory device into the Controller before you save the data for scene groups 1 to 31.

2 Click [Save to file] on the toolbar in the Main Window.



A confirmation message is displayed.

3 Click [OK].

For the FZ5-L3□□ or FZ5-6□□, system data and data from scene group 0 are saved to the Controller's flash memory and the data from scene groups 1 to 31 is saved to the external memory.

For the FH or FZ5-11, all data is saved in the flash memory in the Controller.

If more than one USB memory device is connected to the Controller, check in the File Explorer to confirm that the external memory device where the scene group data is to be saved is recognized as the USB disk.

Reference: ► External Drive Names (p.177)

Note

If an external memory device is not inserted, a confirmation message is displayed.

If [OK] is clicked, only system data and data from scene group 0 are saved in the Controller's flash memory.

Saving Settings Data to the Controller RAM Disk or an External Memory Device

Setting data files are saved to the RAM disk or to an external memory device. The following table lists the data that can be saved.

Data	Description
System data (*.ini)	This is the setting data, such as the [System] menu setting contents, that is shared within the Controller.
Scene data (*.scn)	This is the data for one scene. It contains the sequence of units set in each scene and the set values of units within the scenes.
Scene group data (*.sgp)	The data of scene group with 128 scenes.
Scene + Scene group 0 data (*.bkd)	This is the system data and the data from scene group 0 combined.

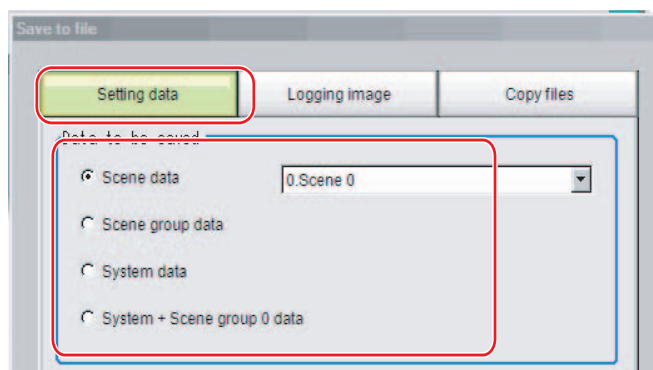
IMPORTANT

During saving, do not restart, turn OFF the power supply, or remove the external memory device. Data will be corrupted and the system will not work properly at the next start-up. Be particularly careful if you use [Save to file] for [System + Scene group 0 data] because the data to be saved will also be saved to the flash memory in the Controller at the same time.

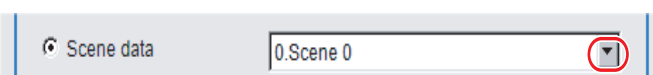
Note

When [Save to file] is executed, the data to save is also saved in the Controller (except scene group data 1 to 31).

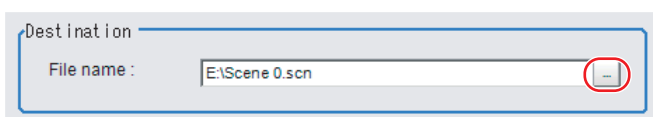
- 1 To save to a USB memory device (or an SD memory card), insert the USB memory device (or SD memory card) in the Controller.**
- 2 In the Main Window, select [Save to file] from the [Function] menu.**
The [Save to file] dialog box is displayed.
- 3 Click the [Setting data] button to select the data to save.**



- 4 If you selected [Scene data], click the [▼] button to select the number of the scene to save.**



- 5 Specify the destination folder and file name.**



- 6 Click [OK].**

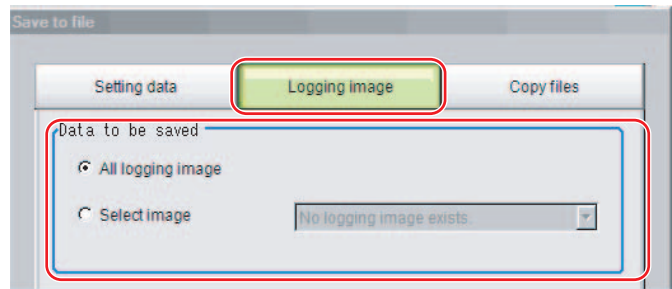
The dialog box showing transfer status is displayed, and the data is sent to the save destination.

Saving Logged Images in the Controller Memory (RAM) to a RAM Disk or an External Memory Device

Use the following procedure to save image data that was logged in the Controller memory (RAM) to the Controller RAM disk or an external memory device.

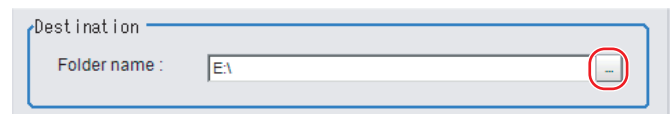
Reference: ► About Saving Areas (p.176)

- 1** When saving data to external memory, insert an external memory device into the Sensor Controller.
- 2** In the Main Window, select [Save to file] from the [Function] menu.
The [Save to file] dialog box is displayed.
- 3** Click [Logging image] and select the file to save.



Parameter	Set value [Factory default]	Description
Data to be saved	[All logging image]	All logged images are saved.
	Select image	The selected logged images are saved. Click [▼] to select the image to save. When [Latest measurement] - [Logging image] is selected, the save file name will be LoggingImage000.ifz.

- 4** Specify the destination folder.



- 5** Click [OK].

The dialog box showing transfer status is displayed, and the data is sent to the save destination.

Copying or Moving Files between the Controller RAM Disk and an External Memory Device

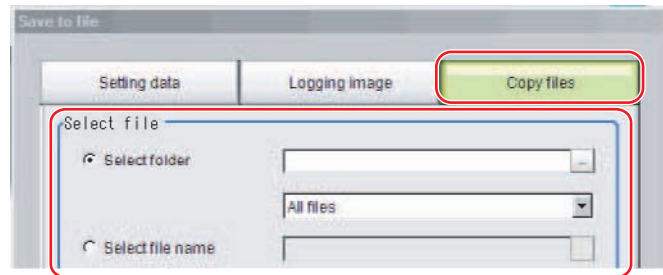
You can copy or move files between the Controller RAM disk and an external memory device. Images and data saved on the RAM disk are deleted if the power supply is turned OFF. To keep these images and data, copy or move them to an external memory device. The types of files that can be copied/moved are as follows:

- Settings data (system data, scene data, and scene group data)
- Logged images
- Logged data (measurement data)

- 1** Insert an external memory device in the Controller.
- 2** In the Main Window, select [Save to file] from the [Function] menu.

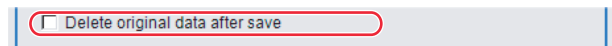
The [Save to file] dialog box is displayed.

- 3** Click [Copy files] and select the file or folder to copy or move.



Parameter	Set value [Factory default]	Description
Select file	[Select folder]	<p>Copies or moves more than one file in the folder.</p> <ul style="list-style-type: none"> • Click the [...] button and specify the source folder to copy or move a file from. • Click the [▼] button and specify the file type to select. Select [All files] to copy or move all files in the folder. Specify a file type to copy or move only files that are of the specified file type in the folder.
	Select file name	<p>Copies or moves the selected file.</p> <p>Click the [...] button and specify the file name.</p>

- 4** To delete the copy source file after saving a copy to external memory, select [Delete original data after save].



- 5** Click [OK].

The dialog box showing transfer status is displayed, and the data is sent to the save destination.

Loading Settings Data from the Controller RAM Disk or an External Memory Device to the Sensor Controller

Use the following procedure to load settings data that is saved in the Controller RAM disk or an external memory device to the Sensor Controller. The scene name and scene group name that have been loaded are displayed in the Measurement Information Display Area.

IMPORTANT

- Always restart the Sensor Controller immediately after you load the settings data.
- If [Load from file] is performed for [System + scene group 0 data], the data being loaded will also be saved to the Controller's flash memory at the same time. While data is being loaded, do not restart, turn OFF the power supply, or remove the external memory device. Data will be corrupted and the system will not work properly at the next startup.

1 Perform either of the following in advance.

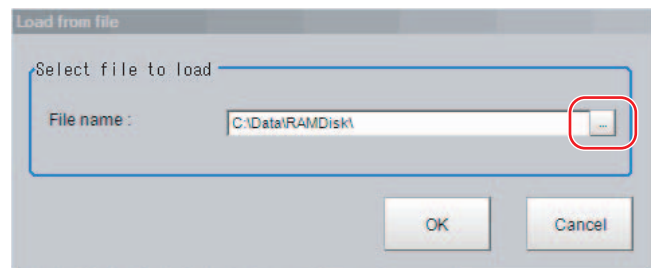
Send the setting data to the Controller's RAM disk using the FTP.

Insert the external memory device that has the load data saved in it into the Controller.

2 In the Main Window, select [Load from file] from the [Function] menu.

The [Load from file] dialog box is displayed.

3 Select the file to load.



4 Click [OK].

A dialog box that shows the progress of the transfer is displayed, and the data is transferred.

The loaded settings are enabled after the Sensor Controller is restarted.

5 Select [System restart] from the [Function] menu.

Changing the System Environment

This section describes the settings that are related to the system environment of the Controller.

Setting the Camera Conditions	186
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Setting the Operating Environment of the System	210

Setting the Camera Conditions

Checking the Camera Connections: [Camera Connection]

You can check whether a Camera is connected. There are no settings.

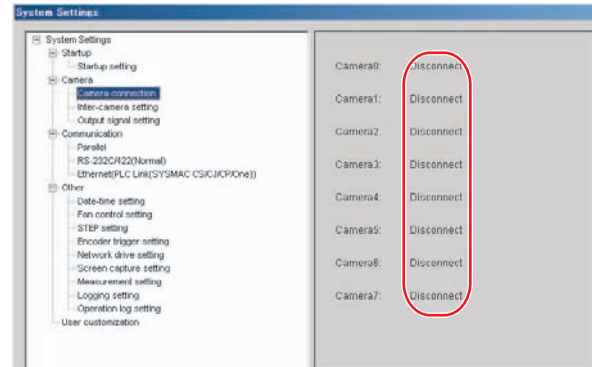
- 1 In the Main Window, select [System settings] – [Camera] – [Camera Connection] from the [Tool] menu.**

The Camera Connection Settings View is displayed.

- 2 Check the connection status.**

If a Camera is connected, the model name of the connected Camera will appear next to the Camera number.

If the [Disconnect] is displayed even though a Camera is connected, there could be a failure or a disconnected line. Check the physical connection.



- 3 Click the [Close] Button.**

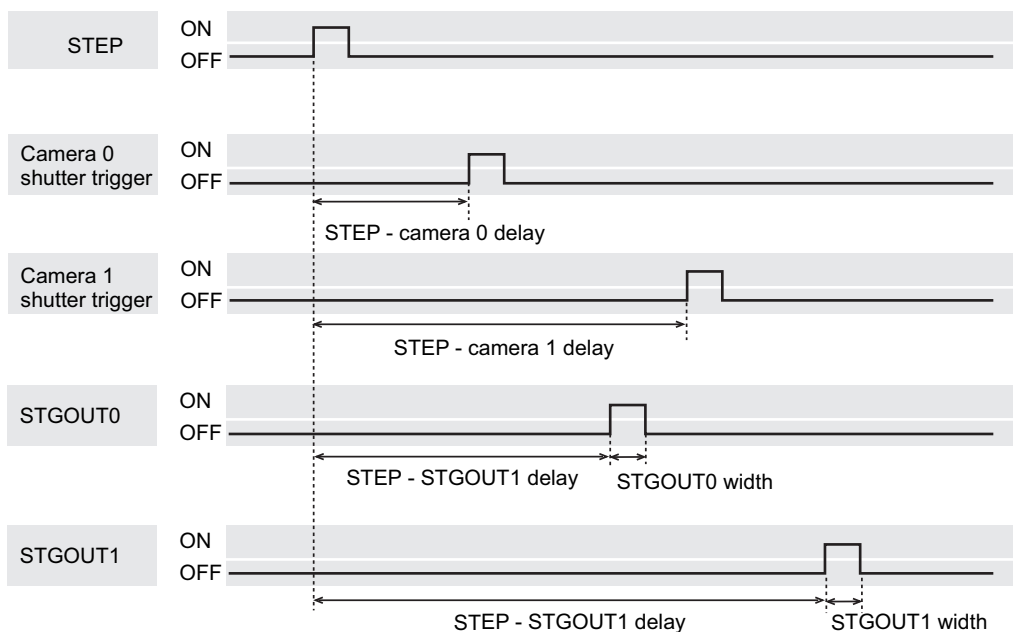
Setting the Trigger Delay: [Inter-camera setting]

This setting is used to set the delay time from when the STEP signal for the input trigger is received to when the shutter is triggered. You can use this to prevent mutual interference caused by the lighting when more than one Camera is used, or as a simple trigger delay when only one Camera is used.

Note

Set the STGOUT pulse width in the [Electronic flash setting] under the [Camera Image Input] processing item.

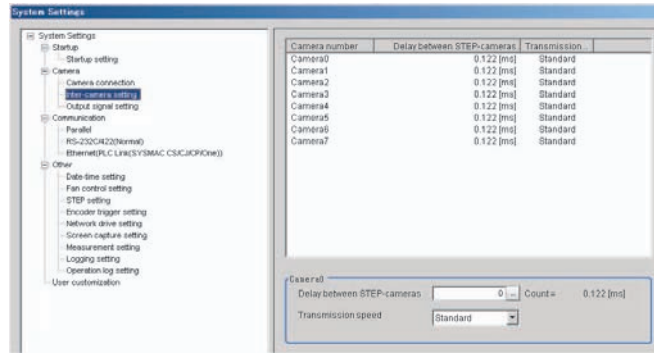
Reference: ► *Electronic Flash Setting of the Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat No. Z341).*



- 1 In the Main Window, select [System settings] – [Camera] – [Inter-camera setting] from the [Tool] menu

The Inter-camera Settings View is displayed.

- 2 Click [· · ·] for each setting and set a numeric value.



Item	Set value [Factory default]	Description
Delay between STEP - cameras	[0] to 511 (1 count is 30 μs) 15 ms max.	Sets the delay time from when the STEP signal is received to when exposure begins for the selected Camera. Delay time = Count x 30 μs + 122 μs
Transmission speed	[Standard] or High speed	If you use a Camera Cable that is shorter than 5 m to connect to an FH-SC□□/SM□□ Camera, you can use the [High speed mode] option to reduce the image input time. Refer to the instruction manual for the Camera for actual frame rates.

Note

With an FH Sensor Controller, you can make Camera settings for up to eight Cameras.

With an FZ5 Sensor Controller, you can make Camera settings for up to four Cameras, Camera 0 to Camera 3. If you make changes to the setting for Camera 4 to Camera 7, they will not be applied.

Setting the SHTOUT Signal: [Output Signal Settings]

This function is exclusively for an FH Sensor Controller.

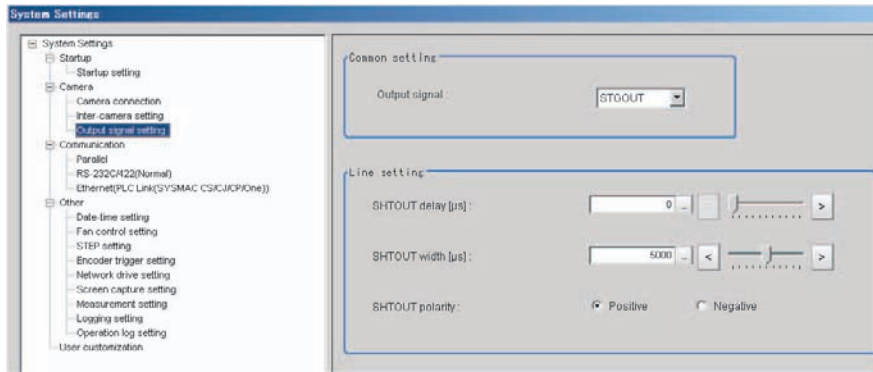
This setting affects the SHTOUT signal that is output when the exposure of the Camera ends. You can detect when the exposure ends with the SHTOUT signal to minimize the time to hold the workpieces still for taking images. This allows you to move the workpiece or the Camera immediately after the exposure ends.

IMPORTANT

- You cannot use the STGOUT signal and SHTOUT signal at the same time. Select the signal to output depending on the application.
- The settings of the [Output Signal Settings] apply only to the FH.
With an FZ5 Sensor Controller, you cannot use the SHTOUT signal even if you change the settings of the [Output Signal Settings].

1 In the Main Window, select [Camera] – [Output Signal Setting] from the [Tool] menu.

The settings dialog box for the output signals is displayed.



Note

- If the [Output Signal Selection] is set to [SHTOUT], the SHTOUT signal is output according to the settings in the [Individual Line Settings]. If the [Output Signal Selection] is set to STGOUT, the STGOUT signal is output according to the settings in the [Electronic flash setting] for a camera input processing item.
- When using the Multi-line Random-trigger Mode, the output signal selection can be set only to the output signal setting for line 0. The settings for line 0 are applied to the other lines.
- If you are using the Camera Image Input HDR, or Camera Image Input HDR Lite processing item, the SHTOUT signal is output for every image that is taken.
- If you are using the Through Image Mode in the Main Window, the SHTOUT signal is output for every through image that is taken.

2 Select the output signal in the [Common setting] Area.

Parameter	Set value [Factory default]	Description
Output signal	[STGOUT]	The STGOUT signal line is used for the STGOUT signal. If you selected STGOUT, you cannot use the SHTOUT output signal.
	SHTOUT	The STGOUT signal line is used for the SHTOUT signal. If you selected SHTOUT, you cannot use the STGOUT output signal.

3 Set SHTOUT for each line in the [Line setting] area.

Parameter	Set value [Factory default]	Description
SHTOUT signal delay [μs]	[0] to 1,000	Sets the delay time from when exposure is completed to when the SHTOUT signal turns ON in increments of 10 μs.
SHTOUT signal pulse width [μs]	40 to 10,000 [5,000]	Sets the time to output the SHTOUT signal in increments of 10 μs.
SHTOUT signal pulse polarity	<ul style="list-style-type: none"> • [Positive] • Negative 	Set the polarity of the SHTOUT signal. Positive: The SHTOUT signal changes from OFF to ON when the exposure ends. Negative: The SHTOUT signal changes from ON to OFF when the exposure ends.

4 Click the [Close] Button.

Setting the Conditions That Are Related to Operation during Measurement

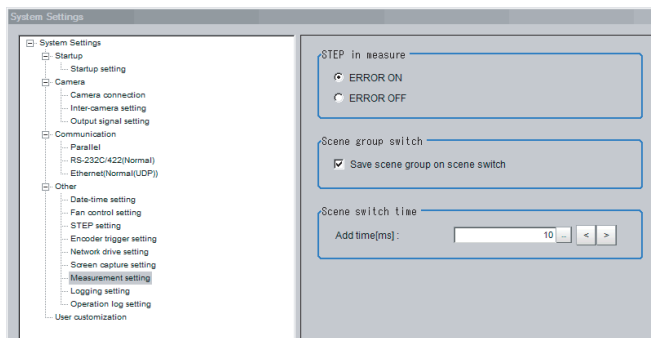
You can change the following items of operation during measurement.

- Operation when the next STEP signal is input during measurement
- Whether the scene group is saved when you change to another scene group
- Setting for when the scene switch time is short and switching cannot be detected by the external device

1 In the Main Window, select [System settings] – [Other] – [Measurement settings] from the [Tool] menu.

The [Measurement settings] dialog box is displayed.

2 Set each item as necessary.



Item	Set value [Factory default]	Description
STEP in measure	[ERROR ON] or ERROR OFF	Set whether the ERROR signal output turns ON when the next STEP signal is input during measurement.
Save scene group on switch scene	<ul style="list-style-type: none"> • [Selected] • Not selected 	Set the operation to perform when you change to another scene group. Set whether the scene group should be saved when changing to another scene group. The scene group switching time can be reduced if the selection of this check box is cleared, but if the power supply is turned OFF without saving changes to settings, the changes will be lost.
Scene switch time, Add time [ms]	0 to 1000 [10]	The BUSY signal is turned ON during scene switching. When this time is short and the change from ON to OFF cannot be detected by the external device, you can increase the time that the BUSY signal is ON. Set in units of 1 ms. Click [<] or [>] to increment the time in 5 ms from the displayed value.

Note

The [Save scene group on switch scene] is linked to the setting for the [Scene group switch] dialog box. Settings specified later override the previous settings.

Reference: ► Changing the Scene or Scene Group (p.59)

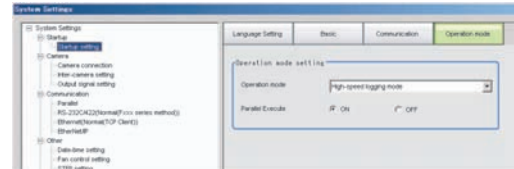
3 Click the [Apply] button.

Setting the Operation Mode

This section describes the operation mode (FH and FZ5-11□□ only). You can use more than one CPU to set the operation mode according to the application conditions. This helps to reduce the takt time and downtime. The operation mode is set in the startup settings.

Reference: ► Setting the Status at Startup: [Startup Settings] (p.212)

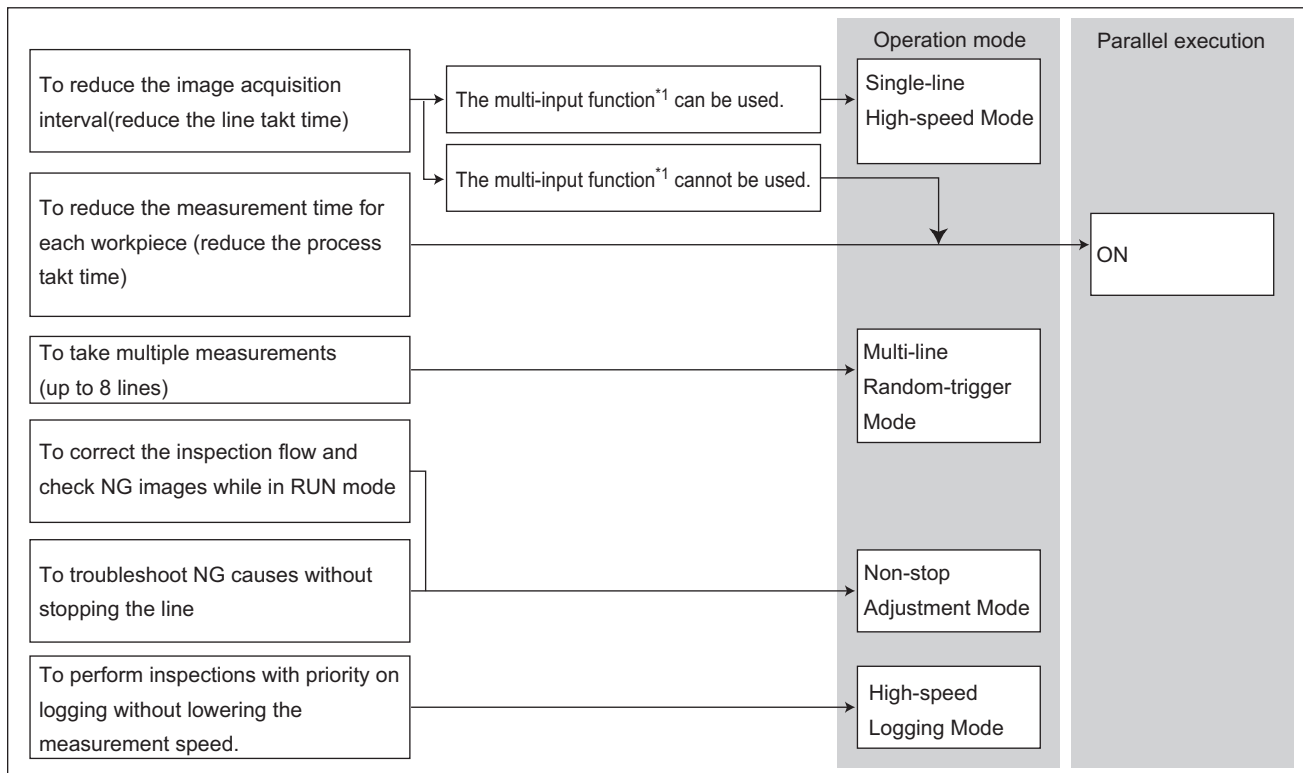
- 1** In the Main Window, select [System settings] – [Startup settings] from the [Tool] menu.
- 2** Click the [Operation mode] button and select the operation mode.
- 3** Click the [Apply] Button.



- 4** In the Adjustment Window (layout 0), click [Data save] in the Toolbox Pane to save the settings data.
- 5** In the Main Window, select [System restart] from the [Function] menu.
The System restart dialog box is displayed.
- 6** Click [OK].

Guidelines for Selecting the Operation Mode

This section describes how to set the operation mode that best suits the purpose.

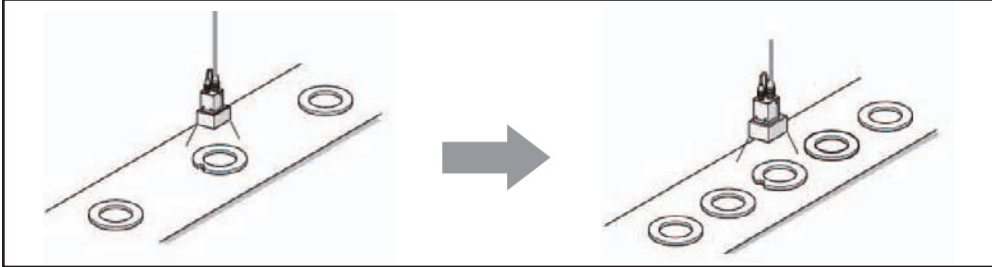


*1: The next STEP input is acknowledged as soon as image input processing is completed. There is no need to wait for measurement processing to finish. Reference: ► Multi-input Function (p.192)

Single-line High-speed Mode

You can execute the measurement process with more than one CPU to inspect more measurement targets in the same amount of time than conventional processing would allow. This Single-line High-speed Mode uses up to eight CPUs that take turns in the execution of a single inspection flow every time the STEP signal is input. This improves the performance of the conventional multi-input function, and reduces the shortest takt time by up to a 1/4.

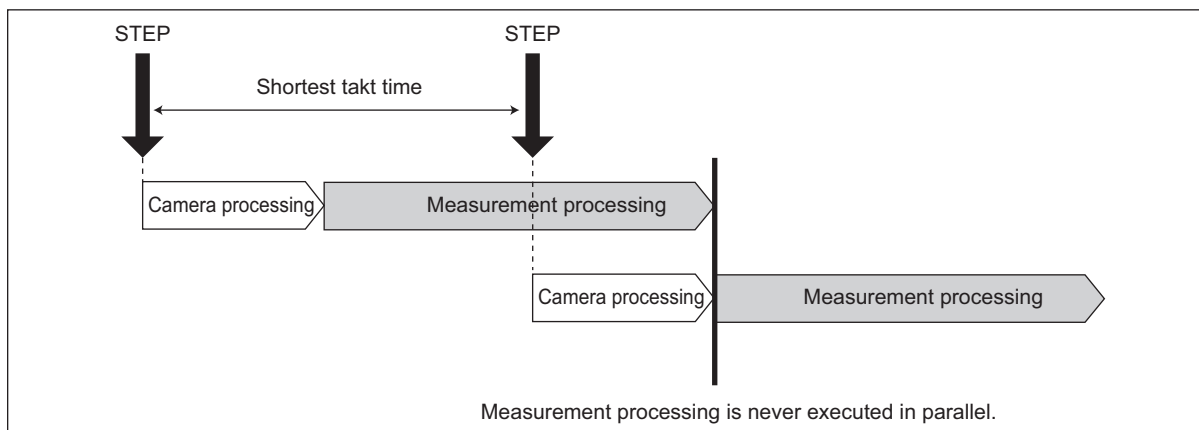
Reference: ► Multi-input Function (p.192)



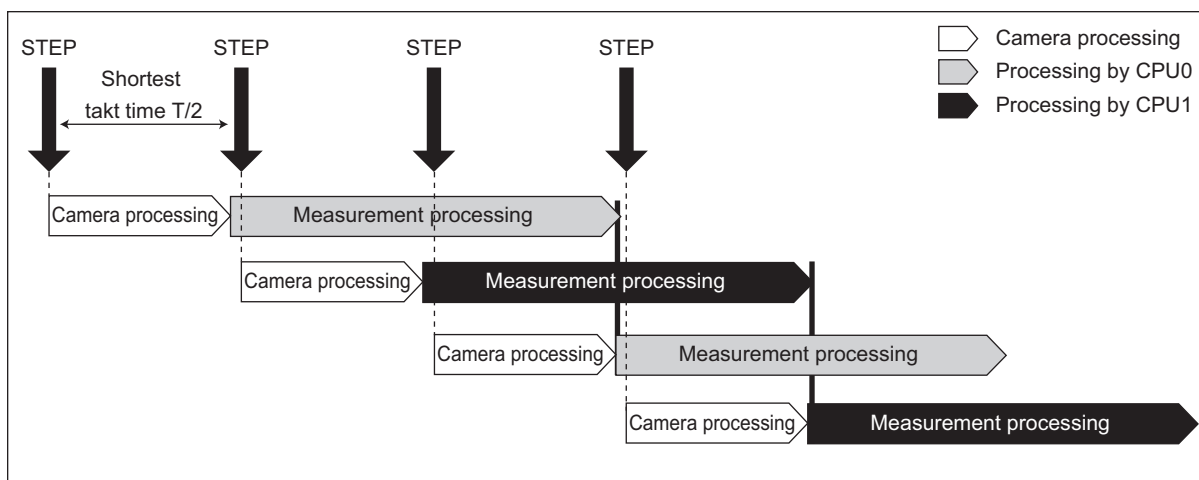
IMPORTANT

- The transaction time for a single workpiece is shorter if parallel processing is enabled to allow parallel execution of the measurement flow.
- It is assumed that the [Single-line High-speed mode] will be used together with the multi-input function. Refer to *Multi-input Function* before you use the Single-line High-speed Mode. If you will not use the multi-input function, consider using parallel processing.
Reference: ► Multi-input Function (p.192)
- Certain processing items, such as Serial Output, Parallel Output, and Parallel Judgement Output, may slow the performance of the Single-line High-speed Mode if they are programmed in the first half of the flow. If the performance drops significantly, consider the use of parallel processing.
- Some processing items, such as Trend Monitor and Last NG Display, may not function correctly if Single-line High-speed Mode is used. Do not use them. Calculation items that use the numeric values from a previous STEP may not calculate correctly.
- You cannot use Simplified Non-stop Adjustment Mode during Single-line High-speed Mode.
- External commands to obtain and set unit data will not operate correctly. Do not use them.
- If you use external commands, the BUSY signal will remain ON during command execution longer than for other operation modes.

Example: Processing with one CPU



Example: Processing with two CPUs



Multi-input Function

With the multi-input function, images are input consecutively and at high speed. This allows the next STEP to be received as soon as the image input processing is completed. There is no need to wait for measurement processing to be completed. You can check whether image input processing has been completed with the status of the READY signal.

There are no setting items for the multi-input function. You can use it as long as you can check the status of the READY signal, i.e., as long as you use parallel or EtherCAT communications. With EtherCAT communications, check the status of the Trigger Ready signal instead of the READY signal.

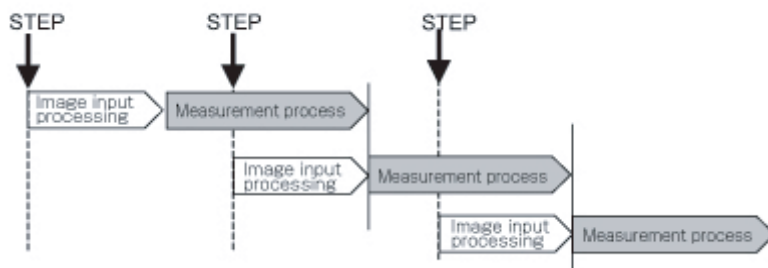
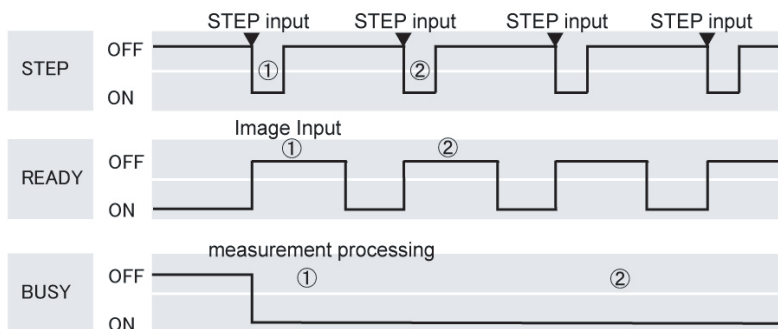
The FH and FZ5-11□□ have multiple CPUs that allow the use of the Single-line High-speed Mode. Each CPU takes turns in the execution of the measurement processing to reduce the shortest takt time by up to 1/2 for the FZ5 and 1/4 for the FH.

*1: The fastest takt time is the shortest time that is allowed to accept a STEP signal without causing a backlog of images.

Reference: ► Single-line High-speed Mode (p.191)

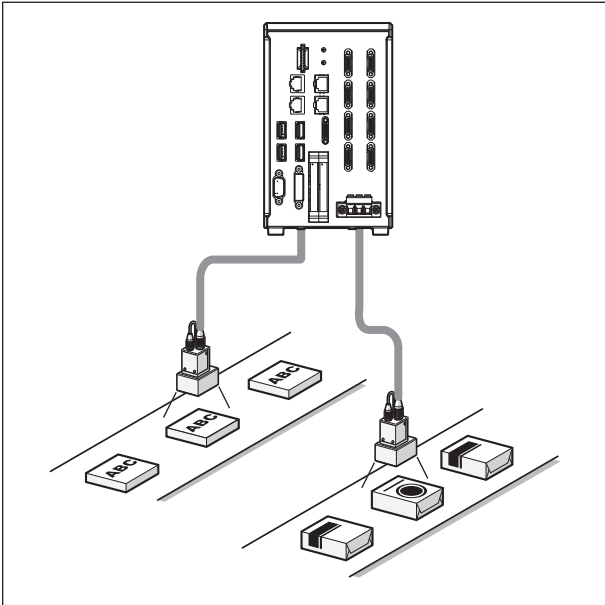
IMPORTANT

- Click the upper left of the Image Display Pane and set the [Image mode] to [Freeze Image].
Reference: ► Changing the Image Mode and Other Display Contents (p.88)
- If images are taken consecutively at high speed, the number of images that you will be able to take will be limited. If the maximum number of images have been taken, the READY signal will not turn ON until the current processing is completed. Therefore, the next STEP signal cannot be input.
- The ERROR terminal turns ON if a STEP signal is input when the READY signal is OFF.
- If the trigger signal input rate is faster than the communications output, some STEP signals may be skipped and measurements may be delayed. Make sure to input trigger signals at a rate that does not cause a delay in communications.
- The multi-input function cannot be used in the following cases:
 - The flow has more than one camera input processing unit.
 - The flow has a Camera Image Input HDR processing unit.
 - Branching is used to process a single camera input processing unit more than one time.
 - Measurement triggers are input through means other than parallel or EtherCAT communications (non-procedure commands or measurement commands through a PLC Link).
- If a measurement trigger is input while using the multi-input function, the last NG image cannot be displayed.
- If images and data are logged to a network drive, the use of the multi-input function and other heavy measurement loads on the Controller may slow down communications and cause logging errors. In this case, set the measurement takt time so that there is some leeway.
- When the multi-input function is in use, most of the resources of the CPU are allocated to measurement processing. This may cause performance drops (delayed responses and packet losses) and communications errors. Do not use Ethernet/IP communications while the multi-input function is in use.

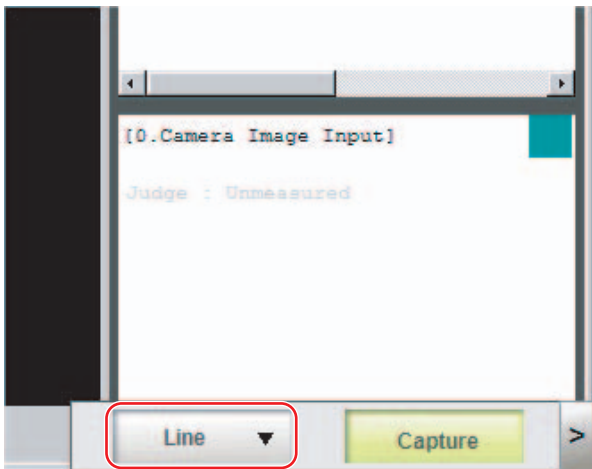


Multi-line Random-trigger Mode

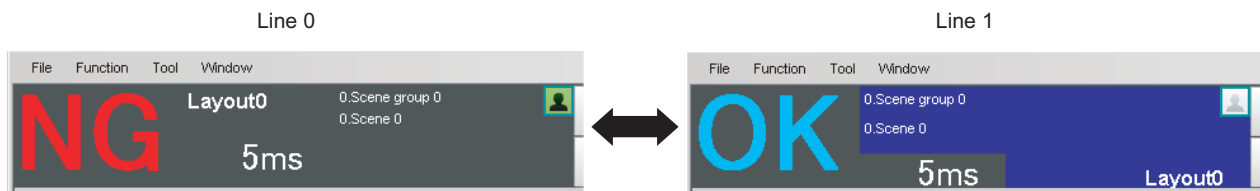
You use the Multi-line Random-trigger Mode when you want to measure more than one line with a single Controller. You can measure the inputs from different Cameras on up to eight independent lines. You can set a scene group data and scene data for each line.



You can switch between lines with the [Line] button that is located on the Measurement Manager Bar that is displayed at the bottom right of the window.



Each line has its own background color.



FH Series

You can assign any of up to eight Cameras to each line.
Use the following procedure to assign Cameras to each line.

- 1** In the Main Window, select [System settings] – [Startup] – [Startup settings] from the [Tool] menu.
- 2** Select [Multi-line random-trigger mode] for the operation mode on the [Operation Mode] tab page.
- 3** Set the [Number of lines] and [Camera - line allotment] on the [Multi-line random-trigger mode settings] tab page.

Multi-line random-trigger mode Settings

Number of lines :

Camera - line allotment :

Camera	0	1	2	3	4	5	6	7
Line0	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line1	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Line2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Line7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

For example, if you use Cameras 0 and 1 on line 0, you can use up to 6 Cameras from Camera 2 to 7 on line 2.

IMPORTANT

The settings of the [Multi-line Random-trigger Mode Settings] apply only to the FH.
With an FZ5 Sensor Controller, there will always be two lines and fixed lines assignments to the Cameras regardless of the settings of the [Multi-line Random-trigger Mode Settings].

FZ5 Series

The Camera assignments for each line are listed below.

Camera number	Software handling
Camera 0	Camera 0 on line 0
Camera 1	Camera 0 on line 1
Camera 2	Camera 1 on line 0
Camera 3	Camera 1 on line 1

Functional Limitations of Multi-line Random-trigger Mode

Keep the following points in mind when using Multi-line Random-trigger Mode.

Item		FH Series	FZ5 Series
Processing time		<ul style="list-style-type: none"> If the STEP signal is input at the exact same time across lines 0 to 7, the measurement on the other lines may be delayed. If data logging occurs at the same time for lines 0 to 7, the transaction time may take longer than usual. 	<ul style="list-style-type: none"> If the STEP signal is input at the exact same time for lines 0 and 1, the measurement on the other lines may be delayed (roughly by the same amount of the Camera Image Input processing unit). If data logging occurs at the same time for lines 0 and 1, the transaction time may take longer than usual.
Number of Cameras		The maximum number of Cameras is 8 for all lines.	The maximum number of Cameras is 2 for all lines.
Error messages		Error messages are the same for lines 0 to 7. If an error occurs on any of the lines, an error message is displayed and the ERROR signal is turned ON.	Error messages are the same for lines 0 and 1. If an error occurs on any of the lines, an error message is displayed and the ERROR signal is turned ON.
Saving data in the Controller		To save data in the Controller, the data must be saved separately for each line.	
Save folder for captured images		When you click [Capture] on the Measurement Manager Bar, captured images are always saved to the folder that is specified for line 0.	
Date-time setting, language setting, and operation mode setting		These settings can be set only for line 0.	These settings can be set only for line 0.
View		Images can be displayed simultaneously for all lines. Use layout modification to set the display position and size for the Main Window for each line.	One of the lines must be selected to be displayed. Both lines cannot be displayed at the same time.
Communications	Parallel	<ul style="list-style-type: none"> Parallel communications can be set only for line 0. The settings for line 0 are applied to lines 1 to 7. Refer to <i>Table 1</i> for details on the differences between parallel I/O and parallel terminals. 	<ul style="list-style-type: none"> Parallel communications can be set only for line 0. The settings for line 0 are applied to line 1. Refer to <i>Table 1</i> for details on the differences between parallel I/O and parallel terminals.
	PLC Link (RS-232C/422)	RS-232C can be set only for line 0. Lines 1 to 7 cannot be used.	RS-232C/422 can be set only for line 0. Line 1 cannot be used.
	PLC Link (Ethernet)	<ul style="list-style-type: none"> To use Ethernet, use a different port number for each line. The IP address for the Controller cannot be set for lines 1 to 7 (the IP address for line 0 is used). 	<ul style="list-style-type: none"> To use Ethernet, use a different port number for each line. The IP address for the Controller cannot be set for line 1 (the IP address for line 0 is used).
	EtherNet/IP	<ul style="list-style-type: none"> To use EtherNet/IP, use an EDS file that matches the line to be used. Specify different I/O memory addresses for the sending area and receiving area for line 0 and for lines 1 to 7. 	<ul style="list-style-type: none"> To use EtherNet/IP, use an EDS file that matches the line to be used. Specify different I/O memory addresses for the sending area and receiving area for line 0 and for line 1.
STEP setting		The value of the STEP signal filter for the most recently set line is applied to all lines.	The value of the STEP signal filter for each line is applied to each line.

Item		FH Series	FZ5 Series
Communications	EtherCAT	<ul style="list-style-type: none"> The Communications Module is set for each line. The communications settings can be set only for line 0. The settings are applied as shown below. [Output control]: The same setting is used for all lines. [Output period]: The same setting is used for all lines. [Output setting]: This is set for each line. The I/O ports (areas) for communications between the FH and master are assigned as shown below. I/O ports for the Command Area: I/O ports are assigned for each line. I/O ports for the Response Area: I/O ports are assigned for each line. I/O ports for the Output Area: I/O ports are assigned for each line. The I/O ports in the Sysmac Error Status Area are shared by all lines. The maximum data size that can be output depends on the number of lines, as shown in the following table. 1 to 5 lines: 256 bytes max. 6 to 8 lines: 128 bytes max. 	---

Table 1: Parallel I/O Functions and Parallel Terminals for Multi-line Mode

• FH Series

I/O	Number of lines			
	1 line	2 lines	3 to 4 lines	5 to 8 lines
STEP	STEP0	STEP0 or STEP1	STEP0 to STEP3	STEP0 to STEP7
DSA	DSA0	DSA0 or DSA1	No output	
DI	DI0 to DI7	DILINE0, DI0 to DI7 (shared by all lines)	DILINE0 to DILINE1, DI0 to DI7 (shared by all lines)	DILINE0 to DILINE2, DI0 to DI7 (shared by all lines)
ENC (phases A, B, and Z)	ENC0 phase A, ENC0 phase B, and ENC0 phase Z	ENC0 phase A, ENC1 phase A, ENC0 phase B, ENC1 phase B, ENC0 phase Z, and ENC1 phase Z	No output	
ACK	ACK (shared by all lines)			
STGOUT/SHTOUT	STGOUT0/SHTOUT0	STGOUT0/SHTOUT0 or STGOUT1/SHTOUT1	STGOUT0 to STGOUT3 or SHTOUT0 to SHTOUT3	STGOUT0 to STGOUT7 or SHTOUT0 to SHTOUT7
RUN	RUN0	RUN0 or RUN1	RUN0 to RUN3	No output
GATE	GATE0	GATE0 and GATE1	No output	
BUSY	BUSY0	BUSY0 or BUSY1	BUSY0 to BUSY3	BUSY0 to BUSY7
OR	OR0	OR0 or OR1	OR0 to OR3	OR0 to OR7
ERROR	ERROR0	ERROR0 or ERROR1	ERROR0 to ERROR3	ERROR (shared by all lines)
READY	READY0	READY0 or READY1	READY0 to READY3	READY0 to READY7

I/O	Number of lines			
	1 line	2 lines	3 to 4 lines	5 to 8 lines
DO	DO0 to DO15	Line 0: D00 to D07 Line 1: D8 to D15	No output	

- **FZ5 Series**

I/O	Number of lines	
	1 line	2 lines
STEP	STEP0	STEP0 or STEP1
DSA	DSA0	DSA0 or DSA1
DI	DI0 to DI7	DI0 to DI7
RUN	RUN	None (This input is assigned as the BUSY signal for line 1.)
GATE	GATE0	GATE0 and GATE1
BUSY	BUSY	BUSY or RUN
OR	OR0	OR0 or OR1
ERROR	ERROR	ERROR (shared by all lines)
READY	READY0	READY0 or READY1
DO	DO0 to DO15	Line 0: D00 to D07 Line 1: D8 to D15

Non-stop Adjustment Mode

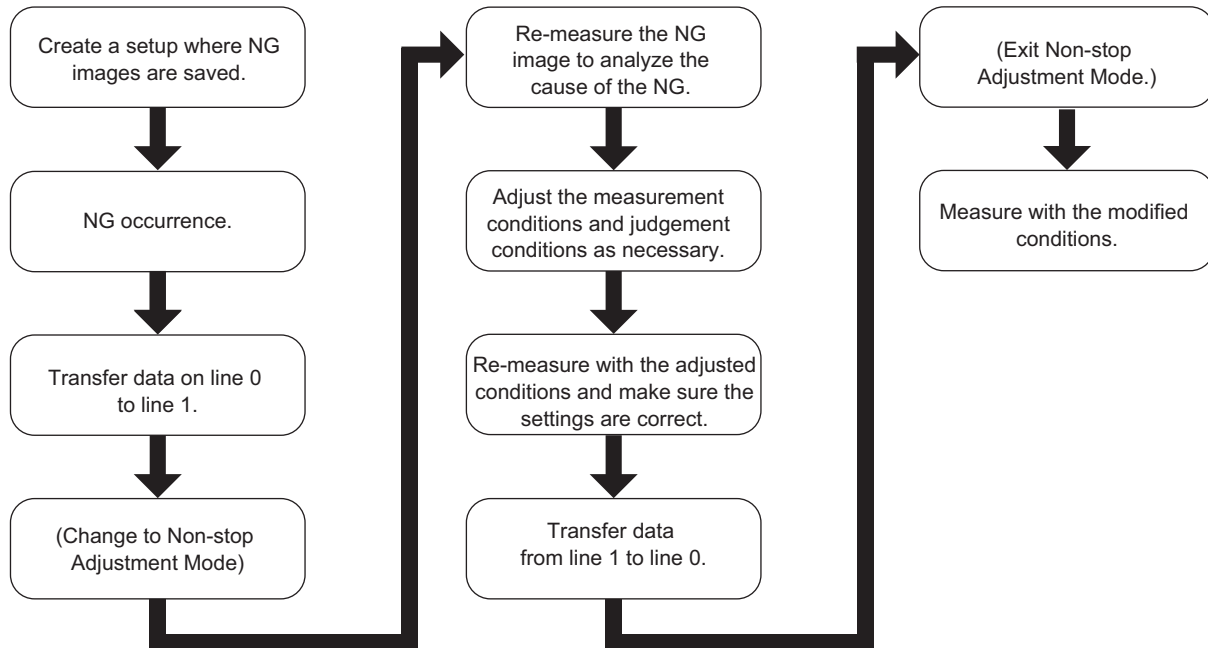
Non-stop Adjustment Mode allows you to change and adjust the measurement flow without having to stop the measurement processing during operation.

You use saved image files to adjust measurement flows. You can apply a modified measurement flow while the Controller is in RUN mode.

Lines 0 and 1 are used simultaneously for the execution of the Non-stop Adjustment Mode.

While the measurement process is executed for line 0, you modify and adjust the measurement flow for line 1.

Typical Application for Non-stop Adjustment Mode



1 In the Main Window for line 0, select [Transfer data] from the [Function] menu.

The settings for line 0 are transferred to line 1.

Change to Non-stop Adjustment Mode (The Main Window for line 1 is called the Non-stop Adjustment Mode Window.)

Measurement does not stop and continues to be executed on line 0.

