OMRON

Robotics packaging line solution

Vision Sensor FH series
Operation Manual Sysmac Studio
Conveyor Panorama Display Tool

FH-1□□□
FH-3□□□

SYSMAC-SE20□□

SYSMAC-RA401L

NJ501-4□□□

R88D-KN□-ECT

Startup Guide

SYSMAC always in control

Z371-E1-01

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Revision History

Revision Symbol	Revision Date	Reason for Revision and Revised Page
01	December 1, 2015	First edition

1. Introduction

1.1. Introduction

Thank you for purchasing FH/FZ5 Series product.
This manual provides information regarding functions, performance and operating methods that are required for using FH/FZ5 Series product. When using FH/FZ5 Series product, be sure to observe the following:

- FH/FZ5 Series product must be operated by personnel knowledgeable in electrical engi-neering.
- 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.

This Manual does not contain safety information and other details that are required for actual use of a FH/FZ5 Series Controller. Thoroughly read and understand the manuals for all of the devices that are used in this Manual to ensure that the system is used safely. Review the entire contents of these materials, including all safety precautions, precautions for safe use, and precautions for correct use.

The contents of this manual, including product specifications, are subject to change based on improvements of the product without prior notice. Your understanding is appreciated
We are committed to providing precise information. Should you have any questions or con-cerns regarding the contents of this document, please do not hesitate to contact us. When you contact us, please be sure to provide us with the Catalog number printed on the back cover.

1.2. Conventions Used in This Manual

Symbols in this manual are used as follows:

Safety Information

Things that should be done or avoided to safely use the product.

Precautions for Use

Things that should be done or avoided to prevent malfunction, or other negative effects to the product.

Useful Information

Things that may apply to certain situations. Information and tips that help you use the product

effectively. This information is provided to increase understanding or make operation easier.

Reference

Location of detailed or related information.

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1.4. Meanings of Signal Words

For details on Meanings of Signal Words, refer to Meanings of Signal Words in *Vision System FH/FZ5 Series User's Manual* (Cat. No. Z340-E1-08 or later).

1.5. Precausions for Safe Use

For details on Precautions for Safe Use, refer to Precautions for Safe Use in *Vision System FH/FZ5 Series User's Manual* (Cat. No. Z340-E1-08 or later).

1.6. Precausions for Correct Use

For details on Precautions for Correct Use, refer to Precautions for Correct Use in *Vision System FH/FZ5 Series User's Manual* (Cat. No. Z340-E1-08 or later).

1.7. Regulations and Standards

For details on Regulations and Standards, refer to Regulations and Standarrds in *Vision System FH/FZ5 Series User's Manual* (Cat. No. Z340-E1-08 or later).

1.8. Related Manuals

The following manuals are also helpful when using Conveyor Tracking Calibration Wizard. Use these manuals for reference.

Cat. No.	Manual name	Content	Application
Z340-E1	Vision System FH/FZ5 Series User's Manual	Describes how to configure settings on the sensor controller of FH/FZ5 Series Vision Sensors.	To learn how to configure FH/FZ5 Series Vision Sensors.
Z341-E1	Vision System FH/FZ5 Series Processing Item Function Reference Manual	Describes how to configure settings for processing items for FH/FZ5 Series Vision Sensors.	To learn how to configure settings for processing items for FH/FZ5 Series Vision Sensors.
Z342-E1	Vision System FH/FZ5 Series User's Manual (Communications Settings)	Describes how to configure communication settings on the sensor controller of FH/FZ5 Series Vision Sensors.	To learn how to configure communication settings for FH/FZ5 Series Vision Sensors.
Z343-E1	Vision System FH Series Operation Manual Sysmac Studio	Describes how to configure FH Series Sensor Controllers on Sysmac Studio.	To learn how to configure FH Series Sensor Controllers.
W504-E1	Sysmac Studio Version 1 Operation Manual	Describes the operation of Sysmac Studio.	To learn the operation and functions of Sysmac Studio.
Z369-E1	Vision Sensor FH Series Operation Manual Sysmac Studio Calibration Plate Print Tool	Describes how to configure and operate Calibration Plate Print Tool on Sysmac Studio on FH Sensor Controllers.	To learn the setup procedure for printing the Pattern on a Calibration Plate used for calibration for cameras and robots on Sysmac Studio.
Z370-E1	Vision Sensor FH Series Operation Manual Sysmac Studio Conveyor Tracking Calibration Wizard Tool	Describes how to configure and operate the Conveyor Tracking Calibration Wizard tool on Sysmac Studio on FH Sensor Controllers.	To learn the setup procedure of the wizard style calibration for cameras, robots, or conveyors.
Z371-E1	Vision Sensor FH Series Operation Manual Sysmac Studio Conveyor Panorama Display Tool (This manual)	Describes how to configure and operate the Conveyor Panorama Display tool on Sysmac Studio on FH Sensor Controllers.	To learn the setup procedure of panorama display for image capture of target objects on conveyors.

