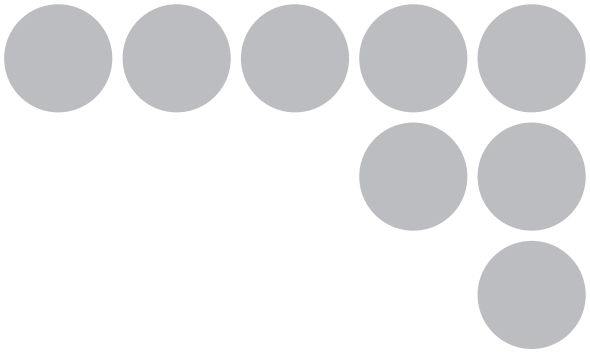
OMRON

Glue Bead Inspection Software



User's Manual

CAT. NO. Z295-E1-02

Contents

1 Glue Bead Inspection Software

This software is the specialized software based on the FZ3 software for inspecting the conditions of the glue bead (sealing, etc) in the vehicle production.
Using this software's various setting functions makes it possible to perform highly accurate and highly efficient inspections through simple operations.

1-1 Software Overview

This software makes it possible to carry out the following inspections:

Glue bead inspection

The glue bead inspection can inspect gaps and overflows from the designated glueing route.
It can also measure the maximum width, minimum width and average width of the glue.

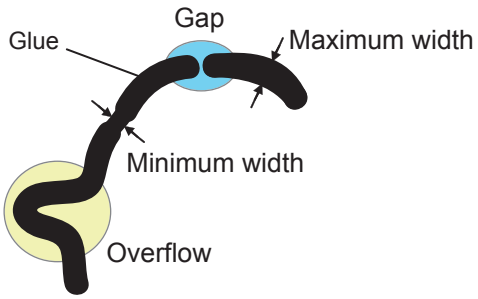
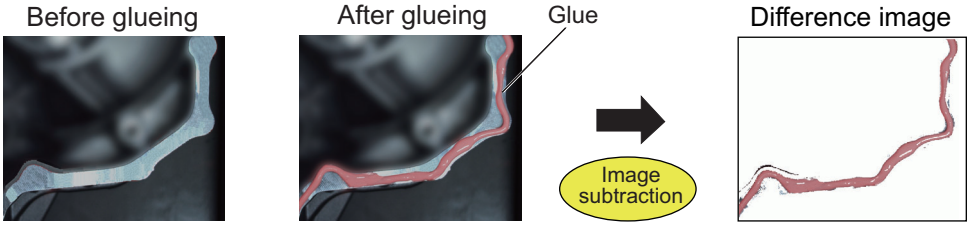


Image Subtraction

This precedure should be done before the "Glue bead inspection".
Comparing the images before and after the glueing is applied and extracting the difference, the glue bead inspection performs more accurately.
Although glue bead inspection can be performed without image subtraction, performing this task makes it possible to achieve more stable inspection results.



1-2 Limitations and Precautions

- Compatible cameras

- Only the color cameras listed below are compatible:
FZ-SC5M/SC2M/SC/SFC/SPC/SLC15/SLC100/SZC15/SZC100