2 Click the [Switch Screen] button to display line 1 (Non-stop Adjustment Mode Window).

3 Click the icon portion of the processing unit to adjust.

To change the flow, use the [Edit flow] tool in the Toolbox Pane.

The settings dialog box for the selected unit is displayed.

4 Modify the processing units.

5 Click [OK].

The settings dialog box closes and the display returns to the Main Window (layout 1).

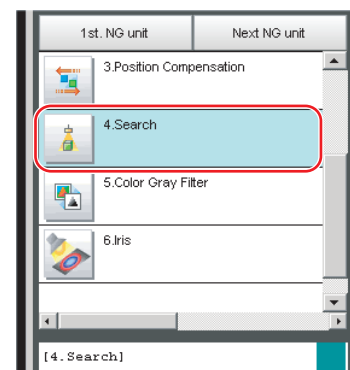
If you need to modify the judgement conditions for more than one processing unit, repeat steps 3 to 4.

At this stage, none of the changes have been applied.

6 In the Main Window for line 1, select [Non-stop data transfer] from the [Function] menu.

The changes to the settings for line 1 are saved as the settings for line 0 without affecting the measurement.

7 Click the [Switch Screen] button to display the Main Window for line 0.



IMPORTANT

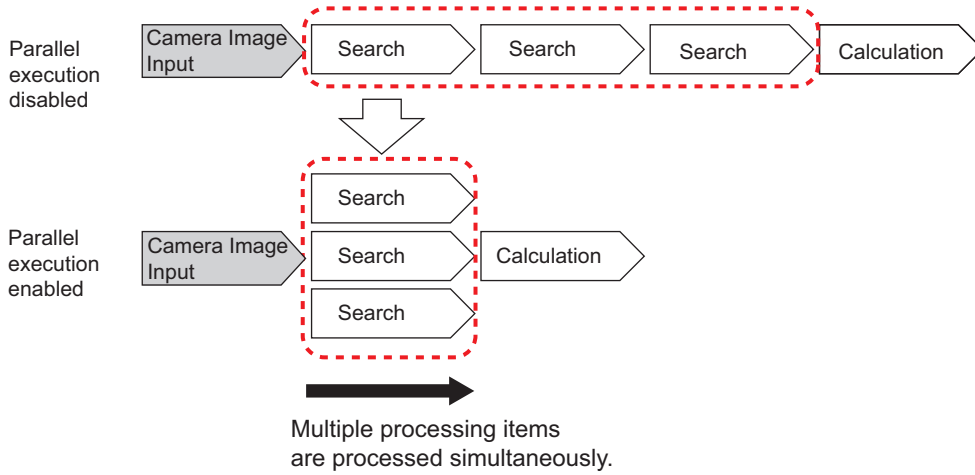
- When you execute [Non-stop data transfer], the results in the Trend Monitor and Expression processing units are cleared.
- If you use an external command to switch scenes or scene groups, or change the settings of processing units while the Controller is in RUN mode, the results of those changes will not be applied when you change to line 1 (Adjustment Mode) in the Main Window.
- If you use the Non-stop Adjustment Mode after you change the scene group while the Controller is in RUN mode, you may overwrite the scene group data unintentionally.
- The only communications commands that are accepted during a non-stop data transfer are the measurement (parallel, non-procedure, or PLC Link) and continuous measurement (parallel only) commands.
- The larger the size of the scene group file, the longer the non-stop data transfer will take.
- The communications settings cannot be changed in Non-stop Adjustment Mode.
- Do not register a new Camera Image Input processing unit in the Non-stop Adjustment Mode Window.
- If there is not enough external memory when you are about to do a non-stop data transfer, the transfer may not start. Set the destination for image logging to a destination that does not use external memory.
- Do not change the image mode for Non-stop Adjustment Mode.
- If you use image logging in Non-stop Adjustment Mode, the non-stop data transfer may become unavailable. To avoid this, set the trigger frequency so that it is longer than the logging time.
- Do not change the settings for image input processing items and do not change Camera parameters in the system settings in Non-stop Adjustment Mode.

High-speed Logging Mode

Normally, one CPU executes the processing for measurements, image logging, and image display. The FH or FZ5-11□□ executes those processes with one CPU, and uses the remaining CPU for measurement processing. This ensures that measurements are always processed at maximum performance.

Parallel Processing

Parallel processing splits part of the measurement flow into two or more tasks, and processes each task in parallel to shorten the transaction time.



Parallel Processing Settings

Parallel processing is available when [Parallel Execute] is set to ON in the [Operation mode setting]. You can specify the portion of the measurement flow to process in parallel, or have it specified automatically. If parallel processing is simply turned ON, the measurement flow is automatically parallelized based on the type of items that are registered in the flow.

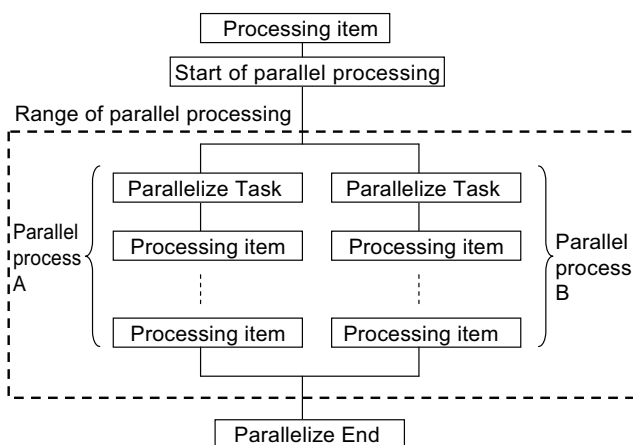
Refer to the following for details on the processing items that are automatically parallelized.

Reference: ► Precautions on Flow Editing (p.207)

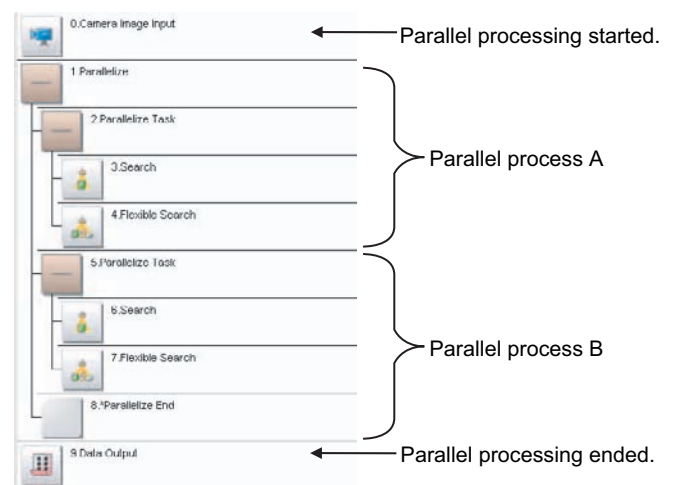
With the FH, you can specify parallel processing.

To specify this yourself, add parallel items as shown in the following measurement flow.

Concept of a Parallelized Measurement Flow



Actual Measurement Flow



- The range from the Parallelize processing item to the Parallelize End processing item is called a *parallel block*.
- The processing range of the Parallelized Task processing item is called a *task block*. A task block is a group of measurement processes that are distributed among multiple CPUs.
In a measurement flow, the task block is the range from the Parallelize Task processing item to the next Parallelize Task processing item, or the point that comes just before the Parallelize End processing item.

IMPORTANT

With the FZ5-L35□/6□□, you cannot use the operation modes or parallel processing.

Note

If [Parallel process] is turned OFF in the [Operation mode setting], the measurement flow is processed in series in order of the unit numbers.

Processing Items for Parallel Processing

You use the following three items.

Processing item category	Processing item name	Description
Measurement support processing items (Inspection and measurement support items)	Parallelize	Marks the beginning of a parallel processing range.
	Parallelize Task	Gives the range to be parallelized.
	Parallelize End	Marks the end of a parallel processing range.

Reference: Refer to the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for information on the parameters for the above items.

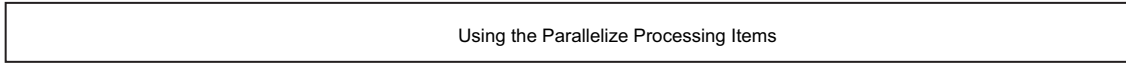
Programming Parallel Processing Items

- Always use the Parallelize and Parallelize End processing items in pairs.
- Do not place processing items between the Parallelize processing item and Parallelize Task processing item. Any processing units that are placed in this position will not be executed.
- Always insert the Parallelize Task processing item between the Parallelize processing item and Parallelize End processing item.
- If you program a branch under a Parallelize Task processing item, make sure the branch stays within the range of the Parallelize Task processing item.

Specific Example of Parallel Processing

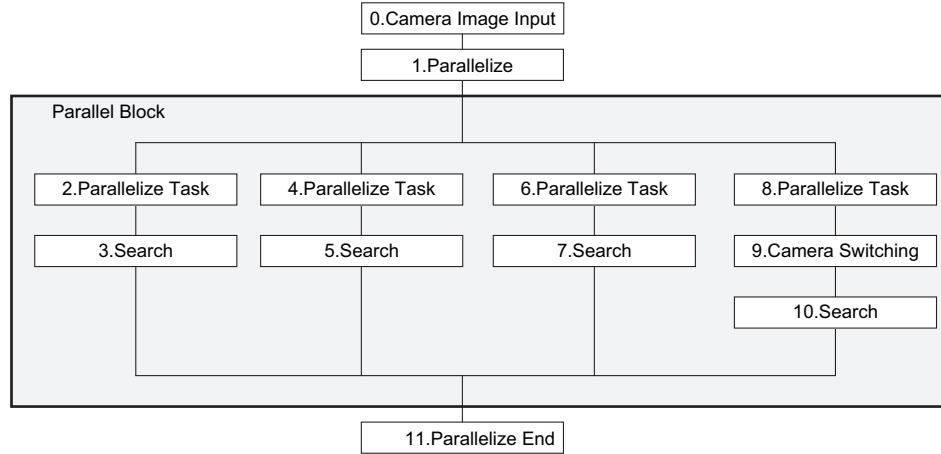
In the following example, the parallelizing is used to parallelize these processing items: 3. Search, 5. Search, and 7. Search, and also 9. Camera Switching and 10. Search.

Example:



After Using the Parallelize Processing Items

0.Camera Image Input
1.Parallelize
2.Parallelize Task
3.Search
4.Parallelize Task
5.Search
6.Parallelize Task
7.Search
8.Parallelize Task
9.Camera Switching
10.Search
11.Parallelize End



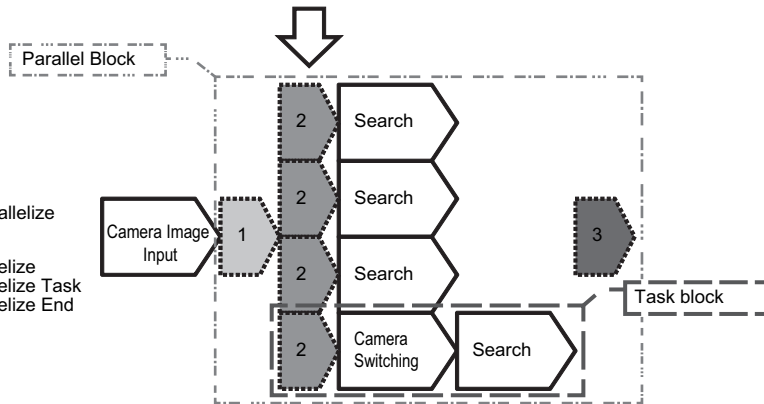
Before Parallelization



Using the Parallelize Processing Items

After Using the Parallelize Processing Items

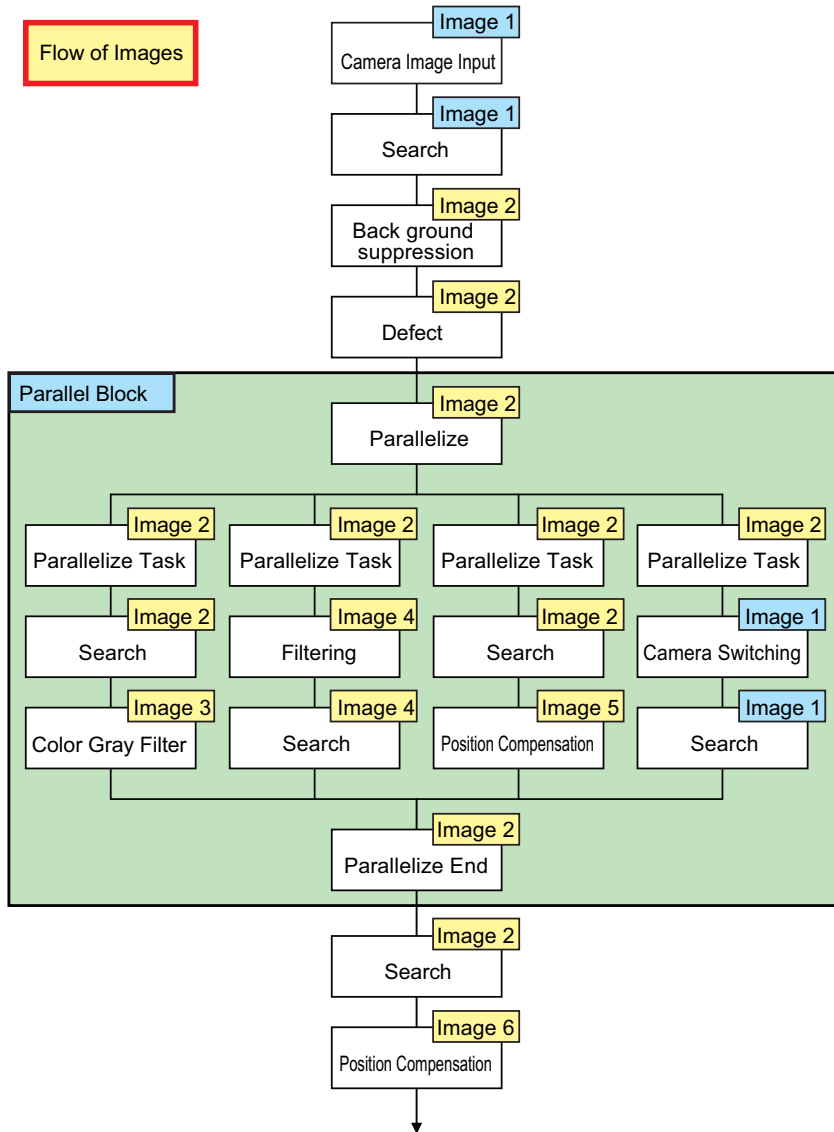
1. Parallelize
2. Parallelize Task
3. Parallelize End



Restrictions

Flow of Images

- The image at the start of parallel processing is passed on to the next item for use in each task block.
- The image for the start of parallel operation is also the image that is used after the Parallelize End processing item.

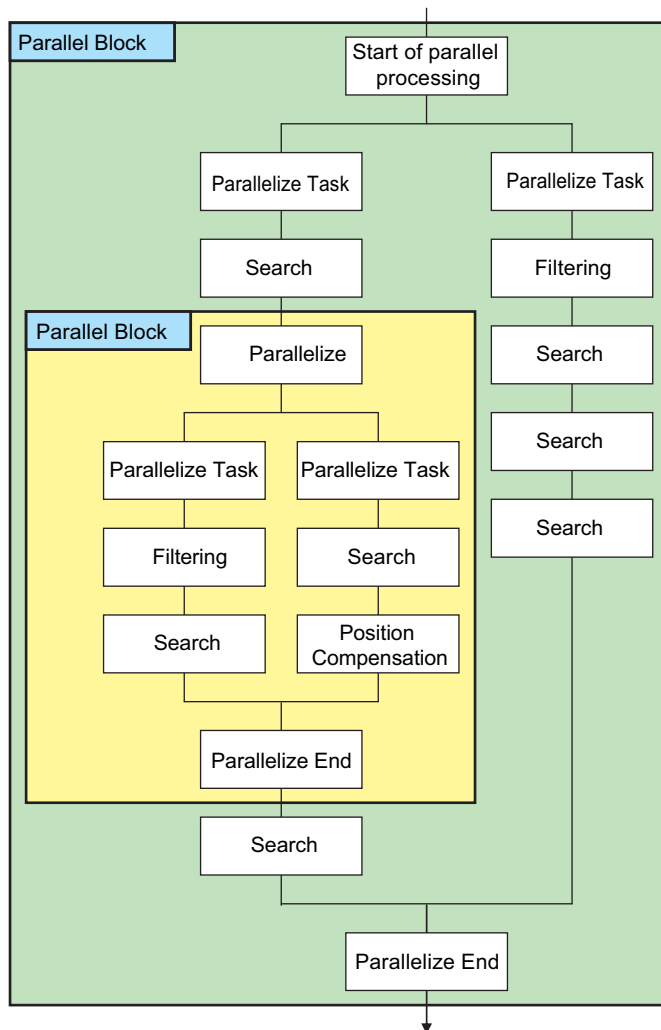


- You cannot place a Camera Image Input in every task block. To change the Camera image, you must use the Camera Switching processing item and set a different Camera number.

Nesting

- Parallel blocks can be nested.

Example:



Processing Order

The processing order for Parallelize Task processing items is not defined. Do not program a measurement flow that relies on a specific processing order of Parallelize Task processing items.

Transaction Times

Parallel processing may not be able to reduce transaction times as effectively as expected due to the processing time of each task, and the number of CPU cores. Before commissioning the system, always check the transaction time with the actual measurement flow and image.

Inserting Camera Image Input Processing Items

- Do not insert a Camera Image Input processing item inside the range of a Parallelize Task processing item. To use a different Camera image for a measurement under a Parallelize Task processing item, use the Camera Switching processing item inside the range of the Parallelize Task processing item.
- When inside the range of a Parallelize Task processing item, do not reference an image that is processed under a different Parallelize Task processing item.

Getting and Setting Data

- Do not get or set user data and system data inside task blocks.
- When inside the range of a Parallelize Task processing item, do not get or set unit data from a processing unit that is under a different Parallelize Task processing item.
- Do not input or output to the same file from a processing unit that is under a different Parallelize Task processing item.

Accessing the Same File

Do not input or output to the same file that is used for data logging in a task block.

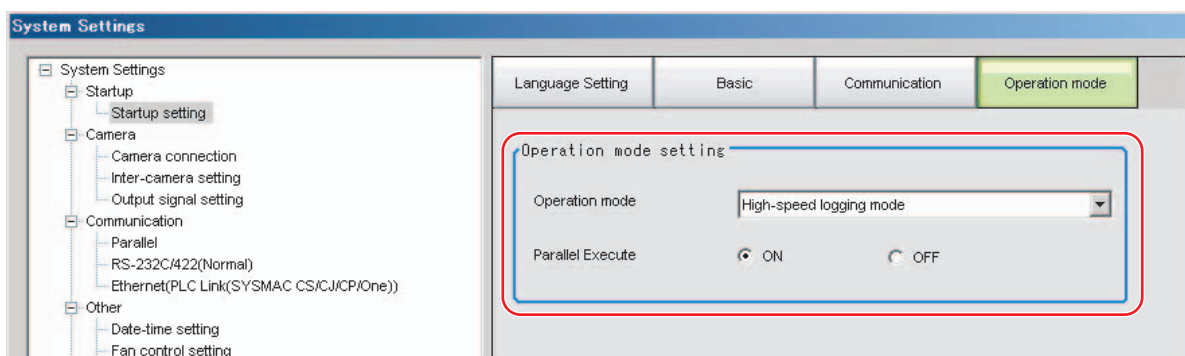
Setting Procedures

This section describes the settings that are required to enable parallel processing.

Setting the Operation Mode

Use the following procedure to set [Parallel processing] or ON in the [Operation mode setting].

- 1** In the Main Window (layout 0), select [Tool] – [System Settings].
- 2** In the [Startup setting], click the [Operation mode] tab.
- 3** Select [ON] for [Parallel Execute].



Note

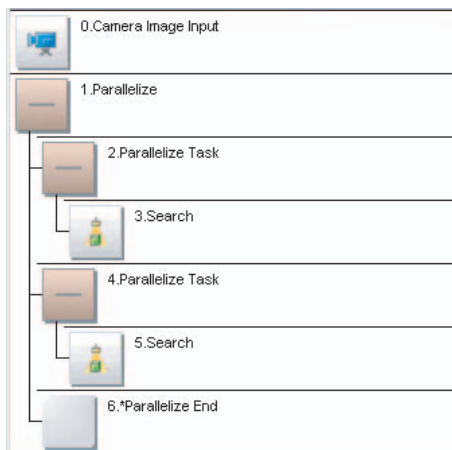
With an FZ5 Sensor Controller, the functions of the operation modes may be affected if you turn ON parallel processing. If you log everything with High-speed Logging Mode, turn OFF parallel processing to take advantage of the features of the operation mode. If you use parallel processing with an FZ5 Sensor Controller, we recommend that you turn ON parallel processing in High-speed Logging Mode and then do not use the logging function, which is a feature of the operation mode.

Editing the Measurement Flow

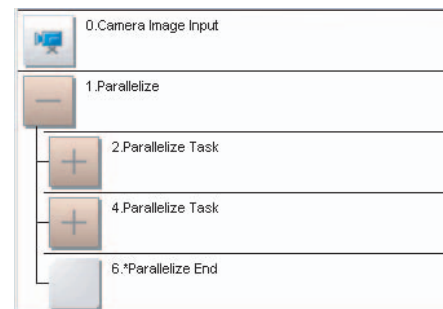
- 1 In the Main Window (layout 0), select [Function] – [Edit Flow].
- 2 Drag the following processing items from under [Inspection and measurement support items], or click the [Insert] button.
 - Parallelize
 - Parallelize Task
- 3 Program the processing items to execute in parallel between two Parallelize Task processing items.

Example:

Fully Expanded



Parallel Blocks Collapsed



The Parallelize processing item is the parent, and everything up to the Parallelize End processing item is a child. Additionally, the Parallelize Task processing item is the parent, and everything up to the step just before the next Parallelize Task processing item or the Parallelize End processing item is a child.

There is no settings dialog box for Parallelize processing items.

The Parallelize End processing item is not displayed in the list of items. (It is registered as a set with the Parallelize processing item).

Precautions on Flow Editing

- Editing operations on parallel blocks and task blocks, such as register, move, delete, copy, and paste, and unit save and load operations, are performed on the parallel block as a group.
- You cannot delete a Parallelize End processing item by itself. It is deleted as a set with the Parallelize processing item.
- You cannot paste or move items within the same parallel block.
- If a processing item in a parallel block is set to reference data in a processing unit that is inside the block, and if that block is copied, the reference will be replaced with a reference to the unit in the block at the copy destination.
References to a unit that is outside the parallel block will be retained.
- You cannot move, paste, or load a task block outside of its parallel block.

The following table lists the processing items that support parallel processing.

Processing item	Parallelize processing	Processing item	Parallelize processing	Processing item	Parallelize processing
Camera Image Input	---	Intersection	---	Parallelize	---
Camera Image Input FH	---	Barcode	---	Parallelize Task	---
Camera Image Input HDR	---	Glue Bead Inspection	---	Statistics	---
Camera Image Input HDR Lite	---	Position Compensation	---	Reference Calib Data	---
Camera Switching	---	Filtering	---	Position Data Calculation	---
Measurement Image Switching	---	Back Ground Suppression	---	Stage Data	---
Search	OK	Brightness Correct Filter	---	Robot Data	---
Flexible Search	OK	Color Gray Filter	---	Vision Master Calibration	---
Sensitive Search	OK	Extract Color Filter	---	PLC Master Calibration	---
ECM Search	OK	Anti-Color Shading	---	Convert Position Data	---
EC Circle Search	OK	Stripes Removal Filter II	---	Movement Single Position	---
Ec Corner	OK	Polar Transformation	---	Movement Multi Points	---
Ec Cross	OK	Trapezoidal Correction	---	Detection Point	---
Shape Search II	OK	Machine Simulator	---	Camera Calibration	---
Classification	OK	Image Subtraction	---	Data Save	---
Edge Position	OK	Advanced Filter	---	Conditional Branch	---
Edge Pitch	OK	Panorama	---	End	---
Scan Edge Position	OK	Calculation	---	DI Branch	---
Scan Edge Width	OK	Line Regression	---	Control Flow Normal	---
Circular Scan Edge Position	OK	Circle Regression	---	Control Flow PLC Link	---
Circular Scan Edge Width	OK	Precise Calibration	---	Parallel Flow Control	---
Color Data	OK	User Data	---	Control Flow Fieldbus	---
Gravity and Area	OK	Set Unit Data	---	Selective Branch	---
Labeling	OK	Get Unit Data	---	Data Output	---
Label Data	---	Set Unit Figure	---	Parallel Data Output	---
Defect	OK	Get Unit Figure	---	Parallel Judgement Output	---
Precise Defect	OK	Trend Monitor	---	Fieldbus Data Output	---
Fine Matching	OK	Image Logging	---	Result Display	---
Character Inspection	OK	Image Conversion Logging	---	Display Image File	---
Date Verification	---	Data Logging	---	Display Last NG Image	---
Model Dictionary	---	Elapsed Time	---	Scan Edge Position	OK
2D Codes	---	Wait	---		
Circle Angle	OK	Focus	OK		
Shape Search III	---	Iris	OK		
Ec Corner	---	Macro	---		
Ec Cross	---	Macro Calculation	---		

Note

Some processing items are processed in parallel as individual units.

Troubleshooting

Symptom	Correction
An error message is displayed on the console.	Refer to the error message list.
Insertion position for a unit to parallelize	Do not place items between the Parallelize item and Parallelize Task item. Any process units that are placed in that position will not be executed.
Insertion position of a parallelize processing items	Always insert the Parallelize Task processing item between Parallelize and Parallelize End processing items.
Setting the Parallelize processing item	Always use Parallelize and Parallelize End processing items in pairs.
Camera Image Input processing items are not being processed in parallel	Do not insert Camera Image Input processing items under Parallelize Tasks processing items. To use a different Camera image for a measurement under a Parallelize Task processing item, use the Camera Switching processing item under the Parallelize Task processing item.
Getting and setting the image from more than one Parallelize Task processing item	Do not reference an image that is processed under a different Parallelize Task processing item.
Getting and setting data from more than one Parallelize Task processing item	Do not get or set figure data from a processing unit that is inside the range of a different Parallelize Task processing item. Do not get or set unit data from a processing unit that is inside the range of a different Parallelize Task processing item.
Accessing files from under more than one Parallelize Task processing item	Do not input or output to the same file from a processing unit that is under a different Parallelize Task processing item.
Conditional branching under a Parallelize Task processing item	If you need to branch the processing items inside the range of a Parallelize Task processing item, make sure the branch stays within the range of the Parallelize Task processing item.
Processing order of Parallelize Tasks	The processing order for the Parallelize Task processing units is not defined. Do not program a measurement flow that relies on a specific processing order of Parallelize Task processing items.
Improving processing speed with Parallelize Task processing item	Parallel processing may not reduce transaction times as much as expected due to the processing time of each task, and the number of CPU cores. Before commissioning the system, always check the transaction time with the actual measurement flow and image.
Getting and setting system data under Parallelize Task processing items	Do not get or set user data and system data within the range of a Parallelize Task processing item.

Setting the Operating Environment of the System

This section describes how to set the operating environment of the Controller. The following settings are available.

- Reference: ► **Setting the Date and Time: [Date-time Setting] (p.210)**
- Reference: ► **Selecting the Language: [Language Setting] (p.211)**
- Reference: ► **Setting the Fan Rotation Speed: [Fan Control Setting] (p.211)**
- Reference: ► **Setting the Status at Startup: [Startup Settings] (p.212)**
- Reference: ► **Setting the Encoder Trigger: [Encoder Trigger Setting] (p.215)**
- Reference: ► **Setting the STEP Input Detection Pulse Width: [STEP Setting] (p.216)**
- Reference: ► **Setting a Network Drive: [Network Drive Setting] (p.217)**
- Reference: ► **Setting Up a Connection to the External Device**

This section describes communications with external devices, such as computers and programmable controllers.

Refer to the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342) for details.

The Controller model and measurement application version can also be checked.

- Reference: ► **Checking System Information: [System Information] (p.219)**

Setting the Date and Time: [Date-time Setting]

Confirm that the date and time on the built-in calendar are correct, and make corrections if they are not. The log data dates and times are set based on contents set here.

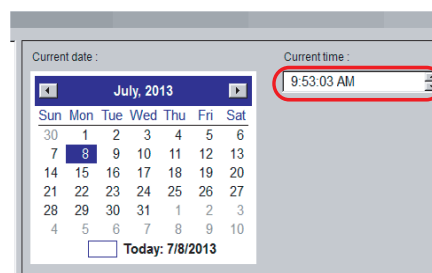
- 1 In the Main Window, select [System settings] – [Other] – [Date-time setting] from the [Tool] menu.**

The [Date-time setting] dialog box is displayed.

- 2 Set the current date and time.**

- 3 Click the [Apply] button.**

Close the [Date-time setting] dialog box.



Selecting the Language: [Language Setting]

You can set the language to use for the characters displayed on the displays. Information about the application software will be displayed in the selected language.

Note

- When a Controller with default settings is started, the [Language setting] dialog box is automatically displayed.
- The Controller default setting is for Japanese-language displays. If the language setting is changed to a non-Japanese language, the system automatically restarts.

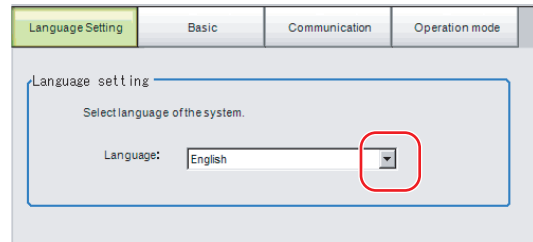
1 In the Main Window, select [System settings] – [Startup] – [Startup setting] – [Language Setting] from the [Tool] menu.

The [Language setting] dialog box is displayed.

2 Click the [▼] button to select the language.

3 Click the [Apply] button.

4 Return to the Main Window and click the [Data save] button. Then, restart the Controller. The Controller will start up with the selected language.



Note

The [Language setting] dialog box is also displayed when restarting after executing [System initialization].

Setting the Fan Rotation Speed: [Fan Control Setting]

This procedure describes how to set the rotation speed of the Controller fan.

FZ5-6□□ or FZ5-11□□ only

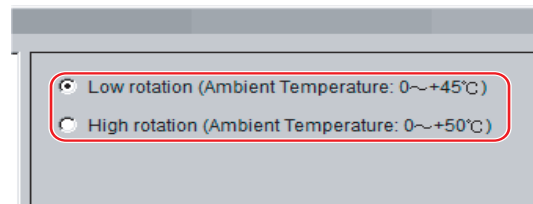
Note

The default setting is for low rotation. Use fast rotation when using the system in a high-temperature environment between 45 and 50°C.

1 In the Main Window, select [System settings] – [Other] – [Fan control setting] from the [Tool] menu.

The [Fan control setting] dialog box is displayed.

2 Select a fan setting.



Set value [Factory default]	Description
<ul style="list-style-type: none">• [Low rotation (Ambient temperature: 0 to +45°C)]• High rotation (Ambient temperature: 0 to +50°C)	Select the rotation speed of the fan.

3 Click the [Apply] button.

IMPORTANT

The fan control setting is disabled for the FZ5-L35□.

Setting the Status at Startup: [Startup Settings]

You can set the status when the power supply is turned ON.

Inspection can be set to start immediately after the power supply is turned ON by setting the number of the scene in which the measurement contents are set.

In addition, settings can be done so that the [Camera setting] dialog box is not displayed during startup.

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

The [Startup setting] dialog box is displayed.

- 2 Change the settings.**

Basic

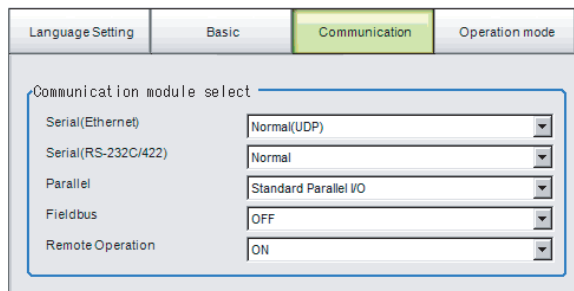
Item	Set value [Factory default]	Description
Scene		
Specify startup scene, scene group	[Selected]	The selected scene and scene group will be the scene and scene group at startup.
	Not selected	The scene or scene group that is set in the Controller when you execute [Data save] will be used at startup.
Scene group	Scene groups 0 to 31 [Scene group 0]	Select the scene group to use at startup.
Scene	Scene 0 to 127 [Scene 0]	Select the scene to use at startup.
Startup layout	Layout (local): Layout 0 Layout (remote): Layout 0	Select the layout number to display at startup. Layout (local): Layouts 0 to 8 Layout (remote): Layouts 0 to 8
Operation priority		Specify whether measurement results display or menu operation is to have priority.
	[Measurement result priority]	Processing of measurement results display is given priority. Menu operation will be harder to receive because of its lowered priority status.
	Menu operation priority	Menu operation is given priority. Measurement results displays may be incomplete.

Item	Set value [Factory default]	Description
Measurement initialization priority		Measurement initialization is performed immediately after changing the scene or editing the flow. You can specify whether measurement trigger reception or display refresh processing has priority during measurement initialization.
	[Measurement trigger receipt priority]	Measurement trigger reception is given priority even during measurement initialization processing. Displays for display refresh processing may be incomplete because of its lowered priority status.
	Processing of re-drawing on screen priority	Processing of refreshing the display is given priority. Measurement triggers will not be received until display refresh processing is completed.

Communication

Select the type of Communications Module to determine the communications method to use for communications between the Sensor Controller and external device.

Refer to the ► *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342) for details on how to select the Communications Module.



Item	Set value [Factory default]	Description
Serial (Ethernet)	<ul style="list-style-type: none"> • [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) 	Specify the Communications Module. Serial/Ethernet Normal/Normal (Fxxx series method): Communications are performed with external devices through [non-procedure] communications. For differences between [Normal] and [Normal (Fxxx series method)], refer to the following note.
Serial (RS-232C/RS-422)	<ul style="list-style-type: none"> • [Normal] • Normal (Fxxx series method) • PLC Link (SYSMAC CS/CJ/CP/One) • PLC Link (MELSEC QnU/Q/QnAS) 	PLC Link: Communications are performed through link areas with the PLC.
Parallel	[Standard Parallel I/O]	Parallel Standard Parallel I/O: Communications are performed with a standard parallel interface.
Fieldbus	<ul style="list-style-type: none"> • [OFF] • EtherCAT • EtherNet/IP 	Fieldbus: Communications are performed through EtherCAT communications and the EtherNet/IP interface. EtherCAT is supported only by the FH-series Controllers.
Remote Operation	<ul style="list-style-type: none"> • [ON] • OFF 	Remote operation: The Controller is operated from an external device.

IMPORTANT

- Do not set [EtherNet/IP] and [PLC Link] at the same time. They cannot be used at the same time.
Example:
Set [Serial (Ethernet)] to [PLC Link] and [Fieldbus] to [EtherNet/IP] at the same time.
Set [Serial (RS-232C/422)] to [PLC Link] and [Fieldbus] to [EtherNet/IP] at the same time.
Set both [Serial (Ethernet)] and [Serial (RS-232C/422)] to [PLC Link], and set [Fieldbus] to [EtherNet/IP] at the same time.
- Do not set both [Serial (Ethernet)] and [Serial (RS-232C/422)] to [PLC Link]. They cannot be used at the same time.

Note

- Normal (Fxxx Series Method)**
With the [Normal (Fxxx series method)] communications method, the OK response timing in relation to MEASURE commands is different from that of the [Normal] communications method.

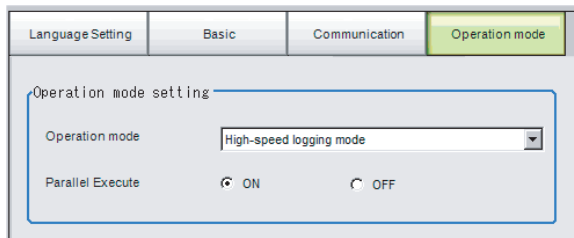
Normal (Fxxx series method) communications method	Normal communications method
MEASURE	MEASURE
Measurement result	OK
OK	Measurement result

- OK Responses**
With [Normal communications method], an OK response is returned when the Controller receives a command.
With [Normal (Fxxx series method)], an OK response is returned when command execution is completed.

Operation Mode (FH and FZ5-11□□ Only)

Select the operation mode according to the application conditions, such as the operation mode that is best suited to reduce the takt time and downtime.

Refer to ► Setting the Operation Mode (p.190) for details on the operation modes.



Item	Set value [Factory default]	Description
Operation mode	<ul style="list-style-type: none"> Single-line High-speed mode [High-speed logging mode] Multi-line random-trigger mode Non-stop adjustment mode 	Set the operation mode. Reference: ► Setting the Operation Mode (p.190)
Parallel execution	ON/[OFF]	Set whether to uses parallel processing. Reference: ► Parallel Processing Settings (p.201)

3 Click the [Apply] button.

Setting the Encoder Trigger: [Encoder Trigger Setting]

1 In the Main Window, select [System setting] – [Other] – [Encoder trigger setting] from the [Tool] menu.

2 Set the target encoder.

Parameter	Set value [Factory default]	Description
Use encoder trigger	<ul style="list-style-type: none"> Selected [Not selected] 	Set whether to use an encoder trigger.
Encoder input type	<ul style="list-style-type: none"> [Open collector] Line driver 	Select the output format of the encoder to be connected.
Resolution [pulse/rotation]	[1] to 65535	Set how many pulses equal one rotation. Set this parameter according to the resolution of the encoder.
Count rotations with pulse Z	<ul style="list-style-type: none"> Selected [Not selected] 	When this check box is selected, pulse Z is used to determine whether a full rotation is made. When this check box is cleared, a full rotation is determined by whether the number of pulses on phase A has reached the resolution of phase A.

3 Set the advanced settings for the trigger as necessary.

Parameter	Set value [Factory default]	Description
Trigger signal	[Phase A] Phase Z	Set the phase to use as the trigger signal.

Parameter	Set value [Factory default]	Description
Phase A		
Enable timing	<ul style="list-style-type: none"> • [ENABLE start] • STEP start 	Set the timing for starting the pulse count. ENABLE start: Counts the pulses input during the measurement trigger receipt period. STEP start: The pulses are not counted even during the measurement trigger receipt period until the STEP signal is input.
Pulse reset timing	<ul style="list-style-type: none"> • [Every trigger pulse] • Every rotation (Pulse Z) 	Set the timing for resetting. When [Every rotation] is set, multiple pulses can be set for phase A.
Phase A trigger	[0] to 65535	Set how many pulses it takes to produce a trigger.
Support backlashing (using phase B)	<ul style="list-style-type: none"> • Selected • [Not selected] 	Set whether the rotation direction is detected.
Trigger in backlashing	<ul style="list-style-type: none"> • Selected • [Not selected] 	Set to produce a trigger during reverse rotation.
Phase Z		
Enable timing	<ul style="list-style-type: none"> • [ENABLE start] • STEP start 	Set the timing for starting the pulse count. ENABLE start: Counts the pulses input during the measurement trigger receipt period. STEP start: The pulses are not counted even during the measurement trigger receipt period until the STEP signal is input.
Pulse reset timing	• Every trigger pulse	Set the timing for resetting.
Phase Z trigger	[1] to 1023	Set how many pulses it takes to produce a trigger.

IMPORTANT

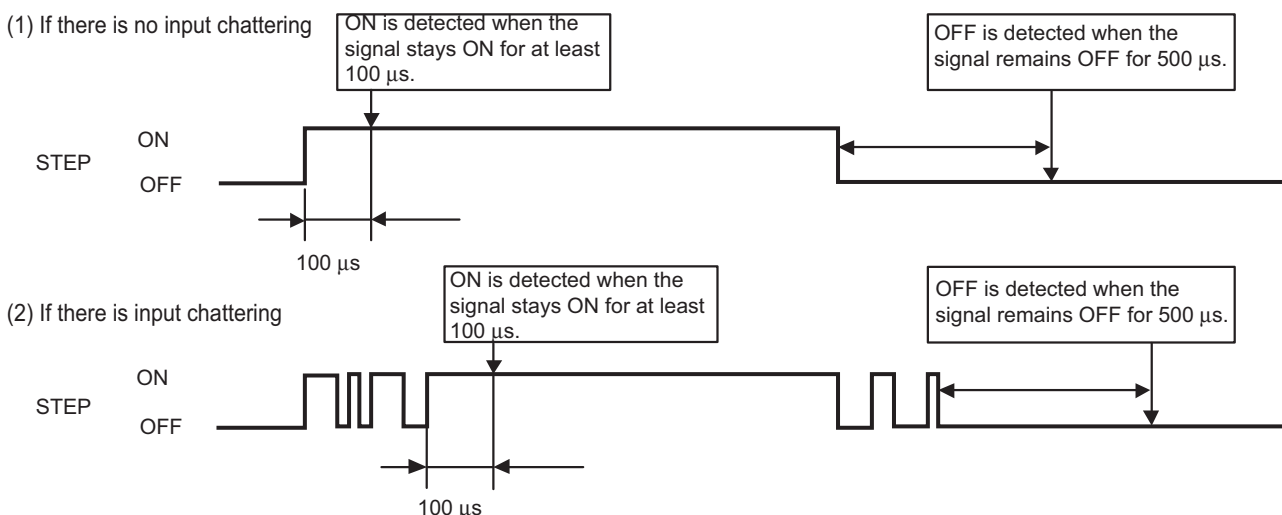
The encoder trigger setting is disabled for the FZ5-L35□.

Setting the STEP Input Detection Pulse Width: [STEP Setting]

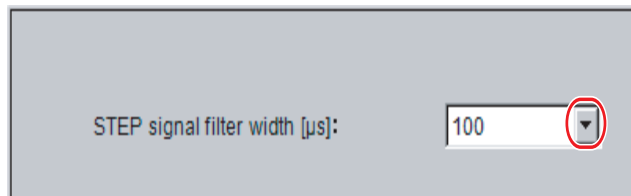
You can set a filter as a countermeasure against STEP input chattering and to prevent operation malfunctions due to noise.

Filter Set Value of 100 μs (Default 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 that point. Accordingly, STEP signal detection is delayed by an amount of time equivalent to the set filter value. Also, when turning from ON to OFF, the OFF filter fixed at 500 μs is activated and the STEP signal is detected as OFF when it is OFF for at least 500 μs.



- 1 In the Main Window, select [System settings] – [Other] – [Controller] – [STEP setting] from the [Tool] menu.
- 2 Set the filter width in the [STEP setting] area.



Parameter	Set value [Factory default]	Description
STEP signal filter width [μs]	<ul style="list-style-type: none"> • [100] • 200 • 300 • 400 • 500 	Set the filtering width.

IMPORTANT

If you use Multi-line Random-trigger Mode for an FH-series Controller, the value for the STEP signal filter on line 0 is applied to all lines.

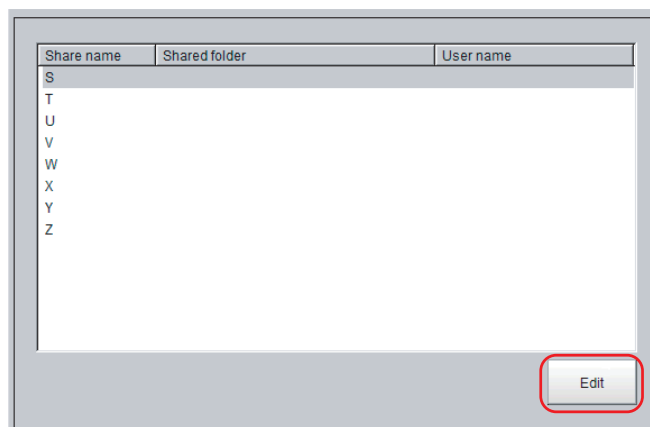
Setting a Network Drive: [Network Drive Setting]

You can save logging images to an external device, such as a network-connected computer with a shared folder, using a network drive.

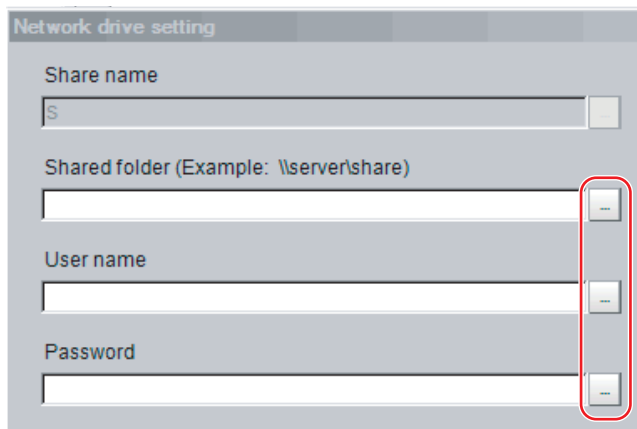
You can also load setting data saved in a network drive into the Controller.

If you register a shared folder on the network drive, the network drive connected to the [Select file] or [Select folder] dialog box of the FH/FZ5 software will be displayed.

- 1 In the Main Window, select [System settings] – [Other] – [Network drive settings] from the [Tool] menu.
- 2 Select the share name to register, and click the [Edit] button.



3 Enter the information to be allocated to the network drive (shared name), such as the shared folder, user name, and password.



Parameter	Set value [Factory default]	Description
Share name	S,T,U,V,W,X,Y,Z	This is the name to be recognized by the Controller as a network drive. Only 1 unit can be connected. For FZ5-L3□□ or FZ5-6□□, the shared name is displayed in the \Network folder. For the FH or FZ5-11□□, a drive letter such as E:, F:, G:, or H: is displayed.
Shared folder	---	Specify the shared folder name. Create a folder in advance on a computer that has a DNS resolved name on the network, and specify this as the shared folder name. For example, if the host name (computer name) is VISION and the shared name is COMMON, specify a name such as \\VISION\COMMON.
Username	---	Enter the user name and the password to access the network drive. If you do not know the user name or the password, contact the device network administrator.
Password	---	

4 Click the [Apply] button.

The settings are enabled after the Controller is restarted.

Note

With the FH/FZ5-11□□, you can still connect to the network drive even if you specify the IP address instead of the host name when you set the shared folder name. With the FZ5-L35□/FZ5-6□□, you will not be able to connect to the network drive if you specify the IP address.

IMPORTANT

- If images and data are logged to a network drive, the use of the multi-input function and other heavy measurement loads on the Controller may slow down communications and cause logging errors. In this case, set the measurement takt time so that there is some leeway.
- If many drives are set as network drives, it may require a greater amount of time to start the Controller.
- Do not pull out the LAN cable while the Controller is accessing the network drives.
- Start the Controller when the network drives are ready. Connections cannot be established if the network drives are not ready when the Controller is started.
- If there is no access to a network drive for a certain amount of time, the connection will be automatically cut off depending on the network drive setting at the connection target. Make sure that the setting at the connection target is not set to automatic disconnection.
- Dates and Times of the Updates of the Files Created at Network Logging
If the time zone of the external device is different from the time zone setting of the Controller [GMT-08:00 Pacific Time (US & Canada): Do not automatically adjust clock for Daylight Saving Time], the date and time actually written may be different from the date and time of the file update. Adjust the time zone of the external device to match that of the Controller.

Checking System Information: [System Information]

The Controller model and measurement application version can be checked.

You can check the external memory status only on the FH and the FZ5-11□□.

Reference: ► Using External Memory Devices (FH and FZ5-11□□ Only) (p.178)

1 In the Main Window, select [System information] from the [Function] menu.

The [System information] dialog box is displayed.

2 Check the information.

The Controller model and measurement application version can be checked.

3 Click the [Memory state] button.

You can check the following information.



Available Application Memory

The application memory is the memory that is used by all applications.

Knowing the available memory provides a rough standard for confirming status while operating.

Available data memory (FZ5-L3□□ or FZ5-6□□ 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 Click the [Close] button.

The [System information] dialog box closes.

Note

Application Memory

This memory is used for all applications.

This memory area is used temporarily by the application. By confirming available memory, this provides a rough standard for confirming status while operating. The user cannot access it.

With the FH or FZ5-11□□, a warning message is displayed when the amount of available application memory falls below 1 GB. Adjust the inspection flow so that the available memory is more than 1 GB.

Data Memory (FZ5-L3□□ or FZ5-6□□)

This memory is used to hold the current setting details of scene group data.

If the capacity of this memory is exceeded, adding units and copying scenes cannot be performed to edit the flow.

The available data memory can be checked from the system menu.

Reference: ► Checking System Information: [System Information] (p.219)

MEMO

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Alignment

An FH/FZ5-series Controller has an alignment function that you can use to position workpieces for stage and robot applications (hereafter called *external devices*).