Z368-E1	Vision Sensor FH Series Conveyor Tracking Application Programming Guide	Describes the setting procedure of sample macros used for applications of conveyor tracking on FH Sensor Controllers.	To learn the setting procedure of sample macros for conveyor tracking.

2. About Conveyor Panorama Display

2.1. Overview

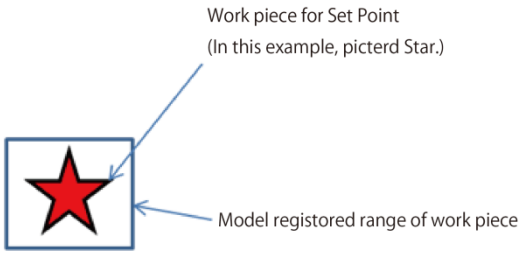
Conveyor Panorama Display is a tool to display the outline of the model registered region and of each image capture overlaid over the panoramic image they constitute so that you can estimate how targets move on the conveyor. Using a scene that includes target object images and conveyor tracking data, this tool generates an image that makes trigger interval and conveyor speed adjustments easier when adding new production lines.

Images can be displayed both online and offline.

2.2. Target Readers and Expected Skill Level

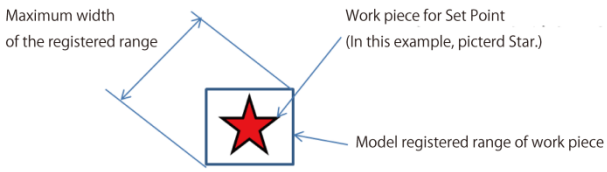
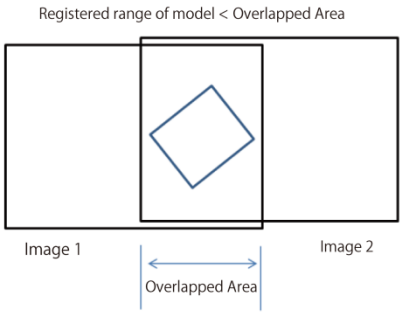
Target readers of this manual include developers of vision conveyor tracking systems, and engineers and programmers who support end users of vision conveyor tracking systems.

2.3. Terminology

Term	Explanation
panoramic image stitching	A process to combine multiple images into a single image.
target, target object	Objects that are targets of Pick and Place operation.
model registered region	A region that is registered as the model for target objects. This is not a model used for actual detection. 

2.4. Restrictions and Precautions

Subject	Explanation
When launching Conveyor Panorama Display, confirm the following:	The FH Sensor Controller must have a Scene that includes the Conveyor Calibration processing item. Conveyor tracking calibration has been completed by the Conveyor Calibration processing item. The unit of measure for the MCS used for the conveyor tracking calibration is millimeter. The above Scene includes the Unit Calculation Macro processing item that holds the encoder value at the time when image was captured.
Precautions for off-line measurement using image logs	The name of image logs must have the either of the following structures: "Measurement ID_encoder value at image capture.bmp", or "Measurement ID_encoder value at image capture.ifz". For example, if the encoder value is 12345, the image log should be named as follows: ・File name: 2015-01-21_14-03-10-6700_12345.bmp ・File name: 2015-01-21_14-03-10-6700_12345.ifz For how to logging, refer to the *Conveyer Panolama* in the *FH Series Sample Macro User's Guide* The BKD data at the time of the logging is loaded to FH Sensor Controller. There is a "logic for offline measurement" in the Unit Macro processing item used to obtain encoder values. For more information about method for offline measurement, refer to Encoder value section in the *FH Series Sample Macro User's Guide*
Encoder value	Restrictions for encoder value: ・Encoder value must be set 0-2147483647 ・One reaching its maximum value (2147483647), the encoder value must return to 0 (ring count).

Size of target objects	To effectively use the tracking function, the size of target objects should meet the following restrictions. The maximum width of the registered model area must be smaller than the overlapped area of camera Field of View (FOV). If the registered model area exceeds that, the robot may miss some objects.  