- Compatible controllers

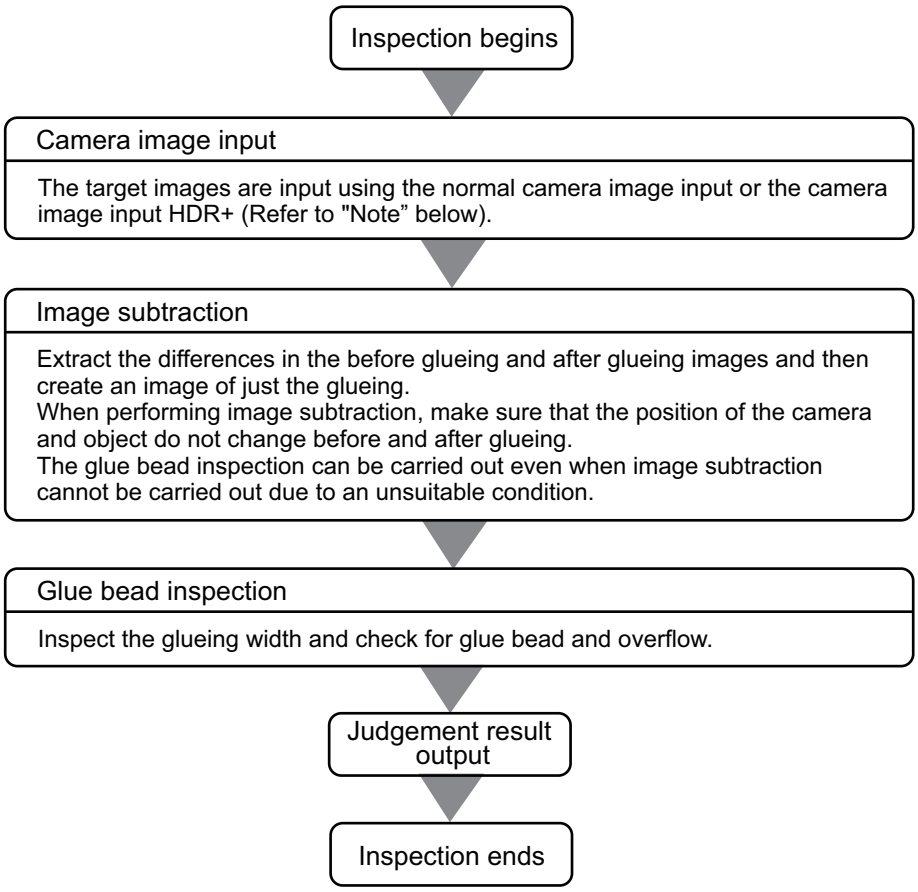
- The following FZ3 series controllers are compatible:
FZ3-H7xx/H7xx-10/H3xx/H3xx-10/7xx/7xx-10/3xx/3xx-10
FZ4-6xx/6xx-10/7xx/7xx-10/L35x/L35x-10

- Usable processing items

This software includes specified processing items for glue bead inspection and processing items that have been narrowed down from standard FZ3 software.
For usable processing items, see "Appendix Processing Items List" (P23).

2 Glue Bead Inspection Flow

This software uses the following flow for glue bead inspection.



Note

Camera Image Input HDR+
With this method, you can acquire an image with a wider dynamic range by combining multiple images photographed consecutively at different shutter speeds.
This is effective with objects that generate halation, images with low-contrast, and environments with fluctuation in the lighting.
For more details, see "Vision Sensor FZ3 Series Processing Items List Manual" (Cat. No. Z291).

● Differences from Standard Software

This software includes the following specialized features for vehicle glueing inspection.
This software also includes functions taken from the standard software necessary for glue bead inspection.
For details, see "Appendix Processing Items List" (P23).

Function name	Contents	Related page
Image subtraction	Extracts the differences before glueing and after glueing.	P3
Glue bead inspection	Performs a glue bead inspection.	P11

3 Image Subtraction

Compares images before and after glueing, extracts the differences, and then only pulls out the information for the glue bead.

Usage Warning

- Difference extraction can only be used for color images. When monochrome images are processed this way, the judgement result is NG (incompatible image).
- For image subtraction, the position of the targeted object must be the same in the images before and after glueing. Image subtraction cannot be accurately carried out when objects obstruct the view between the camera and the targeted object or when lighting conditions vary greatly before and after glueing. In such as case, perform the glue bead inspection without using image subtraction.