Alignment executes a combination of more than one processing item.

This section gives an overview of alignment, and provides details on its use in general.

Refer to the ► *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for details on the processing items that are used for alignment.

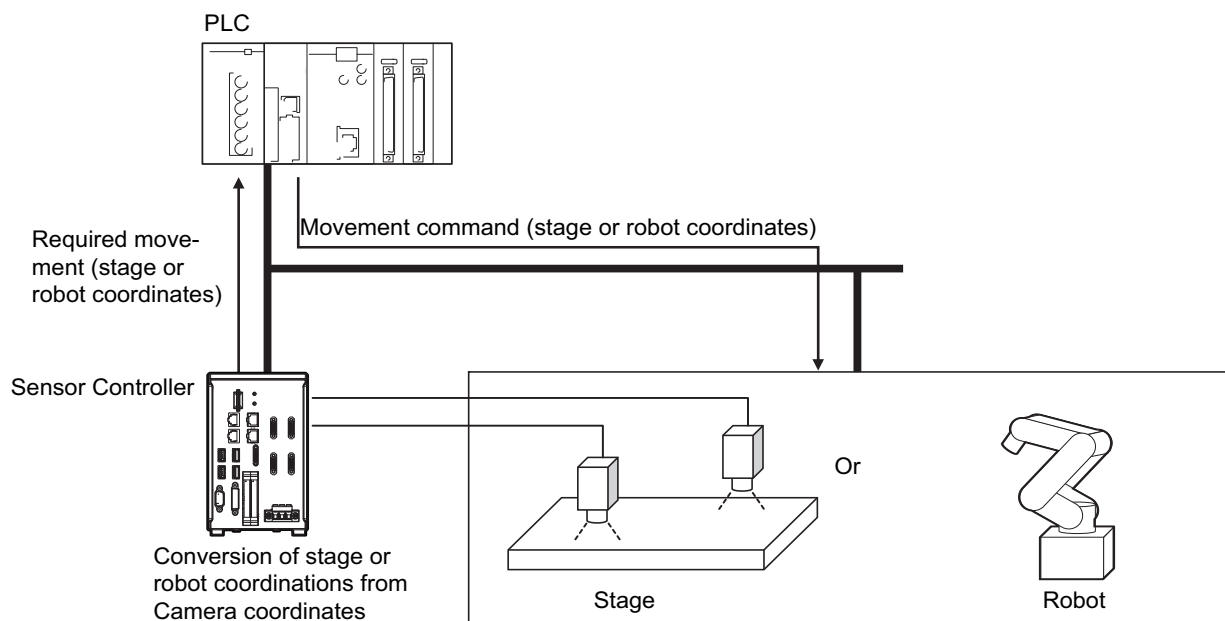
Overview

An FH/FZ5-series Controller measures the position of alignment marks on the workpiece, or the position of specific features of the workpiece (such as corners), and outputs the axis movement to a PLC or stage controller, which aligns the workpiece into a specified position (hereafter called the *reference position*).

The PLC or stage controller simply needs to send a movement command to the external device for the axis movement amount that was output from the FH/FZ5-series Controller to align the position of the workpiece.

The following two measurement flows are used to perform alignment. Set both flows for each scene.

- Calibration flow
This flow associates the coordinates of the external device with the Camera coordinates.
- Alignment flow
This flow uses the calibration parameters that were created in the calibration flow to align the position of the workpiece.



Supported External Devices

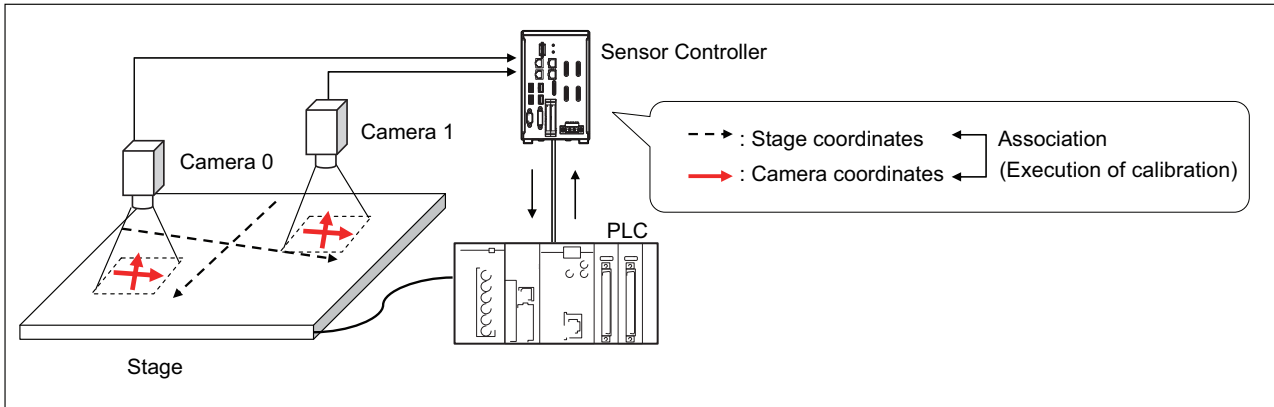
Alignment is supported for the following external devices.

Type			
Stages	XY		Camera axis movement: None
	XY θ	θ axis: Direct drive	Camera axis movement: X axis
			Camera axis movement: Y axis
			Camera axis movement: XY axes
			Camera axis movement: None
	XY θ	θ axis: Linear drive	Camera axis movement: X axis
			Camera axis movement: Y axis
			Camera axis movement: XY axes
			Camera axis movement: None
	θ XY	θ axis: Direct drive	Camera axis movement: X axis
			Camera axis movement: Y axis
			Camera axis movement: XY axes
			Camera axis movement: None
	XY θ	θ axis: Linear drive	Camera axis movement: X axis
			Camera axis movement: Y axis
			Camera axis movement: XY axes
Camera axis movement: None			
UVW	Direct fulcrum motion		
	Rotary fulcrum motion		
UVWR	Direct fulcrum motion		
	Rotary fulcrum motion		
Robots	3 axes		
	4 axes	Control method: Fixed positions	
		Control method: Measured positions	

Calibration

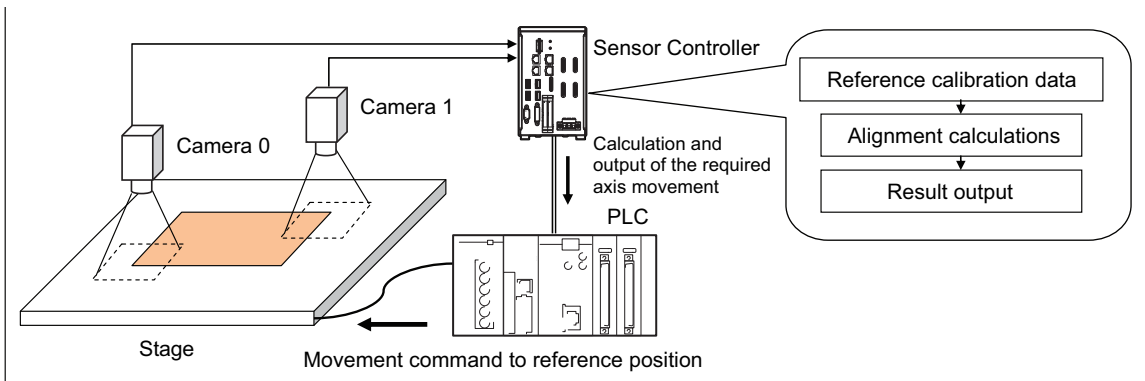
The Camera and external device both have their own coordinates, so it is necessary to calculate the relationship of the coordinates of the Camera and the external device in advance. This process is called *calibration*.

The FH/FZ5-series Controller uses the external device to move the workpiece and measure it. This is repeated to calculate the calibration parameter.



Alignment: Aligning the Position of the Workpiece

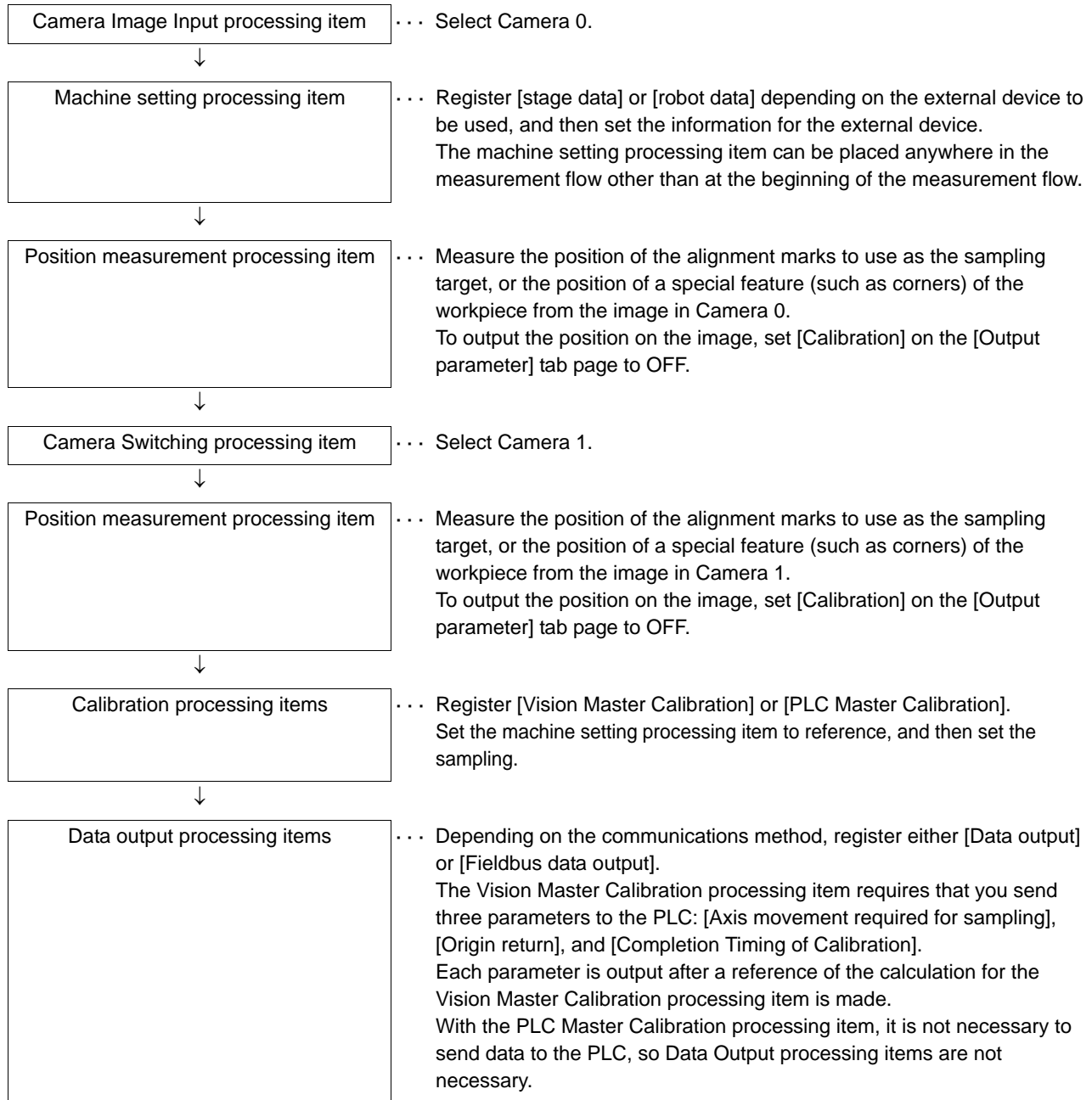
The image taken by the Camera is used to measure the position of alignment marks on the workpiece, or the position of specific features of the workpiece (such as corners) in Camera coordinates (pixels). The calibration parameter that is calculated in the calibration flow is used to convert the measured position into the coordinates of the external device. Finally, the axis movement that is required to match the measured position to the reference position angle is calculated and output to the external device.



Execution of Calibration

This section uses two Cameras and a stage as the external device to describe an example for setting the calibration flow and executing calibration.

Example: Calibration Flow Example for 2 Cameras



Settings for the External Device to Use

Set the parameters that describe the type and specifications of the external device to use.

Add the following machine setting processing item to the flow.

Stage Data

If you are using a stage, use this processing item.

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

Robot Data

If you are using a robot, use this processing item.

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

The settings for the machine setting processing item can be referenced by the following processing items.

- Vision Master Calibration
- PLC Master Calibration
- Convert Position Data
- Movement Single Position
- Movement Multi Points

Note

The settings for the machine setting processing item can be referenced from other scenes.

The machine setting processing item can be registered only in one scene group, but it can be referenced from other the scenes. This enables central management of the external device settings.

Settings for the Calibration To Execute

Add the following Calibration processing items to the flow.

Vision Master Calibration

This processing item calculates the axis movement that is necessary to perform the most accurate calibration within the range of movement of the external device.

This routine is performed repeatedly to create very precise calibration parameters: Output the calculated axis movement to the PLC, the PLC moves the external device, the PLC sends a measurement command to the FH/FZ5-series Controller.

Reference the Reference Calib Data processing item to access the calibration parameters that were created. Refer to ► *Vision Master Calibration* of the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

IMPORTANT

If you are using the measurement results of the Sensor Controller to operate an external device, make sure the movement is within the range of the movement of the external device before you implement the move.

Note

The Vision Master Calibration processing item has the following advantages over PLC Master Calibration processing item.

- There is no need for trial and error with the order of movements or axis movement, even with complicated external devices, such as UVW stages.
The order of movement of the workpiece during calibration and the axis movement of the external device that corresponds to each movement are automatically calculated.
- Even if you change the calibration conditions, you do not have to change the PLC ladder programming.
If you add more sampling points for better precision, or if you reduce the number of sampling points to shorten the calibration time, you can still use the ladder programming as is.
- In conjunction with calibration, you can also calculate the parameters for distortion correction at the same time.
This allows you to align positions with even greater accuracy without doing any extra work.

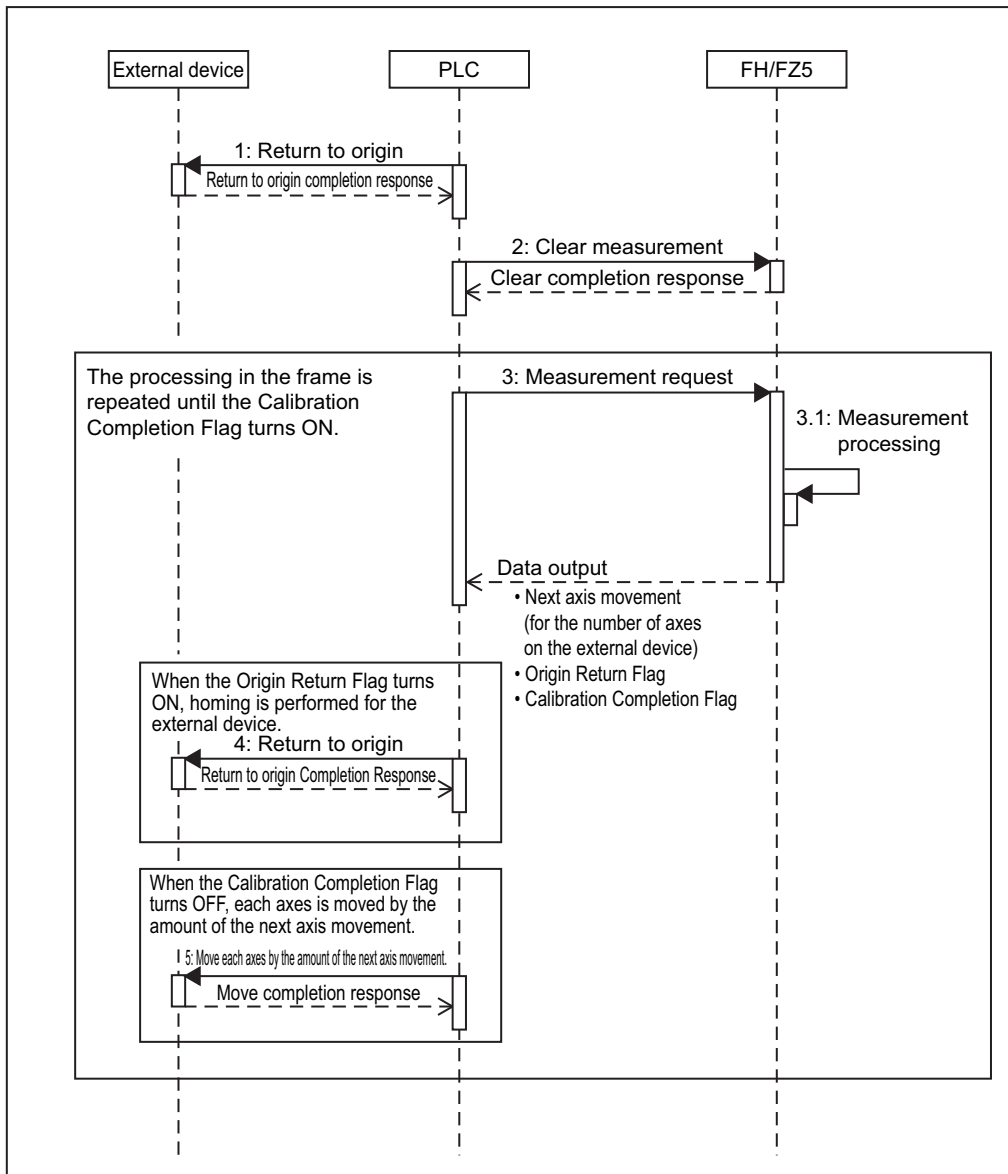
PLC Master Calibration

The PLC Master Calibration processing item creates calibration data as follows: The axis movement that is necessary for sampling is calculated in advance. Then, the following routine is repeated: the PLC moves the external device, it sets the axis movement in the FH/FZ5-series Controller, and then it sends a measurement command to the FH/FZ5-series Controller.

Reference the *Reference Calib Data* item to access the calibration data that was created.

Refer to ► *PLC Master Calibration* of the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

Vision Master Calibration

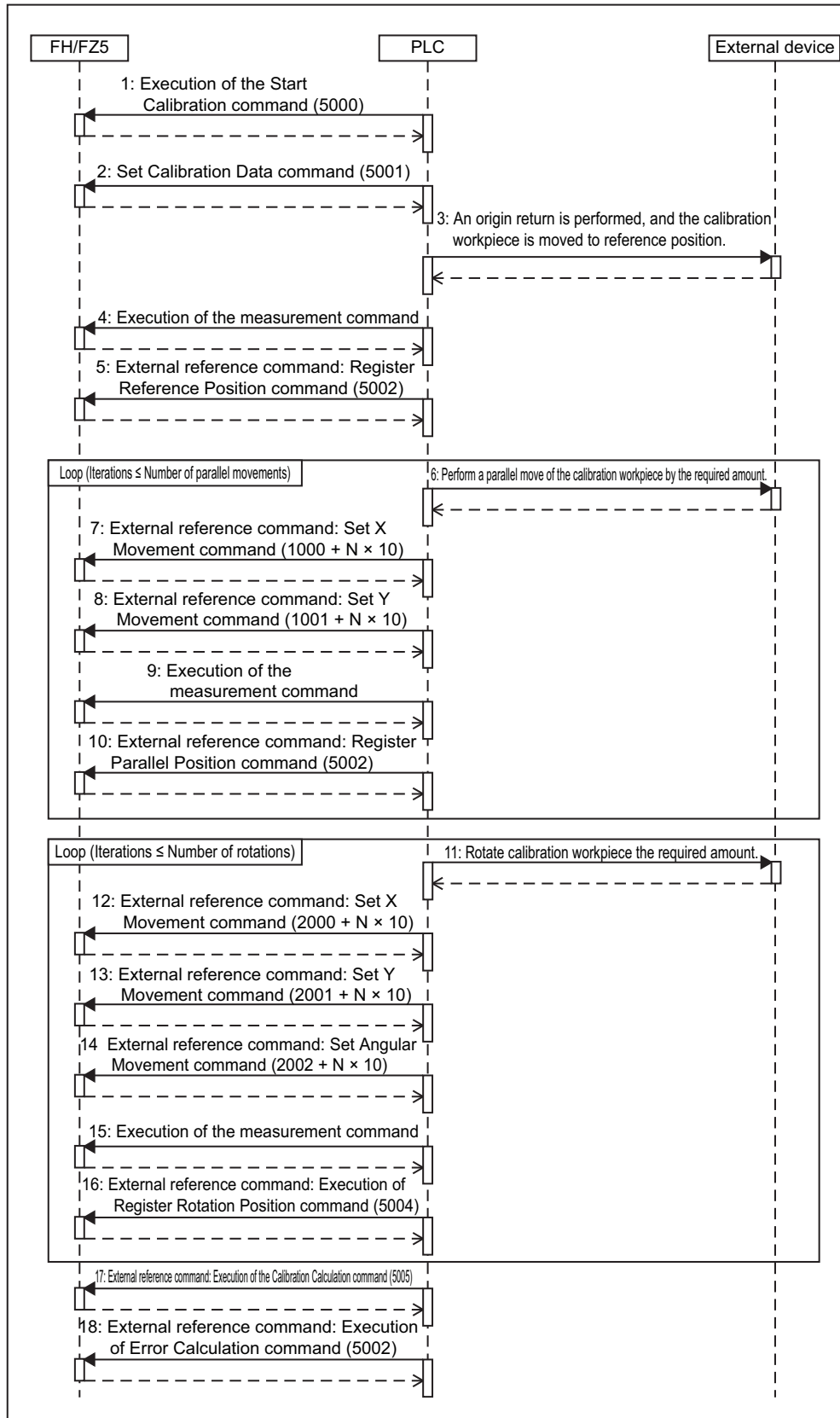


PLC Master Calibration

• Standard Mode

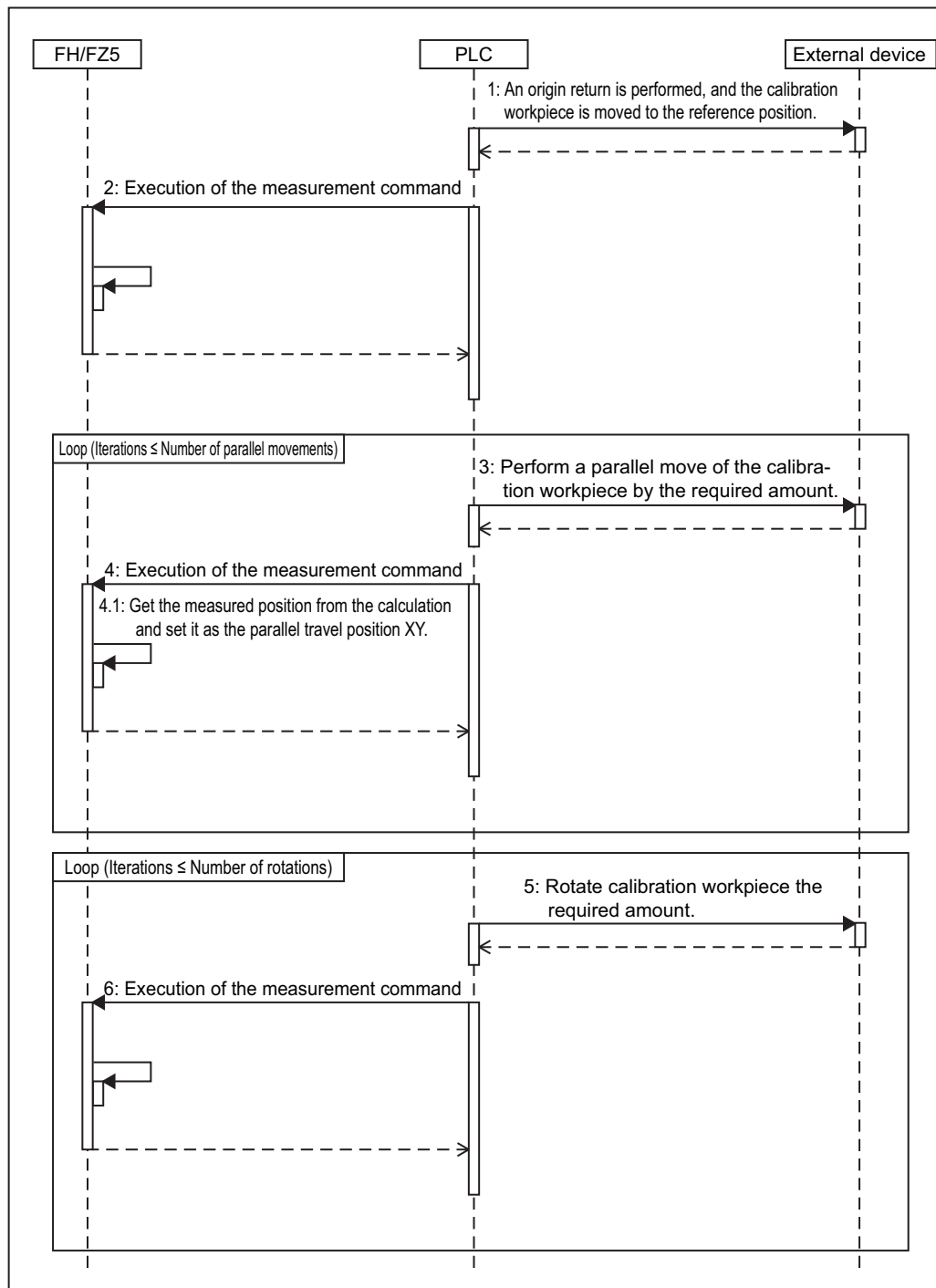
The numbers in parenthesis are the external reference numbers that are used when commands are executed for the PLC Master Calibration processing unit.

Refer to ► *External Reference Table* under *PLC Master Calibration* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).



• **Easy Mode**

The Calibration Execution Flag and movement in actual coordinates must be set in advance in the PLC Master Calibration settings dialog box.



Troubleshooting

PLC Master Calibration

Refer to ► *Key Points for Adjustment* under *PLC Master Calibration* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

Vision Master Calibration

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

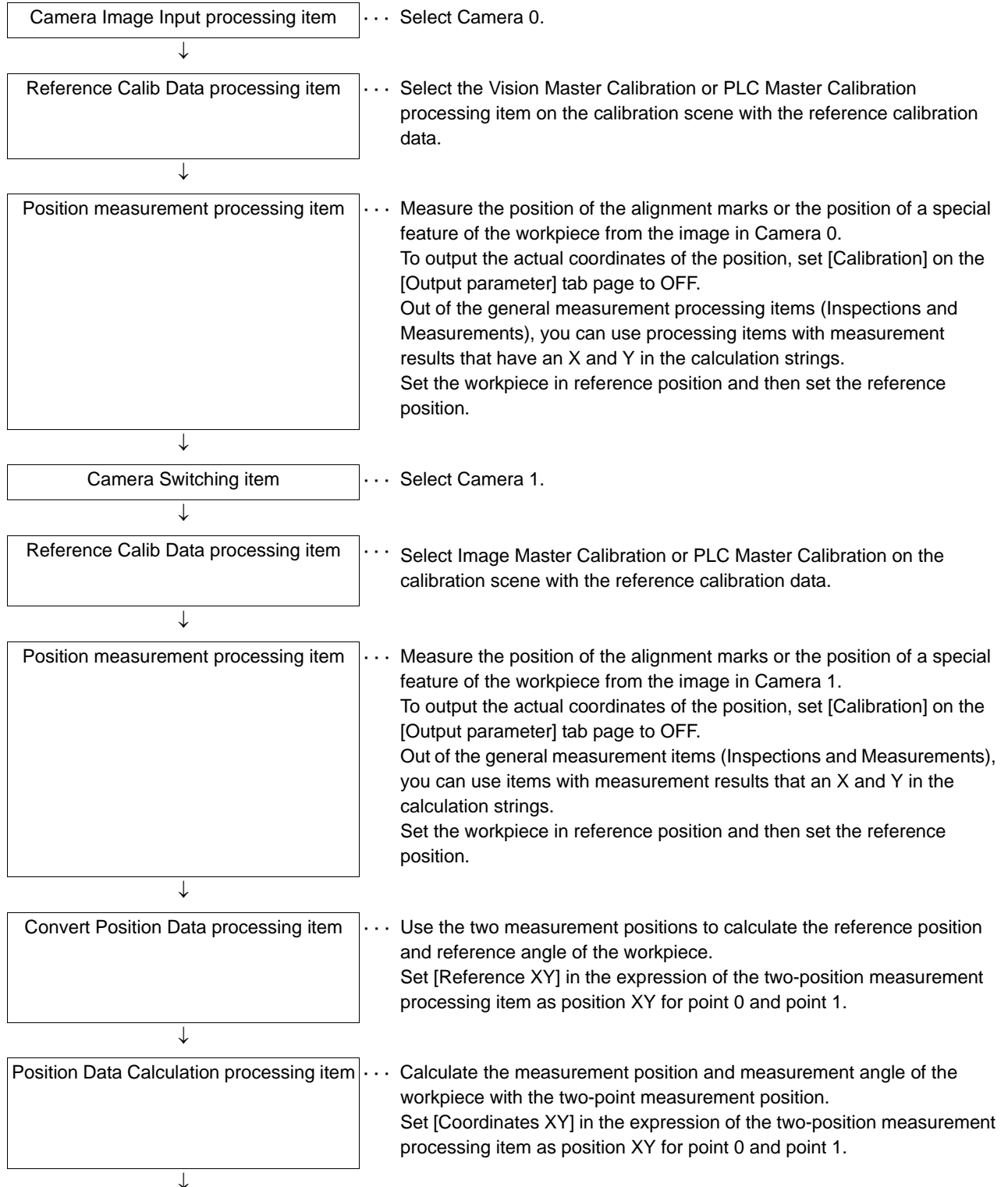
Calibration Support Tool

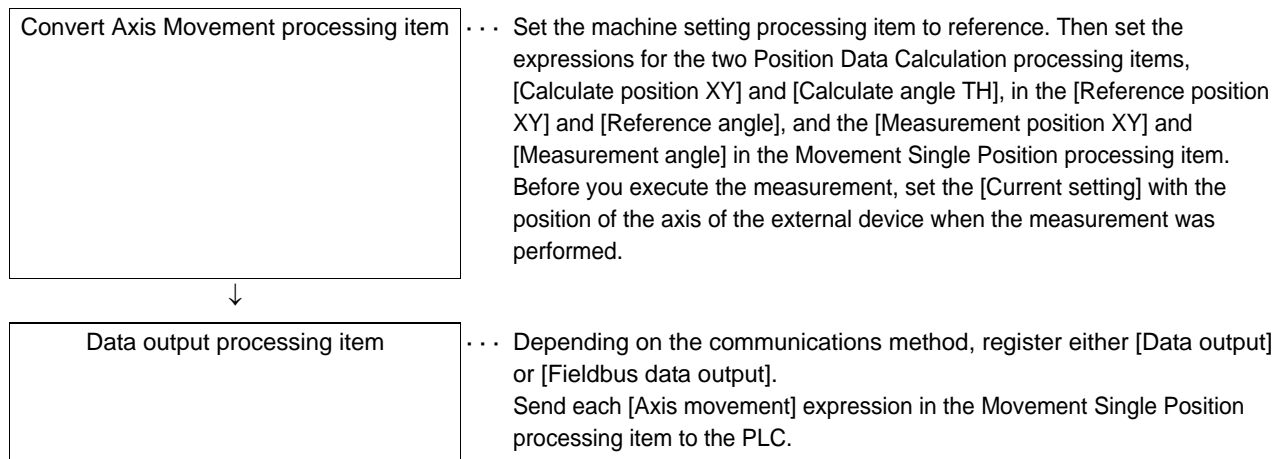
Symptom	Type	Parameters to adjust	Correction
The unit number is set to [None] and cannot be selected.		---	Check whether there are any processing items that retain calibration data that are registered in the current scene.
The setting data is initialized every time the Toolbox is opened.		<ul style="list-style-type: none">• Tool Settings Save Button• Tool Settings Load Button	This is the specified behavior. If you need to save the settings data, use the [Save] button in the Toolbox. The saved settings can be loaded with the [Load] button.
How do you rotate the graphic display for better visibility?		<ul style="list-style-type: none">• Standard axis• Axis direction• Direction of rotation	You can rotate the graphic display along the standard axis, axis direction, and rotation direction on the [Display setting] tab page.

Alignment

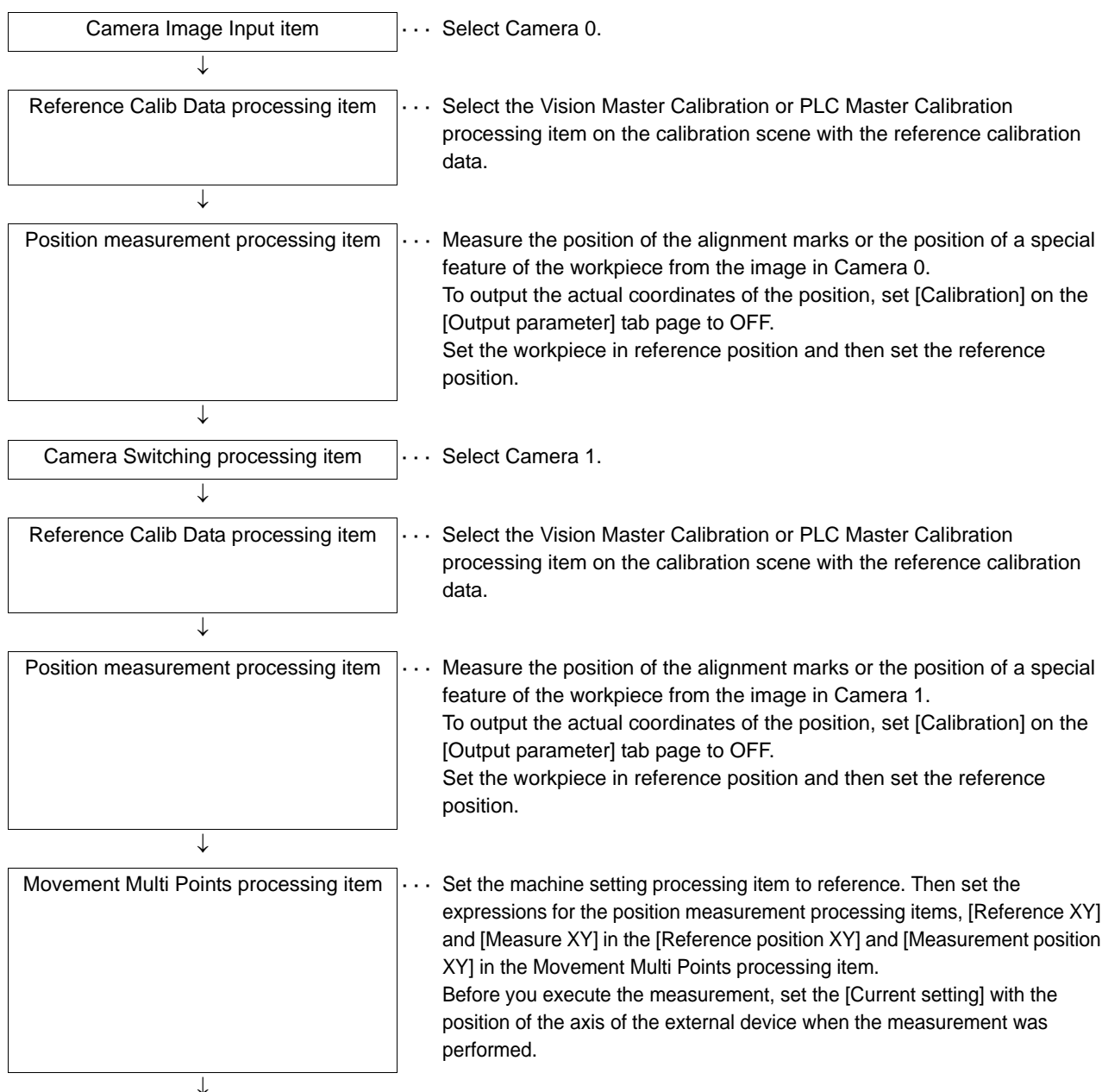
This section will use two Cameras to describe the procedures for setting the alignment flow and executing alignment.

Example 1: Alignment Flow Example (Position Data Calculation and Axis Movement Conversion) for Two Cameras





Example 2: Alignment Flow Example (Movement Multi Points) for Two Cameras



Data output processing item

- · · Depending on the communications method, register either [Serial data output] or [Fieldbus data output].
Send each [Axis movement] expression in the Movement Multi Points processing item to the PLC.

Convert Position Data + Movement Single Position

Use these settings to align the measured position and measured angle with the reference position and reference angle.

The movement that is required to align each axis of the external device is calculated and output.

Refer to ► *Convert Position Data and Movement Single Position* in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341).

Movement Multi Points

Use this setting to align more than one measured position with corresponding reference positions.

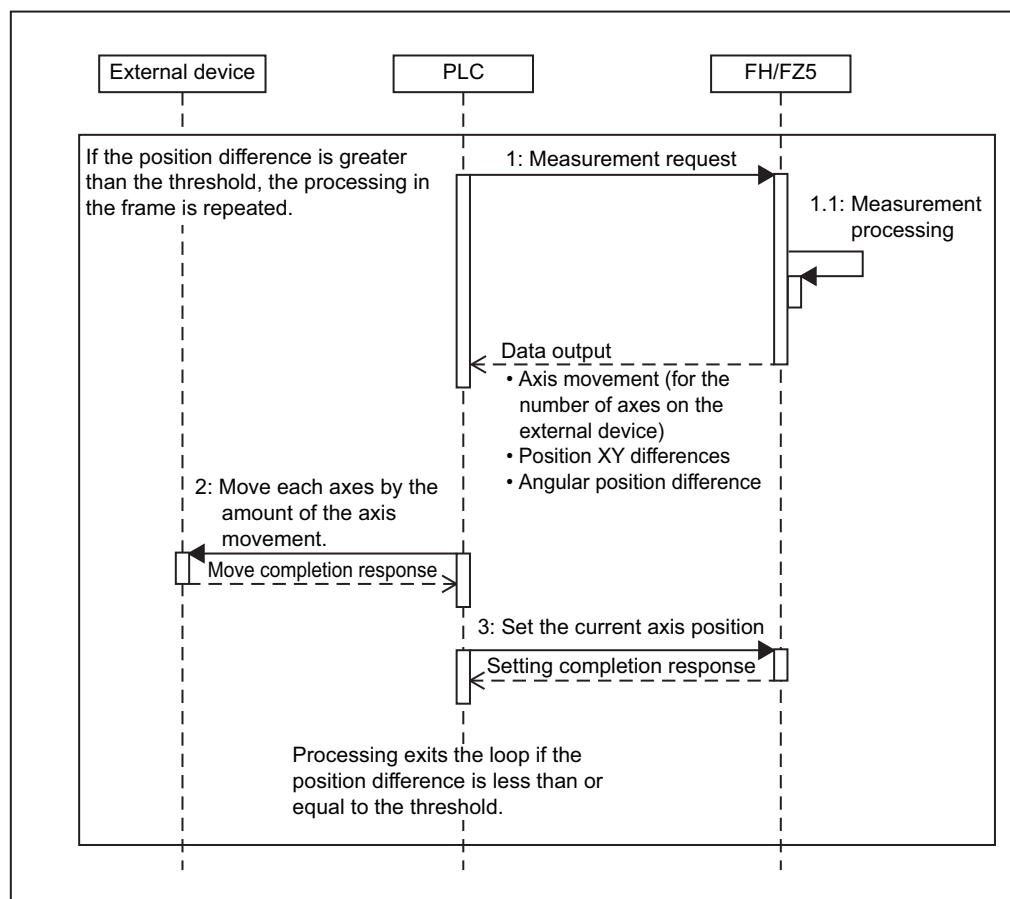
The movement that is required to align each axis of the external device is calculated and output.

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

IMPORTANT

If you are using the measurement results of the Sensor Controller to operate an external device, make sure the movement is within the range of the movement of the external device before you implement the move.

Executing Alignment



Checking the Calibration Results

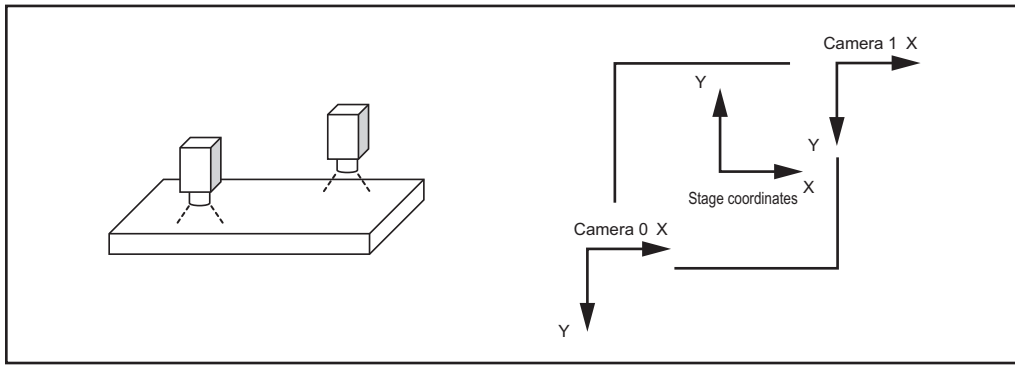
The Calibration Support Tool uses the calibration parameters to graphically display the relationship of the positions that are represented by the Camera coordinates and the actual coordinates. You can compare the relationship of the displayed position with the actual position of the equipment. This allows you to easily check the validity of the calibration parameters. To start the Calibration Support Tool, select [Calibration support tool] from the [Tool] menu.

- **Overview**

The calibration data for the specified data number that is stored in the processing unit for the specified unit number is used to graphically display the positioning relationship of the Camera coordinates and the actual coordinates.

You can specify the following processing items for the processing units

- Camera Image Input
- Camera Image Input HDR
- Camera Image Input HDR Lite
- Camera Image Input FH
- Vision Master Calibration
- PLC Master Calibration
- Camera Calibration
- Reference Calib Data
- Precise Calibration



↓ Generate calibration parameters

A comparison of the device drawings and the graphic display will easily show calibration errors.

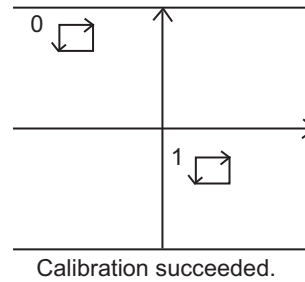
Camera 0

A = 0.2500
B = 0.0000
C = -480.0000
D = 0.0000
E = -0.2500
F = 480.0000

Camera 1

A = 0.2500
B = 0.0000
C = 160.0000
D = 0.0000
E = -0.2500
F = -160.0000

→ Graphic display



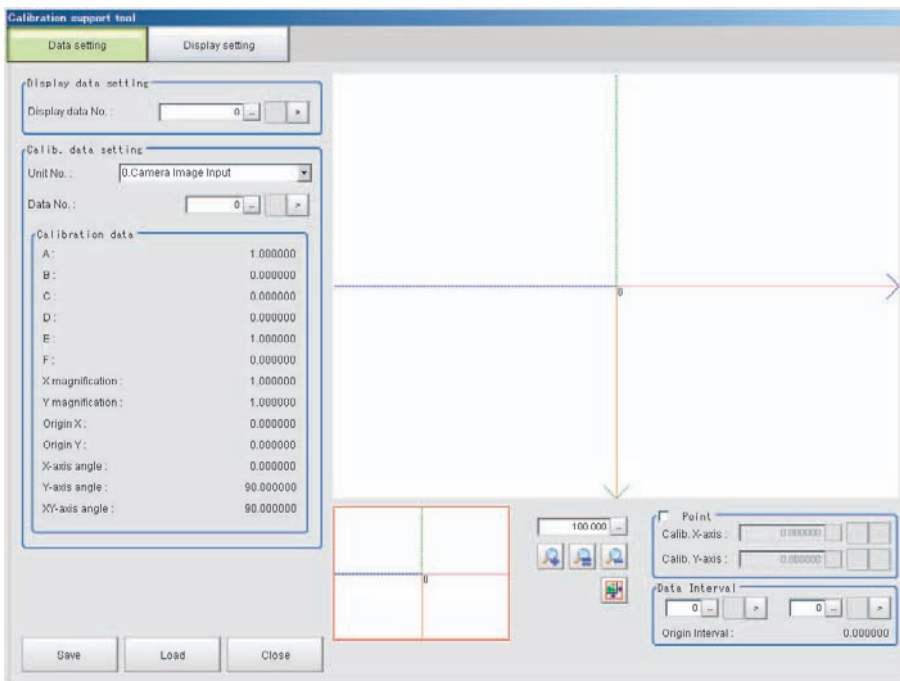
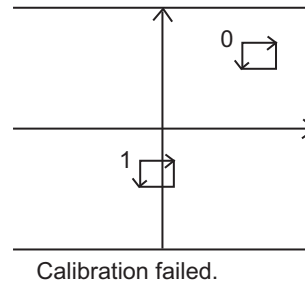
Camera 0

A = 0.2500
B = 0.0000
C = 480.0000
D = 0.0000
E = -0.2500
F = 480.0000

Camera 1

A = 0.2500
B = 0.0000
C = -120.0000
D = 0.0000
E = -0.2500
F = -120.0000

→ Graphic display

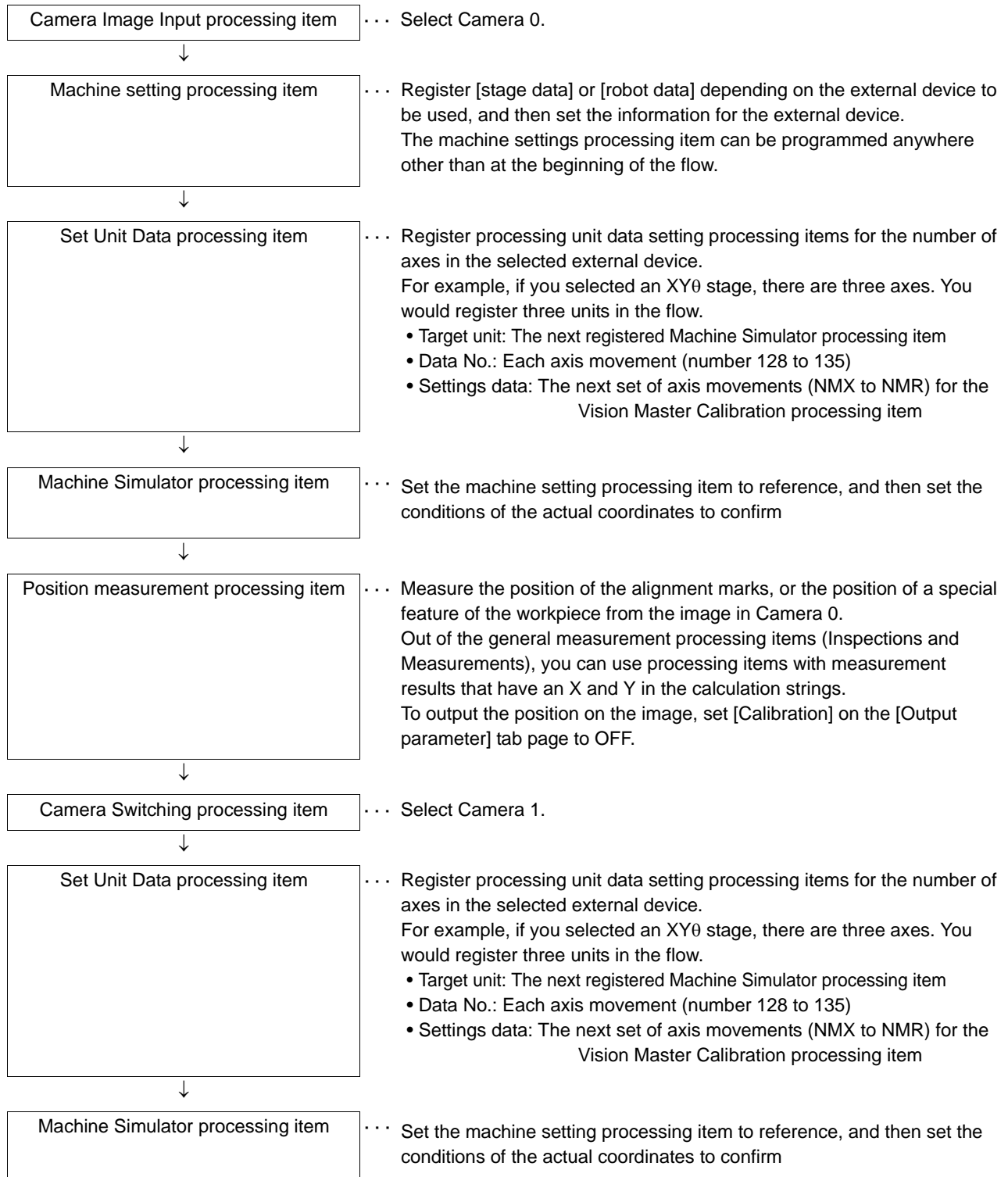


Refer to the *Vision System FH/FZ5 Series Processing Function Reference Manual* (Cat No. Z341) for further information on the alignment processing items.