3. Using the Tool

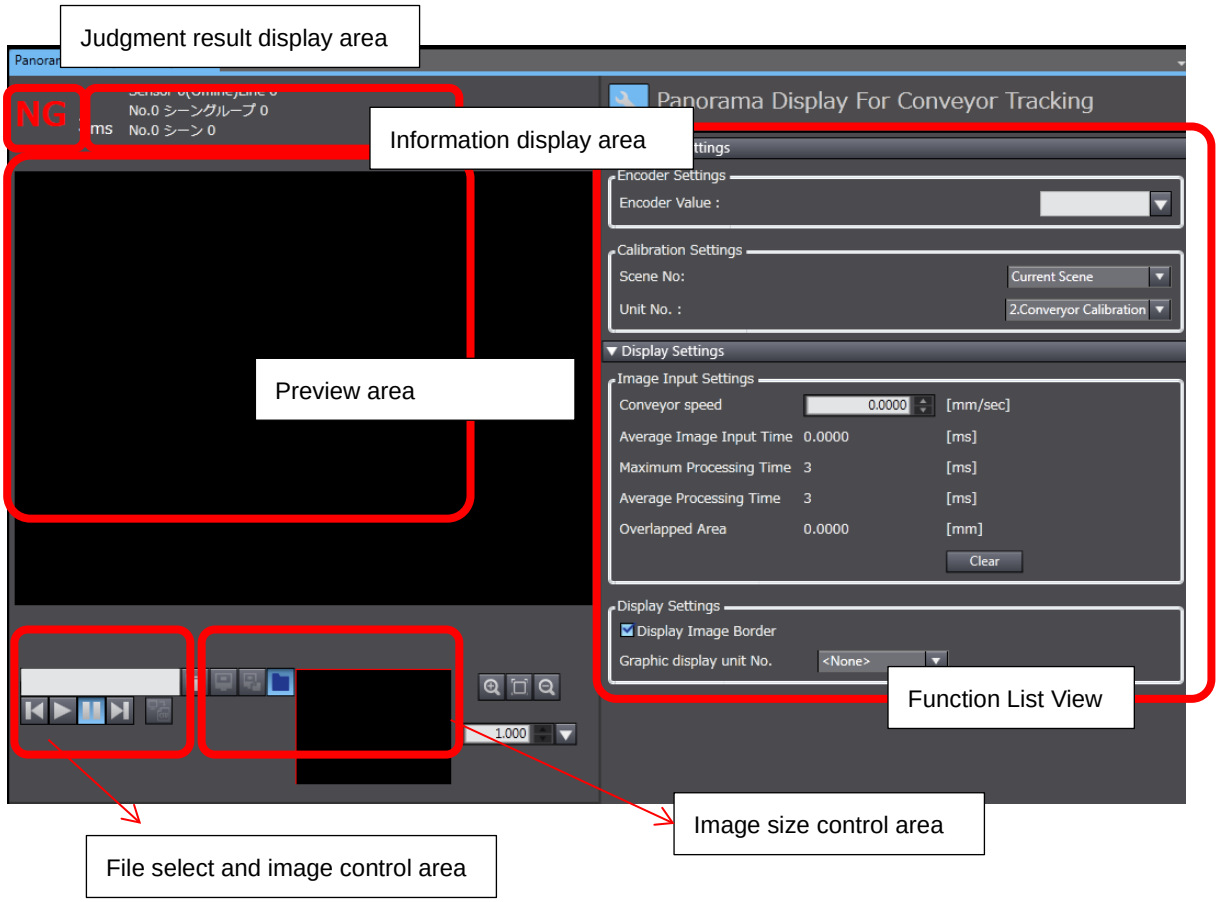
3.1. Setup Procedure and User Interface of Conveyor Panorama Display

The setup procedure of Conveyor Panorama Display is as follows.
After launching Conveyor Panorama Display:

1. Create a Scene to perform Conveyor Panorama Display.
2. Set the encoder and calibration data.
3. Display setting.

Step	Explanation
Creating a Scene to perform Conveyor Panorama Display.	Create a Scene to perform Conveyor Panorama Display.
Setting encoder and calibration data.	Set the encoder value and select calibration data to use for Conveyor Panorama Display.
Display setting	Set display for Conveyor Panorama Display.

The following figure shows the user interface of Conveyor Panorama Display.

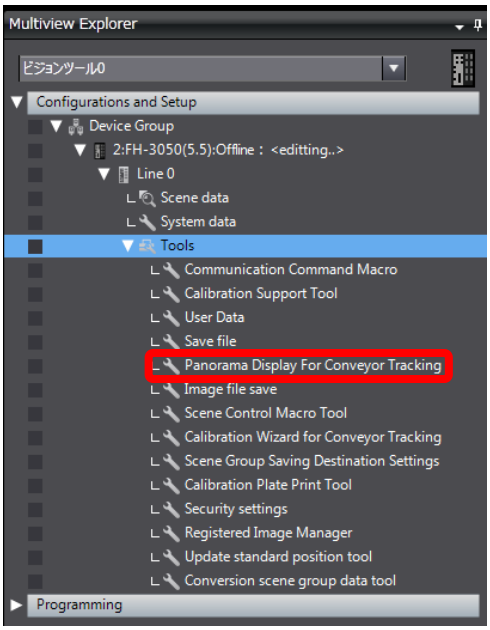


Screen elements	Explanation
Judgment display area	The judgment result of the Conveyor Panorama Display is displayed.
Information display area	Area to display information of FH Sensor Controller, the Scene group name, and the Scene number.
Preview area	Area where the panoramic images will be displayed.
Function List View	Area where parameters for Conveyor Panorama Display are listed and adjusted.
File select and image control area	Area to specify image logs for panorama display or adjust settings for continuous measurements using images from specific folders. For more information, refer to the following manual. Refer to the Scene maintenance window in the *FH Series Vision System Operation Manual for Sysmac Studio* (Cat.No. Z343-E1).
Image size control area	Area where you can enlarge/reduce the image preview size. For more information, refer to the following manual. Refer to the Monitor window in the *FH Series Vision System Operation Manual for Sysmac Studio* (Cat.No. Z343-E1).