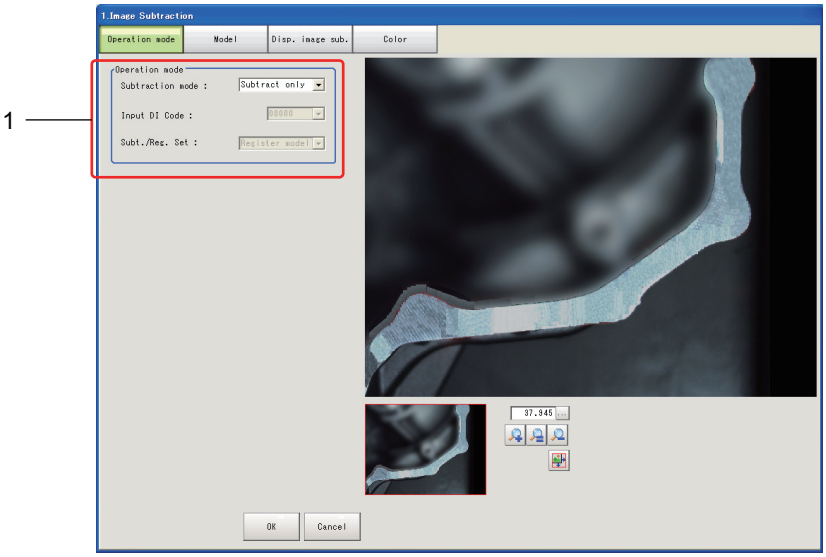
3-1 Settings Flow

Carry out the settings for image subtraction according to the sequence in the following flow.

Operation mode	Set the methods for model registration and difference extraction when a measurement is performed.	➡ P3
Model registration	Use the image before glueing to set the model registration range.	➡ P5
Difference image display	Set difference image extraction method.	➡ P6
Color setting	Set background color of the difference image.	➡ P8

3-2 Operation Mode

Set how it switches from model registration to image subtraction when a measurement is performed.



Note

Select operation mode according to the inspection contents and the on-site environment.
(Example)
- When the glueing process and the glueing inspection process (camera position) are far apart
  →Always perform image subtraction with the model registered before starting inspection
  <Subtract only>
  (Use only if the object stops precisely in the same position every time.)
- When the glueing process and the glueing inspection process (camera position) are in the same location
  →Model registration takes place each time it is input externally <DI Register>
- When using logging images before and after glueing to perform continuous re-measurements
  →Model registration and measuring are carried out alternately <Subt./Reg.>