Machine Simulator

The Machine Simulator processing item allows you to see how the alignment marks move on the image while each axes of the stage or robot is being controlled. You can use it to verify the operation of the alignment processing items even if the actual stage or robot is not available. The following example uses two Cameras to describe the use of the Machine Simulator processing item to verify the operation of a Vision Master Calibration processing item.

Example: Usage Example for Two Cameras





Position measurement processing item

... Measure the position of the alignment marks or the position of a special feature of the workpiece from the image in Camera 1.
To output the position on the image, set [Calibration] on the [Output parameter] tab page to OFF.
Out of the general measurement processing items (Inspections and Measurements), you can use processing items with measurement results that have an X and Y in the calculation strings.



Vision Master Calibration processing item

... Set the machine setting processing item to reference, and then set the sampling.

• Using the Flow

The motionless workpiece (or a saved image) is continuously measured until the calibration is completed. This allows you to easily verify the operation of the calibration flow with the FH/FZ5-series Controller. Conventionally, you could not verify the calibration flow unless the Controller was integrated into the system.

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

Alignment Processing Items

The following processing items can be used as alignment processing items.

Refer to the following manual for details on processing items.

Reference: ► *Vision System FH/FZ5 Series Processing Item Function Reference Manual (Cat No. Z341)*.

Processing item category	Sub category	Processing item name	Description
Measurement support processing items (Inspection and measurement support items)	Machine setting processing items	Stage Data	This processing item sets and retains data that is related to a stage. Enter the data based on the specifications of the stage to use.
		Robot Data	This processing item sets and retains data that is related to the robot. Enter the data based on the specifications of the robot to use.
	Calibration processing items	Vision Master Calibration	This processing item is specifically for the calibration of the Camera coordinates and external device coordinates. This processing item automatically calculates all axis movements of the external device that are required for calibration. This allows the calibration process to be carried out with greater ease and precision.
		PLC Master Calibration	This processing item is specifically for the calibration of the Camera coordinates and external device coordinates. This processing item allows you to freely set the axis movement of the external device that is required for calibration.
	Reference Calib Data	Reference Calib Data	This processing item is used to reference calibration data and distortion data that is stored in other processing items. The referenced data is used to perform coordinate conversion processing and distortion correction on the measurement results that follow this processing item.
	Alignment calculations	Movement Single Position	This processing item calculates all axis movements of the external device that are required to match the measured position and angle to the reference position and angle.
		Movement Multi Points	This processing item calculates all axis movements of the external device that are required to match the measured position to the reference position. You can set up to eight points each for the measured position and reference position.
		Convert Position Data	This processing item calculates the position data and angle data after each axis of the external device is moved by a required amount. Use this processing item when you want to move the stage by a required amount, and then perform a measurement to obtain the position data and angle data before the stage was moved.
		Position Data Calculation	This processing item uses the measurement results from more than one processing item to calculate the position data and angle data to be used in a Movement Single Position processing item.

Processing item category	Sub category	Processing item name	Description
Image Correction processing items ([Compensate image])	Scrolling	Machine Simulator	This processing item allows you to see how the alignment marks move on the image while each axes of the external device is being controlled. You can use it to verify the operation of the alignment processing items even if the actual stage or robot is not available.

Macro Function

Macros

You can use macros to combine pre-installed commands and modify them according to your needs to customize operation.

The following three types of macros are supported for different needs.

Macro Types	Overview
Macro calculations	You can create user-defined formulas to meet your application needs. You can combine these with commands that are designed for calculations to enter them in programming. This allows you to create more advanced and more flexible formulas than is possible with the standard calculations formed with processing items.
Custom I/O commands	You can create user-defined communications commands that you can send from an external device to the FH or FZ5 according to user application needs. You can create commands that combine multiple processes.
Macro processing	You can create user-defined measurement processes and then execute them. The measurement processes that you can create are equivalent to the pre-installed processing items that you use in the measurement flow, such as measurement processing, display processing, I/O processing, and setting dialog boxes.

The commands that you can use with macros depend on the type of macro. Refer to ► [Macro Command Reference](#) (p.261) for the commands that you can use with macros.

Settings That Are Required for Macros

This section describes the settings that are required to use macros.

Macro Calculations

The macros are set in the measurement flow as processing items.

Macro calculations are performed in the order that they are set in the measurement flow.

To output the calculation results or judgements from macro calculations to an external device, you must also set Output Units in the measurement flow in addition to the macro calculations.

Refer to ► [Macro Calculation](#) in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for information on the setting procedures.

Custom I/O Commands

You must register the user-defined communications command in the system setup.

When a registered custom communications command is received by the FH/FZ5 from an external device, the FH/FZ5 recognizes it and executes it.

Refer to ► [Using Customer Communications Commands](#) (p.161) for the setting procedures.

Macro Processing

The macros are set in the measurement flow as processing items.

Macro processes are performed in the order that they are set in the measurement flow.

Refer to ► [Macro](#) in the *Vision System FH/FZ5 Series Processing Item Function Reference Manual* (Cat No. Z341) for information on the setting procedures.

Common Rules for Macro

Grammar of program approximately conforms to BASIC grammar, it also contains part contents that Macro program specially has.

Please see each item for details.

- Reference: ▶ Calculation (p.244)
- Reference: ▶ Character (p.245)
- Reference: ▶ Comment (p.245)
- Reference: ▶ Constant (p.246)
- Reference: ▶ Convert Type (p.246)
- Reference: ▶ Expression (p.247)
- Reference: ▶ Initialization Selection (p.248)
- Reference: ▶ Label (p.248)
- Reference: ▶ Line Number (p.248)
- Reference: ▶ Line (p.248)
- Reference: ▶ Reserved Word (p.248)
- Reference: ▶ Reserved Word List (p.248)
- Reference: ▶ Statement (p.252)
- Reference: ▶ Subroutine (p.252)
- Reference: ▶ Variable (p.252)
- Reference: ▶ Wildcard (p.256)

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 by 0 calculation will be wrong.

During an addition calculation, subtraction calculation, or multiplication calculation, if the result exceeds -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	More Than	A>B
<=, =<	Less Than or Equal	A<=B, A==, =>	More Than or Equal	A>=B, A=>B

A relative 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-precision constant and character constant. The range of value is as follows:

Integer Constant	-2147483648 to 2147483647
Double-precision 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 use list command to show procedure, the result will be expressed using decimal such as A=&=255.

Convert Type

Calculation

When calculation between integer type and double-precision type, integer type is converted into double-precision type.

When doing logic calculation, all digits are operated as integer type, and the result is integer type.

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-precision type variable is assigned to an integer type, decimal digit part is rounded off.

If integer type variable is not assigned to in -2147483648 to 2147483647, the result will be overflow error.

If double-precision variable is not assigned to 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 operator.
- The expression is composed by character constant and character variable using plus operator.
- 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 round brackets. Two mathematic expressions combine a relative expression by relative operator.

Character constant, character variable and function of return string compose the mathematic expression by plus operator.

It can be the composition of many mathematic expression by round 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 operator 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.

Initialization Selection

This item is required only for macro processing.

It performs initialization when a macro program is loaded.

The label is always *MCRINT.

Always include initialization selection in the program when you program macro processing.

It mainly defines processing for events and initializes variables.

Label

Label name must be in the 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 statement.

A macro program can contain blank lines or lines with only comments.

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 these 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

Initial Character	Reserved Word
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	Endlf
E	eof
E	erase
E	errcmd\$
E	errno
E	ExecutelmageLogging

Initial Character	Reserved Word
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

Initial Character	Reserved Word
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

Initial Character	Reserved Word
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

You can use subroutines only for macro processing.

A subroutine is code that is enclosed between <label> and a Return. It contains a unit of processing.

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: ► Gosub command (p.362)

Variable

The area that storages numerical and string, it is called variable.

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 alphabetical character, not numeric. Others of numerical part are recognized as numerical value. 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 reserved word, it can contain reserved word.
- Lower case is the same with upper case in character treatment.

(Example) Variable A& and variable a&...is the same. Both of them are considered as upper case.

Variable Type

- It can be divided into integer variable, double-precision variable and character variable.
- After variable name, please add all kind of identifier. The same variable name with different type is different.
- If two type identifiers are attached, the variable will be a saved variable. Refer to *Saved Variables* for details. Saved variables and unsaved variables are differentiated even if they have the same name.
- 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-precision 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 dimensional 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 dimensional array
dim C&(100, 100, 100) three dimensional array
```

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 Area

Use area of variable divides fix length area and variable length area.

The capacity of fix length area is 8KB. It can save integer and double-precision variable.

The capacity of variable length area is no limited(memory permit), it can store string and array variable.

Saved Variables

There are saved variables and unsaved variables.

The values of unsaved variables are not retained when the power supply is turned OFF.

The values of saved variables are saved in the relevant processing unit data when the scene data is saved.

Integer variables	Unsaved variables: XXX&
	Saved variables: XXX&&
Double-precision variables	Unsaved variables:XXX#
	Saved variables: XXX##
Character string variables	Unsaved variables: XXX\$
	Saved variables: XXX\$\$
Integer arrays	Unsaved variables:XXX&()
	Saved variables: XXX&&()
Double-precision arrays	Unsaved variables: XXX#()
	Saved variables: XXX##()
Character string arrays	Unsaved variables: XXX\$()
	Saved variables: XXX\$\$()

- If you use arrays for saved variables, you have to declare the dim command after looking at the flag that says whether to initialize.

```
*McrInit
    dim ARRAY&&(2)
return
```

If you use the above code, the next time you load the macro program, ARRAY&&() is redefined, so any values that are saved are initialized.

The following code prevent this.

```
*McrInit
    if ARRAYCHK&&=0 then
        dim ARRAY&&(2)
        ARRAYCHK&&=1
    endif
return
```

A flag (ARRAYCHK&&) is added and a check is performed.

Note

The values of macro variables do not change when Clear Measurement is executed.

Scope of Variables

- All variables are manage in the relevant processing unit. If there is more than one Macro Unit in the measurement flow, the variables in each processing unit are different variables even if they have the same names.
- Variables can be accessed or changed only from the macro program for the processing unit in which they exist. However, if you specify the variable name as the identifier of the external reference data for the relevant Macro Unit, you can access or change the editing contents from outside the processing unit.

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

Debugging Macro Program

Overview

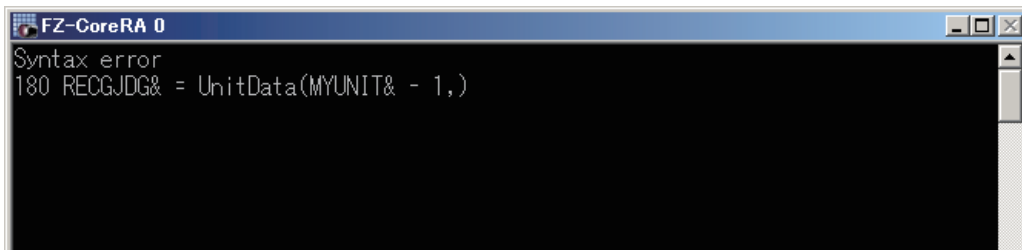
Macro program may cause error while it is working, by illegal command call or incorrect value of parameters. Debugging support function will help you to find out the cause of the error and fix the problem.

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.258)

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.

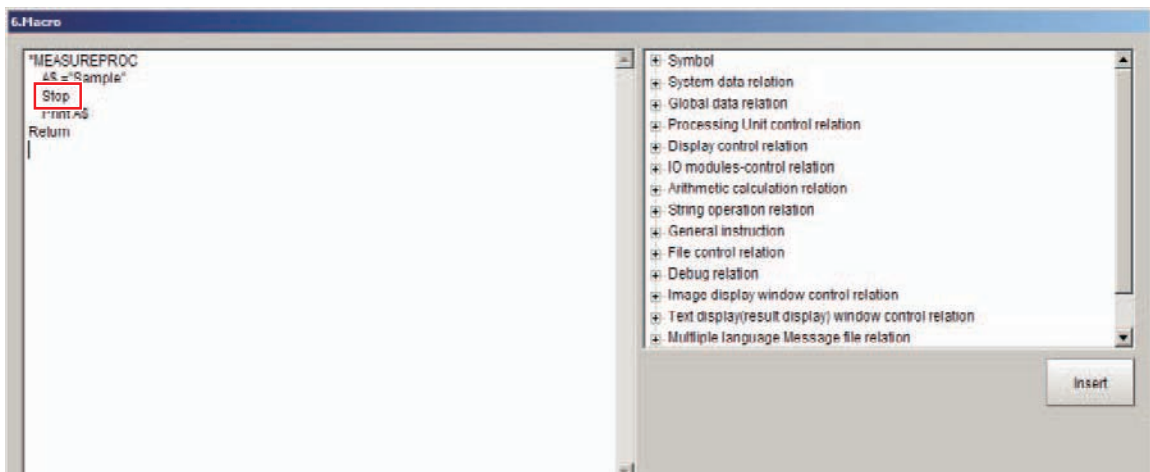
Error statement is a statement causing error.

Reference: ► Macro Command Reference (p.261)

Debugging Procedure

- **Break Points**

1 Insert the Stop command into the program to set a break point.



2 When executed, the program will stop at the location of the Stop command.

IMPORTANT

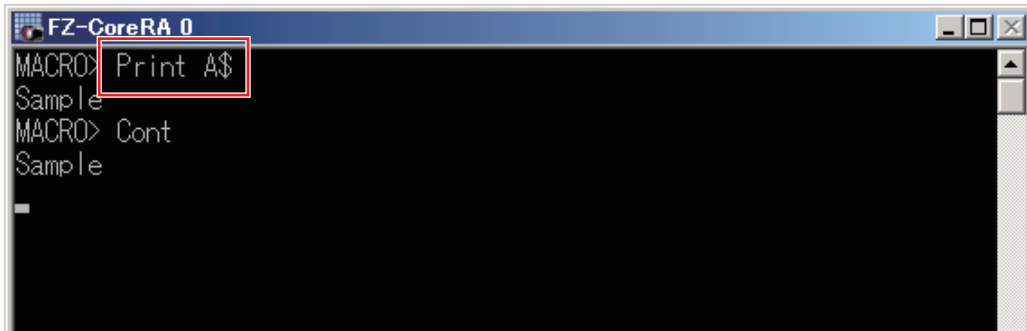
Do not overwrite the macro program while execution is stopped at a break point. If you do, operation will be unpredictable.

- **Command Execution**

3 While the macro program is stopped, "MACRO>" will be displayed on the Console.

4 You can execute macro command on the Console to check the status.

Example: MACRO>Print A\$



- Restarting the Program

5 To restart the macro program, execute the cont command.

Error Messages

Refer to ► List of Macro Error Messages (p.258) for a list of the error messages.

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 mismatch0
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

Error No.	Error Message
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.

Error Message	Description of Error	To Correct This Error
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.
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

Functional Classified Order

General Instruction

Function	Command Name	References
Definition of the array variables is carried out.	Dim	Reference: ► Details (p.313)
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.315)
Free the array variable memory region that was defined by the Dim command.	Erase	Reference: ► Details (p.340)
Gets the Error occurrence commands during exception handling.	Errcmdnd\$ (Function)	Reference: ► Details (p.341)
Gets the error class during exception handling.	Errno (Function)	Reference: ► Details (p.342)
Repeats and executes the statements between the For statement and the Next statement.	For...To...Step - Next	Reference: ► Details (p.348)
Moves the processing to the specified subroutine.	Gosub	Reference: ► Details (p.362)
Moves the processing to the line of the specified Label.	Goto	Reference: ► Details (p.363)
Controls the flow of processing in accordance with the judgement conditions of the logical expression.	If...Then - Elseif - Else - Endif	Reference: ► Details (p.366)
Controls the flow of processing in accordance with specified conditions.	If...Then - Else	Reference: ► Details (p.365)
Inserts comments into the program.	Rem	Reference: ► Details (p.418)
Controls the branching of processing in accordance with the expression results.	Select ... Case - Case Else - End Select	Reference: ► Details (p.439)
Carries out exception handling.	Try - Catch - End Try	Reference: ► Details (p.476)
Returns saved variables.	Varpop	Reference: ► Details (p.488)
Temporarily saves the value of a variable.	Varpush	Reference: ► Details (p.490)

Arithmetic Calculation

Function	Command Name	References
Get the absolute value of the expression specified.	Abs (Function)	Reference: ► Details (p.284)
Get the logical product (AND) of 2 specified expressions.	And (Function)	Reference: ► Details (p.287)
Get approximate circle.	ApproximationCircle	Reference: ► Details (p.288)
Get the arc tangent of the expression specified.	Atn (Function)	Reference: ► Details (p.291)

Function	Command Name	References
Gets the cosine of the specified expression.	Cos (Function)	Reference: ► Details (p.308)
Gets the intersection between 2 straight lines.	Crspoint	Reference: ► Details (p.309)
Get the shortest distance between the specified line and 2 points.	Dposline (Function)	Reference: ► Details (p.316)
Calculate exponential function.	Exp (Function)	Reference: ► Details (p.344)
Truncates everything after the radix point and gets the integer value.	Fix (Function)	Reference: ► Details (p.347)
Converts the numeric value given into an integer value.	Int (Function)	Reference: ► Details (p.373)
Gets the natural logarithm value.	Log (Function)	Reference: ► Details (p.391)
Gets the approximate line from multiple point coordinates using the method of least squares.	Lsqumeth	Reference: ► Details (p.392)
Gives the remainder.	Mod (Function)	Reference: ► Details (p.399)
Gets the negation result of the expression.	Not (Function)	Reference: ► Details (p.401)
Gets the logical sum of 2 expressions.	Or (Function)	Reference: ► Details (p.407)
Gets the sine of the specified expression.	Sin (Function)	Reference: ► Details (p.459)
Gets the square root.	Sqr (Function)	Reference: ► Details (p.460)
Gets the tangent of the specified expression.	Tan (Function)	Reference: ► Details (p.467)
Gets the exclusive disjunction (exclusive-OR) of 2 expressions.	Xor (Function)	Reference: ► Details (p.494)

String Operation

Function	Command name	References
Get the value of the character code for the specified character.	Asc (Function)	Reference: Details (p.289)
Gets the character corresponding to the character code.	Chr\$ (Function)	Reference: ► Details (p.295)
Displays a character string.	DrawText	Reference: ► Details (p.334)
Displays a character string.	DrawTextG	Reference: ► Details (p.335)
Displays the processing unit image.	DrawUnitImage	Reference: ► Details (p.336)
Converts the value of the expression to a character string hexadecimal expression.	Hex\$ (Function)	Reference: ► Details (p.364)
Convert the capital letter into a small letter	LCASE\$ (Function)	Reference: ► Details (p.381)

Function	Command name	References
Fetches the specified character string length from the left of the character string.	Left\$ (Function)	Reference: ► Details (p.382)
Gets the length of the specified character string.	Len (Function)	Reference: ► Details (p.383)
Fetches a part of the character string.	Mid\$ (Function)	Reference: ► Details (p.397)
Fetches the specified part separated by the specified character from the character string.	Piece\$ (Function)	Reference: ► Details (p.408)
Fetches the specified character string length from the right of the character string.	Right\$ (Function)	Reference: ► Details (p.422)
Converts a numeric value into a numeric character string.	Str\$ (Function)	Reference: ► Details (p.463)
Converts to a numeric character string with the numeric value format specified.	Str2\$ (Function)	Reference: ► Details (p.464)
Convert a small letter into a capital letter	UCase\$ (Function)	Reference: ► Details (p.477)
Converts the number of a character string notation into a numeric value.	Val (Function)	Reference: ► Details (p.487)

File Control

Function	Command Name	References
Closes the specified file	Close	Reference: ► Details (p.298)
Get the available space of the drive.	Dskf (Function)	Reference: ► Details (p.337)
Checks for the end of file.	Eof (Function)	Reference: ► Details (p.339)
Copies a file within the memory card.	Fcopy	Reference: ► Details (p.346)
Reads in the specified number of bytes of binary data.	Input\$ (Function)	Reference: ► Details (p.370)
Reads in data and assigns it to a variable.	Input#	Reference: ► Details (p.371)
Checks for the existence of a file and its attributes.	Isfile (Function)	Reference: ► Details (p.374)
Deletes a file	Kill	Reference: ► Details (p.380)
Reads data of one line from a file	Line Input#	Reference: ► Details (p.384)
Creates a directory in the Memory Card.	Mkdir	Reference: ► Details (p.398)
Opens and loads a file.	Open Input	Reference: ► Details (p.403)
Opens and writes a file.	Open Output	Reference: ► Details (p.404)
Opens and adds to a file.	Open Append	Reference: ► Details (p.405)

Function	Command Name	References
Output data to the file	Print#	Reference: ► Details (p.409)
Deletes a directory within the memory card.	Rmdir	Reference: ► Details (p.423)

Measurement Control

Function	Command Name	References
Clear processing unit measure data	ClearMeasureData	Reference: ► Details (p.296)
Gets measurement result the Output presence	ElapsedTime (Function)	Reference: ► Details (p.338)
Executes image logging.	ExecuteImageLogging	Reference: ► Details (p.343)
Gets whether the measurement result is output.	GetMeasureOut (Function)	Reference: ► Details (p.353)
Update image	ImageUpdate	Reference: ► Details (p.369)
Executes display processing for processing unit measurement results.	MeasureDispG	Reference: ► Details (p.393)
Executes processing unit measurement processing.	MeasureProc	Reference: ► Details (p.394)
Gets the measurement ID.	MeasureId\$ (Function)	Reference: ► Details (p.394)
Permit the measurement execution	MeasureStart	Reference: ► Details (p.395)
Forbid the measurement execution	MeasureStop	Reference: ► Details (p.396)
Carry out the measurement	Measure	Reference: ► Details (p.393)
Carry Out Re-Measurement Processing	Remeasure	Reference: ► Details (p.419)
Set the output mode of the measurement result	SetMeasureOut	Reference: ► Details (p.446)

IO Module Control

Function	Command Name	References
Output BUSY state	BusyOut	Reference: ► Details (p.292)
Input terminal all point input	GetAll (Function)	Reference: ► Details (p.349)
Gets PLC the read data	GetPlcData	Reference: ► Details (p.354)
Sets the polling execution status.	SetPollingState	Reference: ► Details (p.448)
Gets the polling execution status.	GetPollingState	Reference: ► Details (p.356)

Function	Command Name	References
Input terminal a point input	GetPort (Function)	Reference: ► Details (p.355)
Judge result output	JudgeOut	Reference: ► Details (p.379)
Output terminal all point output	PutAll	Reference: ► Details (p.411)
Output terminal a point output	PutPort	Reference: ► Details (p.412)
Begin to read data from designated memory of the PLC	ReadPlcMemory	Reference: ► Details (p.414)
Receive data	ReceiveData	Reference: ► Details (p.415)
Output RUN state	RunOut	Reference: ► Details (p.424)
Send data	SendData	Reference: ► Details (p.440)
Sends string	SendString	Reference: ► Details (p.441)
Set PLC the write data	SetPlcData	Reference: ► Details (p.447)
Write in data at designated storage device of the PLC	WritePlcMemory	Reference: ► Details (p.493)

Display Control

Function	Command Name	References
Gets the displayed sub number.	DisplaySubNo (Function)	Reference: ► Details (p.314)
Displays an arc.	DrawArc	Reference: ► Details (p.317)
Displays an arc with a width.	DrawArcW	Reference: ► Details (p.318)
Displays a rectangle.	DrawBox	Reference: ► Details (p.319)
Displays a circle.	DrawCircle	Reference: ► Details (p.320)
Displays a circle with a width.	DrawCircleW	Reference: ► Details (p.321)
Displays a cross cursor.	DrawCursor	Reference: ► Details (p.322)
Displays an ellipse.	DrawEllipse	Reference: ► Details (p.323)
Displays a figure.	DrawFigure	Reference: ► Details (p.324)
Displays a filled image.	DrawFillImage	Reference: ► Details (p.325)
Displays the judgement results.	DrawJudgeText	Reference: ► Details (p.326)

Function	Command Name	References
Displays a line.	DrawLine	Reference: ► Details (p.327)
Displays a line with a width.	DrawLineW	Reference: ► Details (p.328)
Displays the processing unit measurement image.	DrawMeasureImage	Reference: ► Details (p.329)
Displays a point.	DrawPoint	Reference: ► Details (p.330)
Displays a polygon.	DrawPolygon	Reference: ► Details (p.331)
Displays a search figure.	DrawSearchFigure	Reference: ► Details (p.332)
Gets the image/text display processing unit number	DisplayUnitNo (Function)	Reference: ► Details (p.314)
Gets information about the Image Display window setting	GetImageWindow	Reference: ► Details (p.352)
Gets information about the text Display window setting	GetTextWindow	Reference: ► Details (p.359)
Update the indication of the image display window	RefreshImageWindow	Reference: ► Details (p.416)
Update the indication of the judgement result display window	RefreshJudgeWindow	Reference: ► Details (p.416)
Update the indication of the text display window	RefreshTextWindow	Reference: ► Details (p.417)
Update the indication of the measurement processing time display window	RefreshTimeWindow	Reference: ► Details (p.417)
Set the processing unit number of image / text window	SetDisplayUnitNo	Reference: ► Details (p.441)
Set the attribute of the image window	SetImageWindow	Reference: ► Details (p.444)
Set the attribute of the Text Window	SetTextWindow	Reference: ► Details (p.454)
Sets the graphic figure drawing attributes.	SetDrawStyle	Reference: ► Details (p.442)
Sets the character string drawing attributes.	SetTextStyle	Reference: ► Details (p.453)

Save/Load

Function	Command Name	References
Load the system + scene group data	LoadBackupData	Reference: ► Details (p.386)
Load the scene group data	LoadSceneGroup	Reference: ► Details (p.388)
Load the scene data	LoadScene	Reference: ► Details (p.387)
Load the system data	LoadSystemData	Reference: ► Details (p.389)

Function	Command Name	References
Load the processing unit data	LoadUnitData	Reference: ► Details (p.390)
Save the system + scene group data	SaveBackupData	Reference: ► Details (p.424)
Saves data to a controller	SaveData	Reference: ► Details (p.425)
Save the scene group data	SaveSceneGroup	Reference: ► Details (p.428)
Save the scene data	SaveScene	Reference: ► Details (p.427)
Save the system data	SaveSystemData	Reference: ► Details (p.429)
Save image data	SaveImage	Reference: ► Details (p.425)
Saves the processing unit measurement image.	SaveMeasureImage	Reference: ► Details (p.426)
Save the processing unit data	SaveUnitData	Reference: ► Details (p.430)

Control Global Data

Function	Command Name	References
Adds global data	AddGlobalData	Reference: ► Details (p.285)
Get global data	GetGlobalData	Reference: ► Details (p.350)
Sets global data	SetGlobalData	Reference: ► Details (p.443)

Control System Data

Function	Command Name	References
Adds system data	AddSystemData	Reference: ► Details (p.286)
Gets system data	GetSystemData	Reference: ► Details (p.357)
Sets system data	SetSystemData	Reference: ► Details (p.452)

Control Scene

Function	Command Name	References
Change scene number	ChangeScene	Reference: ► Details (p.292)
Clear the scene number	ClearScene	Reference: ► Details (p.297)
Copy the scene data	CopyScene	Reference: ► Details (p.302)

Function	Command Name	References
Gets the available scene number	SceneCount (Function)	Reference: ► Details (p.431)
Gets the explanation of the scene	SceneDescription\$ (Function)	Reference: ► Details (p.432)
Gets the scene creator name	SceneMaker\$ (Function)	Reference: ► Details (p.435)
Get the current scene number	SceneNo (Function)	Reference: ► Details (p.436)
Gets the scene title name	SceneTitle\$ (Function)	Reference: ► Details (p.437)
Set the explanation of the scene	SetSceneDescription	Reference: ► Details (p.449)
Set the scene maker name	SetSceneMaker	Reference: ► Details (p.450)
Set the scene title name	SetSceneTitle	Reference: ► Details (p.451)

Control Scene Group

Function	Command Name	References
Change scene group number	ChangeSceneGroup	Reference: ► Details (p.293)
Clear the specified scene group	ClearsceneGroup	Reference: ► Details (p.297)
Copy the scene group data	CopySceneGroup	Reference: ► Details (p.303)
Gets the number of available scene groups	SceneGroupCount	Reference: ► Details (p.433)
Gets the current scene group number	SceneGroupNo	Reference: ► Details (p.433)
Gets the scene group title name	SceneGroupTitle\$ (Function)	Reference: ► Details (p.434)
Set the scene group title name	SetSceneGroupTitle	Reference: ► Details (p.450)

Flow Control

Function	Command Name	References
Register a processing unit.	AssignUnit	Reference: ► Details (p.290)
Check a registration state of the processing unit	CheckUnit (Function)	Reference: ► Details (p.294)
Copy the processing unit	CopyUnit	Reference: ► Details (p.304)
Delete the processing unit	DeleteUnit	Reference: ► Details (p.312)
Insert the processing unit	InsertUnit	Reference: ► Details (p.372)

Function	Command Name	References
Move the processing unit	MoveUnit	Reference: ► Details (p.400)
Gets the enrollment number of the processing unit	UnitCount (Function)	Reference: ► Details (p.478)

Control Processing Item

Function	Command Name	References
Gets the number of the available processing items	ItemCount (Function)	Reference: ► Details (p.375)
Gets the Distinguished Name of the processing item	ItemIdent\$ (Function)	Reference: ► Details (p.376)
Gets the information of the processing item	ItemInfo (Function)	Reference: ► Details (p.377)
Gets a title name of the processing item	ItemTitle\$ (Function)	Reference: ► Details (p.378)

Control Processing Unit

Function	Command Name	References
Copies the processing unit measurement image.	CopyMeasureImage	Reference: ► Details (p.301)
Copies the processing unit image.	CopyUnitImage	Reference: ► Details (p.306)
Copy the processing unit figure data	CopyUnitFigure	Reference: ► Details (p.305)
Copy the processing unit model data	CopyUnitModel	Reference: ► Details (p.307)
Gets processing unit image size	GetImageSize	Reference: ► Details (p.351)
Gets processing unit data	GetUnitData	Reference: ► Details (p.360)
Gets processing unit figure data	GetUnitFigure	Reference: ► Details (p.361)
Gets processing unit figure format	ImageFormat (Function)	Reference: ► Details (p.368)
Gets the processing unit numbers after the flow is edited and updated.	RenumUnitNo (Function)	Reference: ► Details (p.420)
Sets the processing unit measurement image.	SetMeasureImage	Reference: ► Details (p.445)
Sets processing unit data	SetUnitData	Reference: ► Details (p.455)
Sets processing unit figure data	SetUnitFigure	Reference: ► Details (p.456)
Sets the processing unit title name	SetUnitTitle	Reference: ► Details (p.458)
Gets the overall judgement result.	TotalJudge (Function)	Reference: ► Details (p.470)

Function	Command Name	References
Converts the calibration angle.	TransformAngle	Reference: ► Details (p.471)
Converts the calibration area.	TransformArea	Reference: ► Details (p.472)
Converts the calibration distance.	TransformDist	Reference: ► Details (p.473)
Converts the calibration line.	TransformLine	Reference: ► Details (p.474)
Converts the calibration coordinates.	TransformXY	Reference: ► Details (p.475)
Gets the processing unit data (display coordinates).	UnitData2 (Function)	Reference: ► Details (p.481)
Gets processing unit number	UnitNo (Function)	Reference: ► Details (p.485)
Gets processing unit data (character string)	UnitData\$ (Function)	Reference: ► Details (p.480)
Gets processing unit data (numeric value)	UnitData (Function)	Reference: ► Details (p.479)
Gets processing unit information	UnitInfo (Function)	Reference: ► Details (p.482)
Gets the processing item ident name of processing unit	UnitItemIdent\$ (Function)	Reference: ► Details (p.483)
Gets the judgement value of the processing unit	UnitJudge (Function)	Reference: ► Details (p.484)
Gets the processing unit title name	UnitTitle\$ (Function)	Reference: ► Details (p.486)

Debug Command

Function	Command Name	References
Continues the execution of a program halted by a stop statement.	Cont	Reference: ► Details (p.300)
Sets the debugging mode.	Debug	Reference: ► Details (p.311)
Outputs all or a part of the program content to the macro console.	List	Reference: ► Details (p.385)
Writes data (macro console).	Print	Reference: ► Details (p.410)
Stops the execution of the program.	Stop	Reference: ► Details (p.462)
Gets the processing unit numbers after the flow is edited and updated.	RenumUnitNo (Function)	Reference: ► Details (p.420)

Others

Function	Command Name	References
Sets the command execution status.	CommandExecute	Reference: ► Details (p.299)
Reads in the date from the internal clock	Date\$ (Function)	Reference: ► Details (p.310)
Terminate the controller	ExitFzProcess	Reference: ► Details (p.344)
Publish the optional event	RaiseOptionEvent	Reference: ► Details (p.413)
Returns numbers that give the color values.	RGB (Function)	Reference: ► Details (p.421)
Save the capture of the screen	ScreenCapture	Reference: ► Details (p.438)
Time of starting a measurement processing	StartTimer (Function)	Reference: ► Details (p.461)
Reboot the controller	SystemReset	Reference: ► Details (p.466)
Reads out the time from the internal clock.	Time\$ (Function)	Reference: ► Details (p.468)
Gets a processing time	Timer (Function)	Reference: ► Details (p.469)
Standby at specified time	Wait	Reference: ► Details (p.492)

Multilingual Support Message Functions

Function	Command Name	References
Opens the message file.	OpenTextData	Reference: ► Details (p.406)
Gets the message data.	GetText	Reference: ► Details (p.358)
Closes the message file.	CloseTextData	Reference: ► Details (p.299)

Alphabetical Order

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Get the absolute value of the expression specified.	Abs (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.284)
Adds global data	AddGlobalData	Control global data	OK	OK	OK	Reference: ► Details (p.285)
Adds system data	AddSystemData	Control system data	OK	OK	OK	Reference: ► Details (p.286)
Get the logical product (AND) of 2 specified expressions.	And (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.287)
Get approximate circle	ApproximationCircle	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.288)
Get the value of the character code for the specified character.	Asc (Function)	String operation	OK	OK	OK	Reference: ► Details (p.289)
Register a processing unit.	AssignUnit	Flow control	---	OK	---	Reference: ► Details (p.290)
Get the arc tangent of the expression specified.	Atn (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.291)
Output BUSY state	BusyOut	IO module control	---	OK	OK	Reference: ► Details (p.292)
Change scene number	ChangeScene	Scene Control Related	---	OK	---	Reference: ► Details (p.292)
Change scene group number	ChangeSceneGroup	Scene Group Control Related	---	OK	---	Reference: ► Details (p.293)
Check a registration state of the processing unit	CheckUnit (Function)	Flow control	---	OK	---	Reference: ► Details (p.294)
Gets the character corresponding to the character code.	Chr\$ (Function)	String operation	OK	OK	OK	Reference: ► Details (p.295)
Clear processing unit measure data	ClearMeasureData	Measurement Control Related	---	OK	OK	Reference: ► Details (p.296)
Clear the scene number	ClearScene	Scene Control Related	---	OK	---	Reference: ► Details (p.297)
Clear the specified scene group	ClearSceneGroup	Scene Control Related	---	OK	---	Reference: ► Details (p.297)
Closes the specified file	Close	File control	OK	OK	OK	Reference: ► Details (p.298)
Closes the message file.	CloseTextData	Multilingual support message functions	OK	---	OK	Reference: ► Details (p.299)
Sets the command execution status.	CommandExecute	Others	---	OK	---	Reference: ► Details (p.299)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Continues the execution of a program halted by a stop statement.	Cont	Debug command	OK	OK	OK	Reference:▶ Details (p.300)
Copies the processing unit measurement image.	CopyMeasure Image	Processing Unit Control Related	---	---	OK	Reference:▶ Details (p.301)
Copy the scene data	CopyScene	Scene Control Related	---	OK	---	Reference:▶ Details (p.302)
Copy the scene group data	CopyScene Group	Control scene group	---	OK	---	Reference:▶ Details (p.303)
Copy the processing unit	CopyUnit	Flow control	---	OK	---	Reference:▶ Details (p.304)
Copy the processing unit figure data	CopyUnitFigure	Processing Unit Control Related	---	OK	OK	Reference:▶ Details (p.305)
Copies the processing unit image.	CopyUnit Image	Processing Unit Control Related	---	---	OK	Reference:▶ Details (p.306)
Copy the processing unit model data	CopyUnitModel	Processing Unit Control Related	---	OK	OK	Reference:▶ Details (p.307)
Gets the cosine of the specified expression.	Cos (Function)	Arithmetic calculation	OK	OK	OK	Reference:▶ Details (p.308)
Gets the intersection between 2 straight lines.	Crspoint	Arithmetic calculation	OK	OK	OK	Reference:▶ Details (p.309)
Reads in the date from the internal clock	Date\$ (Function)	Others	OK	OK	OK	Reference:▶ Details (p.310)
Sets the debugging mode.	Debug	Debug command	OK	OK	OK	Reference:▶ Details (p.311)
Delete the processing unit	DeleteUnit	Flow control	---	OK	---	Reference:▶ Details (p.312)
Definition of the array variables is carried out.	Dim	General instruction	OK	OK	OK	Reference:▶ Details (p.313)
Gets the displayed sub number	DisplaySub No (Function)	Display Control Related	---	---	OK	Reference:▶ Details (p.314)
Gets image/text Display the processing unit number	DisplayUnit No (Function)	Display Control Related	---	OK	---	Reference:▶ Details (p.314)
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	OK	OK	OK	Reference:▶ Details (p.315)
Get the shortest distance between the specified line and 2 points.	Dposline (Function)	Arithmetic calculation	OK	OK	OK	Reference:▶ Details (p.316)
Displays an arc.	DrawArc	Display Control Related	---	---	OK	Reference:▶ Details (p.317)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Displays an arc with a width.	DrawArcW	Display Control Related	---	---	OK	Reference:▶ Details (p.318)
Displays a rectangle.	DrawBox	Display Control Related	---	---	OK	Reference:▶ Details (p.319)
Displays a circle.	DrawCircle	Display Control Related	---	---	OK	Reference:▶ Details (p.320)
Displays a circle with a width.	DrawCircleW	Display Control Related	---	---	OK	Reference:▶ Details (p.321)
Displays a cross cursor.	DrawCursor	Display Control Related	---	---	OK	Reference:▶ Details (p.322)
Displays an ellipse.	DrawEllipse	Display Control Related	---	---	OK	Reference:▶ Details (p.323)
Displays a figure.	DrawFigure	Display Control Related	---	---	OK	Reference:▶ Details (p.324)
Displays a filled image.	DrawFillImage	Display Control Related	---	---	OK	Reference:▶ Details (p.325)
Displays the judgement results.	DrawJudgeText	Display Control Related	---	---	OK	Reference:▶ Details (p.326)
Displays a line.	DrawLine	Display Control Related	---	---	OK	Reference:▶ Details (p.327)
Displays a line with a width.	DrawLineW	Display Control Related	---	---	OK	Reference:▶ Details (p.328)
Displays the processing unit measurement image.	DrawMeasureImage	Display Control Related	---	---	OK	Reference:▶ Details (p.329)
Displays a point.	DrawPoint	Display Control Related	---	---	OK	Reference:▶ Details (p.330)
Displays a polygon.	DrawPolygon	Display Control Related	---	---	OK	Reference:▶ Details (p.331)
Displays a search figure.	DrawSearchFigure	Display Control Related	---	---	OK	Reference:▶ Details (p.332)
Displays a character string.	DrawText	String operation	---	---	OK	Reference:▶ Details (p.334)
Displays a character string.	DrawTextG	String operation	---	---	OK	Reference:▶ Details (p.335)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Displays the processing unit image.	DrawUnit Image	String operation	---	---	OK	Reference: ► Details (p.336)
Finds the available space on a disk drive.	Dskf (Function)	File control	OK	OK	OK	Reference: ► Details (p.337)
Gets the elapsed time from start of measurement.	ElapsedTime (Function)	Measurement Control Related	OK	OK	OK	Reference: ► Details (p.338)
Checks for the end of file.	Eof (Function)	File control	OK	OK	OK	Reference: ► Details (p.339)
Free the array variable memory region that was defined by the Dim command.	Erase	General instruction	OK	OK	OK	Reference: ► Details (p.340)
Gets the Error occurrence commands during exception handling.	Errcmd\$ (Function)	General instruction	OK	OK	OK	Reference: ► Details (p.341)
Gets the error class during exception handling.	Errno (Function)	General instruction	OK	OK	OK	Reference: ► Details (p.342)
Executes image logging.	ExecutelmageLogging	Measurement Control Related	---	---	OK	Reference: ► Details (p.343)
Terminate the controller	ExitFzProcess	Others	---	OK	---	Reference: ► Details (p.344)
Calculate exponential function.	Exp (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.344)
Copies a file within the memory card.	Fcopy	File control	OK	OK	OK	Reference: ► Details (p.346)
Truncates everything after the radix point and gets the integer value.	Fix (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.347)
Repeats and executes the statements between the For statement and the Next statement.	For...To...Step Next	General instruction	OK	OK	OK	Reference: ► Details (p.348)
Input terminal all point input	GetAll (Function)	IO module control	---	OK	OK	Reference: ► Details (p.349)
Get global data	GetGlobalData	Control global data	OK	OK	OK	Reference: ► Details (p.350)
Gets processing unit image size	GetImageSize	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.351)
Set information about the Image Display window setting	GetImageWindow	Display Control Related	---	OK	OK	Reference: ► Details (p.352)
Gets measurement result the Output presence	GetMeasureOut (Function)	Measurement Control Related	---	OK	---	Reference: ► Details (p.353)
Gets PLC the read data	GetPlcData	IO module control	---	OK	OK	Reference: ► Details (p.354)
Gets the polling execution status.	GetPollingState	IO module control	---	OK	OK	Reference: ► Details (p.356)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Input terminal a point input	GetPort (Function)	IO module control	---	OK	OK	Reference: ► Details (p.355)
Gets system data	GetSystem Data	Control system data	OK	OK	OK	Reference: ► Details (p.357)
Gets the message data.	GetText	Multilingual support message functions	OK	---	OK	Reference: ► Details (p.358)
Gets information about the text Display window setting	GetText Window	Display Control Related	OK	---	OK	Reference: ► Details (p.359)
Gets processing unit data	GetUnit Data	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.360)
Gets processing unit figure data	GetUnit Figure	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.361)
Moves the processing to the specified subroutine.	Gosub	General instruction	OK	OK	OK	Reference: ► Details (p.362)
Moves the processing to the line of the specified Label.	Goto	General instruction	OK	OK	OK	Reference: ► Details (p.363)
Converts the value of the expression to a character string hexadecimal expression.	Hex\$ (Function)	String operation	OK	OK	OK	Reference: ► Details (p.364)
Controls the flow of processing in accordance with the judgement conditions of the logical expression.	If...Then - Elseif - Else - Endif	General instruction	OK	OK	OK	Reference: ► Details (p.366)
Controls the flow of processing in accordance with specified conditions.	If...Then - Else	General instruction	OK	OK	OK	Reference: ► Details (p.365)
Gets processing unit figure format	ImageForm at (Function)	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.368)
Update image	ImageUpdate	Measurement Control Related	---	OK	---	Reference: ► Details (p.369)
Reads in data and assigns it to a variable.	Input#	File control	OK	OK	OK	Reference: ► Details (p.371)
Reads in the specified number of bytes of binary data.	Input\$ (Function)	File control	OK	OK	OK	Reference: ► Details (p.370)
Insert the processing unit	InsertUnit	Flow control	---	OK	---	Reference: ► Details (p.372)
Converts the numeric value given into an integer value.	Int (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.373)
Checks for the existence of a file and its attributes.	Isfile (Function)	File control	OK	OK	OK	Reference: ► Details (p.374)
Gets the number of the available processing items	ItemCount (Function)	Control processing item	---	OK	---	Reference: ► Details (p.375)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Gets the Distinguished Name of the processing item	ItemIdent\$ (Function)	Control processing item	---	OK	---	Reference: ► Details (p.376)
Gets the information of the processing item	ItemInfo (Function)	Control processing item	---	OK	---	Reference: ► Details (p.377)
Gets a title name of the processing item	ItemTitle\$ (Function)	Control processing item	---	OK	---	Reference: ► Details (p.378)
Judge result output	JudgeOut	IO module control	---	OK	OK	Reference: ► Details (p.379)
Deletes a file	Kill	File control	OK	OK	OK	Reference: ► Details (p.380)
Convert the capital letter into a small letter	LCase\$ (Function)	String operation	OK	OK	OK	Reference: ► Details (p.381)
Fetches the specified character string length from the left of the character string.	Left\$ (Function)	String operation	OK	OK	OK	Reference: ► Details (p.382)
Gets the length of the specified character string.	Len (Function)	String operation	OK	OK	OK	Reference: ► Details (p.383)
Reads data of one line from a file	Line Input#	File control	OK	OK	OK	Reference: ► Details (p.384)
Outputs all or a part of the program content to the macro console.	List	Debug command	OK	OK	OK	Reference: ► Details (p.385)
Load the System + Scene group data	LoadBackupData	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.386)
Load the scene data	LoadScene	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.387)
Load the Scene group data	LoadScene Group	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.388)
Load the System data	LoadSystemData	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.389)
Load the Processing unit data	LoadUnitData	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.390)
Gets the natural logarithm value.	Log (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.391)
Gets the approximate line from multiple point coordinates using the method of least squares.	Lsqmeth	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.392)
Carry out the measurement	Measure	Measurement Control Related	---	OK	---	Reference: ► Details (p.393)
Performs Measurement Result Output	MeasureDispG	Measurement Control Related	---	---	OK	Reference: ► Details (p.393)
Gets Measure ID	MeasureID\$ (Function)	Measurement Control Related	OK	---	OK	Reference: ► Details (p.394)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Executes processing unit measurement processing.	Measure Proc	Measurement Control Related	---	---	OK	Reference: ► Details (p.394)
Sets measurement trigger input to enabled.	Measure Start	Measurement Control Related	---	OK	---	Reference: ► Details (p.395)
Sets measurement trigger input to disable.	MeasureStop	Measurement Control Related	---	OK	---	Reference: ► Details (p.396)
Fetches a part of the character string.	Mid\$(Function)	String operation	OK	OK	OK	Reference: ► Details (p.397)
Creates a directory in the Memory Card.	Mkdir	File control	OK	OK	OK	Reference: ► Details (p.398)
Gives the remainder.	Mod (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.399)
Move the processing unit	MoveUnit	Flow control	---	OK	---	Reference: ► Details (p.400)
Gets the negation result of the expression.	Not (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.401)
Opens and adds to a file.	Open Append	File control	OK	OK	OK	Reference: ► Details (p.405)
Opens and loads a file.	OpenInput	File control	OK	OK	OK	Reference: ► Details (p.403)
Opens and writes a file.	Open Output	File control	OK	OK	OK	Reference: ► Details (p.404)
Opens a message file.	OpenTextData	Multilingual support message functions	OK	---	OK	Reference: ► Details (p.406)
Gets the logical sum of 2 expressions.	Or (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.407)
Fetches the specified part separated by the specified character from the character string.	Piece\$(Function)	String operation	OK	OK	OK	Reference: ► Details (p.408)
Writes data (macro console).	Print	Debug command	OK	OK	OK	Reference: ► Details (p.410)
Output data to the file	Print#	File control	OK	OK	OK	Reference: ► Details (p.409)
Output terminal all point output	PutAll	IO module control	---	OK	OK	Reference: ► Details (p.411)
Output terminal a point output	PutPort	IO module control	---	OK	OK	Reference: ► Details (p.412)
Publish the optional event	RaiseOptionEvent	Others	---	OK	---	Reference: ► Details (p.413)
Begin to read data from designated memory of the PLC	ReadPlcMemory	IO module control	---	OK	OK	Reference: ► Details (p.414)
Receive data	Receive Data	IO module control	---	OK	OK	Reference: ► Details (p.415)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Update the indication of the image display window	RefreshImageWindow	Display Control Related	---	OK	---	Reference: ► Details (p.416)
Update the indication of the judgement result display window	RefreshJudgeWindow	Display Control Related	---	OK	---	Reference: ► Details (p.416)
Update the indication of the text display window	RefreshTextWindow	Display Control Related	---	OK	---	Reference: ► Details (p.417)
Update the indication of the measurement processing time display window	RefreshTimeWindow	Display Control Related	---	OK	---	Reference: ► Details (p.417)
Inserts comments into the program.	Rem	General instruction	OK	---	OK	Reference: ► Details (p.418)
Carry out the measurement	Remeasure	Measurement Control Related	---	OK	---	Reference: ► Details (p.419)
Gets the processing unit numbers after the flow is edited and updated.	RenumUnitNo(Function)	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.420)
Returns numbers that give the color values.	RGB (Function)	Others	OK	OK	OK	Reference: ► Details (p.421)
Fetches the specified character string length from the right of the character string.	Right\$ (Function)	String operation	OK	OK	OK	Reference: ► Details (p.422)
Deletes a directory within the memory card.	Rmdir	File control	OK	OK	OK	Reference: ► Details (p.423)
Output RUN state	RunOut	IO module control	---	OK	OK	Reference: ► Details (p.424)
Save the System + Scene group data	SaveBackupData	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.424)
Saves data to a controller	SaveData	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.425)
Save image data	SaveImage	Measurement Control Related	---	OK	---	Reference: ► Details (p.425)
Saves the processing unit measurement image.	SaveMeasureImage	Data Save/ Load Related	---	---	OK	Reference: ► Details (p.426)
Save the scene group data	SaveSceneGroup	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.428)
Save the System data	SaveSystemData	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.429)
Save the scene data	SaveScene	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.427)
Save the Processing unit data	SaveUnitData	Data Save/ Load Related	---	OK	---	Reference: ► Details (p.430)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Gets the available scene number	SceneCount (Function)	Scene Control Related	---	OK	---	Reference: ► Details (p.431)
Gets the explanation of the scene	SceneDescription\$ (Function)	Scene Control Related	---	OK	---	Reference: ► Details (p.432)
Gets the number of available scene groups	SceneGroupCount	Scene Group Control Related	---	OK	---	Reference: ► Details (p.433)
Gets the current scene group number	SceneGroupNo	Scene Group Control Related	---	OK	---	Reference: ► Details (p.433)
Gets the scene group title name	SceneGroupTitle\$ (Function)	Scene Group Control Related	---	OK	---	Reference: ► Details (p.434)
Gets the scene creator name	SceneMaker\$ (Function)	Scene Control Related	---	OK	---	Reference: ► Details (p.435)
Get the current scene number	SceneNo (Function)	Scene Control Related	---	OK	---	Reference: ► Details (p.436)
Gets the scene title name	SceneTitle\$ (Function)	Scene Control Related	---	OK	---	Reference: ► Details (p.437)
Save the capture of the screen	ScreenCapture	Others	---	OK	---	Reference: ► Details (p.438)
Controls the branching of processing in accordance with the expression results.	Select ... Case - Case Else - End Select	General instruction	OK	OK	OK	Reference: ► Details (p.439)
Send data	SendData	IO module control	---	OK	OK	Reference: ► Details (p.440)
Sends string	SendString	IO module control	---	OK	OK	Reference: ► Details (p.441)
Set the processing unit number of image / text window	SetDisplayUnitNo	Display Control Related	---	OK	---	Reference: ► Details (p.441)
Sets the graphic figure drawing attributes.	SetDrawStyle	Display Control Related	---	---	OK	Reference: ► Details (p.442)
Sets global data	SetGlobalData	Control global data	OK	OK	OK	Reference: ► Details (p.443)
Set the attribute of the image window	SetImageWindow	Display Control Related	---	OK	OK	Reference: ► Details (p.444)
Sets the processing unit measurement image.	SetMeasureImage	Processing Unit Control Related	---	---	OK	Reference: ► Details (p.445)
Set the output mode of the measurement result	SetMeasureOut	Measurement Control Related	---	OK	---	Reference: ► Details (p.446)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Set PLC the write data	SetPlcData	IO module control	---	OK	OK	Reference: ► Details (p.447)
Sets the polling execution status.	SetPolling State	IO module control	OK	OK	---	Reference: ► Details (p.448)
Set the explanation of the scene	SetScene Description	Scene Control Related	---	OK	---	Reference: ► Details (p.449)
Set the scene group title name	SetScene GroupTitle	Scene Group Control Related	---	OK	---	Reference: ► Details (p.450)
Set the scene maker name	SetSceneM aker	Scene Control Related	---	OK	---	Reference: ► Details (p.450)
Set the scene title name	SetSceneTi tle	Scene Control Related	---	OK	---	Reference: ► Details (p.451)
Sets system data	SetSystem Data	Control system data	OK	OK	OK	Reference: ► Details (p.452)
Sets the character string drawing attributes.	SetText Style	Display Control Related	---	---	OK	Reference: ► Details (p.453)
Set the attribute of the Text Window	SetText Window	Display Control Related	---	OK	---	Reference: ► Details (p.454)
Sets processing unit data	SetUnit Data	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.455)
Sets processing unit figure data	SetUnit Figure	Processing Unit Control Related	---	OK	OK	Reference: ► Details (p.456)
Sets judge value of a processing unit	SetUnit Judge	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.457)
Sets the processing unit title name	SetUnit Title	Processing Unit Control Related	---	OK	OK	Reference: ► Details (p.458)
Gets the sine of the specified expression.	Sin (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.459)
Gets the square root.	Sqr (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.460)
Time of starting a measurement processing	StartTimer (Function)	Others	OK	OK	OK	Reference: ► Details (p.461)
Stops the execution of the program.	Stop	Debug command	OK	OK	OK	Reference: ► Details (p.462)
Converts a numeric value into a numeric character string.	Str\$ (Function)	String operation	OK	OK	OK	Reference: ► Details (p.463)
Converts to a numeric character string with the numeric value format specified.	Str2\$ (Function)	String operation	OK	OK	OK	Reference: ► Details (p.464)
Reboot the controller	System Reset	Others	---	OK	---	Reference: ► Details (p.466)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Gets the tangent of the specified expression.	Tan (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.467)
Reads out the time from the internal clock.	Time\$ (Function)	Others	OK	OK	OK	Reference: ► Details (p.468)
Gets a processing time	Timer (Function)	Others	OK	OK	OK	Reference: ► Details (p.469)
Gets the overall judgement result.	TotalJudge (Function)	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.470)
Converts the calibration angle.	TransformAngle	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.471)
Converts the calibration area.	TransformArea	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.472)
Converts the calibration distance.	TransformDistance	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.473)
Converts the calibration line.	TransformLine	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.474)
Converts the calibration coordinates.	TransformXY	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.475)
Carries out exception handling.	Try - Catch - End Try	General instruction	OK	OK	OK	Reference: ► Details (p.476)
Convert a small letter into a capital letter	UCase\$ (Function)	String operation	OK	OK	OK	Reference: ► Details (p.477)
Gets the enrollment number of the processing unit	UnitCount (Function)	Flow control	---	OK	---	Reference: ► Details (p.478)
Gets processing unit data (numeric value)	UnitData (Function)	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.479)
Gets processing unit data (character string).	UnitData\$(Function)	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.480)
Gets the processing unit data (display coordinates).	UnitData2(Function)	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.481)
Gets processing unit information	UnitInfo (Function)	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.482)
Gets the processing item ident name of processing unit	UnitItemIdent\$ (Function)	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.483)
Gets the judgement value of the processing unit	UnitJudge (Function)	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.484)

Function	Command Name	Classification	Macro calculations	Customize I/O command	Macro processing	References
Gets processing unit number	UnitNo (Function)	Processing Unit Control Related	OK	---	OK	Reference: ► Details (p.485)
Gets the processing unit title name	UnitTitle\$ (Function)	Processing Unit Control Related	OK	OK	OK	Reference: ► Details (p.486)
Converts the number of a character string notation into a numeric value.	Val (Function)	String operation	OK	OK	OK	Reference: ► Details (p.487)
Returns saved variables.	Varpop	General instruction	OK	OK	OK	Reference: ► Details (p.488)
Temporarily saves the value of a variable.	Varpush	General instruction	OK	OK	OK	Reference: ► Details (p.490)
Standby at specified time	Wait	Others	---	OK	OK	Reference: ► Details (p.492)
Write in data at designated storage device of the PLC	WritePlcMemory	IO module control	---	OK	OK	Reference: ► Details (p.493)
Gets the exclusive disjunction (exclusive-OR) of 2 expressions.	Xor (Function)	Arithmetic calculation	OK	OK	OK	Reference: ► Details (p.494)

Get the Absolute Value of the Expression Specified.

Abs (<expression>)

Parameters

<Equation>	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 integer 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: ► System Data List (p.495)

Example

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