3.2. Starting Conveyor Panorama Display

Launch Conveyor Panorama Display from the FH Sensor Controller you are using.

1. On the main window of FH Sensor Controller, select Tool under Multiview Explorer.
   Available tools will be displayed. Double click **Panorama Display for Conveyor Tracking**.



3.3. Creating a Scene to perform Conveyor Panorama Display

To launch **Conveyor Panorama Display**, an exclusive Scene that includes Conveyor Panorama Display processing item needs to be created on FH Sensor Controller.
Add the Conveyor Panorama Display processing item to the Scene that is currently in use for capturing targets and performing conveyor tracking.

This process corresponds to the step 1 in 4.1. Setup Procedure and User Interface of Conveyor Panorama Display.

1. Double click **Panorama Display For Conveyor Tracking.**

A warning dialog will appear if the Conveyor Panorama Display processing item is not included in the current Scene. See 2.

The operation differs depending on the number of the Conveyor Panorama Display processing items included in the Scene.

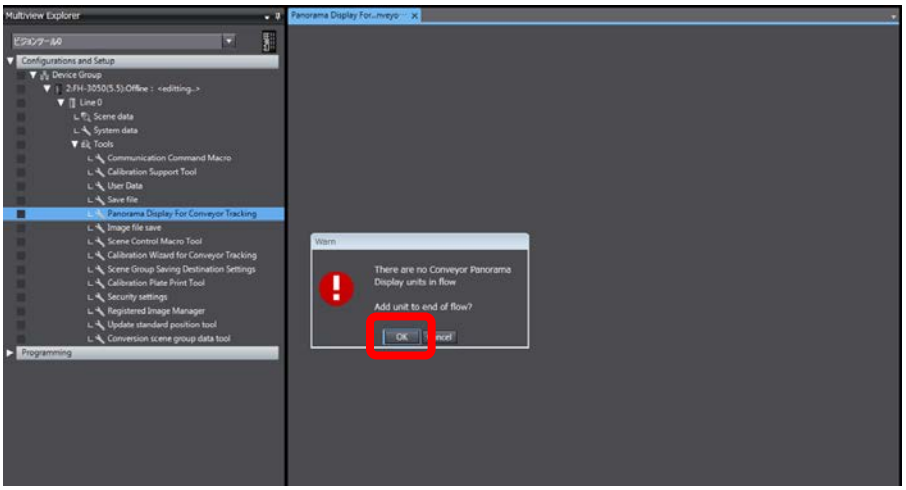
If there are multiple Conveyor Panorama Display processing items, see 4.

If there is only one, see 5.

2. A warning dialog will appear.

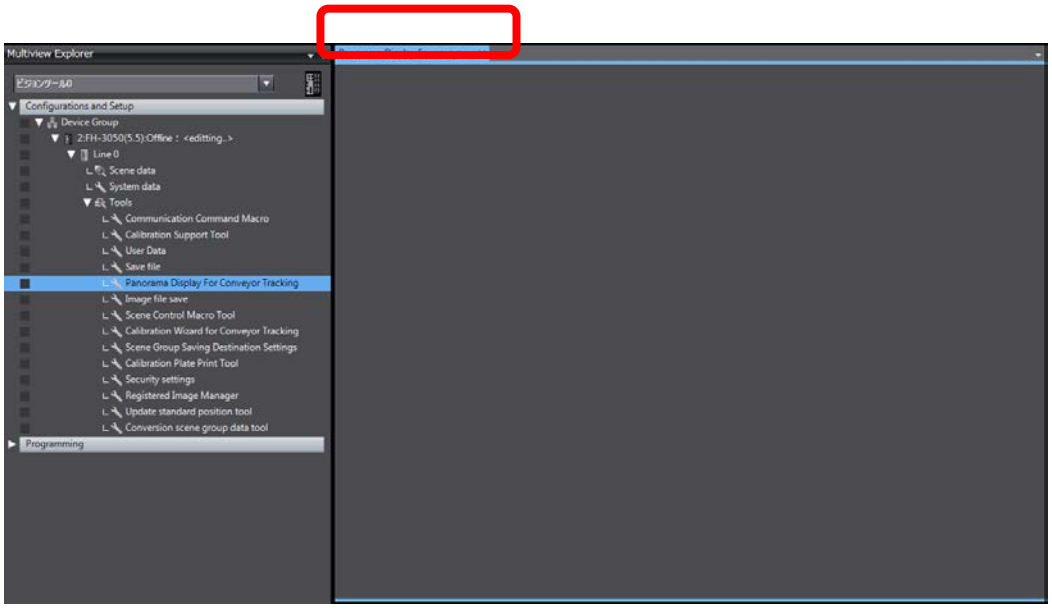
If you click **OK** in the warning dialog, the Conveyor Panorama Display processing item will automatically be added to the current Scene.