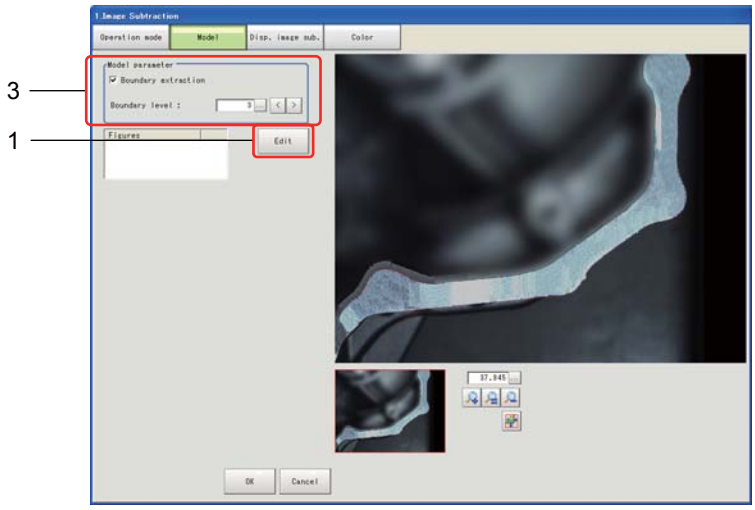
Setting Methods

1. Set the following parameters in the [Operation mode] area.

Setting item	Setting value [Factory default]	Contents	
Subtraction mode	[Subtract only] DI Register Subt./Reg.	Subtract only	Always execute image subtraction processing using the registered model. In setting mode register model, and in operation mode always perform image subtraction processing.
		DI Register	Check DI Input (4~0) during measurement processing and execute model registration only when the signal of the pattern set by the [Input DI Code (4~0)] is input. In other cases execute image subtraction processing. During operation shoot the model images, execute registration and then perform difference processing.
		Subt./Reg.	Every time a measurement is executed, mode switches from model registration to image subtraction processing. Select when performing a re-measurement using logging images. Since model images and measurement images can be alternately read, model registration-measurement work can be conducted off-line.
Input DI Code (4~0)	[00000]~11111	Set the DI input pattern you want to use for model registration. Can only set when [Subtraction mode] is set to [DI Register].	
Subt./Reg. Set	[Register model] Subtract	Set whether model registration or difference extraction will be executed during the next measuring. Can only set when [Subtraction mode] is set to [Subt./Reg.].	

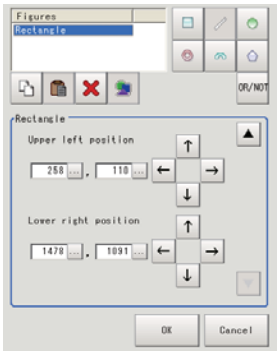
3-3 Model Registration

Use the image before the glueing is applied to set the model registration area.

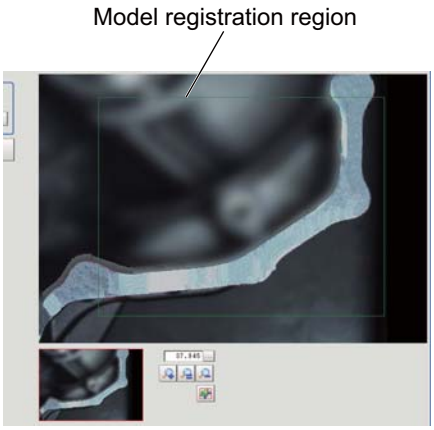


Setting Methods

1. **Tap [Edit].**
   The drawing tools are displayed.

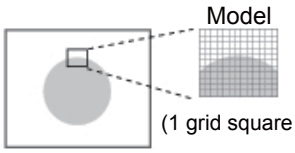


2. **After setting the model registration area with the drawing tool, tap [OK].**



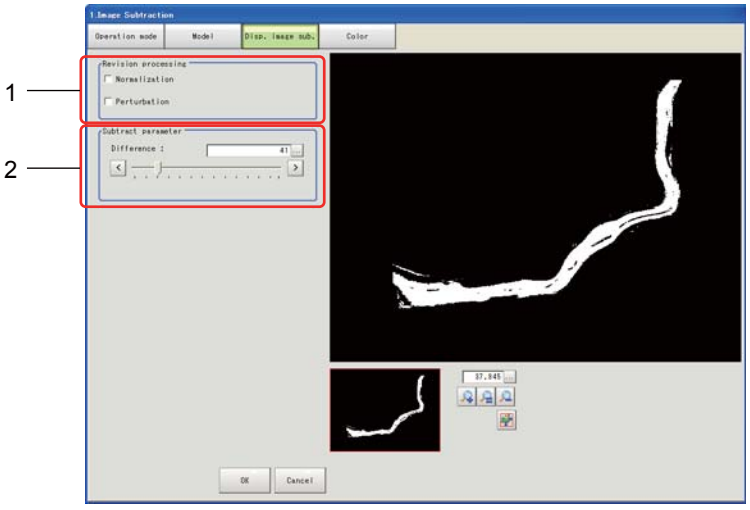
For details on how to use the drawing tools, see the FZ3 User's Manual.