```
AddSystemData "PanDA" , "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

Return the value of the integer type.

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.244)

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

Return the value of the integer type.

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 an <itemIdent> processing items with the position appointed with a <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

<Equation>	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 <iolent>, <state>

Parameters

<iolent>	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 <iolent>. The content of operation depends on the specification of the I/O module.

Reference: ► List of IO Modules (p.507)

Example

Output BUSY ON to Parallel interface.

```
BusyOut "Parallelo", 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

Return 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 a <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

<Equation>	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>]

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 a <unitNo>. When a <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
```

Closing the Message File

CloseTextData [#<textDataNo>[, #<textDataNo>]...]

Parameters

<textDataNo>	Message file number (0 to 15) Specify the message file number that was specified in the CloseTextData command for the message file to close. If the parameter is omitted, all message files will be closed.
--------------	---

Return value

None.

Description

The message file with the message file number that is specified by the textDataNo parameter is closed.

Example

The following command closes message files 0 and 1, which were previously opened.

```
CloseTextData #0, #1
```

Setting the Command Execution Status

CommandExecute&

Parameters

None.

Return value

None.

Description

The command execution status is set.

After execution of a customer communications command, set the command execution status to FALSE if a standard command is executed after command execution and to TRUE if a standard command is not executed after command execution.

Example

The following example sets the command execution status for execution of a standard command after execution of the custom command.

```
CommandExecute& = False
```

Continues the Execution of a Program Halted by a Stop Statement.

Cont

Parameters

None.

Return value

None.

Description

This command is a direct command intended 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 Processing Unit Measure Image

CopyMeasureImage <measureImageNo>, <myImageNo>

Parameters

<measureImageNo>	Number of measured image of processing unit
<myImageNo>	Number of image of "Macro" processing unit

Return value

None.

Description

Copy processing unit measure image.

The argument <measureImageNo> specifies the number of the measured image of the processing unit. The value that can be specified is 0-3.

The measured image of the processing unit is an image processed when the processing unit executes the latest measurement processing.

Because number only 0 is used in principle in the application software of present FJ as for the measured imagery, the value specified for the argument <measureImageNo> always usually becomes 0.

The image number in "Macro" processing unit is specified for the argument <myImageNo>, and the image specified by this becomes a copy destination. The value that can be specified is 0-31.

Example

Copy the measurement image 0 to image number 2.

```
CopyMeasureImage 0, 2
```

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

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

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 (integer type)

Return value

None.

Description

Copy a processing item registered with the <srcUnitNo> position of the scene appointed with an <srcSceneNo> at the <destUnitNo> position of the current scene.

When an <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 Processing Unit Image

CopyUnitImage <unitNo>, <imageNo>, <myImageNo>

Parameters

<unitNo>	Processing unit number
<imageNo>	Number of image of processing unit
<myImageNo>	Number of image of "Macro" processing unit

Return value

None.

Description

Copy processing unit image.

The image that specifies the image number specified by the argument <imageNo> of the processing unit for which the number is specified by the argument <unitNo> as the copy origin.

The image number in "Macro" processing unit is specified for the argument <myImageNo>, and the image specified by this becomes a copy destination. The value that can be specified is 0-31.

Example

Copy the image 3 of processing unit 2 to image 1 of the "macro" processing unit.

CopyUnitImage 2, 3, 1

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 figure data.

If the copied model region figure is different from the source model region figure, use CopyUnitFigure to copy the figure data as well.

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

<Equation>	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>,<YCoordinate>

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.392)

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#()
```

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.256)

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 a <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 Display Sub Number

DisplaySubNo()

Parameters

None.

Return value

Display sub number.

In *MeasureDispG and *MeasureDispT subroutine, the display sub number which is set in the image display window and the text display window, otherwise returns -1.

Description

Gets display sub number.

Example

Gets display sub number.

```
subNo& = DisplaySubNo()
```

Gets Image/Text Display the Processing Unit Number

DisplayUnitNo

Parameters

None.

Return value

Return 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.244)

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.392)

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#()
```

Draws an Arc

DrawArc <x>, <y>, <radius>, <start>, <end>, <imageNo>[, <unitNo>]

Parameters

<x>	X position coordinate of the center of the wide arc to be drawn
<y>	Y position coordinate of the center of the wide arc to be drawn
<radius>	Radius of the wide arc to be drawn
<start>	Start point angle of the wide arc to be drawn
<end>	End point angle of the wide arc to be drawn
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws an arc at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the arcs from central coordinate (100,200), radius 50, 90 degrees to 180 degrees with a fixed value.

'The unit number acquisition of the processing unit
workNo& = UnitNo

DrawArc 100, 200, 50, 90, 180, 2, workNo&

Draws a Wide Arc

DrawArcW <x>, <y>, <radius>, <start>, <end>, <width>, <imageNo>[, <unitNo>]

Parameters

<x>	X position coordinate of the center of the wide arc to be drawn
<y>	Y position coordinate of the center of the wide arc to be drawn
<radius>	Radius of the wide arc to be drawn
<start>	Start point angle of the wide arc to be drawn
<end>	End point angle of the wide arc to be drawn
<width>	Width of the wide arc to be drawn
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws a wide arc at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the arcs from central coordinate (100,200), radius 50, 90 degrees to 180 degrees with a fixed value at width 30.

'The unit number acquisition of the processing unit
workNo& = UnitNo

DrawArcW 100, 200, 50, 90, 180, 30, 2, workNo&

Draws a Rectangle

DrawBox <x0>, <y0>, <x1>, <y1>, <imageNo>[, <unitNo>]

Parameters

<x0>	X position coordinate of the upper left corner of the rectangle to be drawn
<x1>	X position coordinate of the lower right corner of the rectangle to be drawn
<y0>	Y position coordinate of the upper left corner of the rectangle to be drawn
<y1>	Y position coordinate of the lower right corner of the rectangle to be drawn
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws a rectangle at the specified position in the Image Display window. It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the rectangle from upper left coordinate (100,200) to lower right coordinate (250,350) with a fixed value.

'The unit number acquisition of the processing unit
workNo& = UnitNo

DrawBox 100, 250, 200, 350, 2, workNo&

Draws a Circle

DrawCircle <x>, <y>, <radius>, <imageNo>[, <unitNo>]

Parameters

<x>	X position coordinate of the center of the circle to be drawn
<y>	Y position coordinate of the center of the circle to be drawn
<radius>	Radius of the circle to be drawn
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws a circle at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the circle from central coordinate (100,200), radius 50 with a fixed value.

'The unit number acquisition of the processing unit
workNo& = UnitNo

DrawCircle 100, 200, 50, 2, workNo&

Draws a Wide Circle

DrawCircleW <x>, <y>, <radius>, <width>, <imageNo>[, <unitNo>]

Parameters

<x>	X position coordinate of the center of the circle to be drawn
<y>	Y position coordinate of the center of the circle to be drawn
<width>	Width of the circle to be drawn
<radius>	Radius of the circle to be drawn
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws a wide circle at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the wide circle from central coordinate (100,200), width 30, radius 50 with a fixed value.

```
'The unit number acquisition of the processing uni  
workNo& = UnitNo
```

```
DrawCircleW 100, 200, 30, 50, 2, workNo&
```

Draws a Cross-Shaped Cursor

DrawCursor <x>, <y>, <imageNo>[, <unitNo>]

Parameters

<x>	X position coordinate of the cross-shaped cursor to be drawn
<y>	Y position coordinate of the cross-shaped cursor to be drawn
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws a cross-shaped cursor at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the cross cursor in the standfast of the coordinate (100,200).

'The unit number acquisition of the processing unit
workNo& = UnitNo

DrawCursor 100, 200, 2, workNo&

Draws an Ellipse

DrawEllipse <x>, <y>, <radiusX>, <radiusY>, <imageNo>[, <unitNo>]

Parameters

<x>	X position coordinate of the center of the ellipse to be drawn
<y>	Y position coordinate of the center of the ellipse to be drawn
<radiusX>	Radius of the ellipse to be drawn in the X direction
<radiusY>	Radius of the ellipse to be drawn in the Y direction
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws an ellipse at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error(Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the ellipse from central coordinate (100,200), width 60, height 30 with a fixed value.

```
'The unit number acquisition of the processing unit  
workNo& = UnitNo
```

```
DrawEllipse 100, 200, 60, 30, 2, workNo&
```

Draws a Figure

DrawFigure <figure()>, <imageNo>[, <unitNo>]

Parameters

<figure()>	The figure data to be set
<imageNo>	Image number
<unitNo>	Processing unit number

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 makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the polygon from coordinate (100,200), (200,300), (300,100) with a fixed value.

```
'Figure data setting
Dim figure&(8)

figure&(0) = 512 'Figure Kind
figure&(1) = 3 'Number of tops
figure&(2) = 100 'First point X
figure&(3) = 200 'First point Y
figure&(4) = 200 'Second point X
figure&(5) = 300 'Second point Y
figure&(6) = 300 'Third point X
figure&(7) = 100 'Third point Y

'The unit number acquisition of the processing unit
workNo& = UnitNo

DrawFigure figure&(), 2, workNo&
```

Fills the Image

DrawFillImage <color>

Parameters

<color>	Fill color. Specified by RGB method.
---------	---

Return value

None.

Description

Fills the image in image display window with the specified color.

Example

Fill image with white color.

```
DrawFillImage RGB(255,255,255)
```

Draw Judge Text

DrawJudgeText <judge>

Parameters

<judge>	Judge text to be drawn
---------	------------------------

The following drawing judgement result values can be set.

Judgement result value	Description
0 (JUDGE_NC)	No judgement (unmeasured)
1 (JUDGE_OK)	Judgement result OK
-1 (JUDGE_NG)	Judgment result NG
-10 (JUDGE_IMAGEERROR)	Judgement result error (image format mismatch)
-11 (JUDGE_MODELERROR)	Judgement result error (unregistered model)
-12 (JUDGE_MEMORYERROR)	Judgement result error (insufficient memory)
-20 (JUDGE_ERROR)	Judgement result error (other errors)

Return value

None.

Description

It makes an error (Illegal function call) when performing it not in the *MeasureDispT subroutine.

Example

Display the character string of "judgement result OK".

```
DrawJudgeText 1
```

Draws a Line

DrawLine <x0>, <y0>, <x1>, <y1>, <imageNo>[, <unitNo>]

Parameters

<x0>	Initial point X position coordinate of the straight line to be drawn
<x1>	Terminal X position coordinate of the straight line to be drawn
<y0>	Initial point Y position coordinate of the straight line to be drawn
<y1>	Terminal Y position coordinate of the straight line to be drawn
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws a straight line at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error(Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the line from coordinate (100,200) (300,200) with a fixed value.

```
'The unit number acquisition of the processing unit  
workNo& = UnitNo
```

```
DrawLine 100, 200, 300, 200, 2, workNo&
```

Draws a Wide Line

DrawLineW <x0>, <y0>, <x1>, <y1>, <width>, <imageNo>[, <unitNo>]

Parameters

<x0>	Initial point X position coordinate of the straight line to be drawn
<x1>	Terminal X position coordinate of the straight line to be drawn
<y0>	Initial point Y position coordinate of the straight line to be drawn
<y1>	Terminal Y position coordinate of the straight line to be drawn
<width>	Width of the straight line to be drawn
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws a wide straight line at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the wide line from coordinate (100,200) (300,200) width 10 with a fixed value.

'The unit number acquisition of the processing unit
workNo& = UnitNo

DrawLineW 100, 200, 300, 200, 10, 2, workNo&

Draw Processing Unit Measure Image

DrawMeasureImage <measureImageNo>

Parameters

<measureImageNo>	Processing unit measure image number
------------------	--------------------------------------

Return value

None.

Description

Draw processing unit measure image in the image display window.

The argument <measureImageNo> specifies the number of the measured image of the processing unit. The value that can be specified is 0-3.

The measured image of the processing unit is an image processed when the processing unit executes the latest measurement processing

Because number only 0 is used in principle in the application software of present FJ as for the measured imagery, the value specified for the argument <measureImageNo> always usually becomes 0.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Example

Display the measurement image to a Image display window.

```
*MeasureDispl  
DrawMeasureImage 0
```

Draws a Point

DrawPoint <x>, <y>, <imageNo>[, <unitNo>]

Parameters

<x>	X position coordinate of the point
<y>	X position coordinate of the point
<imageNo>	Image number
<unitNo>	Processing unit number

Return value

None.

Description

Draws a point at the specified position in the Image Display window.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Example

When drawing to the position in which it followed to image transformation (Scroll etc.) in the figure for the measurement coordinates, processing is executed with the ► UnitData2 function (p.481) as follows. (Argument <unitNo> is omitted.)

```
X#=UnitData2(2,"X")
Y#=UnitData2(2,"Y")
```

```
DrawPoint X#,Y#,0
```

'Processing is executed specified by the processing unit reference number of processing unit (the argument <unitNo>), when drawing figure in a fixed position of the screen

```
DrawPont 320,240,0,UnitNo
```

Draws a Polygon

DrawPolygon <count>, <x()>, <y()>, <imageNo>[, <unitNo>]

Parameters

<count>	The number of vertexes of the polygon to be drawn
<x()>	X coordinates of the polygon each top
<y()>	Y coordinates of the polygon each top
<imageNo>	Image number
<unitNo>	Processing unit No.

Return value

None.

Description

Draws a polygon at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

The top number of the polygon is specified in argument <count>.

Processing unit number is specified by the argument <unitNo>, image number is specified by the argument <imageNo>.

X/Y coordinates of the polygon each top is specified by the argument <x()>/<y()>. It saves as real type or integer type array variable, do not specify it with the number of element like X&() but like () only with the type.

Example

Display the polygon from coordinate (100,200), (200,300), (300,100) with a fixed value.

```
Dim x&(3), y&(3)
x&(0) = 100 'First point X
y&(0) = 200 'First point Y
x&(1) = 200 'Second point X
y&(1) = 300 'Second point Y
x&(2) = 300 'Third point X
y&(2) = 100 'Third point Y
```

```
'The unit number acquisition of the processing unit
workNo& = UnitNo
DrawPolygon 3, x&(), y&(), 2, workNo&
```

Draws a Figure of Search

DrawSearchFigure <figure()>, <referenceX>, <referenceY>, <measureX>, <measureY>, <measureAngle>, <imageNo>[, <unitNo>]

Parameters

<figure()>	The figure data to be set
<referenceX>	X coordinate of reference
<referenceY>	Y coordinate of reference
<measureX>	X coordinate of measurement
<measureY>	Y coordinate of measurement
<measureAngle>	Angle of measurement
<imageNo>	Image number
<unitNo>	Processing unit number

Return value

None.

Description

Draws a figure at the specified position in the Image Display window.

The main purpose of this command is drawing a figure on the coordinate of the result of Search.

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 makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display the search figure with a fixed value.

The search processing unit shall be set to unit number 5.

```
*MeasureDispl
'figure data setting
Dim figure&(5)

figure&(0) = 8 'Figure kind (Box)
figure&(1) = 100 'Upper left X
figure&(2) = 100 'Upper left Y
figure&(3) = 300 'Lower right X
figure&(4) = 300 'Lower right Y

'Gets the data of the search unit
GetUnitData 5, "SX", referenceX# 'Reference X
GetUnitData 5, "SY", referenceY# 'Reference Y
GetUnitData 5, "X", measureX# 'Measure X
GetUnitData 5, "Y", measureY# 'Measure Y
GetUnitData 5, "TH", measureAngle# 'Measure angel

'The unit number acquisition of the processing unit
workNo& = UnitNo

DrawSearchFigure figure&(), referenceX#, referenceY#, measureX#, measureY#, measureAngle#, 2, workNo&
```

Draws String

DrawText <string>, <color>, <newLine>

Parameters

<string>	String to be drawn
<color>	Color of the text to be drawn
<newLine>	Specifies whether or not to insert a line break after drawing the specified string

Return value

None.

Description

Draw string in the image display window.

Color of the string is specified by the argument <color>. The value that can be specified is as follows.

JUDGE_NC Gray

JUDGE_OK OK color(Black)

JUDGE_NG NG color(Red)

It makes an error (Illegal function call) when performing it not in the *MeasureDispT subroutine.

Example

Display the measurement result (coordinate X, coordinate Y, angle) of the search unit.

The search processing unit shall be set to unit number 5.

*MeasureDispT

'Gets the data of the search unit

GetUnitData 5, "X", measureX# 'Measure X (123.4567)

GetUnitData 5, "Y", measureY# 'Measure Y (10.5)

GetUnitData 5, "TH", measureAngle# 'Measure angle (90.0)

'Convert measurement coordinate X into character string and display it with black. (no newline)

DrawText Str2\$(measureX#,4,4,0,0), JUDGE_OK, 0

'Display the delimiter. (no newline)

DrawText " , ", JUDGE_OK, 0

'Convert measurement coordinate Y into character string and display it with black. (newline)

DrawText Str2\$(measureY#,4,4,0,0), JUDGE_OK, 1

'Convert measurement angle into character string and display it with black. (no newline)

DrawText Str2\$(measureAngle#,4,4,0,0), JUDGE_OK, 0

The displayed as follows.

123.4567 , 10.5000

90.0000

Draws String

DrawTextG <string>, <x>, <y>, <imageNo>[, <unitNo>]

Parameters

<string>	The string to be drawn
<x>	X position coordinate of the string to be drawn
<y>	Y position coordinate of the string to be drawn
<imageNo>	Image number
<unitNo>	Processing unit number

Return value

None.

Description

Draws a string at the specified position in the Image Display window.

It draws the figure at the position corresponding to the state of the image scrolling specified by the image number and coordinates specified by the argument.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Refer to the explanation of the ► DrawPoint command (p.330) for the method of specifying the drawing coordinates.

Example

Display character string "OK" in the standfast of the coordinate (100,100).

```
*MeasureDispG
  'The unit number acquisition of the processing unit
  workNo& = UnitNo

  DrawTextG "OK", 100, 100, 2, workNo&
```

Draw Processing Unit Image

DrawUnitImage <unitNo>, <imageNo>

Parameters

<unitNo>	Processing unit number
<imageNo>	Image number

Return value

None.

Description

Draw processing unit reference number of image in the image display window.

Processing unit number is specified by the argument <unitNo>, image number is specified by the argument <imageNo>.

What the image of each image number is each processing item defined.

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Example

Display an image to image number 0 of unit number 5.

```
*MeasureDispG  
DrawUnitImage 5, 0
```

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

Return the value of the integer type.

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 "Parallelo",103,1
```

Gets the Elapsed Time

ElapsedTime(<mode>)

Parameters

<mode>	Get mode
--------	----------

Return value

Elapsed time.

Description

The get mode is specified for the argument <mode>.

Available modes are:

0: Gets the elapsed time of each ms

1: Gets the elapsed time of each μ s

Example

Measure the time from a measurement start to this processing unit, display an error to a text window if more than 1000msec.

```
*MEASUREPROC
```

```
'Gets an elapsed time in measurement processing.
```

```
TIME& = ElapsedTime(0)
```

```
Return
```

```
*MEASUREDISPT
```

```
'display an error if more than 1000msec.
```

```
If TIME& > 999 Then
```

```
    DrawText "ERROR" , JUDGE_NG, 1
```

```
EndIf
```

```
Return
```

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

Return the value of the integer type.
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.

Errcmd\$

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 "C:\DATA.DAT" for OUTPUT as #1
```

```
  Print #1, DATA$
```

```
  Close
```

```
Catch
```

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

```
If ERRCMD$ = "Open" Then
```

```
  Print "Unable to open file"
```

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

```
Elseif ERRCMD$ = "Print" Then
```

```
  Close
```

```
  Print "Writing failed"
```

```
Endif
```

```
End Try
```

```
Return
```

Gets the Error Class During Exception Handling.

Errno

Parameters

None.

Return value

Return the value of the integer type.

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 mismatch0
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
```

Execute Image Logging

ExecutelmageLogging <directory>, <header>

Parameters

<directory>	Subdirectory name that saves logging image (character string)
<header>	Head character of file name that saves logging image

Return value

None.

Description

Execute image logging at measure processing.

It executes in *MeasureProc subroutine. The input image in the measurement processing is done and logging is done.

The subdirectory name (character string) that saves the logging image is specified for the argument <directory>, the subdirectory specified here is made for the directory for which logging is specified by the system set first, and the logging image is saved under that. When (blank string "") is specified, the logging image is saved below the directory for which logging is specified by the system set early.

The header character string of the file name in which the logging image is saved is specified for the argument <header>. The file name of the logging image is the following basically form, and it becomes shape that the character string specified is added to the head. When (blank string "") is specified, it becomes the file name of the form as it is about the following.

YYYY-MM-DD_HH-MM-SS-SSSS.ifz

Example

Save the logging image.

```
*MeasureProc  
ExecuteImageLogging "Image", "new_"
```

The following file is generated into "C:\XXX\Image" folder.
new_2012-11-01_13-11-25-0025.ifz

Terminate the Controller

ExitFzProcess

Parameters

None.

Return value

None.

Description

Ends FH/FZ5 processing.

If this command is executed by the Controller, turn OFF the power supply after execution is completed.

Example

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

```
SaveData  
ExitFzProcess
```

Calculate Exponential Function.

Exp <Expression>

Parameters

<Equation>	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.

$$\text{SINH\&} = (\text{Exp(TH\&)} - \text{Exp(-TH\&)}) / 2$$

$$\text{COSH\&} = (\text{Exp(TH\&)} + \text{Exp(-TH\&)}) / 2$$

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.256)

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

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

Return value

Return the value of the integer type.

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

GetAll(<ioident>)

Parameters

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

Return value

Return the value of the integer type.
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.507)

Example

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

```
AA& = GetAll("Parallelo")
```

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).

Example

Gets the setting information of image display window 3.

```
GetImageWindow 3, locationX&, locationY&, width&, height&, unitNo&, subNo&, magnification#, originX&, originY&, update&, visible&
```

GetMeasureOut

Parameters

Return value

Return 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 <iolent>, <readData()>, <offset>, <size>, <data>

Parameters

<iolent>	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 <iolent>.

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 a <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 a <size> (NULL of the end does not include it) and appointed.

Appoint -1 in a <size>, acquire character string before NULL emerging from the offset position that appointed with an <offset>.

Reference: ► List of IO Modules (p.507)

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
```

GetPort(<iolent>, <portNo>)

Parameters

<iolent>	Identification name (string) of I/O module
<portNo>	Port number (integer type) * For Parallelo • FH Series DI0 to DI7: 0 to 7 DSA N: $100 + N \times 8$ (N: Line number 0 to 7) STEP N: $101 + N \times 8$ DILINE0 to DILINE2: 200 to 202 • FZ5 Series DI0 to DI7: 0 to 7 DSA0: 100 STEP0: 101 DSA1: 102 STEP1: 103

Return value

Return the value of the integer type.

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 <iolent>.

The content of operation depends on the specification of the I/O module.

Reference: ► List of IO Modules (p.507)

Example

If DI3 is ON, carry out processing.

```
pno3& = GetPort("Parallelo", 3)
If pno3& = 1 Then
  'Carry out processing
Endif
```

Getting the Polling Execution Status

GetPollingState(<ioident>)

Parameters

<ioident>	Identifier of the I/O Module to execute the process
-----------	---

Return value

The value of the execution condition for I/O Module polling is returned. (False: Stopped, True: Operating)

Description

The value of the execution condition for I/O Module polling that is specified with the ioident parameter is returned.

Example

The following example gets the I/O Module status and changes it to stopped if the obtained value shows that the I/O Module is operating.

```
iostate& = GetPollingState("SerialNormal")
```

```
If iostate& = True Then  
    SetPollingState "SerialNormal", False  
EndIf
```

Gets System Data

GetSystemData <dataIdent0>, <dataIdent1>, <data>

Parameters

<dataIdent0>	Set data ident name 0 (character string type)
<dataIdent1>	Set data ident name 1 (character string type)
<data>	Data to be get

Return value

None.

Description

Gets system data.

Reference: ► System Data List (p.495)

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"
```

Getting the Message Data

GetText\$(#<textDataNo>, <textIdent>)

Parameters

<textDataNo>	Message file number (0 to 15) Specify the message number that was specified when the message file was opened with OpenTextData.
<textIdent>	The message identifier.

Return value

None.

Description

The message character string of the message identifier that is specified in the textIdent parameter is obtained from the message file with the message file number that is specified in the textDataNo parameter.

Example

The following example gets the message character string for the message identifier "Correlation" from the message file with message file number 0.

```
GetText$(#0, "Correlation")
```

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 No.
<dataNo>	Data number
<dataIdent>	Data identifier name
<data>	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 No.
<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 a 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&(1) = 256 Then

'Switch to the wide circle.
figure&(1) = 64
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

<Equation>	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.244)

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
```

```

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.244)

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

Return the value of the integer type.

The content of the value is the processing unit figure format of the specified image.

0 Binary image

1 Monochrome image

2 RGB color image

100 User-defined image

101 User-defined data

-1 invalid 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

Search

'Make the input image from a camera

ImageUpdate

Search

Search

Reads in the Specified Number of Bytes of Binary Data.

Input\$(<No. of Characters>[,#<File No.>])

Parameters

<Number of decoded 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 <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 an <itemIdent> in the position appointed with a <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

<Equation>	The expression (double-precision type) that requests the integer.
------------	---

Return value

Return the value of the integer type.

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

Return the value of the integer type.

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

Return 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 an 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: Image data maximum number 7: Inner unit maximum number 8: Imaging camera setting

Return value

Return 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

Returns the value of the character type.
The contents of the value are title names of the processing item.

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.507)

Example

Output the total judgement result in parallel interface.

```
'Gets the total judgement result  
judge& = TotalJudge
```

```
JudgeOut "Parallelo", 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.

You can use wildcards in <File Path Name>. Refer to Wild Cards for details on Wild Cards.

Reference: ► Wildcard (p.256)

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 string>	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

Return the value of the integer type.

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".

```
CHRLLEN&=Len("OMRON")
```

The results are as follows:

```
CHRLLEN&=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

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 a <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

<Equation>	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 $e=2.71828\dots$
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 a <wait> is omitted, assume it 0.

Example

Executes measurement processing.

Measure

Performs Measurement Result Output

MeasureDispG <unitNo>, <subNo>

Parameters

<unitNo>	Processing unit No.
<subNo>	Sub number

Return value

None.

Description

Performs measure result display (graphic display) of the specified processing unit measurement result output.

Example

Display the measurement result of subwindow 1 of processing unit number 2.

MeasureDispG 2, 1

Gets Measure ID

MeasureId\$

Parameters

None.

Return value

Measure ID (character string) in the shape of "YYYY-MM-DD_HH-MM-SS-XXXX".

Description

Gets measure ID.

Example

Gets the measurement ID. Used to the file name when save a measurement image.

```
'Gets the measurement ID  
file$ = MeasureId$  
'Output the measurement image 0 with a BitMap format.  
SaveMeasureImage 0, file$, 0
```

Performs Measurement Processing

MeasureProc <unitNo>

Parameters

<unitNo>	Processing unit No.
----------	---------------------

Return value

None.

Description

Performs the measurement processing.

Example

Carry out the measurement processing of processing unit number 2.

```
MeasureProc 2
```

Remarks

MeasureProc command is not available for processing items which are in Input image category.

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 [<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 a <mode> 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).
<Number of decoded 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$="ABCDEFGG"  
OUTPUTSTR1$=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>	The expression to be divided (integer).
<destUnitNo>	The expression to divide (integer).

Return value

None.

Description

Moves a registered processing unit from <srcUnitNo> to <destUnitNo>.

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

Gets the negation result of the expression.

Not (<Expression>)

Parameters

<Equation>	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 Processing in Accordance With the Specified Condition.

On <Expression> Gosub <Label>[,<Label>...]

Parameters

<Equation>	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
```

Opening and Loading a File

Open <filename> For Input As #<fileNo>

Parameters

<filename>	File name for the file to open (character string)
<fileNo>	Integer number assigned to the file to open

Return value

None.

Description

The file that is specified with the filename parameter is opened with the number that is specified by textDataNo. Use this command to read data from a file.

After you perform processing for the file that you opened, close it with Close.

Example

The following example reads data from the input.dat file on the E drive to the end.

```
Open "E:\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
```

Opening and Writing a File

Open <filename> For Output As #<fileNo>

Parameters

<filename>	File name for the file to open (character string)
<fileNo>	Integer number assigned to the file to open

Return value

None.

Description

The file that is specified with the filename parameter is opened with the number that is specified by textDataNo. Use this command to write data to a file.

After you perform processing for the file that you opened, close it with Close.

Example

The following example opens the input.dat file on the E drive and writes data to it.

```
Open "E:\input.dat" For Output As #1
```

```
Print #1, DATA&
```

```
Close #1
```

Opening and Adding to a File

Open <filename> For Append As #<fileNo>

Parameters

<filename>	File name for the file to open (character string)
<fileNo>	Integer number assigned to the file to open

Return value

None

Description

The file that is specified with the filename parameter is opened with the number that is specified by textDataNo. Use this command to append data to an existing file.

After you perform processing for the file that you opened, close it with Close.

Example

The following example opens the input.dat file on the E drive and writes data to it.

```
Open "E:\input.dat" For Append As #1  
STRING$ = "Sample"
```

```
Print #1, STRING$ + " Print#"
```

```
Close #1
```

Opening a Message File

OpenTextData <ident> as #<textDataNo>

Parameters

<ident>	Message file identifier
<textDataNo>	Message file number (0 to 15) This number is used to identify the message file that was opened with the CloseTextData command until the message file is closed. You can open up to 16 message files simultaneously.

Return value

None.

Description

The message file with the identifier that is specified by the *ident* parameter is opened with the message file number that is specified by *textDataNo*.

Example

In this example, a message file is opened by specifying FZ-PanDA as the identifier of the message file and 1 as the message file number.

The message file that is opened depends on the current language setting. For example, if the language is set to Japanese under [System Settings] - [Startup settings] - [Language Setting], the FZ-PanDA_jpn.msg file is opened. If it is set to English, the FZ-PanDA_eng.msg file is opened.

```
OpenTextData "FZ-PanDA" as #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

Return the value of the integer type.

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.244)

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> ...]][;,<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.507)

Example

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

```
data& = 1  
PutAll "Parallelo", data&
```

Output Terminal a Point Output

PutPort <iolent>, <portNo>, <state>

Parameters

<iolent>	Identification name (string) of I/O module that executes send processing
<portNo>	<p>Port number (integer)</p> <p>* For Parallelo</p> <ul style="list-style-type: none">• FH Series<ul style="list-style-type: none">DO0 to DO15: 0 to 15GATE N: $100 + N \times 8$ (N: Line number 0 to 7)BUSY N: $101+N \times 8$OR N: $102+N \times 8$ERROR N: $103+N \times 8$RUN N: $104+N \times 8$READY N: $105+N \times 8$ACK: 00• FZ5 Series<ul style="list-style-type: none">DO0 to DO15: 0 to 15GATE0: 100BUSY: 101OR0: 102ERROR: 103RUN: 104READY0: 105GATE1: 108OR1: 110READY1: 113 <p>IMPORTANT</p> <p>If you specify the ERROR signal, you will not be able to turn the signal ON and OFF even if you use a command for line 1. Use line 0.</p>
<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 <iolent>.

The content of operation depends on the specification of the I/O module.

Reference: ► List of IO Modules (p.507)

Example

Using a parallel interface, turn ON the DO0.

```
data& = 1
```

```
PutPort "Parallelo", 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 <eventNo> argument and a <parameter> 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 <iolident>, <area>, <channelOffset>, <channelCount>, <readData()>

Parameters

<iolident>	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 <iolident>.

Set a Area classification number Identification name in an <area>.

Reference: ► List of IO Modules (p.507)

Appoint a <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 <iolident>, <inputData()>, <inputMaxSize>, <inputSize>[, <parameter()>, <parameterSize>]

Parameters

<iolident>	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 <iolident>.

Reference: ► List of IO Modules (p.507)

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 text 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 the <preImageNo>, latest logging image the re-measurement.

When appoint 1, logging image before one again the re-measure.

Include a pass in a <fileName>.

When a <wait> is omitted, assume it 0.

Example

Executes remeasurement 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"

Obtain the Processing Unit Updated Number when Flow is Edited

RenumUnitNo(<oldUnitNo>)

Parameters

<oldUnitNo>	Convert object unit number
-------------	----------------------------

Return value

Processing unit number after update.

Description

Obtain the processing unit updated number when flow is edited.

*It makes an error (Illegal function call) when performing it not in the *RenumProc subroutine.

Example

Add an item search process unit prior to the present process after removing the previous processing unit processing unit 2 invention

```
'Gets the number of processing units the processing unit  
olduno& = UnitNo
```

```
'Remove the pre-processing unit of two  
DeleteUnit(olduno&-2)
```

```
'Gets the number of processing units after updating the processing unit  
newuno& = RenumUnitNo(olduno&)
```

```
'Inserts an item into the search process prior to the processing unit  
InsertUnit newuno&, "Search"
```

Returns a Whole Number Representing an RGB Color Value

RGB(red, green, blue)

Parameters

red	Required. Number in the range 0-255 representing the red component of the color.
green	Required. Number in the range 0-255 representing the green component of the color.
blue	Required. Number in the range 0-255 representing the blue component of the color.

Return value

Returns an Integer value representing an RGB color value from a set of red, green and blue color components.

Description

Application methods and properties that accept a color specification expect that specification to be a number representing an RGB color value. An RGB color value specifies the relative intensity of red, green, and blue to cause a specific color to be displayed.

The low-order byte contains the value for red, the middle byte contains the value for green, and the high-order byte contains the value for blue.

Example

Displays a string of green text display window

```
'Gets the number of green  
color& = RGB(0, 255, 0)  
DrawText "OK", color&, 1
```

Remarks

The value for any argument to RGB that exceeds 255 is assumed to be 255.

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 <iolident>, <state>

Parameters

<iolident>	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 <iolident>. The content of operation depends on the specification of the I/O module.

Reference: ► List of IO Modules (p.507)

Example

ON the RUN signal of the parallel interface

```
RunOut "Parallelo", 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 a <fileName>.

The file name include a pass.

If the file name specified already exists, the older file will be written over.

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

Saves 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"
```

Saves Processing Unit Measure Image

SaveMeasureImage <measureImageNo>, <fileName>, <imageFormat>[, <startX>, <startY>, <sizeX>, <sizeY>]

Parameters

<measureImageNo>	Number of measured image of processing unit
<fileName>	File name to be saved (String)
<imageFormat>	Image format information of the file to be saved
<startX>	Initial point X position coordinate of the rectangle to be saved in measure image
<startY>	Initial point Y position coordinate of the rectangle to be saved in measure image
<sizeX>	X size of the rectangle to be saved in measure image
<sizeY>	Y size of the rectangle to be saved in measure image

Return value

None.

Description

Saves processing unit measure image in the specified file.

Parameter <measureImageNo> is the number of measured image of processing unit.

The measure image is an image processed when the processing unit executes the latest measurement processing.

In FJ system, only No.0 is used for measure image essentially, <measureImageNo> is 0 normally.

Parameter <fileName> is the string of file name to be saved.

Parameter <imageFormat> is image format information as follows.

0	BMP image
10000 to 10100	JPEG image (10000 + JPEG image quality 0 to 100)

Parameters <startX>, <startY>, <sizeX>, <sizeY> indicate initial point X position coordinate/indicate initial point Y position coordinate/X size/Y size of the rectangle to be saved in measure image (possible to omit)

When these parameters are omitted, a full screen image is saved.

Example

Output to a file in BMP format full screen image of measurement 0

```
SaveMeasureImage 0, "C:\IMAGE\sample.bmp", 0
```

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 a <fileName>.

The file name include a pass.

If the file name specified already exists, the older file will be written over.

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 a <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 a <fileName>.

The file name include a pass.

If the file name specified already exists, the older file will be written over.

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 a <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

Return the value of the integer type.

The content of the value is available scene numbers.

Description

Acquires the count of usable scenes.

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 an 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

Return 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

Acquires the count of the valid scene groups on the memory card.

```
groupCount& = SceneGroupCount
```

Gets the Current Scene Group Number

SceneGroupNo

Parameters

None.

Return value

Return the value of the integer type.
The content of the value is current scene group number.

Description

Acquires the current scene group No.

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 a <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$(3) = "" Then  
SetSceneGroupTitle 3 , "Group 3"  
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

Return the value of the integer type.
The content of the value is current scene number.

Description

Acquires the current scene No.

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 (character type)
------------	----------------------------

Return value

None.

Description

Capture the screen and save it in BMP form by a name appointed with a <fileName>.

Capture is capture of the screenfuls.

The file name include a pass.

If the file name specified already exists, the older file will be written over.

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 <iolident>, <outputData()>, <outputSize>[, <parameter()>, <parameterSize>]

Parameters

<iolident>	Identification name (string) of I/O module that executes send processing
<outputData()>	Data to be output (integer array type)
<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 <iolident>.

Reference: ► List of IO Modules (p.507)

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 <iolent>, <outputString>

Parameters

<iolent>	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 <iolent>.

Reference: ► List of IO Modules (p.507)

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 Style of a Figure to be Drawn

SetDrawStyle <style>, <width>, <color>

Parameters

<style>	Style of the figure to be drawn
<width>	Line width of the figure to be drawn
<color>	Color of the figure to be drawn

Return value

None.

Description

Sets style of a figure to be drawn by draw figure command (DrawPoint, DrawLine and so on) in image display window.

Performs DrawTextG command after this command, display character string with style specified of this command.

Style of the figure is specified by the argument <style>, The value that can be specified is as follows.

- PS_SOLID Solid
- PS_DASH Dash
- PS_DOT Dot
- PS_DASHDOT Dash dot
- PS_DASHDOTDOT Dash dot dot
- PS_NULL Null
- PS_INSIDEFRAME Inside frame

*1: If in the Windows CE, specified PS_DASHDOT and PS_DASHDOTDOT is the same as PS_DASH, specified PS_INSIDEFRAME is the same as PS_SOLID.

If the argument <width> is larger than 1, PS_DASH, PS_DOT, PS_DASHDOT and PS_DASHDOTDOT is specified the same as PS_SOLID.

The argument <width> specifies line width. If 0 is specified, line width will be 1 pix.

Color of the figure is specified by the argument <color>, The value that can be specified is as follows.

- JUDGE_NC Gray
- JUDGE_OK OK color(Green)
- JUDGE_NG NG color(Red)

*2: It makes an error (Illegal function call) when performing it not in the *MeasureDispl or MeasureDispG subroutine.

Example

Displayed on the image display window with a broken line a line of color OK

```
SetDrawStyle PS_DASH, 1, JUDGE_OK  
DrawLine 100, 100, 500, 500, 0
```

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 a <magnification>, make displaying compactedly. When set "2.0", spread and display.

When appoint -1 in a <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>
```

Sets Processing Unit Measurement Image

SetMeasureImage <measureImageNo>, <unitNo>, <imageNo>

Parameters

<measureImageNo>	Image number of current processing target image to register
<unitNo>	Processing unit number
<imageNo>	Image number to register in processing unit

Return value

None.

Description

Sets a measurement image for a processing unit to process later in the measurement flow.

*It is assumed that this command will be executed in the MeasureProc subroutine to specify the image to measure by a later processing unit.

Example

The following measurement flow provides an example.

0. Camera Image Input
1. Filtering
2. Macro
3. Search

The following code is implemented in the *MeasureProc subroutine of the Macro unit (unit 2). When measurements are processed, the Search unit (unit 3) executes search processing for the image that was input by the Camera Image Input unit (unit 0).

```
*MeasureProc
  SetMeasureImage 0,0,0
  Return
```

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 <iolident>, <writeData()>, <offset>, <size>, <data>

Parameters

<iolident>	Identification name of I/O module (character type)
<writeData()>	Write data (integer type array)
<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

Set the data to be written to the PLC memory area.

Use it in a use to make the write data of the WritePlcMemory command.

Set a identification Name Identification name in an <iolident>.

Reference: ► List of IO Modules (p.507)

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 a <data>, appoint data for the setting.

The value that a <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&(), 8, 4, 150
```

```
'Set "OMRON"( character string data) in writeData().  
SetPlcData "SerialPlcLink", writeData&(), 12, 6, "OMRON"
```

```
'Set 12345 (integer type data) in writeData().  
SetPlcData "SerialPlcLink", writeData&(), 18, 4, 12345
```

Setting the Polling Execution Status

SetPollingState <iolident>, <state>

Parameters

<iolident>	Identifier of the I/O Module to execute the process
<state>	Execution condition for I/O Module polling FALSE: Stopped TRUE: Operating

Return value

None.