After that, the Conveyor Panorama Display will start. See 4.



3. If you click Cancel on the warning dialog, the Conveyor Panorama Display processing item will not be added to the current Scene, and the **Panorama Display For Conveyor Tracking** tab will open.

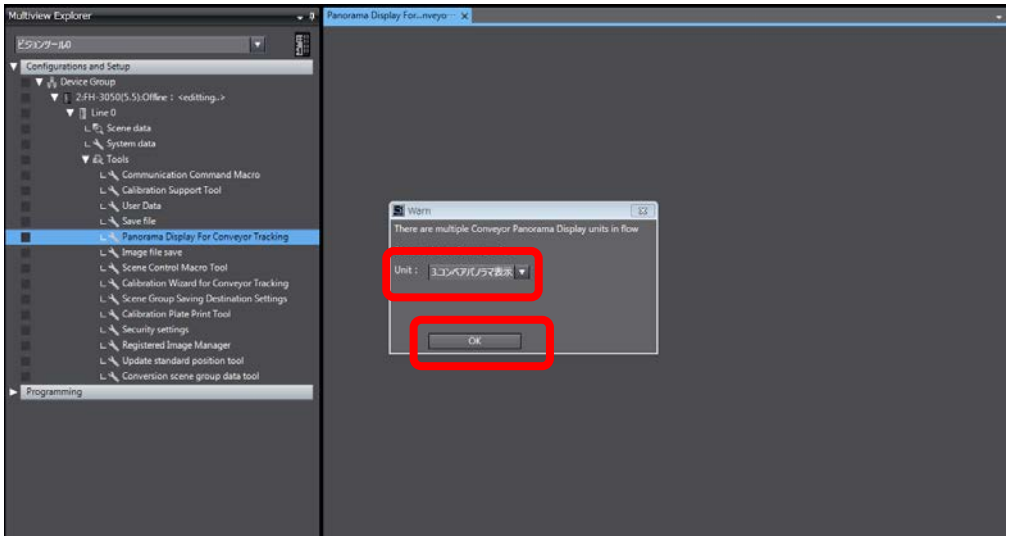
   Click the close button (**x**) on the **Panorama Display For Conveyor Tracking** tab to exit.



4. A warning dialog will appear if there are more than one Conveyor Panorama Display processing items in the current Scene.

   Only one Conveyor Panorama Display processing item can be used with the Conveyor Panorama Display.

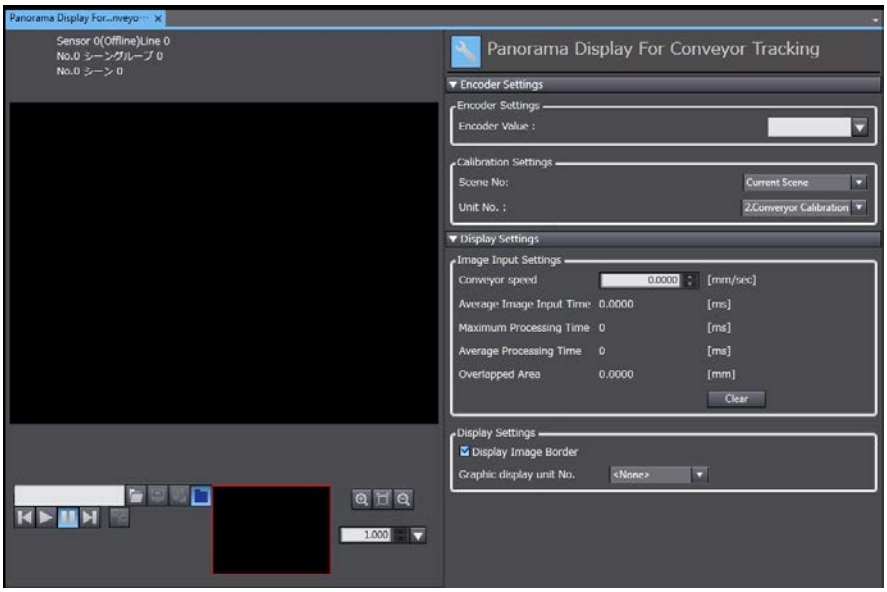
   Select a Conveyor Panorama Display processing item to use from the Unit drop-down list. When completed, click **OK**. See 5.



Parameter	Value [Factory Default]	Explanation
Unit	The Conveyor Panorama Display unit with the smallest unit number in the current Scene.	Select a unit you want to use for Conveyor Panorama Display from the drop-down list. Click ▼ to select the Conveyor Panorama Display processing item to reference.

5. If the current Scene includes a Conveyor Panorama Display processing item, Conveyor Panorama Display Tool window on the **Panorama Display For Conveyor Tracking** will be displayed.

   Set the initial values for encoder value and calibration settings using the selected Conveyor Panorama Display processing item.



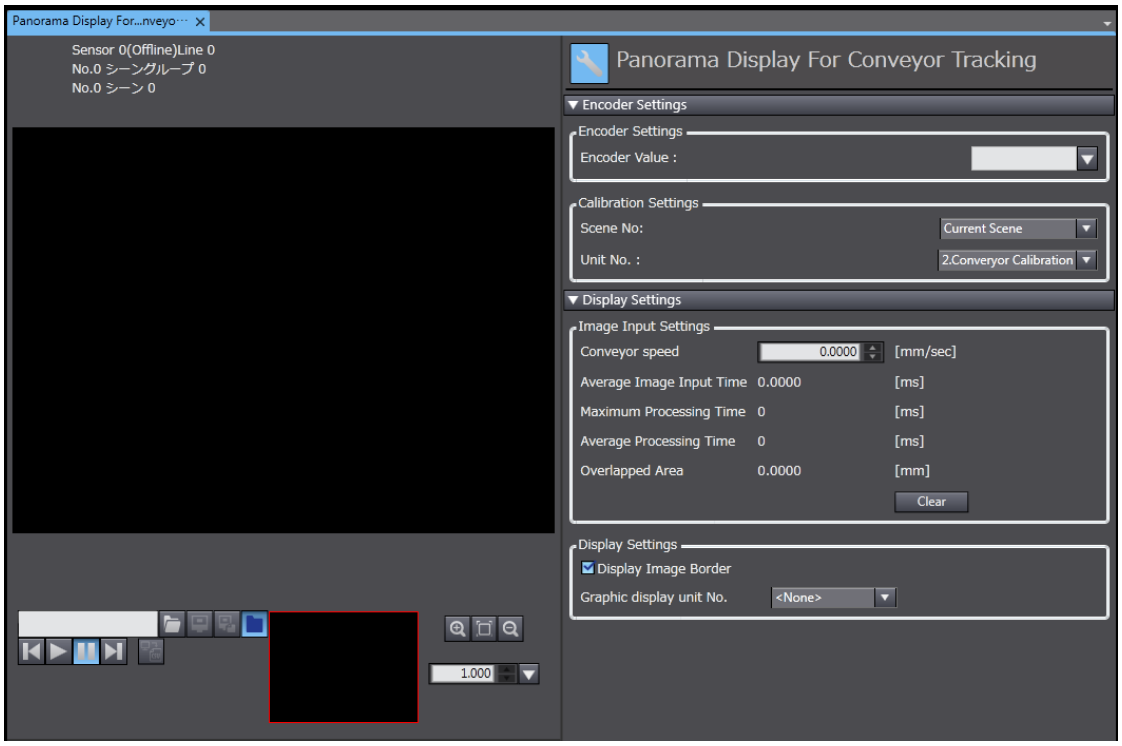
3.4. Setting encoder and calibration data

Set up the encoder and calibration data to perform Conveyor Panorama Display.

If the current Scene is assigned to image capture and conveyor tracking, the Conveyor Calibration processing item and Unit Calculation Macro processing item are included in the Scene. Load data from those processing items.

This process corresponds to step 2 in 4.1. *Setup Procedure and User Interface of Conveyor Panorama Display*.

1. The Conveyor Panorama Display tab page will be displayed.



2. Set parameter under Encoder Setting.
   Click ▼, or enter the value into the box.

Parameter	Value [Factory Default]	Explanation

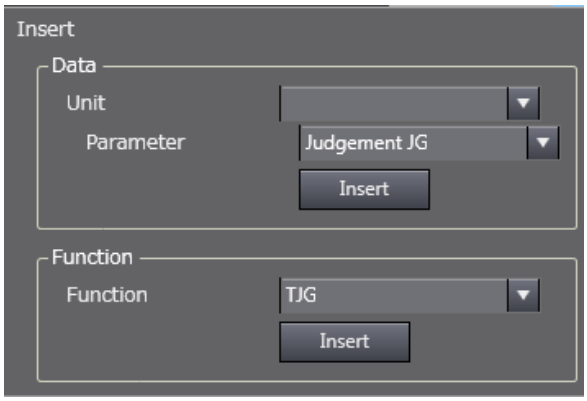
Encoder Value	[Unit for Conveyor Panorama Display]	Set the encoder value in the form of an expression to create panoramic images online. If you click ▼, the Insert dialog will appear. See 3.

Precautions for Use

If you are using a sample Scene provided by OMRON, the encoder value does not need to be set.