Description

The value of the execution condition for I/O Module polling that is specified with the iolident parameter is set to the state that is specified with state.

Example

The I/O Module is stopped, up to 10 bytes of data is received at the Serial I/O Module, and then the I/O Module status is set to operating state.

Diim data&(256)

```
SetPollingState "SerialNormal", False  
ReceiveData "SerialNormal", data&(), 10, size&  
SetPollingState "SerialNormal", True
```

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. Sets an 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 a <sceneGroupNo>.
The number of the <sceneGroupTitle> is less than 15 characters.

Example

Gets the title name of scene group 0. Sets a title name if unestablished.

```
If SceneGroupTitle$(3) = "" Then
  SetSceneGroupTitle 3 , "Group 3"
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: ► System Data List (p.495)

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$
```

Sets Style of a String to be Drawn

SetTextStyle <fontSize>, <align>, <color>, <angle>, <style>

Parameters

<fontSize>	Font size to draw
<align>	Arrangement specification of the string to be drawn
<color>	Color of the string to be drawn
<angle>	Tilt of the string to be drawn
<style>	Typeface of the string to be drawn

Return value

None.

Description

Sets style of a string to be drawn by the DrawTextG command in the display window.

Performs DrawTextG command after this command, display character string with style specified of this command.

Specify FONTSIZE_NORMAL for the normal size.

The following value is specified for the argument <align>.

TA_BASELINE	Sets the text display coordinate at the baseline
TA_BOTTOM	Sets the text display coordinate at the bottom
TA_TOP	Sets the text display coordinate at the top
TA_CENTER	Sets the text display coordinate at the center (horizontal)
TA_LEFT	Sets the text display coordinate at the left end
TA_RIGHT	Sets the text display coordinate at the right end
TA_NOUPDATECP	Sets no update
TA_RTLREADING	Right to left (Middle East version)
TA_UPDATECP	Update current position

Color of the string is specified by the argument <color>, The value that can be specified is as follows.

JUDGE_NC	Gray
JUDGE_OK	OK color (Green)
JUDGE_NG	NG color (Red)

The following value is specified for the argument <style>.

FONTSTYLE_NORMAL	Normal
FONTSTYLE_BOLD	Bold
FONTSTYLE_ITALIC	Italic
FONTSTYLE_UNDERLINE	Underline
FONTSTYLE_STRIKEOUT	Strikeout

It makes an error (Illegal function call) when performing it not in the *MeasureDispl or *MeasureDispG subroutine.

Example

The image display window, displays the string in italic 90° tilt, color OK, right-aligned bottom-aligned, font size of 20,

```
SetTextStyle 20, TA_BOTTOM or TA_RIGHT, JUDGE_OK, 90, FONTSTYLE_ITALIC  
DrawTextG "Processing is OK", 100, 100, 0
```

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 a 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 identifier name
<data>	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
```

Remarks

It is forbidden to modify parameters of image input category units from *MeasureProc.

SetUnitFigure <unitNo>, <figureNo>, <figure()>

Parameters

<unitNo>	Processing unit No.
<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)
GetUnitFigure 2, 1, figure&()
figure&(2) = 100 'X coordinate of the upper left point
figure&(3) = 100 'Y coordinate of the upper left point
figure&(4) = 300 'X coordinate of the lower right corner
figure&(5) = 300 'Y coordinate of the lower right corner
```

```
SetUnitFigure 2, 1, figure&()
```

Sets Judge Value of a Processing Unit

SetUnitJudge <unitNo>, <judge>[, <totalJudgeRefract>]

Parameters

<unitNo>	Processing unit number
<judge>	Judgement result to be set
<totalJudgeRefract>	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 <totalJudgeRefract> (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 No.
<unitTitle>	The processing unit title name that is to be set

Return value

None.

Description

Sets a 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

<Equation>	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

<Equation>	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.

IMPORTANT

Do not overwrite the macro program while execution is stopped at a break point. If you do, operation will be unpredictable.

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

<Equation>	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

<Equation>	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 suppress>	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
```

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

<Equation>	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 (:).

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 μ s 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 &

Gets the Overall Judgement Result

TotalJudge

Parameters

None.

Return value

judgement result

JUDGE_NC Unmeasured

JUDGE_OK Judged as OK

JUDGE_NG Judged as NG

Description

Gets the overall judgement result.

Example

The overall result of the determination, the table displays the string on the window image

```
charstring$ = ""
```

```
'To get the results overall judgment  
jg& = TotalJudge
```

```
If jg& = 1 Then  
  charstring$ = "OK"  
Elseif jg& = -1 Then  
  charstring$ = "NG"  
Elseif jg& = 0 Then  
  charstring$ = "NC"  
Endif
```

```
'Displays the string  
DrawTextG charstring$, 100, 100, 0
```

Performs Angle Transformation

TransformAngle <unitNo>, <imageNo>, <mode>, <srcAngle>, <destAngle>

Parameters

<unitNo>	Processing unit No.
<imageNo>	Image number
<mode>	Transformation mode 0: After transform → Before transform 1: Before transform → After transform 10: Picture element → Calibration
<srcAngle>	Angle value before transformation
<destAngle>	Angle value after transformation(the real type array element is acceptable)

Return value

None.

Description

Performs angle transformation.

Example

Output parameters to get the angle of the measurement results of the search processing unit 5 ON, converted to a value before the execution of calibration

'Angle to obtain data

GetUnitData 5, "TH", srcAngle#

'Converted to the angle of the angle calibration before acquisition

TransformAngle 5, 0, 0, srcAngle#, destAngle#

Performs Area Transformation

TransformArea <unitNo>, <imageNo>, <mode>, <srcArea>, <destArea>

Parameters

<unitNo>	Processing unit No.
<imageNo>	Image number
<mode>	Transformation mode 0: After transform → Before transform 1: Before transform → After transform 10: Picture element → Calibration
<srcArea>	Area value before transformation
<destArea>	Area value after transformation (the real type array element is acceptable)

Return value

None.

Description

Performs area transformation.

Example

Output parameters to get the area of the measurement results of Gravity and Area Unit 5 ON, converted to a value before the execution of calibration

'Gets the data area

GetUnitData 5, "AR", srcArea#

'Converts the value of the calibration before the acquisition area

TransformArea 5, 0, 0, srcArea#, destArea#

Performs Dist Transformation

TransformDist <unitNo>, <imageNo>, <mode>, <srcDist>, <destDist>

Parameters

<unitNo>	Processing unit No.
<imageNo>	Image number
<mode>	Transformation mode 0: After transform → Before transform 1: Before transform → After transform 10: Picture element → Calibration
<srcDist>	Dist value before transformation
<destDist>	Dist value after transformation (the real type array element is acceptable)

Return value

None.

Description

Performs dist transformation.

Example

Output parameters to get the average edge width of the measurement results of the processing unit 5 Scan Edge Width of ON, converted to a value before the execution of calibration

```
'Gets the average edge width data  
GetUnitData 5, "AVEW", srcDist#
```

```
'Converts the value of the average edge width calibration before  
TransformDist 5, 0, 0, srcDist#, destDist#
```

Performs Line Transformation

TransformLine <unitNo>, <imageNo>, <mode>, <srcA>, <srcB>, <srcC>, <destA>, <destB>, <destC>

Parameters

<unitNo>	Processing unit No.
<imageNo>	Image number
<mode>	Transformation mode 0: After transform → Before transform 1: Before transform → After transform 10: Picture element → Calibration
<srcA>	Parameter A value of line before transformation
<srcB>	Parameter B value of line before transformation
<srcC>	Parameter C value of line before transformation
<destA>	Parameter A value of line after transformation (the real type array element is acceptable)
<destB>	Parameter B value of line after transformation (the real type array element is acceptable)
<destC>	Parameter C value of line after transformation (the real type array element is acceptable)

Return value

None.

Description

Performs line transformation.

Example

Output parameters to get the parameters of linear measurement results of processing unit 5 Line Regression of ON, converted to a value before the execution of calibration

```
Dim srcPara#(3)  
Dim destPara#(3)
```

```
'Straight-line data to obtain the parameters
```

```
GetUnitData 5, "A", srcPara#(0)
```

```
GetUnitData 5, "B", srcPara#(1)
```

```
GetUnitData 5, "C", srcPara#(2)
```

```
'Converts the value of the parameter data before calibration straight line
```

```
TransformLine 5, 0, 0, srcPara#(0), srcPara#(1), srcPara#(2), destPara#(0), destPara#(1), destPara#(2)
```

Performs Coordinates Transformation

TransformXY <unitNo>, <imageNo>, <mode>, <srcX>, <srcY>, <destX>, <destY>

Parameters

<unitNo>	Processing unit No.
<imageNo>	Image number
<mode>	Transformation mode 0: After transform → Before transform 1: Before transform → After transform 10: Picture element → Calibration
<srcX>	Coordinate X value before transformation
<srcY>	Coordinate Y value before transformation
<destX>	Coordinate X value after transformation (the real type array element is acceptable)
<destY>	Coordinate Y value after transformation (the real type array element is acceptable)

Return value

None.

Description

Performs coordinates transformation.

Example

Output parameter to get the value of the measurement result of the measurement coordinate processing unit 5 Search for ON, converted to a value before the execution of calibration

'Gets the data coordinate value measurement

GetUnitData 5, "X", srcX#

GetUnitData 5, "Y", srcY#

'Converts the value of the coordinate values prior to calibration measurement

TransformXY 5, 0, 0, srcX#, srcY#, destX#, destY#

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 Errcmd\$ 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

Return 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 Data (Drawing Coordinate)

UnitData2(<unitNo>, <dataNo> | <dataIdent>)

Parameters

<unitNo>	Processing unit number
<dataNo>	Data number
<dataIdent>	Data ident name

Return value

The processing unit data.

Description

Gets the processing unit data of a processing item.

Getting value is the numeric value.

Mainly used for getting the drawing coordinate of processing unit on the image display area.

Example

Gets a value measured in the X coordinate processing unit Search has been registered in the processing unit number 5

```
serrch# = UnitData2(5, 6)  
or  
serrch# = UnitData2(5, "X")
```

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 (unmeasured)
1	Judgement result OK
-1	Judgment 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 Processing Unit Number

UnitNo

Parameters

None.

Return value

Returns the unit number of the relevant processing unit.

Description

Gets the unit number of the relevant processing unit.

Example

Gets the determination result of processing units that are registered in the processing unit preceding

```
'Gets the unit number of the processing unit  
uno& = UnitNo
```

```
'Gets the result of the determination of the processing units that are registered in the previous  
judge& = UnitJudge(uno&-1)
```

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 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 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 time (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 <iolent>, <area>, <channelOffset>, <channelCount>, <writeData()>

Parameters

<iolent>	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 an identification Name Identification name in an <iolent>.

Set an Area classification number Identification name in an <area>.

Reference: ► List of IO Modules (p.507)

Appoint a <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 2> 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
```

System Data List

Identifier information 0	Identifier information 1	Data identifier name
	---	Configuration
Basic	Language Sets the display language. jpn: Japanese deu: German eng: English fra: French chs: Simplified Chinese esp: Spanish cht: Traditional Chinese ita: Italian kor: Korean	Language
	Initial scene group number	initialSceneGroupNo
	Initial scene number	initialSceneNo
	Operation priority 0: Measurement result priority 1: Menu operation priority	operationPriority
	Measurement initialization priority 0: Measurement trigger receipt priority 1: Processing of re-drawing on screen priority	measureInitPriority
	Operation mode 0: High-speed Logging Mode 1: Single-line High-speed Mode 2: Multi-line Random-trigger Mode 3: Non-stop Adjustment Mode	operatingMode
	Parallel execution 0: OFF 1: ON	parallelExecute
	Number of scenes	SceneCount

Communication	Serial (Ethernet) UdpNormal: Normal (UDP) TcpNormal: Normal (TCP) UdpNormal2: Normal (UDP) (Fxxx series method) UdpPlcLink: PLC Link (SYSMAC CS/CJ/CP/One) UdpPlcLinkM: PLC Link (MELSEC QnU/Q/QnAS series) UdpPlcLinkY: PLC Link (JEPMC MP)	ioIdent2
	Serial (RS-232C/422) SerialNormal: Non-procedure SerialNormal2: Normal (Fxxx series method) SerialPlcLink: PLC Link (SYSMAC CS/CJ/CP/One) SerialPlcLinkM: PLC Link (MELSEC QnU/Q/QnAS series)	ioIdent1
	Parallel ParallelIo: Standard Parallel I/O	ioIdent0
	Fieldbus *1: Blank character: None EtherCAT: EtherCAT EtherNet/IP: EtherNet/IP	ioIdent3
	Remote Operation RemoteServer: Yes *1: Blank character: None	ioIdent4

Identifier information 0	Identifier information 1	Data identifier name
Multi-line Random-trigger Mode Settings	---	MultiLineRandom
	Number of lines	lineCount
	Camera - line assignment 0	physicalCameraMask0
	Camera - line assignment 1	physicalCameraMask1
	Camera - line assignment 2	physicalCameraMask2
	Camera - line assignment 3	physicalCameraMask3
	Camera - line assignment 4	physicalCameraMask4
	Camera - line assignment 5	physicalCameraMask5
	Camera - line assignment 6	physicalCameraMask6
	Camera - line assignment 7	physicalCameraMask7
Camera settings	---	CameraControl
	STEP - camera 0 delay	cameraDelay0
	STEP - camera 1 delay	cameraDelay1
	STEP - camera 2 delay	cameraDelay2
	STEP - camera 3 delay	cameraDelay3
	STEP - camera 4 delay	cameraDelay4
	STEP - camera 5 delay	cameraDelay5
	STEP - camera 6 delay	cameraDelay6
	STEP - camera 7 delay	cameraDelay7
	Baud rate 0 0: Normal 1: Fast	transferRate0
	Baud rate 1 0: Normal 1: Fast	transferRate1
	Baud rate 2 0: Normal 1: Fast	transferRate2
	Baud rate 3 0: Normal 1: Fast	transferRate3
	Baud rate 4 0: Normal 1: Fast	transferRate4
	Baud rate 5 0: Normal 1: Fast	transferRate5
Baud rate 6 0: Normal 1: Fast	transferRate6	

Identifier information 0	Identifier information 1	Data identifier name
Camera settings	Baud rate 7 0: Normal 1: Fast	transferRate7
	Output signal setting 0: STGOUT 1: SHTOUT	timingSignal
	SHTOUT signal delay	shtoutDelay
	SHTOUT signal pulse width	shtoutWidth
	SHTOUT signal pulse polarity 0: Negative polarity 1: Positive polarity	shtoutPolarity
Parallel	---	Parallelo
	Output polarity 0: ON at NG 1: ON at OK	polarity
	Output control 0: OFF 1: Handshaking 2: Synchronization output	handshake
	Output cycle	cycleTime
	Gate ON delay	riseTime
	Output time	outputTime
	Timeout	timeout
	Number of delay	delayCount
	One-shot OR signal 0: OFF 1: ON	orOutMode
	OR signal output time	orOutputTime
Non-procedure	---	SerialNormal
	Timeout	timeout
	Interface 0: RS-232C 1: RS-422	rsMode
	Baud rate (2,400, 4,800, 9,600, 19,200, 38,400, 57,600, or 115,200)	baudRate
	Data length (7 or 8)	byteSize
	Parity 0: OFF 1: Odd 2: Even	parity
	Stop bits (1 or 2)	stopBits
	Flow control 0: OFF 1: Xon/Xoff	softFlow
Delimiter 0: CR 1: LF 2: CR + LF	delimiter	

Identifier information 0	Identifier information 1	Data identifier name
Normal (Fxxx series method)	---	SerialNormal2
	Timeout	timeout
	Interface 0: RS-232C 1: RS-422	rsMode
	Baud rate (2,400, 4,800, 9,600, 19,200, 38,400, 57,600, 115,200)	baudRate
	Data length (7 or 8)	byteSize
	Parity 0: OFF 1: Odd 2: Even	parity
	Stop bits (1 or 2)	stopBits
	Flow control 0: OFF 1: Xon/Xoff	softFlow
	Delimiter 0: CR 1: LF 2: CR + LF	delimiter
	RS-232C/422 PLC Link (SYSMAC CS/CJ/CP/One)	---	SerialPlcLink
Output control 0: OFF 1: Handshaking		handshake
Timeout		timeout
Interface 0: RS-232C 1: RS-422		rsMode
Baud rate (2,400, 4,800, 9,600, 19,200, 38,400, 57,600, 115,200)		baudRate
Data length (7 or 8)		byteSize
Parity 0: OFF 1: Odd 2: Even		parity
Stop bits (1 or 2)		stopBits
Flow control 0: OFF 1: Xon/Xoff		softFlow
Delimiter 0: CR 1: LF 2: CR + LF		delimiter
Command Area type		commandArea
Command Area address		commandMemoryAddress
Response Area type		responseArea
Response Area address		responseMemoryAddress
Data Output Area type		outputArea
Data Output Area address		outputMemoryAddress

Identifier information 0	Identifier information 1	Data identifier name
RS-232C/422 PLC Link (SYSMAC CS/CJ/CP/One)	Asynchronous output 0: OFF 1: ON	outputBuffering
	Retry interval	responseTimeout
	Polling cycle	pollingMinCycle
	---	SerialPlcLinkM
Ethernet PLC Link(MELSEC QnU/Q/QnAS)	Output control 0: OFF 1: Handshaking	handshake
	Timeout	timeout
	Interface 0: RS-232C 1: RS-422	rsMode
	Baud rate (2,400, 4,800, 9,600, 19,200, 38,400, 57,600, 115,200)	baudRate
	Data length (7 or 8)	byteSize
	Parity 0: OFF 1: Odd 2: Even	parity
	Stop bits (1 or 2)	stopBits
	Flow control 0: OFF 1: Xon/Xoff	softFlow
	Delimiter 0: CR 1: LF 2: CR + LF	delimiter
	Command Area type	commandArea
	Command Area address	commandMemoryAddress
	Response Area type	responseArea
	Response Area address	responseMemoryAddress
	Data Output Area type	outputArea
	Data Output Area address	outputMemoryAddress
	Asynchronous output 0: OFF 1: ON	outputBuffering
	Retry interval	responseTimeout
Polling cycle	pollingMinCycle	
	---	UdpPlcLink
Ethernet PLC Link (SYSMAC CS/CJ/CP/One)	Output control 0: OFF 1: Handshaking	handshake
	Command Area type	commandArea
	Command Area address	commandMemoryAddress
	Response Area type	responseArea
	Response Area address	responseMemoryAddress

Identifier information 0	Identifier information 1	Data identifier name
Ethernet PLC Link (SYSMAC CS/CJ/CP/One)	Data Output Area type	outputArea
	Data Output Area address	outputMemoryAddress
	Asynchronous output 0: OFF 1: ON	outputBuffering
	Retry interval	responseTimeout
	Polling cycle	pollingMinCycle
	Automatic 0: OFF 1: ON	enableDhcp
	IP address	ipAddress
	Subnet mask	subnetMask
	Default gateway	defaultGateway
	DNS server	dns
	Output IP address	destIpAddress
	Input port number	portNo
	Output port number	portNo2

Ethernet PLC Link (MELSEC QnU/Q/QnAS)	Output control 0: OFF 1: Handshaking	handshake
	Command Area type	commandArea
	Command Area address	commandMemoryAddress
	Response Area type	responseArea
	Response Area address	responseMemoryAddress
	Data Output Area type	outputArea
	Data Output Area address	outputMemoryAddress
	Asynchronous output 0: OFF 1: ON	outputBuffering
	Retry interval	responseTimeout
	Polling cycle	pollingMinCycle
	Automatic 0: OFF 1: ON	enableDhcp
	IP address	ipAddress
	Subnet mask	subnetMask
	Default gateway	defaultGateway
	DNS server	dns
	Output IP address	destIpAddress
	Input port number	portNo
Output port number	portNo2	

Identifier information 0	Identifier information 1	Data identifier name
Non-procedure (TCP)	---	UdpNormal
	Automatic 0: OFF 1: ON	enableDhcp
	IP address	ipAddress
	Subnet mask	subnetMask
	Default gateway	defaultGateway
	DNS server	dns
	Output IP address	destIpAddress
	Input port number	portNo
	Output port number	portNo2
Normal (TCP)	---	TcpNormal
	Automatic 0: OFF 1: ON	enableDhcp
	IP address	ipAddress
	Subnet mask	subnetMask
	Default gateway	defaultGateway
	DNS server	dns
	Output IP address	destIpAddress
	Input port number	portNo
	Output port number	portNo2
Normal (TCP Client)	---	TcpClient
	Automatic 0: OFF 1: ON	enableDhcp
	IP address	ipAddress
	Subnet mask	subnetMask
	Default gateway	defaultGateway
	DNS server	dns
	Output IP address	destIpAddress
	Input port number	portNo
	Output port number	portNo2

Identifier information 0	Identifier information 1	Data identifier name
Normal (UDP Fxxx series method)	---	UdpNormal2
	Automatic 0: OFF 1: ON	enableDhcp
	IP address	ipAddress
	Subnet mask	subnetMask
	Default gateway	defaultGateway
	DNS server	dns
	Output IP address	destIpAddress
	Input port number	portNo
	Output port number	portNo2
	Connect to	serverIpAddress
Ethernet PLC Link (JEPMC MP)	---	UdpPlcLinkY
	Output control 0: OFF 1: Handshaking	handshake
	Command Area type	commandArea
	Command Area address	commandMemoryAddress
	Response Area type	responseArea
	Response Area address	responseMemoryAddress
	Data Output Area type	outputArea
	Data Output Area address	outputMemoryAddress
	Asynchronous output 0: OFF 1: ON	outputBuffering
	Retry interval	responseTimeout
	Polling cycle	pollingMinCycle
	Automatic 0: OFF 1: ON	enableDhcp
	IP address	ipAddress
	Subnet mask	subnetMask
	Default gateway	defaultGateway
	DNS server	dns
	Output IP address	destIpAddress
	Input port number	portNo
EtherCAT	---	EtherCAT
	Output control 0: OFF 1: Handshaking	handshake
	Output cycle	cycleTime
	Output time	outputTime
	Timeout	timeout

Identifier information 0	Identifier information 1	Data identifier name
EtherCAT	Data output number for line 0 (number of data output items for line 0) 32: Result Data Format 0 (8 DINT) 64: Result Data Format 1 (16 DINT) 128: Result Data Format 2 (32 DINT) 256: Result Data Format 3 (64 DINT) 2097152: Result Data Format 4 (4 LREAL) 4194304: Result Data Format 5 (8 LREAL) 8388608: Result Data Format 6 (16 LREAL) 16777216: Result Data Format 7 (32 LREAL) 1572872: Result Data Format 8 (2 DINT + 3 LREAL) 3145744: Result Data Format 9 (4 DINT + 6 LREAL) 6291488: Result Data Format 10 (8 DINT + 12 LREAL) 12582976: Result Data Format 11 (16 DINT + 24 LREAL)	outputDataSize0
	Data output number for line 1 (number of data output items for line 1) 32: Result Data Format 0 (8 DINT) 64: Result Data Format 1 (16 DINT) 128: Result Data Format 2 (32 DINT) 256: Result Data Format 3 (64 DINT) 2097152: Result Data Format 4 (4 LREAL) 4194304: Result Data Format 5 (8 LREAL) 8388608: Result Data Format 6 (16 LREAL) 16777216: Result Data Format 7 (32 LREAL) 1572872: Result Data Format 8 (2 DINT + 3 LREAL) 3145744: Result Data Format 9 (4 DINT + 6 LREAL) 6291488: Result Data Format 10 (8 DINT + 12 LREAL) 12582976: Result Data Format 11 (16 DINT + 24 LREAL)	outputDataSize1
	Data output number for line 2 (number of data output items for line 2) 32: Result Data Format 0 (8 DINT) 64: Result Data Format 1 (16 DINT) 128: Result Data Format 2 (32 DINT) 256: Result Data Format 3 (64 DINT) 2097152: Result Data Format 4 (4 LREAL) 4194304: Result Data Format 5 (8 LREAL) 8388608: Result Data Format 6 (16 LREAL) 16777216: Result Data Format 7 (32 LREAL) 1572872: Result Data Format 8 (2 DINT + 3 LREAL) 3145744: Result Data Format 9 (4 DINT + 6 LREAL) 6291488: Result Data Format 10 (8 DINT + 12 LREAL) 12582976: Result Data Format 11 (16 DINT + 24 LREAL)	outputDataSize2

Identifier information 0	Identifier information 1	Data identifier name
EtherCAT	Data output number for line 3 (number of data output items for line 3) 32: Result Data Format 0 (8 DINT) 64: Result Data Format 1 (16 DINT) 128: Result Data Format 2 (32 DINT) 256: Result Data Format 3 (64 DINT) 2097152: Result Data Format 4 (4 LREAL) 4194304: Result Data Format 5 (8 LREAL) 8388608: Result Data Format 6 (16 LREAL) 16777216: Result Data Format 7 (32 LREAL) 1572872: Result Data Format 8 (2 DINT + 3 LREAL) 3145744: Result Data Format 9 (4 DINT + 6 LREAL) 6291488: Result Data Format 10 (8 DINT + 12 LREAL) 12582976: Result Data Format 11 (16 DINT + 24 LREAL)	outputDataSize3
EtherCAT	Data output number for line 4 (number of data output items for line 4) 32: Result Data Format 0 (8 DINT) 64: Result Data Format 1 (16 DINT) 128: Result Data Format 2 (32 DINT) 256: Result Data Format 3 (64 DINT) 2097152: Result Data Format 4 (4 LREAL) 4194304: Result Data Format 5 (8 LREAL) 8388608: Result Data Format 6 (16 LREAL) 16777216: Result Data Format 7 (32 LREAL) 1572872: Result Data Format 8 (2 DINT + 3 LREAL) 3145744: Result Data Format 9 (4 DINT + 6 LREAL) 6291488: Result Data Format 10 (8 DINT + 12 LREAL) 12582976: Result Data Format 11 (16 DINT + 24 LREAL)	outputDataSize4
EtherCAT	Data output number for line 5 (number of data output items for line 5) 32: Result Data Format 0 (8 DINT) 64: Result Data Format 1 (16 DINT) 128: Result Data Format 2 (32 DINT) 256: Result Data Format 3 (64 DINT) 2097152: Result Data Format 4 (4 LREAL) 4194304: Result Data Format 5 (8 LREAL) 8388608: Result Data Format 6 (16 LREAL) 16777216: Result Data Format 7 (32 LREAL) 1572872: Result Data Format 8 (2 DINT + 3 LREAL) 3145744: Result Data Format 9 (4 DINT + 6 LREAL) 6291488: Result Data Format 10 (8 DINT + 12 LREAL) 12582976: Result Data Format 11 (16 DINT + 24 LREAL)	outputDataSize5

Identifier information 0	Identifier information 1	Data identifier name
EtherCAT	Data output number for line 6 (number of data output items for line 6) 32: Result Data Format 0 (8 DINT) 64: Result Data Format 1 (16 DINT) 128: Result Data Format 2 (32 DINT) 256: Result Data Format 3 (64 DINT) 2097152: Result Data Format 4 (4 LREAL) 4194304: Result Data Format 5 (8 LREAL) 8388608: Result Data Format 6 (16 LREAL) 16777216: Result Data Format 7 (32 LREAL) 1572872: Result Data Format 8 (2 DINT + 3 LREAL) 3145744: Result Data Format 9 (4 DINT + 6 LREAL) 6291488: Result Data Format 10 (8 DINT + 12 LREAL) 12582976: Result Data Format 11 (16 DINT + 24 LREAL)	outputDataSize6
	Data output number for line 7 (number of data output items for line 7) 32: Result Data Format 0 (8 DINT) 64: Result Data Format 1 (16 DINT) 128: Result Data Format 2 (32 DINT) 256: Result Data Format 3 (64 DINT) 2097152: Result Data Format 4 (4 LREAL) 4194304: Result Data Format 5 (8 LREAL) 8388608: Result Data Format 6 (16 LREAL) 16777216: Result Data Format 7 (32 LREAL) 1572872: Result Data Format 8 (2 DINT + 3 LREAL) 3145744: Result Data Format 9 (4 DINT + 6 LREAL) 6291488: Result Data Format 10 (8 DINT + 12 LREAL) 12582976: Result Data Format 11 (16 DINT + 24 LREAL)	outputDataSize7
EtherNet/IP	---	EtherNetIP
	Output control 0: OFF 1: Handshaking	handshake
	Output cycle	cycleTime
	Output time	outputTime
	Timeout	timeout
measurement	---	Measure
	Fan control setting 0: Slow rotation 1: Fast rotation	fanControl
	Destination folder	captureDirectory
	STEP in measure 0: ERROR signal output OFF for STEP input during measurement 1: ERROR signal output ON for STEP input during measurement	stepError
	Scene group switch 0: Do not save when changing scene group 1: Save when changing scene group	sceneGroupSave
	Scene switch time	sceneWaitTime

Identifier information 0	Identifier information 1	Data identifier name	
Other	---	Trigger	
	STEP signal filter width 5: 100 11: 200 18: 300 24: 400 30: 500	digitalFilter	
	Use Encoder trigger 0: Not used 1 : Used	encoderEnabled	
	Encoder input selection 0: Open collector 1: Line driver	encoderInputPulse	
	Phase A resolution	encoderResolutionA	
	Count rotations with phase Z 0: Do not count 1: Count	encoderZ	
	Encoder start	encoderStart	
	Encoder count	encoderCount	
	Phase A trigger timing usage flag 0	encoderTriggerAngleA0	
	Phase A trigger timing usage flag 1	encoderTriggerAngleA1	
	Phase A trigger timing usage flag 2	encoderTriggerAngleA2	
	Phase A trigger timing usage flag 3	encoderTriggerAngleA3	
	Phase A trigger timing usage flag 4	encoderTriggerAngleA4	
	Phase A trigger timing usage flag 5	encoderTriggerAngleA5	
	Support backlash (phase B) 0: Do not support 1: Support	encoderBacklash	
	Trigger in backlash 0: Do not generate 1: Generate	encoderBacklashTrigger	
	Phase A	encoderTriggerCountA	
	Phase Z	encoderTriggerCountZ	
	Network drive setting	---	NetworkDrive
		S	drive0
T		drive1	
U		drive2	
V		drive3	
W		drive4	
X		drive5	
Y		drive6	
Z	drive7		
Logging setting	---	Logging	
	Image Logging 0: None 1: Save for only NG 2: All	imageLogging	

Identifier information 0	Identifier information 1	Data identifier name
Logging setting	Destination Specify the image file save destination (RAM disk or USB memory).	imageLoggingDirectory
	Prefix	imageLoggingHeader
	Switch saving folder by scene 0: Disabled 1: Enabled	imageLoggingScene
	Switch saving folder by judge 0: Disabled 1: Enabled	imageLoggingJudge
	Logging priority 0: Give priority to logging 1: Give priority to measurement takt	imageLoggingPriority
	Data Logging 0: None 1: Save for only NG 2: All	dataLogging
	Destination folder name	dataLoggingDirectory
User definition	---	PanDA

List of IO Modules

Identification name	IO module name	References
EtherNetIP	EtherNet/IP Interface communication	Reference: Details (p.508)
Parallelo	Parallel Interface communication	Reference: Details (p.509)
SerialNormal SerialNormal2 (Fxxx series method)	Serial Interface Non-procedure communication	Reference: Details (p.510)
SerialPlcLinkM	Serial Interface PLC Link (MELSEC QnU/Q/QnAS) communication	Reference: Details (p.512)
SerialPlcLink	Serial Interface PLC Link (SYSMAC CS/CJ/CP/One) communication	Reference: Details (p.514)
TcpClient	TCP Client Non-procedure communication	Reference: Details (p.518)
TcpNormal	TCP Non-procedure communication	Reference: Details (p.519)
UdpNormal UdpNormal2 (Fxxx series method)	UDP Non-procedure communication	Reference: Details (p.521)
UdpPlcLinkM	PLC Link (MELSEC QnU/Q/QnAS) communication	Reference: Details (p.523)
UdpPlcLinkY	PLC Link (JEPMC MP) communication	Reference: Details (p.525)
UdpPlcLink	PLC Link (SYSMAC CS/CJ/CP/One) communication	Reference: Details (p.528)

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: OFF 1: Handshaking	0
cycleTime	Output period [ms]	100
outputTime	Output time [ms]	50
timeout	Timeout [s]	100

Supported functions

IoInitialize	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
ReadPlcMemory	---	---
WritePlcMemory	---	---
SetPlcData	---	---
GetPlcData	---	---

Example

Receive data

```
Dim data&(256)
Dim ipaddr&(4)
' Gets the five data.
ReceiveData "UdpPlcLink", data5&(), 4*5, size&
```

Transmit 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
```

Parallelo

Parallel Interface communication

IoModule identification name

Parallelo

Overview

This is a module is for sending and receiving commands and data via the Parallel interface.

System data

Identification	Meaning	Initial value
polarity	Output polarity 0: ON when NG 1: ON when OK	0
handshake	Output control 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	Number of delay	1
orOutMode	One-shot OR signal 0: OFF 1: ON	0
orOutputTime	Time of one-shot output when OK signal [0.1ms]	50

Supported functions

IoInitialize	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	OK	Reference: ► Output BUSY State (p.292)
JudgeOut	OK	Reference: ► Judge Result Output (p.379)
RunOut	OK	Reference: ► Reference: Output RUN State (p.424)
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
ReadPlcMemory	---	---
WritePlcMemory	---	---
SetPlcData	---	---
GetPlcData	---	---

Example

Receive data

A parameter of ReceiveData, the parameter size are unnecessary.

```
Dim data&(256)
```

'Gets the five data.

```
ReceiveData "Parallelo", data&(), 4*5, size&
```

Send data

A parameter of SendData, the parameter size are unnecessary.

```
Dim data&(256)
```

'Transmit the five data.

```
SendData "Parallelo", 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	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
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	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
ReadPlcMemory	OK	Reference: ► Begin to Read Data from Designated Memory of the PLC (p.414)
WritePlcMemory	OK	Reference: ► Write in Data at Designated Storage Device of the PLC (p.493)
SetPlcData	OK	Reference: ► Set PLC the Write Data (p.447)
GetPlcData	OK	Reference: ► Gets PLC the Read Data (p.354)

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 (EM0)	160
EM Area (EM1)	161
EM Area (EM2)	162
EM Area (EM3)	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	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
ReadPlcMemory	OK	Reference: ► Begin to Read Data from Designated Memory of the PLC (p.414)
WritePlcMemory	OK	Reference: ► Write in Data at Designated Storage Device of the PLC (p.493)
SetPlcData	OK	Reference: ► Set PLC the Write Data (p.447)
GetPlcData	OK	Reference: ► Gets PLC the Read Data (p.354)

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	Default gateway	10.5.5.110
dns	DNS server	10.5.5.1
serverIpAddress	Server IP address	10.5.5.101
portNo	Port number to receive commands	9600

Supported functions

IoInitialize	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
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	Default gateway	10.5.5.110
dns	DNS server address	10.5.5.1
portNo	Port number to receive commands	9600

Supported functions

IoInitialize	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
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	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
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	10.5.5.1
delayCount	Output IP address	0.0.0.0
portNo	Input port No.	9600

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	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
ReadPlcMemory	OK	Reference: ► Begin to Read Data from Designated Memory of the PLC (p.414)
WritePlcMemory	OK	Reference: ► Write in Data at Designated Storage Device of the PLC (p.493)
SetPlcData	OK	Reference: ► Set PLC the Write Data (p.447)
GetPlcData	OK	Reference: ► Gets PLC the Read Data (p.354)

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.

PLC Link data

Identification	Meaning	Initial value
enableDhcp	Enable DHCP 0: Disabled 1: Enabled	0
ipAddress	IP address	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
delayCount	Output IP address	0.0.0.0
portNo	Input port number	9600

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	176

Supported functions

IoInitialize	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
ReadPlcMemory	OK	Reference: ► Begin to Read Data from Designated Memory of the PLC (p.414)
WritePlcMemory	OK	Reference: ► Write in Data at Designated Storage Device of the PLC (p.493)
SetPlcData	OK	Reference: ► Set PLC the Write Data (p.447)
GetPlcData	OK	Reference: ► Gets PLC the Read Data (p.354)

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 DNS server address	10.5.5.1
delayCount	Output IP address	0.0.0.0
portNo	Input port No.	9600

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
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EM Area (EM1)	161
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Supported functions

IoInitialize	OK	---
GetPort	OK	Reference: ► Input Terminal a Point Input (p.355)
PutPort	OK	Reference: ► Output Terminal a Point Output (p.412)
BusyOut	---	---
JudgeOut	---	---
RunOut	---	---
GetAll	OK	Reference: ► Input Terminal all Point Input (p.349)
PutAll	OK	Reference: ► Output Terminal All Point Output (p.411)
ReceiveData	OK	Reference: ► Receive Data (p.415)
SendData	OK	Reference: ► Send Data (p.440)
SendString	OK	Reference: ► Sends String (p.441)
ReadPlcMemory	OK	Reference: ► Begin to Read Data from Designated Memory of the PLC (p.414)
WritePlcMemory	OK	Reference: ► Write in Data at Designated Storage Device of the PLC (p.493)
SetPlcData	OK	Reference: ► Set PLC the Write Data (p.447)
GetPlcData	OK	Reference: ► Gets PLC the Read Data (p.354)

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"