3. The Insert dialog appears.

Adjust settings under Data and Function, and click Insert to apply the settings to the value displayed in the Encoder Value box.



Parameter	Value [Factory Default]	Explanation
Unit	Processing items included in the current Scene are available.	Select the processing item that holds the encoder value from the drop-down list. Click ▼ to select processing item to reference.
Parameter	Parameter held in the processing item specified in the Unit box.	To set the encoder value, set the operator that the specified processing item holds. Select an operator from the drop-down list. Click ▼ to show options and select the operator to reference.
Function	Available functions	Select a function that can be used for setting the encoder value from the drop-down list. Click ▼ to show options and select a function.

Insert (the Insert button under Data)	-	When you click Insert, the set unit and parameter will be applied to the Encoder Value box.
Insert (the Insert button under Function)	-	When you click Insert, the set function will be applied to the Encoder Value box.

Reference

On the Insert dialog, the encoder value is set in the form of expression. For more information about available functions and how to enter the value, refer to the Calculation on page 561-571 in the *Vision System Processing Item Function Reference Manual* (Cat. No. Z341-E1).

Useful Information

When you click ▼ the Encoder Value box, the ▼ symbol turns blue ,and the Insert dialog will appear.

8. Set **Scene No** and **Unit No.**

Parameter	Value [Factory Default]	Explanation
Scene No	[Current Scene] Scene 0 to the last Scene number in the Scene group	Select the Scene number for the Scene you want to reference to obtain the calibration data. Click ▼ to select the Conveyor Panorama Display processing item to reference.
Unit No.	[Unit for Conveyor Panorama Display]	Select the unit number to reference to obtain calibration data. The available units for this include Camera Image Input, Camera Image Input FH, Camera Image Input HDR, Camera Image Input HDR Lite, Vision Master Calibration, PLC Master Calibration, Camera, Calibration, and Precise Calibration.

Reference

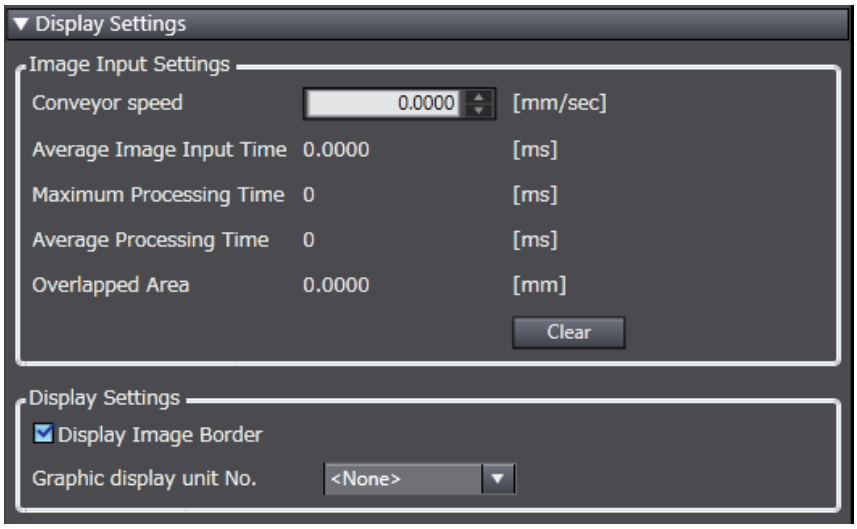
For more information about calibration reference,
refer to ▸ Reference Calib Data on page 648-652 in *Vision System Processing Item Function Reference Manual (Cat. No. Z341-E1)*.

3.5. Display Setting

Data will be loaded from the Unit Calculation Macro unit, etc. Set parameters under Display settings.

This process corresponds to step 3 in 4.1. Setup Procedure and User Interface of Conveyor Panorama Display.

1. Set up parameters under Display settings.



Parameter	Value [Factory Default]	Explanation
Conveyor speed	0.0000 to 99999.9999 [Conveyor speed value obtained from Conveyor Panorama Display]	Adjust values for the conveyor speed in the spin box. The unit of measure: mm/s. Click ▲ and ▼ to adjust the value, or enter the value into the box. The **Average Image Input Time** will be calculated using the following formula. **Average Image Input Time (ms)** = movement per encoder value (mm) x encoder value difference / conveyor speed (mm/s) x 1000
Average Image Input Time	-	**The average time (ms)** of trigger intervals used for image capture is displayed. The value is obtained from Conveyor Panorama Display.
Maximum Processing Time	-	The maximum time spent for processing the current Scene is displayed in ms. Compare with **Average Image Input Time** and adjust the conveyor speed.
Average Processing Time	-	The average processing time (ms) in the current Scene is displayed. Compare with **Average Image Input Time** and adjust the conveyor speed.
Overlapped Area	-	The value of the largest overlapped area of images is displayed. The unit of measure: mm.