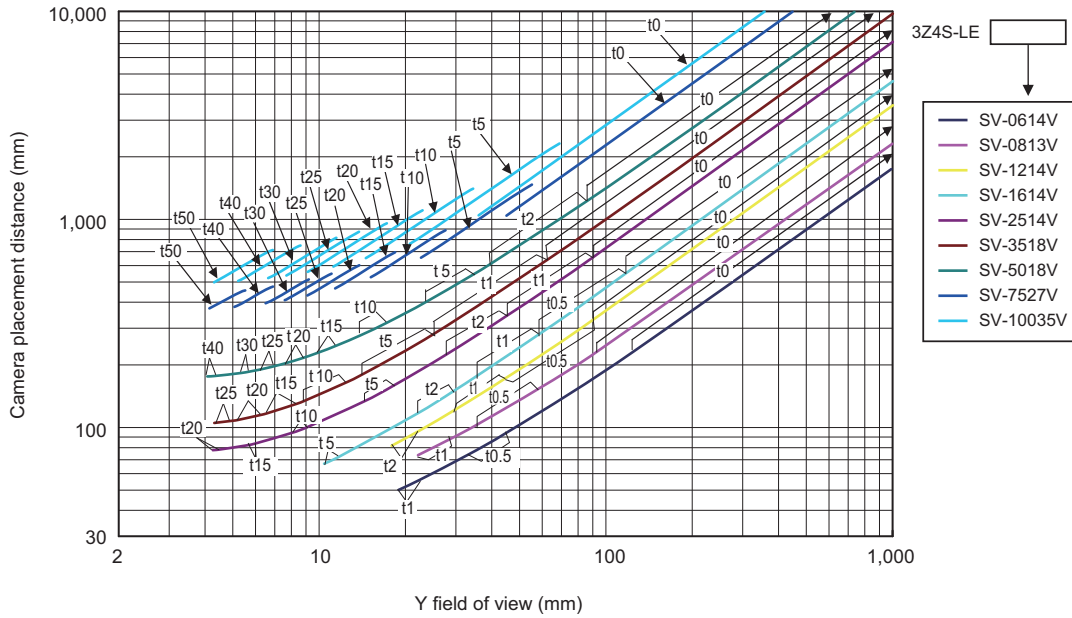
'Write in data for 7ch from 10ch of the DM area.
WritePlcMemory "UdpPlcLink", 130, 10, 7, writeData&()
```

About Lenses

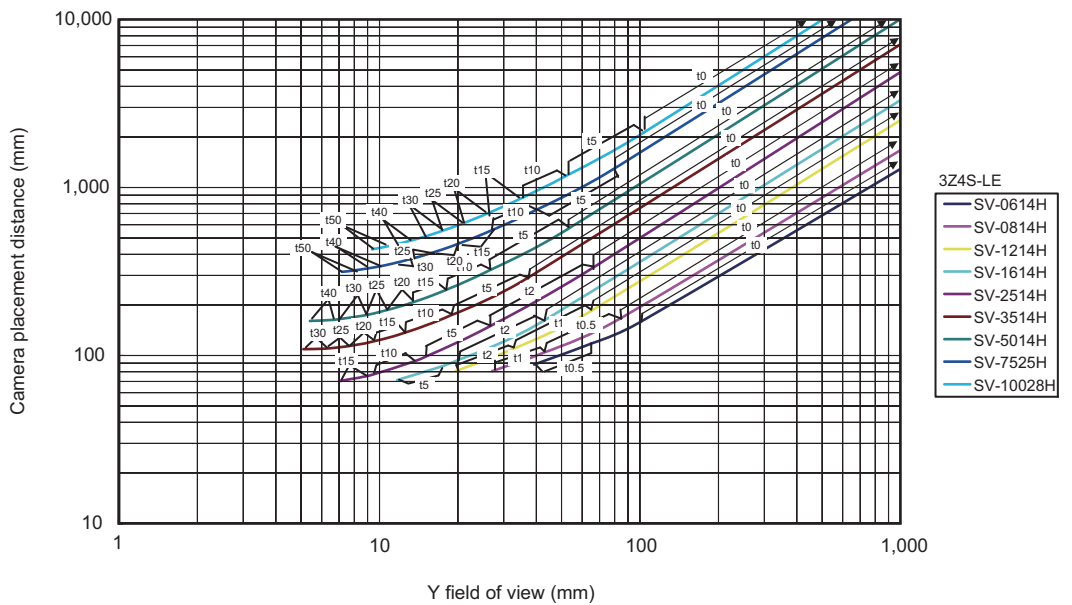
When using a camera (single), refer to the following tables to prepare the lens and extension tube. The lens may vary depending on the size of measurement objects and the camera setting distance.

Normal Lenses (Seven Types)

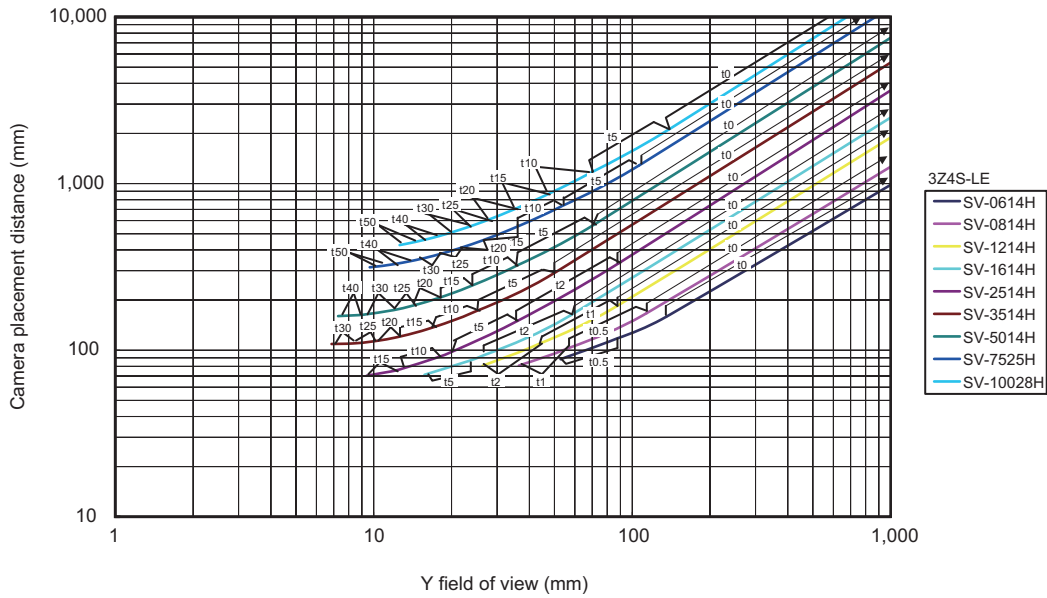
Digital Camera (Standalone) FZ-S□, FZ-SH□, or FH-S□ (Using 3Z4S-LE SV-V)



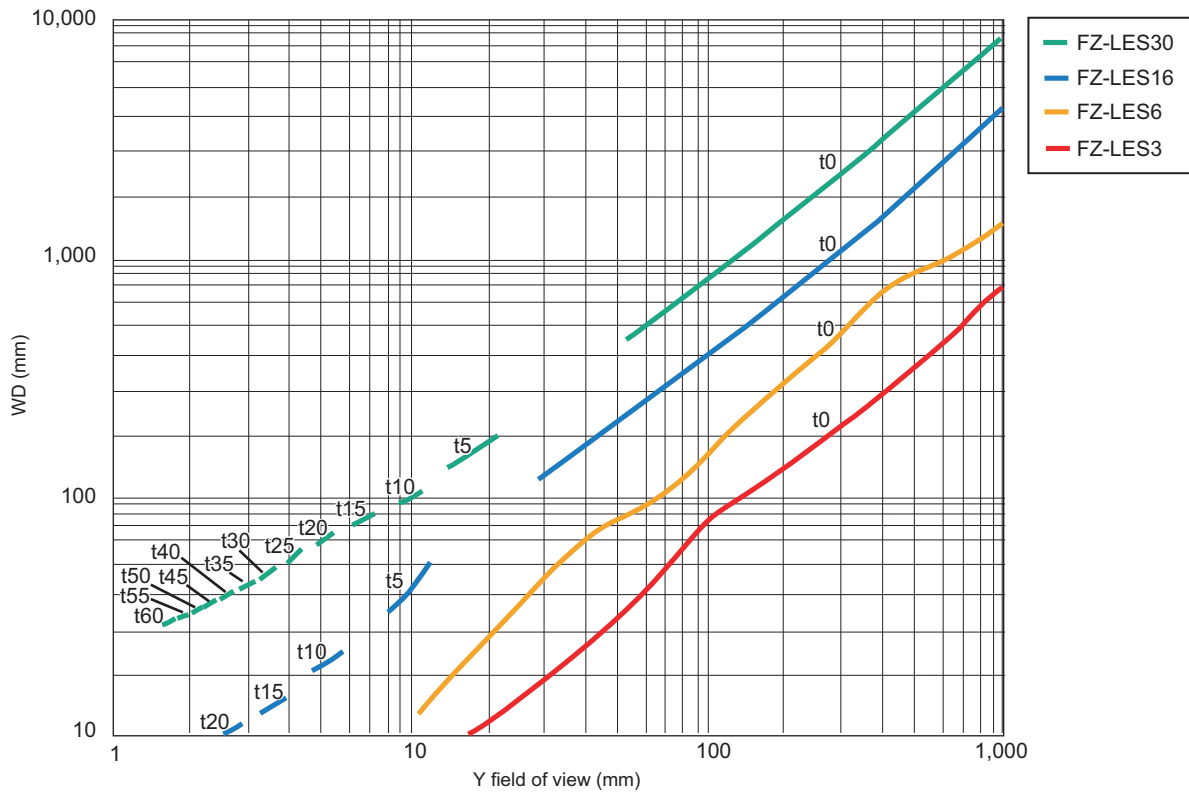
Digital CCD Camera (Standalone) FZ-S□2M (Using 3Z4S-LE SV-H)



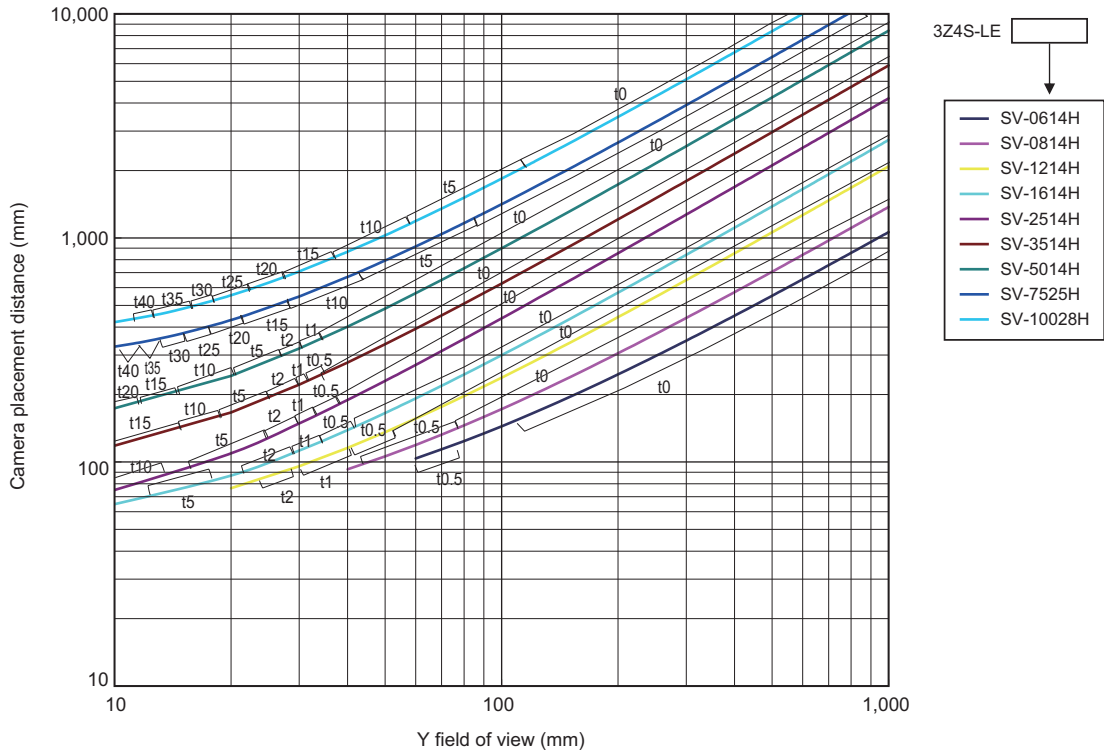
Digital CCD Camera (Standalone) FZ-S□5M2 (Using 3Z4S-LE SV-H)



Small Digital CCD Camera FZ-SP□/FZ-SF□ (FZ-LE S Series)



High-speed CMOS Camera (Standalone) FH-S□02 (Using 3Z4S-LE SV-H)



High-speed CMOS Camera (Standalone) FH-S□04 (Using 3Z4S-LE VS-H1)

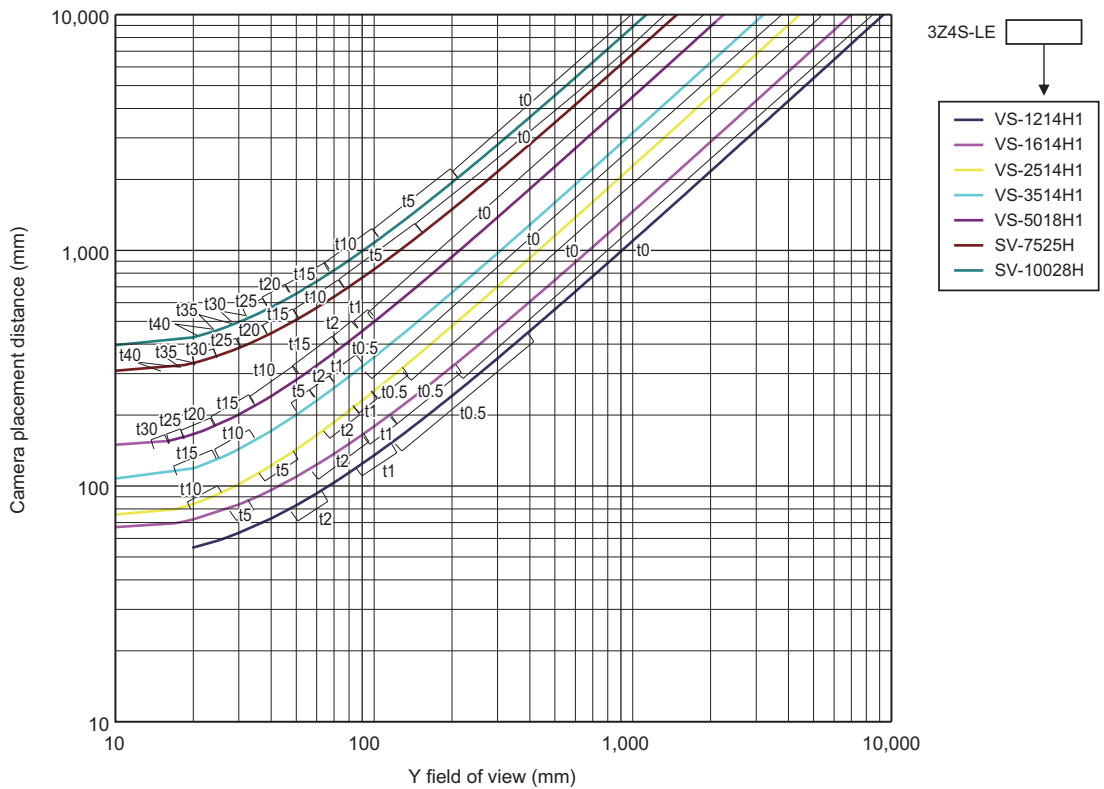
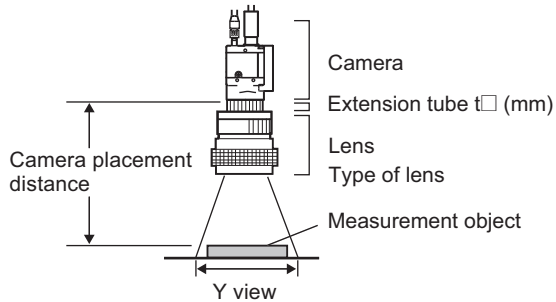


Diagram View

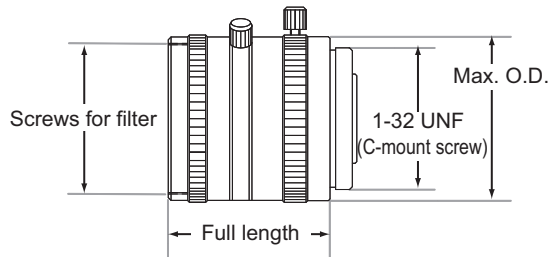
The horizontal axis of the diagram indicates the Y field of view (mm), and vertical axis indicates camera setting distance (mm) or working distance (mm). This diagram shows the relationship between the field of view of lenses and the setting distance for different types. Make sure to verify the lens 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.



Lens Types and Outside Diameters



Lens for 3Z4S-LE SV-V Series

Lens type	Focal distance	Aperture (F number)	Max. O.D.	Full length	Filter size
3Z4S-LE SV-0614V	6.20 mm	F1.4	28 mm dia.	30.0 mm	M27 P0.5
3Z4S-LE SV-0813V	8.05 mm	F1.3	28 mm dia.	34.0 mm	M25.5 P0.5
3Z4S-LE SV-1214V	12.43 mm	F1.4	29 mm dia.	29.5 mm	M27 P0.5
3Z4S-LE SV-1,614V	16.34 mm	F1.4	29 mm dia.	24.0 mm	M27 P0.5
3Z4S-LE SV-2,514V	25.17 mm	F1.4	29 mm dia.	24.5 mm	M27 P0.5
3Z4S-LE SV-3,518V	34.75 mm	F1.8	29 mm dia.	33.5 mm (WD: ∞) to 37.5 mm (WD: 300 mm)	M27 P0.5
3Z4S-LE SV-5,018V	47.97 mm	F1.8	32 mm dia.	37.0 mm (WD: ∞) to 39.4 mm (WD: 1000 mm)	M30.5 P0.5
3Z4S-LE SV-7,527V	76.71 mm	F2.7	32 mm dia.	42.0 mm (WD: ∞) to 44.4 mm (WD: 1000 mm)	M30.5 P0.5
3Z4S-LE SV-10,035V	95.4 mm	F3.5	32 mm dia.	43.9 mm (WD: ∞) to 46.3 mm (WD: 1000 mm)	M30.5 P0.5

High Resolution and Low Distortion Lens Model 3Z-4S-LE SV-H Series

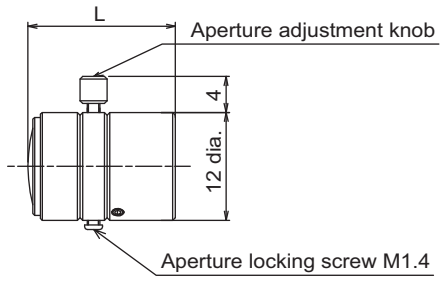
Lens type	Focal distance	Aperture (F number)	Max. O.D.	Full length	Filter size
3Z4S-LE SV-0614H	6.1 mm	F1.4	42 mm dia.	57.5 mm	M40.5 P0.5
3Z4S-LE SV-0814H	8.0 mm	F1.4	39 mm dia.	52.5 mm	M35.5 P0.5
3Z4S-LE SV-1214H	12.3 mm	F1.4	30 mm dia.	51.0 mm	M27 P0.5
3Z4S-LE SV-1614H	16.2 mm	F1.4	30 mm dia.	47.5 mm	M27 P0.5
3Z4S-LE SV-2514H	25.0 mm	F1.4	30 mm dia.	36.0 mm	M27 P0.5
3Z4S-LE SV-3514H	35.01 mm	F1.4	44 mm dia.	45.5 mm	M35.5 P0.5
3Z4S-LE SV-5014H	50.0 mm	F1.4	44 mm dia.	57.5 mm	M40.5 P0.5
3Z4S-LE SV-7525H	75 mm	F2.5	36 mm dia.	49.5 mm (WD: ∞) to 54.6 mm (WD: 1200 mm)	M34.0 P0.5
3Z4S-LE SV-10028H	100 mm	F2.8	39 mm dia.	66.5 mm (WD: ∞) to 71.6 mm (WD: 2000 mm)	M37.5 P0.5

3Z4S-LE-VS-H1 Series

Lens type	Focal distance	Aperture (F number)	Max. O.D.	Full length	Filter size
3Z4S-LE VS-1214H1	12.05 mm	F1.4	38 mm dia.	48.0 mm (WD: ∞) to 48.5 mm (WD: 300 mm)	M35.5 P0.5
3Z4S-LE VS-1614H1	16.06 mm	F1.4	38 mm dia.	42.5 mm (WD: ∞) to 43.3 mm (WD: 300 mm)	M30.5 P0.5
3Z4S-LE VS-2514H1	25.42 mm	F1.4	38 mm dia.	33.5 mm (WD: ∞) to 35.6 mm (WD: 300 mm)	M30.5 P0.5
3Z4S-LE VS-3514H1	35.10 mm	F1.4	38 mm dia.	35.0 mm (WD: ∞) to 39.1 mm (WD: 300 mm)	M30.5 P0.5
3Z4S-LE VS-5018H1	49.93 mm	F1.8	44 mm dia.	44.5 mm (WD: ∞) to 49.5 mm (WD: 500 mm)	M40.5 P0.5

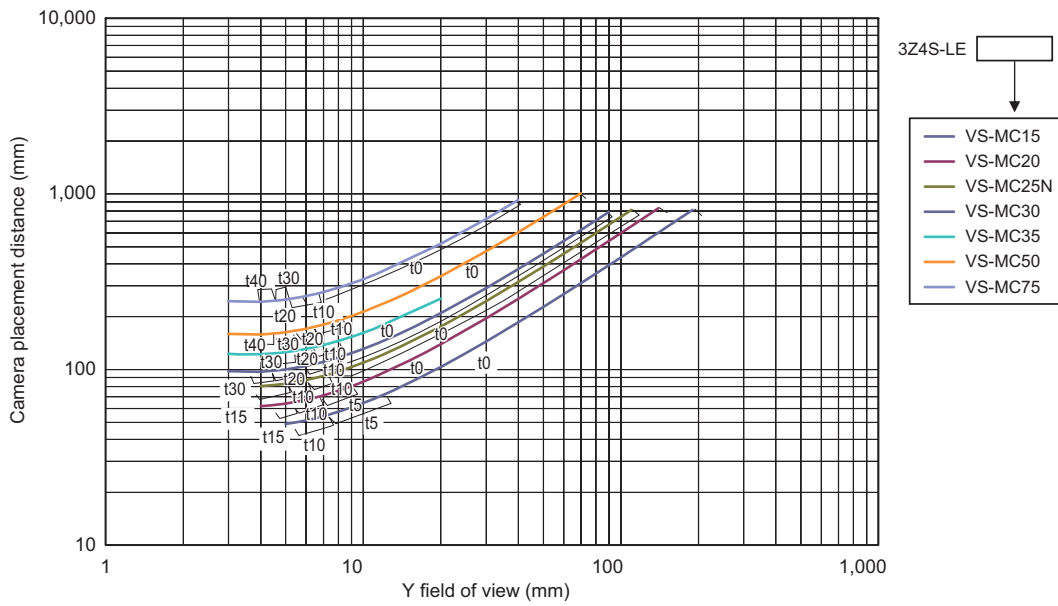
Lens for Small Digital Cameras FZ-LES□ Series

Lens type	Focal distance	Aperture (F number)	Max. O.D.	Full length L
FZ-LES3	3 mm	F2.0	12 mm dia.	16.4 mm
FZ-LES6	6 mm	F2.0	12 mm dia.	19.7 mm
FZ-LES16	16 mm	F3.4	12 mm dia.	23.1 mm
FZ-LES30	30 mm	F3.4	12 mm dia.	25.5 mm

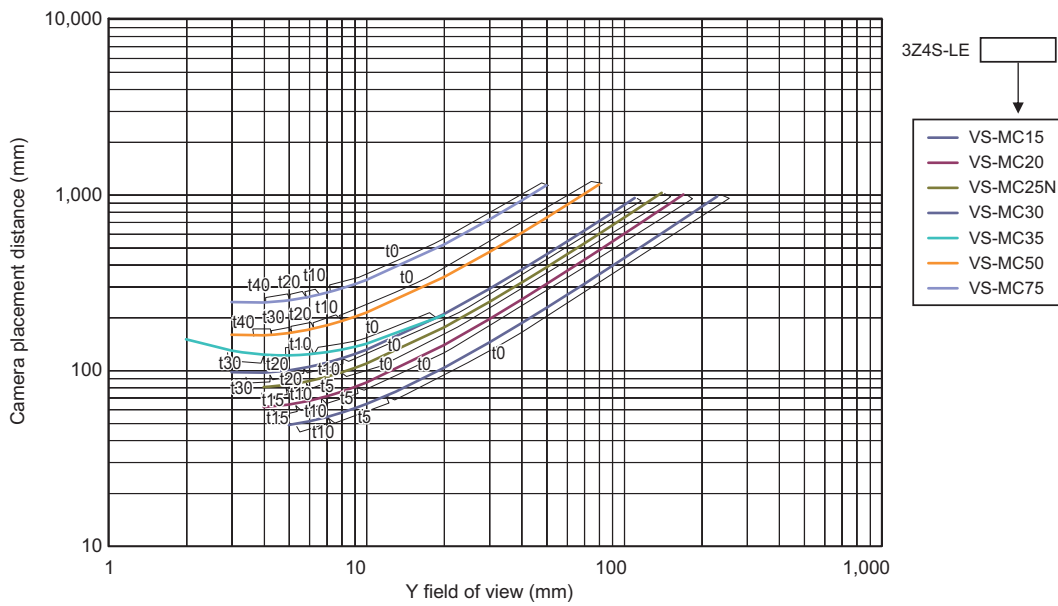


Vibration/Shock-resistance Lens (Six Types)

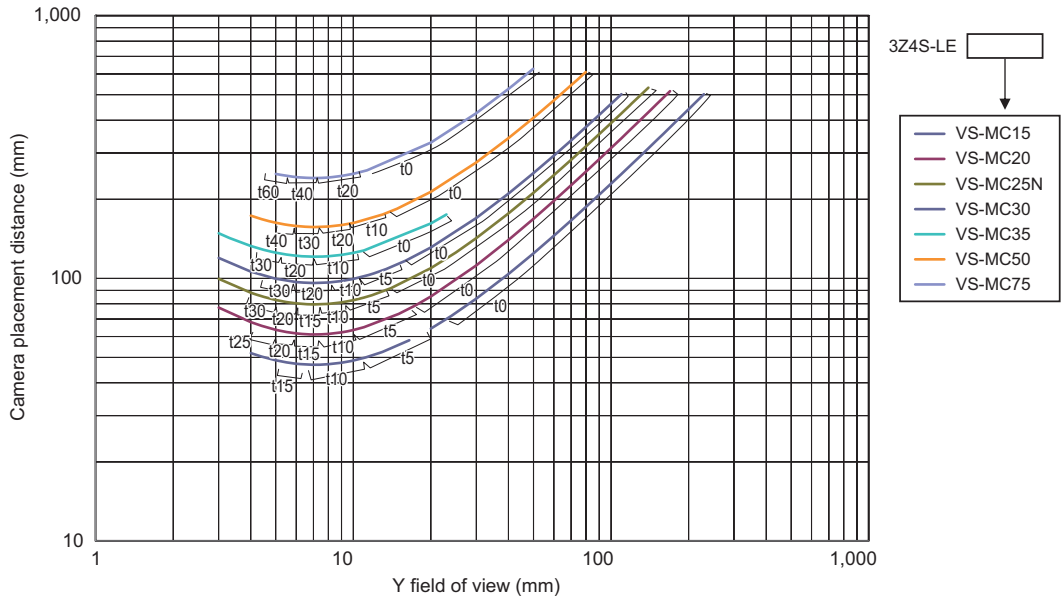
Digital Camera (Standalone) FZ-S□, FZ-SH□, or FH-S□ (Using 3Z4S-LE VS-MC)



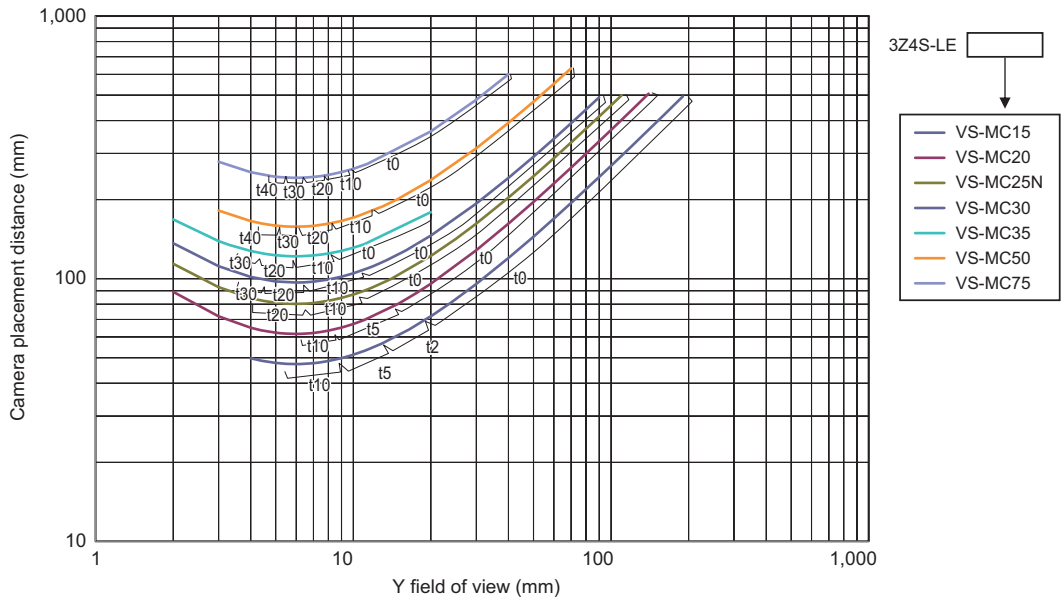
Digital Camera (Standalone) FZ-S□2M (Using 3Z4S-LE VS-MC)



Digital CCD Camera (Standalone) FZ-S□5M2 (Using 3Z4S-LE VS-MC)



High-speed CMOS Camera (Standalone) FH-S□02 (Using 3Z4S-LE VS-MC)



Lens Types and Outside Diameters

- C-mount Lens 3Z4S-LE VS-MC for 1-inch Image Elements

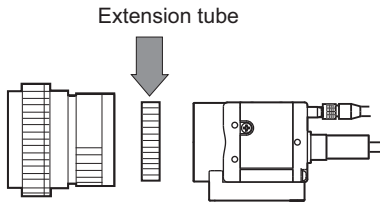
Lens type	Focal distance	Aperture (F number)	Max. O.D.	Full length	Filter size
3Z4S-LE VS-MC15	15 mm	Refer to <i>Table 1</i> , below.	31 dia.	25.4[0.03×] to 29.5[0.3×]	M27.0 P0.5
3Z4S-LE VS-MC15-FNO56	15 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC15-FNO80	15 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC20	20 mm		31 dia.	23.0[0.04×] to 30.5[0.4×]	M27.0 P0.5
3Z4S-LE VS-MC20-FNO56	20 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC20-FNO80	20 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC25N	25 mm		31 dia.	26.5[0.05×] to 38.0[0.5×]	M27.0 P0.5
3Z4S-LE VS-MC25N-FNO56	25 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC25N-FNO80	25 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC30	30 mm		31 dia.	24.0[0.06×] to 35.7[0.45×]	M27.0 P0.5
3Z4S-LE VS-MC30-FNO56	30 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC30-FNO80	30 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC35	35 mm		31 dia.	32.0[0.26×] to 45.7[0.65×]	M27.0 P0.5
3Z4S-LE VS-MC35-FNO56	35 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC35-FNO80	35 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC50	50 mm		31 dia.	44.5[0.08×] to 63.9[0.48×]	M27.0 P0.5
3Z4S-LE VS-MC50-FNO56	50 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC50-FNO80	50 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC75	75 mm		31 dia.	70.0[0.14×] to 105.5[0.62×]	M27.0 P0.5
3Z4S-LE VS-MC75-FNO56	75 mm		31 dia.		M27.0 P0.5
3Z4S-LE VS-MC75-FNO80	75 mm	31 dia.	M27.0 P0.5		

• Table 1

Lens type	3Z4S-LE VS-MC15-□□□□□								
Optical magnification	0.03X			0.2X			0.3X		
Aperture*	Open	F5.6	F8	Open	F5.6	F8	Open	F5.6	F8
Depth of field	183.1	512.7	732.4	4.8	13.4	19.2	2.3	6.5	9.2
Lens type	3Z4S-LE VS-MC20-□□□□□								
Optical magnification	0.04X			0.25X			0.4X		
Aperture*	Open	F5.6	F8	Open	F5.6	F8	Open	F5.6	F8
Depth of field	110.8	291.2	416.0	3.4	9.0	12.8	1.5	3.9	5.6
Lens type	3Z4S-LE VS-MC25N-□□□□□								
Optical magnification	0.05X			0.25X			0.5X		
Aperture*	Open	F5.6	F8	Open	F5.6	F8	Open	F5.6	F8
Depth of field	67.2	188.2	268.8	3.2	9.0	12.8	1.0	2.7	3.8
Lens type	3Z4S-LE VS-MC30-□□□□□								
Optical magnification	0.06X			0.15X			0.45X		
Aperture*	Open	F5.6	F8	Open	F5.6	F8	Open	F5.6	F8
Depth of field	47.1	131.9	188.4	8.2	22.9	32.7	1.1	3.2	4.6
Lens type	3Z4S-LE VS-MC35-□□□□□								
Optical magnification	0.26X			0.3X			0.65X		
Aperture*	Open	F5.6	F8	Open	F5.6	F8	Open	F5.6	F8
Depth of field	2.8	8.4	11.9	2.2	6.5	9.2	0.6	1.7	2.5
Lens type	3Z4S-LE VS-MC50-□□□□□								
Optical magnification	0.08X			0.2X			0.48X		
Aperture*	Open	F5.6	F8	Open	F5.6	F8	Open	F5.6	F8
Depth of field	33.8	75.6	108.0	6.0	13.4	19.2	1.3	2.9	4.1
Lens type	3Z4S-LE VS-MC75-□□□□□								
Optical magnification	0.14X			0.2X			0.62X		
Aperture*	Open	F5.6	F8	Open	F5.6	F8	Open	F5.6	F8
Depth of field	17.7	26.1	37.2	9.1	13.4	19.2	1.3	1.9	2.7

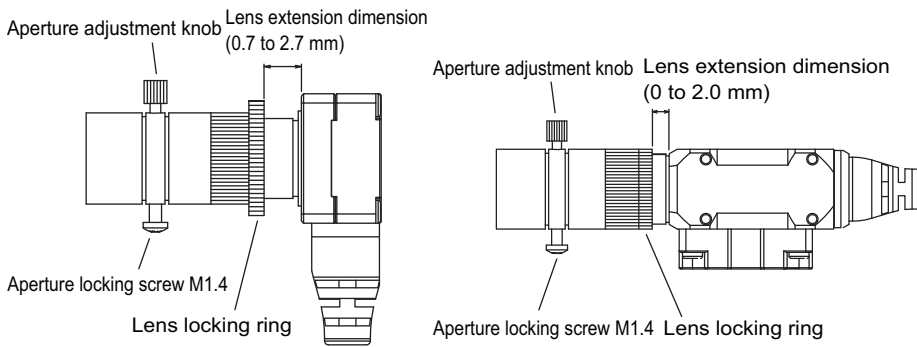
Extension Tube

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	31 dia.	7 sets Thickness: 0.5mm 1mm 2mm 5mm 10mm 20mm 40mm

Extension Tubes for Small Digital Cameras FZ-LESR



Max. O.D.	Thickness
12 dia.	Extension tube 5 mm Extension tube 10 mm 3-piece set Extension tube 15 mm

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	Troubleshooting
No value set. Be sure to set up value.	A value must be set for this item. Please set up value.
<ul style="list-style-type: none"> Invalid system disk Replace the disk, and then press any key. Remove disks or other media. Press any key to restart. 	An error occurred in USB memory. End the Controller and turn OFF the power supply. Then back up the data from the USB memory device that you removed from the Controller and then physically format it on your computer with a physical formatting tool. If the problem cannot be solved by physically reformatting the USB memory device, it may be damaged.
Error of the expression.	<p>Do the following errors exist in settings for an expression set up?</p> <ul style="list-style-type: none"> 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: ► <i>Calculation-Settings (Calculation)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341).
The problem occurred in the camera connection.	<p>Is the camera cable connected to the controller? Is camera cable disconnected? Do [Select camera] of [Camera Image Input] and [Camera Switching] have any errors? Please check the contents of [Camera setting], then switch off and restart. Reference: ► <i>Camera Image Input-Camera Settings</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341).</p>
Failed to start the window. Memory is insufficient.	<p>Because memory available for use was insufficient, memory needed to open the window could not be secured. Check the flow by adjusting the measurement region of each processing unit and the sizes of the registered models.</p> <ul style="list-style-type: none"> [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.	<p>Please redefine the upper and lower warning range limits such that they are within the range between the lower and upper evaluation limits. Reference: ► <i>Trend Monitor-Judgement Conditions (Trend Monitor)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341).</p>
The "Search" measurement result may be "NG (Insufficient memory)" with the current setting.	<p>Insufficient memory may occur during measurement. Reset the model parameters.</p> <ul style="list-style-type: none"> [Search] Reference: ► <i>Search - Judgement is NG (Insufficient Memory)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341). [Flexible search] Reference: ► <i>Flexible search - Judgement is NG (Insufficient Memory)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341). [Classification] Reference: ► <i>Classification - Judgement is NG (Insufficient Memory)</i> in the <i>Vision System FH/FZ5 Series Processing Item Function Reference Manual</i> (Cat No. Z341).
It failed in preservation because the free space of the flash memory was insufficient.	<p>The scene group data size may be too big. Use external memory and save the data to a scene group other than group 0 or change the measurement flow.</p>

Error message	Troubleshooting
<p>The problem occurred in the system.</p> <p> ERR</p>	<p>This is displayed when the significant abnormality occurs in the controller system. Please contact one of our branches or regional offices.</p>
<p>The problem occurred in system date. The system battery is insufficient.</p> <p> ERR</p>	<p>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.</p>
<p>Failed to switch scene.</p>	<p>Is a USB disk set to the controller? A USB disk is needed to read scenes after scene group 1.</p>
<p>Failed to switch scene group or save scene group on switch.</p>	<p>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.</p>
<p>Failed to clear scene group.</p>	<p>Confirm that a USBDisk is set to the controller and try again.</p>
<p>Failed to load scene group. Data is corrupted, or memory is insufficient. Scene group data starts with initialized status.</p>	<p>The following causes are suspected:</p> <ul style="list-style-type: none"> • 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.
<p>The camera connected is not the same as the one used for the last save. Please check.</p>	<p>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.</p>
<p>Cannot read selected file. Confirm selected file once again.</p>	<p>Check the following points.</p> <ul style="list-style-type: none"> • 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.) <p>In addition, the selected file may be corrupt.</p>
<p>The communication time-out is occurred.</p> <p> ERR</p>	<p>Switch off controller, verify the following contents and then restart.</p> <ul style="list-style-type: none"> • Is cable connected correctly? • Does it comply with communication specifications of external devices? • Are external devices functioning normally? <p>If error is not resolved after confirmation, the controller may be damaged. Please discuss this with one of our branches or regional offices. Reference: ► <i>Non-procedure Communications - Communications Specifications Settings in the Vision System FH/FZ5 Series User's Manual for Communications Settings</i> (Cat No. Z342)</p>
<p>Failed to transfer data. The free capacity of RAMDisk may insufficient. Increase the free capacity of RAMDisk and then perform this operation again.</p>	<p>Clean up the content of RAMDisk to increase free space. If this error occurs even though enough free space is available, scene group data may be too large. Review the inspection flow.</p>
<p>Error in input range. Please input using the correct range.</p>	<p>Please verify range for setting and set up again.</p>
<p>File name contains invalid character.</p>	<p>Please confirm that characters such as \ / , ; * ? " < > | & . SPC (space) are not included in the file name.</p>
<p>Failed to save file. Please check.</p>	<p>Check the following points.</p> <ul style="list-style-type: none"> • 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.

Error message	Troubleshooting
Fan/voltage error.  ERR	Switch off controller, and verify if fan is affected. If error message is still shown after restart, the controller may be damaged. Please contact one of our branches or regional offices.
Lighting connection has a problem.	Check the following points. <ul style="list-style-type: none"> • Is there a light with a power consumption higher than 7.5 W connected without an external power supply? • Is there a light with a power consumption higher than 15 W connected with an external power supply?
The error concerning parallel interface was detected. Turn OFF the power and check the connection state of the parallel interface.	Turn OFF the power and check the connection state of the parallel interface.
Procltem error xxxx: xxxerror	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.* ¹ Review the inspection flow and reduce the memory consumption or switch to another scene group. *1: The display varies depending on the controller. The remaining capacity of the application is not sufficient for the FH/FZ5-□□ series. The remaining data memory capacity is not sufficient for the FZ5-L3□□/FZ5-6□□ 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. <ul style="list-style-type: none"> • Have you deleted the destination folder? • For cases where the save destination is the folder in the USBDisk, is the USBDisk connected to the controller? Or, has the USBDisk been detected?
PLC link error	PLC link cannot be established. Check the following points. <ul style="list-style-type: none"> • 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. For fine matching For the fine matching, the two 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.
Region size exceeds. Please narrow region.	There are restrictions as to what can be set up based on the camera and processing items being used. Please adjust the region size so that the region is not too large.
Logging error	Image logging failed due to insufficient memory at the save destination. The error message disappears after 10 s. Please delete unneeded files in the save destination or prepare a new USBDisk.

Error message	Troubleshooting
The Logon to Network Server screen is displayed.	<p>The connection was cut off based on the idling/session time set on the network logging destination PC.</p> <p>At the command prompt on the PC, enter net config server /autodisconnect: -1 and disable the automatic disconnection setting.</p>

Although an error message such as the following, is not displayed, the ERROR signal and the ERR indicator will turn ON.

Cause	Troubleshooting
The STEP signal was input when the READY signal was turned OFF.	<ul style="list-style-type: none"> • Input the STEP signal after the READY signal turns ON. • Noise is superimposed onto the STEP signal. Keep PLC and FH/FZ5 away from the noise source.
A non-existing parallel command was entered.	<ul style="list-style-type: none"> • Please enter a correct parallel command.
The parallel scene group switch command was executed when no USB memory was installed. (FZ5-L3□□/ FZ5-6□□ only)	<ul style="list-style-type: none"> • 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.

FH/FZ5 RUN and ADJUST windows are not displayed.

Camera connection:

- **When the camera connection is checked and initialized during start-up, the system will not start unless there is a response from the camera side. Check if the system starts with the camera cable disconnected.**

Data corruption:

- **The scene group data and system data saved to the controller have been corrupted.**
In some cases when the power is shut down or the USB 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 as a window that opens separately such as the Edit Flow window and the Scene Maintenance window.

"NG (memory shortage)" is displayed in the "Detail result" area

- **Does the number of specific processing items, such as camera image input, exceed the limit?**

Reference: ► About Limits on the Number of Image Input Processing Items Used (p.573)

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.
Click [Function] menu - [Save to file] - [Setting data] - [Scene group data].

The window switching speed is slow.

- **When both lines are set to through display in the multi-line random trigger mode, the controller's response time may be slow.**

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, 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.**

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: ► *Parallel Communications - Testing Communications* in the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342)

- Are windows other than the Main screen (the Edit Flow window, etc.) displayed?
Are there any setting windows open?

* A setting window is defined as a window that opens separately such as the Edit Flow window and the Scene Maintenance window.

Signals cannot be output to external devices

- Is the trigger signal input?
- Are the cables connected correctly?
- Is the signal cable disconnected?

You can check the communication status in the Confirmation window.

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

- Is test measurement being performed?

Data cannot be output to external devices during test measurement.

GATE signals are not output

Wiring:

- Are parallel cables wired correctly?

Please check if GATE signals are being recognized by the receiving side (such as the PLC) by turning the GATE signal ON/OFF in the System - Communication - Parallel - Confirmation window.

Output setting:

- Is parallel judgement output or parallel data output set for the scene? Is an expression input for parallel data output?

GATE signals are not output unless these items are specified.

- Is [Output] set to ON in the layout setup?

Set whether to produce external outputs for each layout.

Timing:

- **Are the parallel communication settings (output cycle and output time) set to a length sufficient for the PLC to recognize?**
- **Could the System - Communication - Parallel output control be set to handshaking or synchronization output?**

These settings influence the GATE output timing.

Reference: ► *Parallel Communications - Time Charts* in the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342)

Serial Interface (RS-232C/422 Connection)

No communication available

- **Are the cables connected correctly?**
- **Are the communication specifications of the external devices compatible with the controller?**

You can check the communication status in the Confirmation window.

Reference: ► *Non-procedure Communications - Testing Communications* in the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342)

The 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: ► *Non-procedure Communications - Communications Specifications Settings* in the *Vision System FH/FZ5 Series User's Manual for Communications Settings* (Cat No. Z342)

Camera with Lighting Controller

The light does not turn ON at all

- **Did you disconnect or connect the Lighting Controller or Light while the power supply was ON?**
- **Are two or more lights connected?**

If more than one light is connected, it may not be possible to turn them ON simultaneously depending on the total current consumption of the lights. If necessary, set the brightness to 0 for all of the lights except for the light to turn ON.

Refer to ► *Camera Image Input, Camera Image Input FH, or Camera Image Input HDR* in the *Vision System FH/FZ5 Series Processing Items Reference Manual* (Cat No. Z341).

The light will not stay ON all the time

- **Are two or more lights connected?**

If two or more lights are connected, the always-on lighting mode cannot be used for lighting if the total power consumption of the lights is 7.5 W or higher.

The light malfunctions

- **Is the sequence for turning ON power correct?**

If you are using an external power supply, either turn it ON at the same time as the power supply to the Sensor Controller or turn ON the external power supply first.

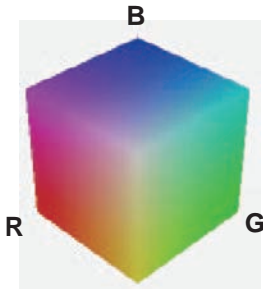
Measurement Mechanism

This section describes how to configure measurement in accordance with the images acquired from cameras. This product is prepared with comprehensive processing capabilities for measuring items. Common processes for various processing items are described here.

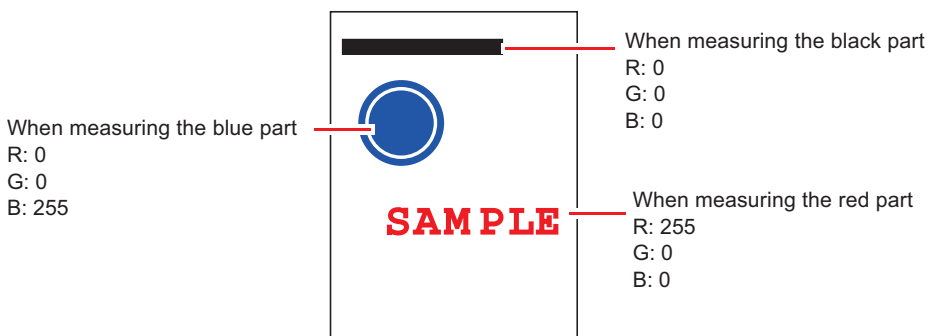
Color Processing Mechanism

The images acquired from cameras are available with color information such as R(red)/G(green)/B(blue). RGB images can render 16.7 million colors on the screen, and adjustment of color intensity with a range of 0 to 255 can be performed.

For each of RGB, black is rendered with a 0 value and white is rendered with a 255 value.



During measurement of color images, many colors can be measured by adjusting the values for RGB.



Note

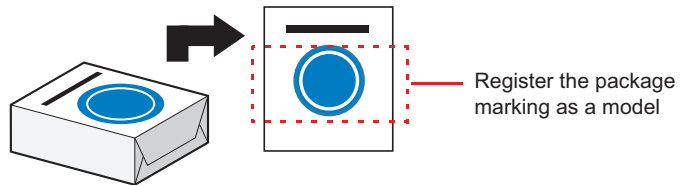
- For monochrome cameras, color processing is not performed.

Search Processing Mechanism

Reference image patterns are registered as models and then search is performed for the parts of input images that most resemble the models. The degree of similarity is represented with a correlation value, inspection for defects and different parts being mixed in can be performed.

The search process is performed over several distinct stages.

1 Register a reference model.



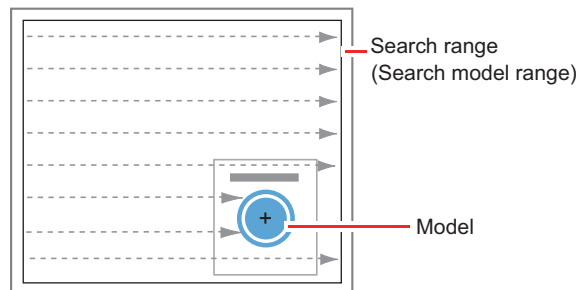
Note

Model Status and Measurement Processing

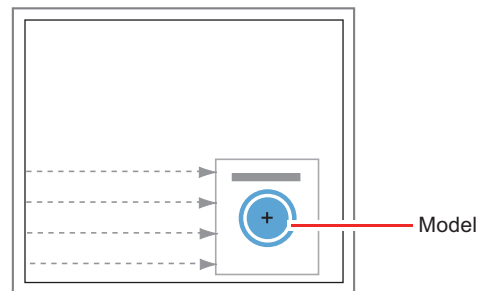
- Measurement time and accuracy may be affected by the status of model in the following ways. Please select measurement objects that are in good condition (clean) for Model Registration.
 - ÅEIn the case of large or complicated models, processing time is prolonged.
 - ÅEWith extremely small models or models without features, search processing is unstable.

2 Perform rough search of overall measurement region.

Search for the model over the entire measurement region.



3 Perform additional searching near the model.



Search Detection Method

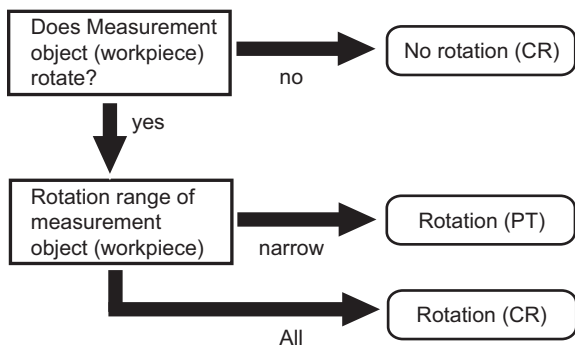
With search processing, there are two types of detection methods: Search by "Correlation (CR)" and search by "Shape (PT)".

The detection method can be selected by changing the "Rotation" settings for each processing item.

Setting item	Description
CR	Measurement for locations where there is high correlation (similar areas) between the color of the model registration image and the input image is performed. Since brightness is normalized in this operation, changes in brightness do not affect searching for correct positions.
PT	Measurement for locations where there is a high degree of similarity between the shape of the model registration image and the input image is performed. Since measurement is based on shape consistency (profile of model), positions can be measured accurately even if portions of the model are missing in images. When the rotation angle range is wide (such as full angle), a search that is faster than a "CR" search can be performed. Note, however, that this method may be less reliable than a "CR" search if the image has low contrast or blurred edges.

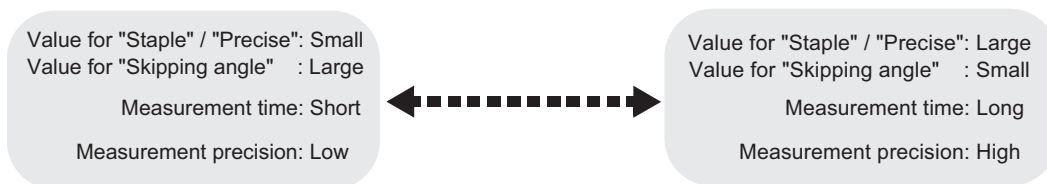
Note

Basic selection flow



Search Speed

For processing items to perform search processing such as [Search] and [Classification], you can specify the search processing speed by through the model parameter items "Stable", "Precise", and/or "Skipping angle". If the value specified for "Stab." or "Prec." is small or if the value for "Skipping angle" is large, the processing speed can be increased since the amount of information for the models will be decreased during the search. In contrast, if the values specified for "Stab." or "Prec." are large or if the value for "Skipping angle" is small, the processing speed is slow because search is performed without the amount of model information being reduced. Specify appropriate values for "Stable", "Precise", and "Skipping angle" according to the measurement conditions.



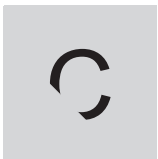
Correlation value

With processing items that use search processing, judgement is performed through correlation values. Correlation values are used to check the consistency (degree of similarity) between actual measurement images and reference model images. If portions of measured images are missing or if shapes are different, the correlation value is lower.

Model image



For partial defect



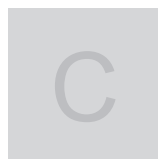
Correlation: 54

For wide line



Correlation: 74

For dark image



Correlation: 99

Larger



Correlation: 43

Horizontal



Correlation: 58

Different shapes



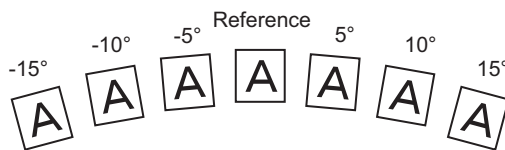
Correlation: 58

Search Angle Range, Skipping Angle

These are values, based on the model registration image, that indicate the allowable rotation interval (skipping angle) and overall maximum rotation range for the model (angle range). Search is performed for objects that most resemble these acceptable models.

Example: When angle range is 15° and skipping angle is 5°

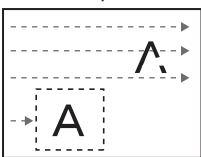
Registration model



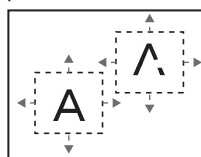
Candidate Point Level

This is the level used for finding models when searching. Images with a correlation value higher than the candidate point level are used to establish candidate points for search inspection.

Roughly search within the search region for candidate points.

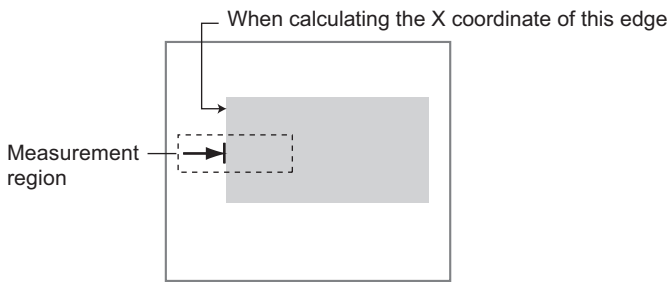


Perform detailed searches in the areas around each candidate point.



Edge Detection Measurement

This method extracts parts with color changes as edges to perform measurement. Edges are found through color changes in the measurement region.



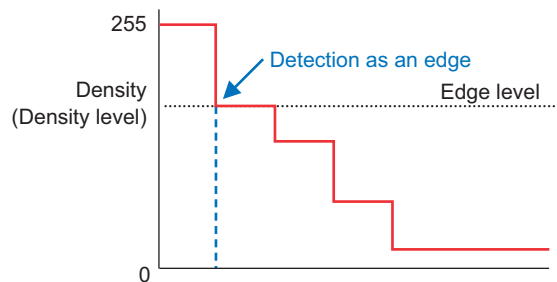
Edge Detection Method

The following two types of edge detection method are available.

Projection (Density method)

A projected waveform is formed relative to the density level. The intersection of the density and the threshold (edge level) is detected as an edge.

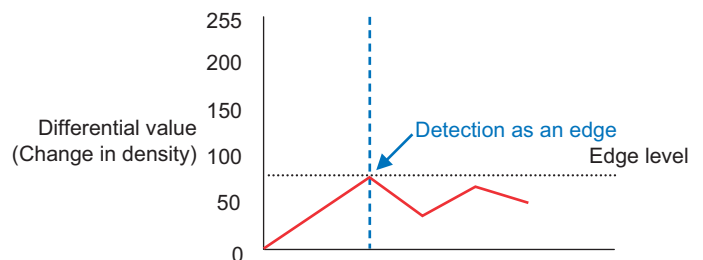
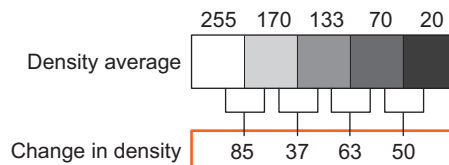
With an image with high noise level or image with blurry edges, the density method is suitable as it allows you to specify the density and color of the edges to be detected.



Derivation

A differential processing is performed to calculate the change in density between neighboring pixels. A differential waveform with the largest density set as 100% of the region is created, and the maximum value (peak point) of the differential waveform that exceeds the threshold (edge level) is detected as an edge.

With an image with low contrast, the differential method is suitable as it normalizes the differences between the neighboring pixels for processing.



Edge Level

Indicates the edge color change level (degree of color difference). This level is adjusted if edges cannot be accurately detected.

Note

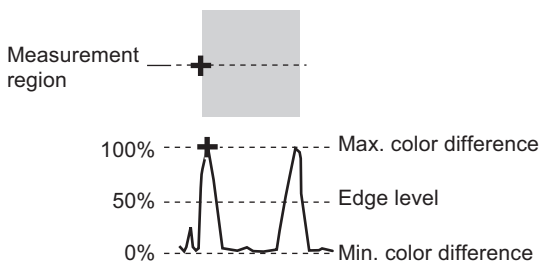
The value 0 to 100 for the edge level indicates the edge intensity. It is not related to color difference in the original images.

For case of measurement using relative position (%) with regards to width of color difference

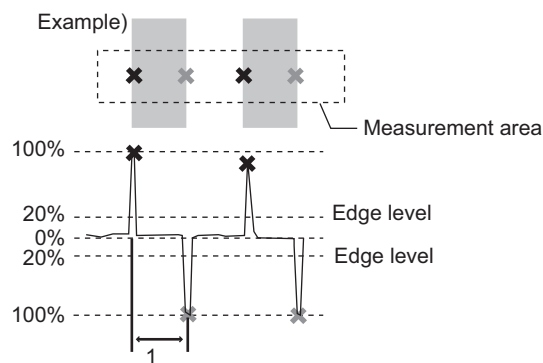
The edges are detected in the following manner.

- 1 Calculate the overall distribution of color difference in the measurement region.**
- 2 Min. color difference value: 0%; Max. color difference value: 100%**
- 3 Locations in which there is an edge level color difference are detected as edges.**

Edge Position

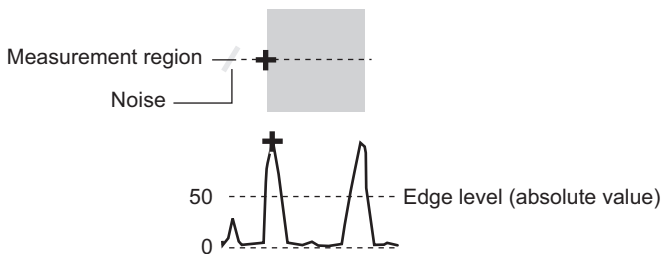


Edge Pitch



When performing measurement using color difference value

Edge level is set using color difference absolute value.



Noise Level

This level judges whether an edge is present or not.

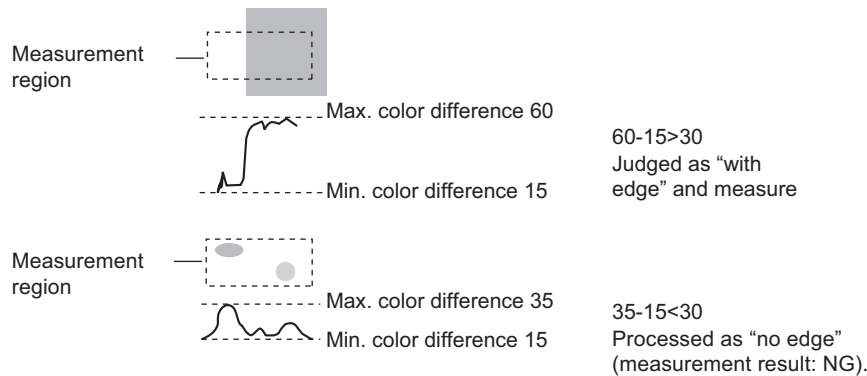
The maximum value and minimum value for color difference in the edge detection area are determined and if the difference is less than the noise level, it is judged that there is no edge. When detection is affected by noise, increase this value.

(within area)

Maximum value - minimum value of color difference < noise level - edge does not exist - measurement result is fail

Maximum value - minimum value of color difference \geq Noise level - edge exists - targeted for measurement

Example: When noise level is set to 30



Noise Width

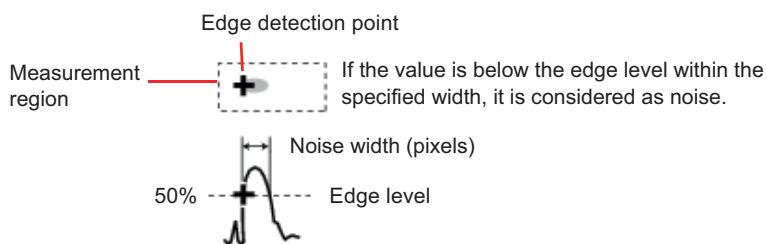
Set the width for judging noise.

- **When no color is specified**

If another edge is detected within the width range starting from the point where an edge was first detected, the newly detected point is considered noise.

- **When a color is specified**

If the color difference distributions again falls below the edge level within the width range starting from the point where an edge was first detected, the newly detected point is considered noise.

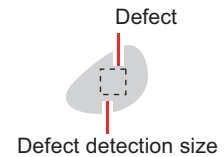


When points are mistakenly detected as edges due to noise, increase the color difference value.

Defect Detection Measurement

Color changes within the measurement region are used to find defects such as scratches, contamination, and chipping.

After measurement region is drawn, a rectangle (defect detection region) is automatically formed in this region. While moving the defect detection region around, calculate average density for each area to determine the difference between the original area and the surrounding area. This difference is called the defect level. Calculate the defect level for all defect detection areas. If the maximum value exceeds the judgement value, it is judged that there are defects in the measurement region.



Increasing "Defect size" allows for shortening of processing time, but this will reduce measurement accuracy.

Setting item	Description
Upper Lower	<p>Specify the upper and lower limits of defect detection size based on the size of scratch or contamination to be detected.</p> <p>The larger the difference between upper and lower limits, the easier it is to detect the scratches or contamination of various sizes.</p> <p>For both upper and lower limits, higher values for defect detection size limits leads to weaker detection sensitivity and shorter processing time.</p>

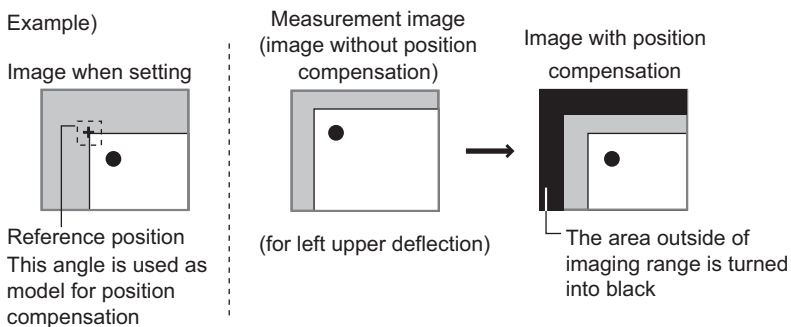
Handling Coordinates

The processing items for measuring positions have a setting item called "Output parameter" with which you can select how to handle coordinates.

In "Output parameter", you can set "Output coordinates" and "Calibration".

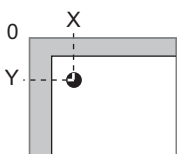
Output Coordinates

Selects coordinate types to be output to external devices.



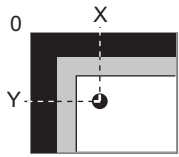
Before position compensation

Coordinate values before position compensation are output.



After position compensation (with factory settings)

Coordinate values after position compensation are output.



Calibration

Select whether or not to perform calibration when selecting output to external devices.

Calibration: ON

Calibration is performed during output and measured values after calibration are output.

Calibration: OFF

Calibration is not performed during output, and coordinate values from camera images are output.

Basic Knowledge about Operations

Inputting Values

This section describes how to input values required for setting the judgement conditions and communication specifications. Methods for setting up values include the following, depending on the settings.

- **Specify values directly with the numeric keyboard**

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. It has the same arrangement as an English keyboard (101/104 keyboard). You can change the input mode to Japanese with Alt + ~ Keys.

Note

If you connect a keyboard to the Sensor Controller with a USB connection, the key arrangement will be the same as an English keyboard.



Operation Method

- 1 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.

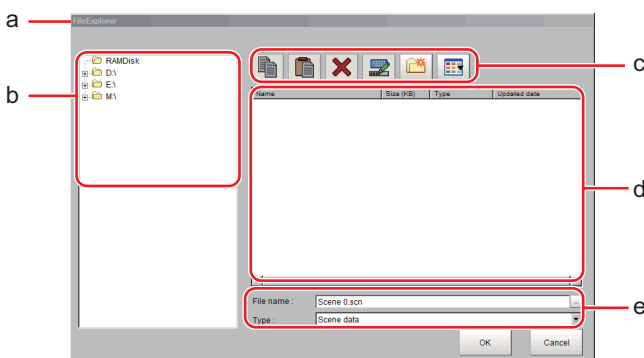
- 3 Tap [OK] after text has been entered.

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: Copying/Pasting a File or Folder (p.561)
-  **Paste**
Reference: Copying/Pasting a File or Folder (p.561)
-  **Delete**
Reference: Deleting a Folder or File (p.561)
-  **Rename**
Reference: Renaming a Folder or a File (p.561)
-  **New folder**
Creates a new folder.
-  **Toggle list view**
Switches the display format of the List View area.

d. List View Area

A list of files and folders contained in the folder selected from the folder view area is displayed.

In addition, when an extension name is selected from "Kind", only the files with the selected extension name are displayed. The content displayed is switched if [List display toggle] () is tapped.

e. File Name View Area

- **File name**

Names of files selected in the List View area are displayed.

- **Kind**

Specifies the types of the file displayed ("Scene data", "System data", etc.) in the List View area.

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 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.559)

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] ().

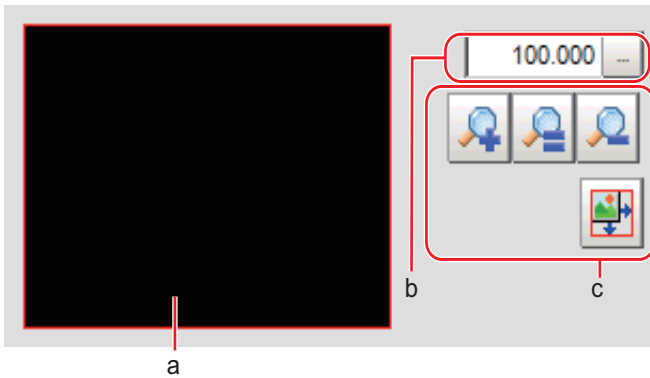
A confirmation window is displayed.

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 indicated.

c. Operation buttons

-  **Zoom-in button**
Enlarges the selected area to twice its size.
-  **Original size button**
Displays the selected area in the original size.
-  **Zoom-out button**
Reduces the selected area by half.
-  **Full-screen button**
Enlarges the zoom browser to the entire screen and returns it to its original size.

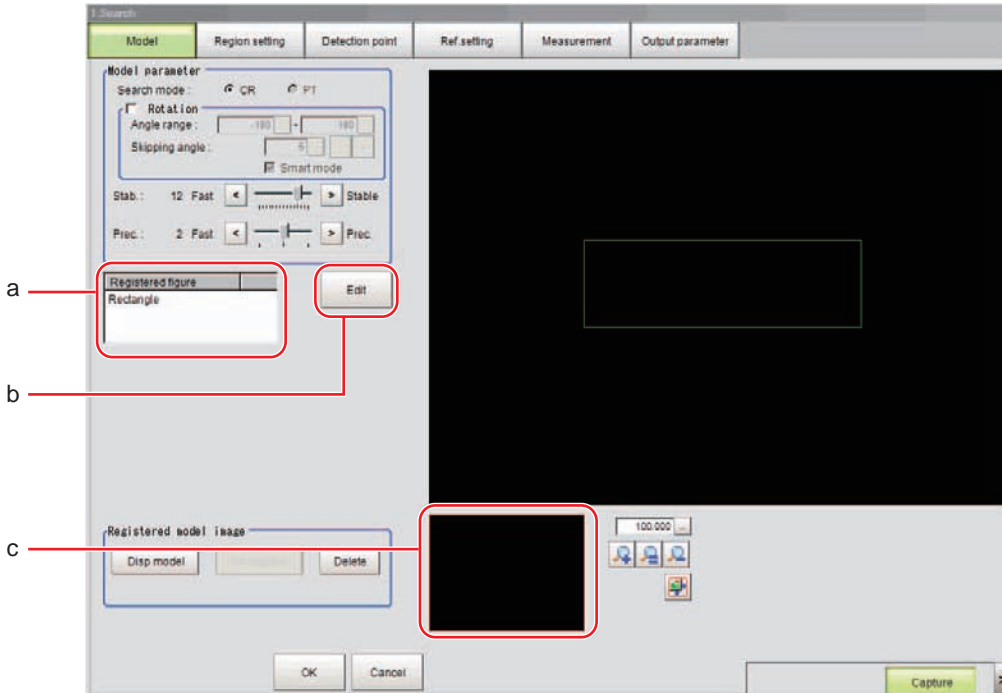
Setting Figures

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.

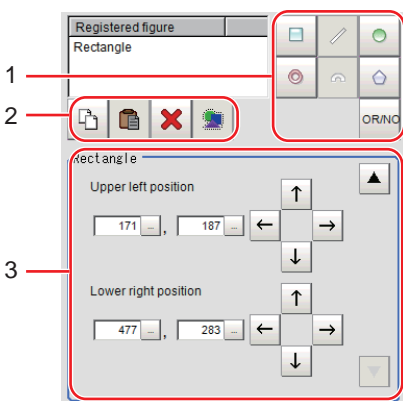


a. Figures

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 up objects, such as figures and text. The number and type of objects available is different depending on the applicable setting (ex. "Result display", "Model", "Region setting").

2. Object editing buttons

Buttons for editing objects

3. Details

Shows the details of the selected figure. Specify the object coordinates or radius. Tapping [▲] or [▼] will display the items currently not displayed.

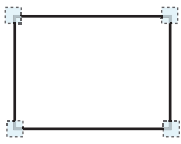
c. Zoom Browser Area

Magnifies the Image Display area by the selected magnification factor.

Setting Methods

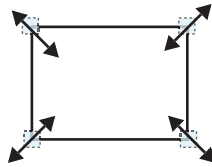
Rectangle

- **Image selection status**

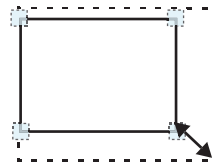


Points are displayed at each of the four corners.

- **Dimension Adjustment**



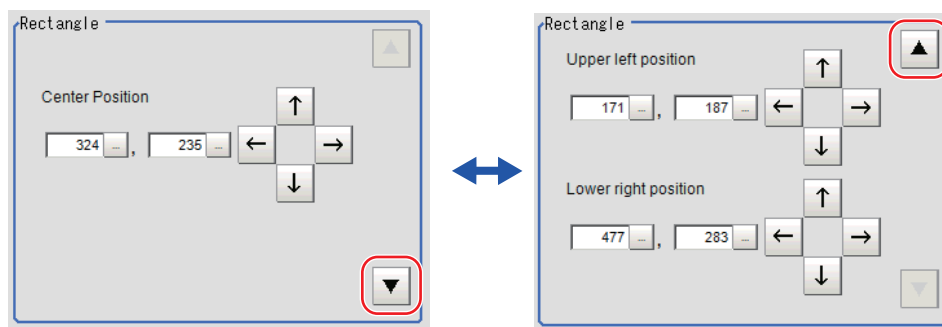
- **Example) When enlarging**



Drag the lower right point down in a diagonal direction.

- **Using numbers for setting**

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.



Line

- **Image selection status**



Points are displayed at the starting point, ending point, and mid point of lines.

- **Dimension Adjustment**

Drag the points.

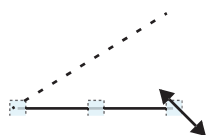


- **Example) When changing the length of a line**

Drag the points toward the intended direction.



- **Example) When changing the oblique direction**



Drag a point in the direction the line is to be changed.

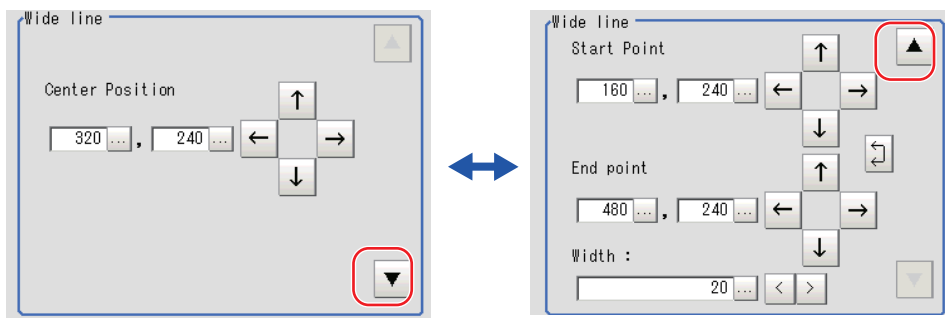
- **Example) When changing the line width**

Drag the center point of the line in a direction perpendicular to the line.



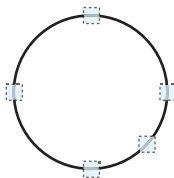
- **Using numbers for setting**

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.



Circle/Ellipse

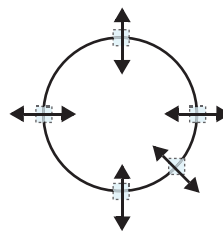
- **Image selection status**



Points are displayed on the top, bottom, left, right, and lower right of the circle.

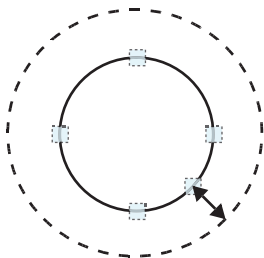
- **Dimension Adjustment**

Drag the points.



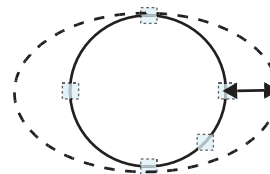
- **Example) When zooming in on a circle**

Drag the point on the lower right of the circle.



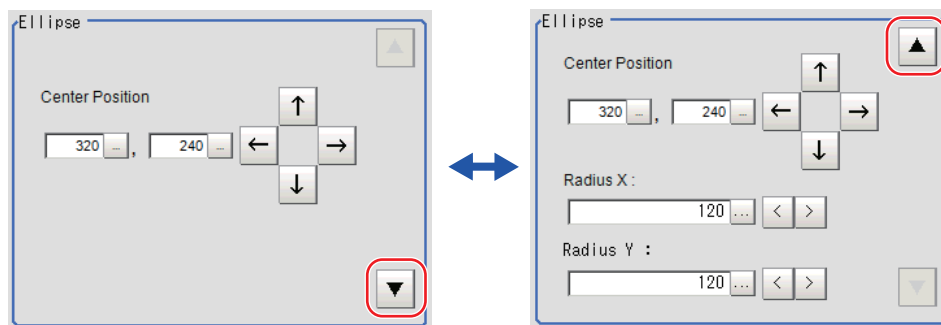
- **Example) When transforming a circle into a long horizontal ellipse**

Drag the point on the right of the circle to the right.



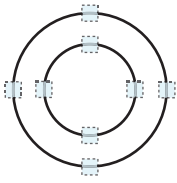
- **Using numbers for setting**

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.



Circumference

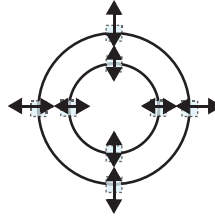
- **Image selection status**



Points are displayed on the top, bottom, left, and right of both the inner and outer circles.

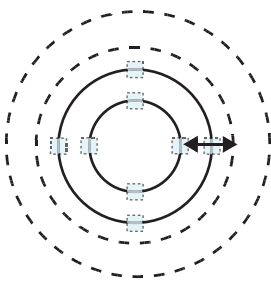
- **Dimension Adjustment**

Drag the points.



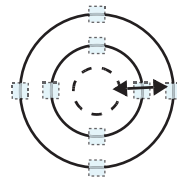
- **Example) When enlarging the entire circumference**

Drag a point on the outer circle.



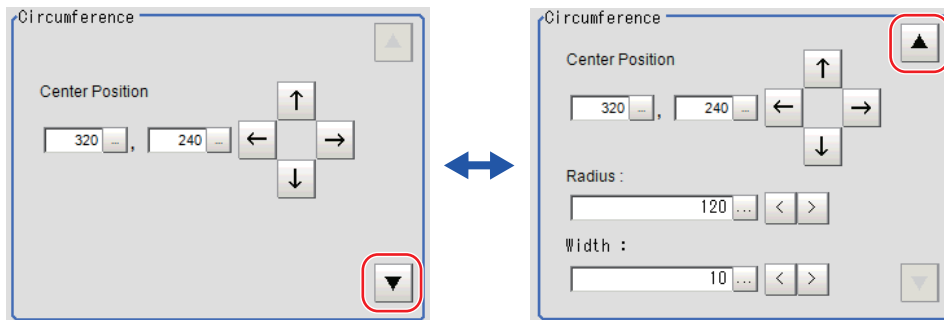
- **Example) When adjusting the width of the circumference**

Drag a point on the inner circle.

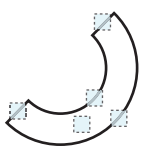


- **Using numbers for setting**

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.



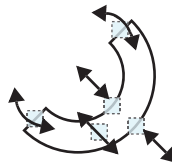
• **Image selection status**



Points are displayed on two lines at both ends of the arcs, on the inner arc, on the outer arc, and inside the

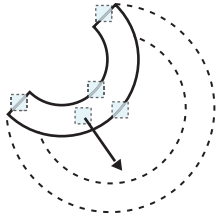
• **Dimension Adjustment**

Drag the points.



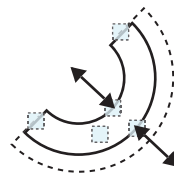
• **Example) When enlarging an arc**

Drag the point inside the arc outward.



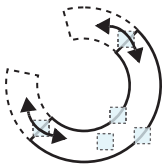
• **Example) When adjusting the width of an arc**

Drag a point on the inner or outer arc inward or outward.



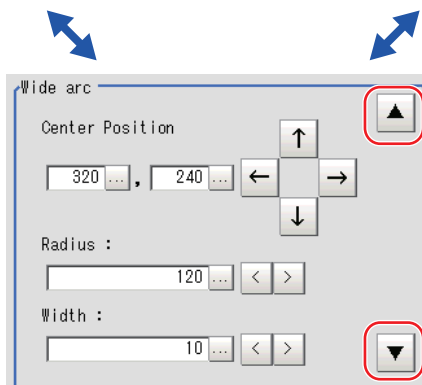
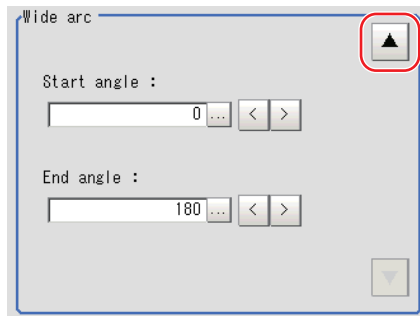
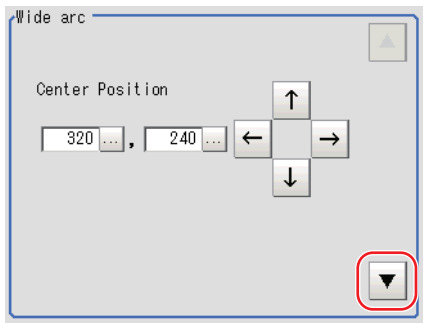
• **Example) When changing the angle of arc (part that is open)**

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

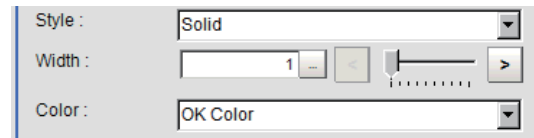
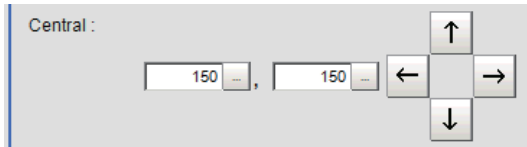
- Image selection status



Entire image is selected.

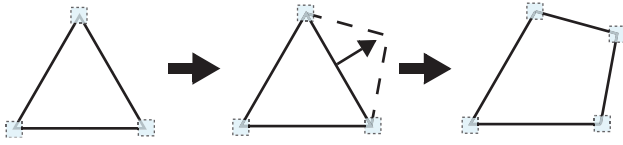
- Using numbers for setting

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)

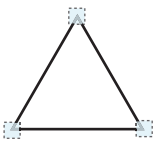
- Drawing methods (for drawing a quadrilateral)



- 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.

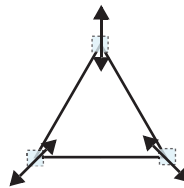
- Image selection status



Point is displayed at vertex of figure.

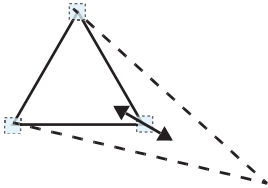
- Dimension Adjustment

Drag the points.



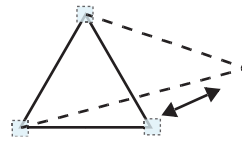
- Example) When changing the angle of one point

Drag points (arbitrarily).



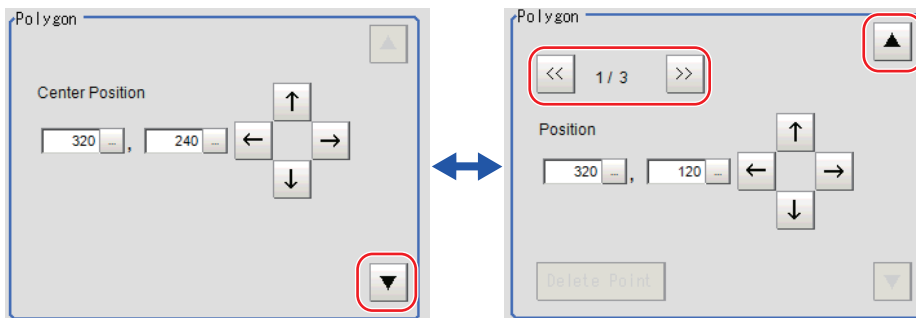
- Example) When changing the region

Drag points (arbitrarily).



- Using numbers for setting

The window for settings is split into two. Setting is performed through input of numbers or through tapping on the arrows.



Text

- Image selection status



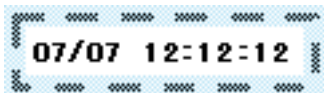
Entire image is selected.

Note

- "Text" can only be used in the [Result display] processing item.

Time

- Image selection status




Entire image is selected.

Note

- "Time" can only be used in the [Result display] processing item.


About OR Setting/NOT Setting

The OR setting/NOT setting is used when multiple images are combined.

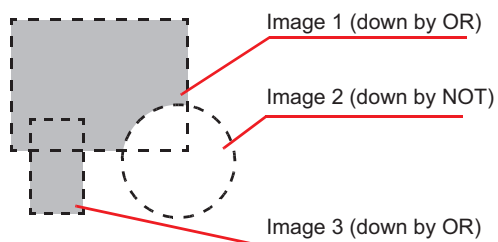
Areas with complex shapes can be drawn through combining figures, and unnecessary parts can be excluded from the area. Each time [OR/NOT] () is tapped, the setting of the selected figure toggles between OR and NOT.

IMPORTANT

- Images with only the NOT setting cannot be drawn.
- At the location that overlaps another figure, OR/NOT of the region set up later will take priority.

Item	Description
OR/NOT ()	Used when drawing a model or a region Switching between OR and NOT occurs each time the button is tapped.
OR	The selected figure is displayed with a dotted line in an OK color. When drawing multiple figures, the entire area is registered as one region.
NOT	The selected figure is displayed with a dotted line in an NG color. The area outside of the NOT image is registered as a region.

(Example) The grey parts are measurement regions.



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							
	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras
FZ5-L3□□	270	135	90	67	---				232	116	77	58	---			
FZ5-6□□																
FZ5-11□□																
FH-1□□□ FH-3□□□	270	135	90	67	54	45	38	33	232	116	77	58	46	38	33	29

Type of controller	2 megapixel camera								5 megapixel camera							
	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras
FZ5-L3□□	40	20	13	10	---				11	5	---		---			
FZ5-6□□	43	21	14	10	---						16	8	5	4	---	
FZ5-11□□																
FH-1□□□ FH-3□□□	43	21	14	10	8	7	6	5	16	8	5	4	3	2	2	2

Type of controller	0.3 megapixel camera								2 megapixel camera							
	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras
FZ5-L3□□	---								---							
FZ5-6□□	---								---							
FZ5-11□□	---								---							
FH-1□□□ FH-3□□□	270	135	90	67	54	45	38	33	37	18	12	9	7	6	5	4

Type of controller	4 megapixel camera							
	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras
FZ5-L3□□	---							
FZ5-6□□	---							
FZ5-11□□	---							
FH-1□□□ FH-3□□□	20	10	6	5	4	3	2	2

For monochrome cameras:

Type of controller	0.3 megapixel camera								2 megapixel camera							
	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras
FZ5-L3□□	252	126	84	63	---				40	20	13	10	---			
FZ5-6□□																
FZ5-11□□	272	136	90	68					43	21	14	10				
FH-1□□□ FH-3□□□	272	136	90	68	54	45	38	34	43	21	14	10	8	7	6	5

Type of controller	5 megapixel camera								0.3 megapixel camera							
	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras
FZ5-L3□□	11	5	---		---				---							
FZ5-6□□																
FZ5-11□□	16	8	5	4												
FH-1□□□ FH-3□□□	16	8	5	4	3	2	2	2	272	136	90	68	54	45	38	34

Type of controller	2 megapixel camera								4 megapixel camera							
	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras	1 camera	2 cameras	3 cameras	4 cameras	5 cameras	6 cameras	7 cameras	8 cameras
FZ5-L3□□	---								---							
FZ5-6□□																
FZ5-11□□																
FH-1□□□ FH-3□□□	37	18	12	9	7	6	5	4	20	10	6	5	4	3	2	2

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	Item	Processing item	
Loading Images	Camera Image Input	Performing image compensation	Anti Color Shading	
	Camera Image Input HDR		Stripes Removal Filter II	
	Camera Switching		Polar Transformation ^(*1)	
	Camera Image Input FH		Image Subtraction	
	Camera Image Input HDR Lite		Advanced Filter	
Performing image compensation	Position Compensation		Machine Simulator	
	Filtering		Panorama	
	Background Suppression		Trapezoidal Correction	
	Brightness Correct Filter		Display results	Display Image File ^(*2)
	Color Gray Filter			Display Last NG image ^(*3)
	Extract Color Filter			

*1: When using a Polar Transformation, each image input related unit after Polar Transformation may consume up to a maximum of 2 items.

*2: Image file display consumes the number of image setting value items per unit.

*3: 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 FH/FZ5-11□□ 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 Multi-input

The function that enables continuous high speed image input is called the multi-input function. The maximum number of images that can be loaded based on each specification is shown below.

Type of controller	0.3 megapixel camera	2 megapixel camera	5 megapixel camera
FZ5-L3□□	16 (for cameras 0 and 1) 32 (for cameras 2 and 3)	4 (for cameras 0 and 1) 8 (for cameras 2 and 3)	1 (for cameras 0 and 1) 2 (for cameras 2 and 3)
FZ5-6□□	32	8	2
FZ5-11□□	32	8	2
FH-1□□□ FH-3□□□	256	64	25

Type of controller	0.3 megapixel camera	2 megapixel camera	4 megapixel camera
FZ5-L3□□	---	---	---
FZ5-6□□	---	---	---
FZ5-11□□	---	---	---
FH-1□□□ FH-3□□□	256	51	32

IMPORTANT

- The multi-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 = output value

(Examples) If the recognized character is "2", "50" is output.

If the recognized character is "C", "67" is output.

		Upper 4 bits							
		0	1	2	3	4	5	6	7
Lower 4 bits	0		D _E		0	@	P	`	p
	1	S _H	D ₁	!	1	A	Q	a	q
	2	S _X	D ₂	"	2	B	R	b	r
	3	E _X	D ₃	#	3	C	S	c	s
	4	E _T	D ₄	\$	4	D	T	d	t
	5	E _Q	N _K	%	5	E	U	e	u
	6	A _K	S _N	&	6	F	V	f	v
	7	B _L	E _B	'	7	G	W	g	w
	8	B _S	C _N	(	8	H	X	h	x
	9	H _T	E _M	)	9	I	Y	i	y
	A	L _F	S _B	*	:	J	Z	j	z
	B	H _M	E _C	+	;	K	[	k	{
	C	C _L	↑	,	<	L	\	l	|
	D	C _R	↓	-	=	M	]	m	}
	E	S _O	→	.	>	N	^	n	~
	F	S _I	←	/	?	O	_	o	

About Memories Usable with FZ Series

The following types of memory can be used with FH/FZ5.

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 FH/FZ5-11□□) . 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 (FZ5-L3□□/FZ5-6□□)

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.219)

Memory Display Image on PLC I/O

The memory display image on PLC I/O varies depending on the PLC to be used.

Using data output to the Data Output area of the PLC link from the serial data output processing item as an example, this section illustrates how the memory display image varies depending on the model.

Data storage image (Data Output area DM1000)

When the PLC link Data Output area is set to DM1000, data is stored as follows in the PLC I/O memory.

- *1: Up to 8 expressions can be registered in the serial output flow on the FZ4 side. If 8 expressions are registered, data is stored as follows.

	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
DM1000	Expression 0		Expression 1		Expression 2		Expression 3		Expression 4	
DM1010	Expression 5		Expression 6		Expression 7					

CX-Programmer PLC I/O memory display image

As an example, if 3 data items, expression 0 (DATA0) = 1.000, expression 1 (DATA1) = 200.000, and expression 2 (DATA2) = 1000.000, are output from FZ4, they are stored to the PLC Link area as measurement data as follows.

	+0	+2	+4	+6	+8
DM1000	1000	200000	1000000	0	0
DM1010	0	0	0	0	0

Decimal number with sign (2ch-separated display)

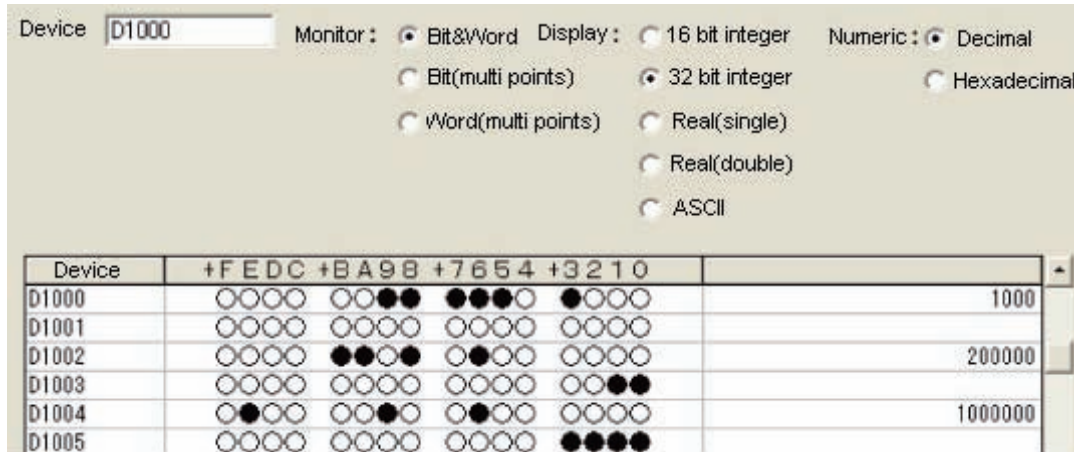
Fixed point (Number of significant figures is 3)
"1.000"

- *1: Data is stored to the PLC I/O memory as follows for a decimal number per channel.

	+0	+1	+2	+3
DM1000	1000	0	16960	15

GX-Developer PLC I/O memory display image

As an example, if 3 data items, expression 0 (DATA0) = 1.000, expression 1 (DATA1) = 200.000, and expression 2 (DATA2) = 1000.000, are output from FZ4, they are stored to the PLC Link area as measurement data as follows.



*1: Data is stored to the PLC I/O memory as follows for a decimal number per channel.

	+0	+1	+2	+3	+4	+5
DM1000	1000	0	3392	3	16960	15

Operation log input information list

This is a list of operation log input information. For the operation log format, see below.

Reference: Operation Log Format (p.123)

Name	Description	References
AddGlobalData	Adds global data.	Reference: ► Details (p.285)
AddSystemData	Adds system data.	Reference: ► Details (p.286)
AssignProc	Assigns units to measurement flows.	---
AssignUnit	Registers a processing unit.	Reference: ► Details (p.290)
BeginSetupUnit	Enters into the unit setting screen.	---
ChangeScene	Switches to the specified scene.	Reference: ► Details (p.292)
ChangeSceneGroup	Switches to the specified scene group.	Reference: ► Details (p.293)
CheckAccessControl	Checks the operation authority.	Reference: ► Details (p.582)
ClearImageLogCount	Clears the logging count information.	Reference: ► Details (p.582)
ClearMeasureData	Clears the measurement results for the processing unit.	Reference: ► Details (p.296)
ClearMeasureData_S	Clears the measurement results for the processing unit.	---
ClearScene	Clears the scene.	Reference: ► Details (p.297)
ClearSceneGroup	Clears a scene group.	Reference: ► Details (p.297)
ClearSecurityData	Clears security related parameters.	Reference: ► Details (p.583)
ClearSettingData	Clears setting data.	Reference: ► Details (p.583)
ConvertImageFileF	Converts an image file.	---
ConvertImageFileM	Converts an image file.	---
CopyFile	Copies a file.	Reference: ► Details (p.584)
CopyScene	Copies scene data.	Reference: ► Details (p.302)
CopySceneGroup	Copies a scene group.	Reference: ► Details (p.303)
CopyUnit	Copies a processing unit.	Reference: ► Details (p.304)
CopyUnit2	Copies a processing unit.	---
CopyUnitFigure	Copies the figure data for a processing unit.	Reference: ► Details (p.305)
CopyUnitModel	Copies the model data for a processing unit.	Reference: ► Details (p.307)
CreateDirectory	Creates a directory.	Reference: ► Details (p.584)
DeleteUnit	Deletes a processing unit.	Reference: ► Details (p.312)
DeleteUserAccount	Deletes a user account.	Reference: ► Details (p.584)
EndSetupUnit	Closes the unit setting screen.	---
ExitFzProcess	Exits an FZ process.	Reference: ► Details (p.344)
GetAll	Executes batch input of parallel I/O and other terminal states.	Reference: ► Details (p.349)
GetDensityProfile	Acquires the image density information.	Reference: ► Details (p.585)
GetGlobalData	Acquires global data.	Reference: ► Details (p.350)
GetHistogram	Acquires the image histogram.	Reference: ► Details (p.585)
GetImageCountM	Acquires the image count.	---
GetImageLogInfo	Acquires the specified image logging information.	Reference: ► Details (p.586)
GetIoModuleIdent	Acquires the identifier name for an I/O module.	Reference: ► Details (p.586)
GetLanguageIdent	Acquires the language identifier.	---

Name	Description	References
GetMeasureOut	Acquires the measurement result output yes/no.	Reference: ► Details (p.353)
GetPort	Executes individual input of parallel I/O terminal states.	Reference: ► Details (p.355)
GetSceneCount	Acquires the count of usable scenes.	---
GetSceneDescription	Acquires the count of usable scenes.	---
GetSceneGroupCount	Acquires the count of the valid scene groups on the memory card.	---
GetSceneGroupNo.	Acquires the current scene group No.	---
GetSceneGroupTitle	Acquires the scene group title name.	---
GetSceneMaker	Acquires the scene maker name.	---
GetSceneNo	Acquires the current scene No.	---
GetSceneTitle	Acquires the scene title name.	---
GetSecurityParameter	Acquires security related parameters.	Reference: ► Details (p.587)
GetSystemData	Acquires the system data.	Reference: ► Details (p.357)
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.361)
GetUnitItemIdent	Acquires the identifier name for a processing item.	---
GetUnitItemIdent2	Acquires the identifier name for a processing item.	---
GetUnitTitle	Acquires a processing unit title name.	---
GetUnitTitle2	Acquires a processing unit title name.	---
ImageLogging	Executes image logging.	---
ImageUpdate	Updates image data.	Reference: ► Details (p.369)
InsertUnit	Inserts a processing unit.	Reference: ► Details (p.372)
IoInitialize	Executes I/O initialization.	Reference: ► Details (p.587)
LoadBackupData	Load the System + Scene group data	Reference: ► Details (p.386)
LoadProc	Executes load processing for unit data.	---
LoadScene	Loads scene data.	Reference: ► Details (p.387)
LoadSceneGroup	Reads scene group data.	Reference: ► Details (p.388)
LoadSceneGroup0	Executes load processing for scene group data.	---
LoadSecurityData	Loads security related settings.	Reference: ► Details (p.587)
LoadSystemData	Loads system data.	Reference: ► Details (p.389)
LoadUnitData	Loads processing unit data.	Reference: ► Details (p.390)
LockMeasureStop	Sets measurement trigger input to disabled.	Reference: ► Details (p.588)
Measure	Executes measurement processing.	Reference: ► Details (p.393)
MeasureInit	Executes unit measurement initialization processing.	---
MeasureOut	Executes measurement results display processing.	---
MeasureProc	Executes unit measurement processing.	Reference: ► Details (p.394)
MeasureStart	Sets measurement trigger input to enabled.	Reference: ► Details (p.395)
MeasureStop	Sets measurement trigger input to disabled.	Reference: ► Details (p.396)
MeasureStop2	Sets measurement trigger input to disabled.	---

Name	Description	References
MoveUnit	Moves a processing unit.	Reference: ► Details (p.400)
NonstopSync	Synchronizes the data for non-stop adjustment settings.	Reference: ► Details (p.588)
PutAll	Executes batch input of parallel I/O and other terminal states.	Reference: ► Details (p.411)
PutPort	Executes individual input of parallel I/O and other terminal states.	Reference: ► Details (p.412)
RaiseOptionEvent	Issues an option event.	Reference: ► Details (p.413)
ReceiveData	Executes byte type array data input.	Reference: ► Details (p.415)
Remeasure0	Executes remeasurement processing.	---
Remeasure1	Executes remeasurement processing.	---
RemoveFile	Removes a file or directory.	Reference: ► Details (p.588)
RenameFile	Changes a file name or directory name.	Reference: ► Details (p.588)
RenumProc	Executes processing for unit number change.	---
RunOut	Outputs the RUN state.	Reference: ► Details (p.424)
SaveBackupData	Save the System + Scene Group Data	Reference: ► Details (p.424)
SaveData	Saves data to the controller.	Reference: ► Details (p.425)
SaveImage	Executes save processing for image data.	Reference: ► Details (p.425)
SaveProc	Executes save processing for unit data.	---
SaveScene	Saves scene data.	Reference: ► Details (p.427)
SaveSceneGroup	Saves scene group data.	Reference: ► Details (p.428)
SaveSecurityData	Saves security related settings.	Reference: ► Details (p.589)
SaveSystemData	Saves system data.	Reference: ► Details (p.429)
SaveSystemData0	Saves system data.	---
SaveUnitData	Saves processing unit data.	Reference: ► Details (p.430)
ScreenCapture	Captures the screen.	Reference: ► Details (p.438)
SendData	Executes byte type array data output.	Reference: ► Details (p.440)
SendString	Sends a character string.	Reference: ► Details (p.441)
SetAccessControl	Sets operation restrictions.	Reference: ► Details (p.589)
SetDisplayUnitNo	Sets the specified processing unit number used for image/text display.	Reference: ► Details (p.441)
SetGlobalData	Sets global data.	Reference: ► Details (p.443)
SetImageWindow	Sets the image display window.	Reference: ► Details (p.444)
SetJudgeWindow	Sets the display attributes for the judgment results display window.	Reference: ► Details (p.589)
SetMeasureOut	Sets whether or not measurement results are output.	Reference: ► Details (p.446)
SetSceneDescription	Sets the scene description.	Reference: ► Details (p.449)
SetSceneGroupTitle	Sets the scene group title name.	Reference: ► Details (p.450)
SetSceneMaker	Sets the scene maker name.	Reference: ► Details (p.450)
SetSceneTitle	Sets the scene title name.	Reference: ► Details (p.451)
SetSecurityParameter	Sets security related parameters.	Reference: ► Details (p.590)
SetSystemData	Sets the system data.	Reference: ► Details (p.452)
SetTextWindow	Sets the text display window.	Reference: ► Details (p.454)

Name	Description	References
SetTimeWindow	Sets the display attributes for the measurement processing time display window.	Reference: ► Details (p.590)
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.456)
SetUnitTitle	Sets a processing unit title name.	Reference: ► Details (p.458)
SetUserAccount	Sets a user account.	Reference: ► Details (p.590)
StartRemoteOperation	Starts remote operation.	---
SyncData	Synchronizes the setting data between Core RA processes.	Reference: ► Details (p.591)
SystemReset	Executes a system reset.	Reference: ► Details (p.466)
UnLockMeasureStop	Sets measurement trigger input to enabled.	Reference: ► Details (p.591)
UserLogin	Logs in as the specified user.	Reference: ► Details (p.591)
UserLogout	Logs out.	Reference: ► Details (p.592)

Checking Operation Restrictions

CheckAccessControl

Parameters

name	Operation identifier name
------	---------------------------

Return value

For an operation that is not permitted for the logged in user, returns 0.

For an operation that is permitted for the logged in user, returns value other than 0.

Clearing the Logging Count Information.

ClearImageLogCount

Parameters

None.

Return value

If the image logging count is cleared successfully, returns 0.

Otherwise, returns value other than 0.

Clearing Security Related Parameters

ClearSecurityData

Parameters

_userName	User name executed
_password	User password executed
mode	Data to be cleared Bit 0: User account Bit 1: Operation restriction contents Bit 2: Other

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Clearing Setting Data in a Batch

ClearSettingData

Parameters

None.

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Copy File

CopyFile

Parameters

srcFileName	Name of file to copy from
destFileName	Name of destination file

Return value

If the file is copied successfully, returns 0.
Otherwise, returns value other than 0.

Directory Creation

CreateDirectory

Parameters

directoryName	Name of directory to create
---------------	-----------------------------

Return value

If the directory is created successfully, returns 0.
Otherwise, returns value other than 0.

Deleting a User Account

DeleteUserAccount

Parameters

_userName	User name executed
_password	User password executed
userName	Name of user to be deleted

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Getting Image Density Information

GetDensityProfile

Parameters

unitNo	Image input related and image conversion related processing item processing unit number
imageNo	Image number
imageChannel	Image channel number (Specifies RGB, R: 0, G:1, B: 2. For monochrome image, any value is OK)
rectangle	Target rectangular area. The maximum size to acquire density is 4096 pixels. Keep the size to no more than 4096.
profile	Density value storage array Resized when functions are executed.

Return value

If the density is acquired successfully, returns 0.
Otherwise, returns value other than 0.

Getting an Image Histogram

GetHistogram

Parameters

unitNo	Image input related and image conversion related processing item processing unit number
imageNo	Image number
imageChannel	Image channel number (Specifies RGB, R: 0, G:1, B: 2. For monochrome image, any value is OK)
rectangle	Target rectangular area. The maximum size to acquire density is 4096 pixels. Keep the size to no more than 4096.
histgram	Histogram array Resized when functions are executed.

Return value

If the density is acquired successfully, returns 0.
Otherwise, returns value other than 0.

Getting the Specified Image Logging Information.

GetImageLogInfo

Parameters

kind	Type of image logging information to acquire <ul style="list-style-type: none">ImageLogMaxCount: Maximum number of images that can be logged in controller memoryImageLogCount: 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 Parallelo (Parallel I/O). (Fixed) 1: Registers any of the following I/O modules in the module communication system. <ul style="list-style-type: none">SerialNormal: Serial non-procedure communicationSerialNormal2: 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 <ul style="list-style-type: none">TcpNormal: TCP non-procedure communicationUdpNormal: UDP non-procedure communicationUdpNormal2: 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. <ul style="list-style-type: none">EtherCAT: EtherCAT communicationEtherNetIP: 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.

Getting Security Related Parameters

GetSecurityParameter

Parameters

_userName	User name executed
_password	User password executed
dataIdent	Data identifier name userLoginTimeout: Login timeout time (minutes)
data	Acquisition data storage variable

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Executing I/O Initialization

IoInitialize

Parameters

ioIdent	Initializing I/O module identifier name <ul style="list-style-type: none">• Parallelo: Parallel I/O• SerialNormal: Serial non-procedure communication• UdpNormal: Ethernet UDP non-protocol 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.

File/Directory Name Change

RenameFile

Parameters

oldFileName	Old file/directory name
newFileName	New file/directory name

Return value

If the file/directory name was changed successfully, returns 0.
Otherwise, returns value other than 0.

Deleting File/Directory

RemoveFile

Parameters

pathName	Path name
----------	-----------

Return value

If the file/directory is deleted successfully, returns 0.
Otherwise, returns value other than 0.

Saving Security Related Settings

SaveSecurityData

Parameters

_userName	User name executed
_password	User password executed
fileName	File path to save to

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Setting Operation Restrictions

SetAccessControl

Parameters

_userName	User name executed
_password	User password executed
name	Operation identifier name
userGroup	User group enabled

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Setting Security Related Parameters

SetJudgeWindow

Parameters

handle	Handle
locationX	X coordinate of upper left of window
locationY	X coordinate of upper right of window
fontSize	Font size

Return value

If the judgment result display window is set successfully, returns 0.
Otherwise, returns value other than 0.

Setting the Measurement Processing Time Display Window

SetSecurityParameter

Parameters

_userName	User name executed
_password	User password executed
dataIdent	Data identifier name userLoginTimeout: Login timeout time (minutes)
data	Data to set

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Setting the Measurement Processing Time Display Window

SetTimeWindow

Parameters

handle	Handle
locationX	X coordinate of upper left of window
locationY	X coordinate of upper right of window
fontSize	Font size

Return value

If the measurement processing time display window is set successfully, returns 0.
Otherwise, returns value other than 0.

Setting a User Account

SetUserAccount

Parameters

_userName	User name executed
_password	User password executed
userName	Name of user to be set
userGroupNo	User group number to be set
password	Password to be set

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Synchronization of Setting Data Between CoreRA Processes

SyncData

Parameters

srcCoreRANo	Source CoreRA number
destCoreRANo	Destination CoreRA number

Return value

If setting data between CoreRA processes is synchronized successfully, returns 0.
Otherwise, returns value other than 0.

Setting Measurement Trigger Input to Enabled

UnLockMeasureStop

Parameters

None.

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Logging in as the Specified User.

UserLogin

Parameters

userName	User name
password	Password

Return value

If it succeeded, returns 0.
Otherwise, returns value other than 0.

Logging Out

UserLogout

Parameters

remoteOperation	Logout target
-----------------	---------------

Return value

If it succeeded, returns 0.

Otherwise, returns value other than 0.

Manual Revision History

The manual revision symbol is an alphabet appended at the end of the manual number found in the bottom left-hand corner of the front or back cover.

Cat. No. Z340-E1-04

↑
Revision code

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01	Jul. 2013	Original production	Ver.5.00
02	Aug. 2013	Additions for lighting controllers.	Ver.5.10
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