Clear	-	When clicked, the following data will be cleared. Maximum Processing Time Average Processing Time Overlapped Area Composited image
Display Image Border	[Cleared] Selected [Value obtained from the Conveyor Panorama Display processing item]	Select to display each image used for panoramic image stitching with a light blue border.
Graphic display unit No.	[Value obtained from the Conveyor Panorama Display processing item]	Select a unit where the desired measurement result to show over the panoramic image is held. The available units include the following: ・Search ・Shape Search II ・Shape Search III ・EC Circle Search ・Labeling

Useful Information

The color and display of graphics are determined by the settings in the selected processing unit. For more information about each processing item, refer to ▸ the *Search, Shape Search II, Shape Search III, EC Circle Search, Labeling in Vision System Processing Item Function Reference Manual* (Cat. No. Z341-E1).

Only a cross symbol will be shown for Labeling. For other processing items, the registered model range and cross symbol are usually shown.

Useful Information

Adjust the conveyor speed physically first, and then enter the value to the **Conveyor speed** box. Value of Conveyor Speed changes 1 mm per click of ▲ or ▼.

To use decimal point values, directly enter the value into the Conveyor Speed box. The entered value will be applied when you click an empty space of user interface outside the Conveyor Speed box.

Useful Information

The overlapped area changes according to the trigger interval. The trigger interval must be adjusted externally.

2. Compares the image of Conveyor Panorama Display Tool window, **Average Image Input Time**, **Maximum Processing Time** or **Average Image Input Time**. Then adjusts the **Converor speed**

Precautions for Use

Regarding **Average Image Input Time**, **Maximum Processing Time** or **Average Image Input Time**

Try to check the actual work piece and operate the system for measurement of the **Average Image Input Time**, **Maximum Processing Time** or **Average Image Input Time.** Then, adjust the **Converor speed**.

・If the proportion of processing time is **Average Image Input Time** ≦**Maximum Processing Time**, objects may be missed because the measurement processing time is longer than the trigger interval in that proportion. Slowdown the conveyor speed.

・Conveyor Speed restricted range is the following;

・**Average Image Input Time**＞**Maximum Processing Time** and **Average Image Input Time** ＞**Average Image Input Time**.

3.6. Troubleshooting

3.6.1. Error message and solution

Error type	Error message	Solution
Calibration has not been performed.	Calibration has not been performed. Failed to create the panorama image.	The Conveyor Calibration unit may not have been selected. Confirm whether the Conveyor Calibration unit is set under **Calibration settings** under Encoder Setting. If not, set the Conveyor Calibration unit accurately by specifying **Scene No** nd **Unit No.**

		The Conveyor Calibration unit is selected, but calibration has not been performed by the Conveyor Tracking Calibration Wizard tool. Switch the Scene that includes the Conveyor Calibration unit, and start the Conveyor Tracking Calibration Wizard tool. On the **Start** page on the **Execute Content** menu, click **Edit** button, and confirm movement per encoder value. If the value is 0, calibration has not been performed with the Conveyor Tracking Calibration Wizard tool. Perform conveyor tracking calibration.
The encoder value is not changed.	Encoder value has not been changed. Failed to create the panorama image.	The result of the encoder value expression did not change. Confirm that the calculation result is changing per image capture using the trend monitor, etc.
		If Sysmac is offline, the file format of the image log currently in use willbe different from the file format of the file that has the encoder value. The name of image logs must have either of the following structures: "Measurement ID_encoder value at image capture.bmp", or "Measurement ID_encoder value at image capture.ifz". (Refer to 3.4. Precautions for off-line measurement with image logs)
	Panorama image creation failed due to out of memory condition.	The image size became too large after panoramic image stitching. Trigger interval may be too long whereby the images do not sufficiently overlap during panoramic image stitching. Set shorter trigger interval.

3.1. Possible Measurement Result Output (Conveyor Panorama Display Tool)

Measurement item	Character strings	Description
Judgment result	JG	Show the judgment result.

3.2. External Reference Table (Conveyor Panorama Display Tool)

No.	Data name	Set/Get	Data range
0	Judge	Get only	0: No Judgement (Unmeasured) 1: Judgement Result OK -1: Judgement Result NG -10: Judgement Result
5	Average image input time	Get only	—
6	Encoder value difference	Get only	—
120	Scene No.	Set/Get	-1：Refer to current scene o to 9,999: Refer to specified scene
121	Unit No.	Set/Get	-1: None 0 to 9,999: Refer to specified unit
122	Conveyor speed	Set/Get	0 to 9,9999 (mm/s)
123	Encorder value	Set/Get	Exp. character string
124	Display image border	Set/Get	0: OFF 1: ON
125	Min. encorder value	Set/Get	Exp. character string
126	Max. encorder value	Set/Get	Exp. character string
128	Graphic display unit No.	Set/Get	-1: OFF 0 to 9,999

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