3. If necessary, set the following parameters in the "Model parameter" area.

Setting item	Setting value [Factory default]	Contents
Boundary extraction	[Checked]	Method for using the difference images directly. When the registration model and the target object after glueing can be shot in the exact same position, since there is no misalignment between the images there is no noise caused by difference extraction. In this case, using the difference images as is enables a more accurate measurement.
	Unchecked	This is the method for deleting set pixel values around the edges of the extracted difference image. Set to remove image distortion noise caused by image misalignment when the objected target for inspection or the camera moves a little. To delete the pixel information from the difference image the width measurement is narrower than the actual glueing width.  (1 grid square = 1 pixel) Inspection image  If the object to be measured moves up out of position even a little bit, the boundary areas will be mistakenly extracted as the difference with the model.  When boundary line extraction is set to [Unchecked] the range of "boundary of the model +/- boundary level" is excluded from the inspection. Example) When the [Boundary level] is 3 A range with a width of 6 pixels is excluded from the inspection.
Boundary level	0~9 [3]	Set the degree of assimilation of variations around boundaries.

3-4 Difference Image Display

Set difference image extraction method.
Set when the glueing cannot be accurately extracted due to things like high noise levels.
Carry out the extraction method settings after taking a shot of the conditions after glueing.

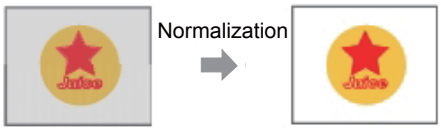


Note

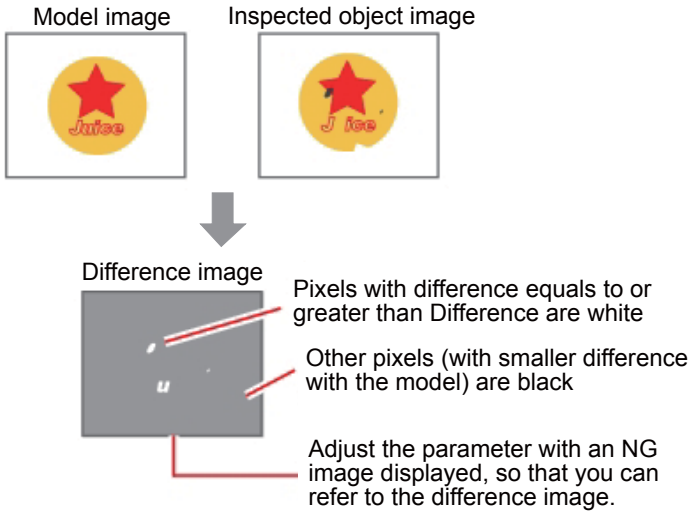
The difference image is displayed in the setting window and the difference is shown in white pixels and everything else is displayed in black pixels.

Setting Methods

1. If necessary, set the following parameters in the "Revision processing" area.

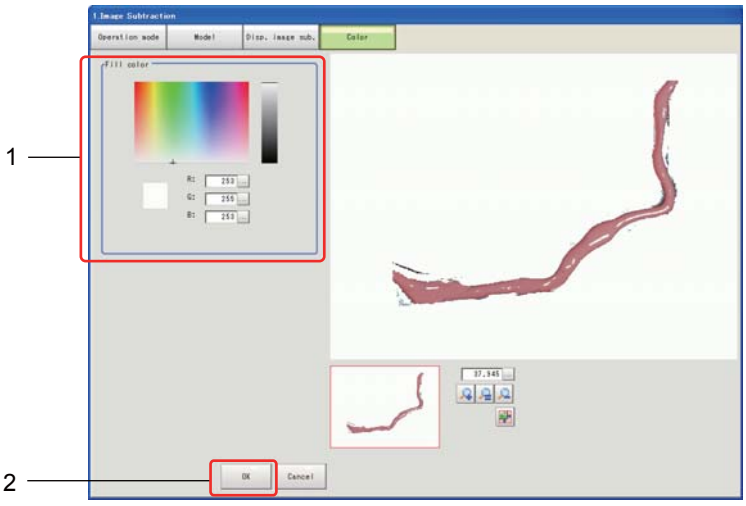
Setting item	Setting value [Factory default]	Contents
Normalization	Checked [Unchecked]	Specify whether to perform normalization based on the brightness in the registered model. When Normalization is checked, the density is adjusted before image subtraction, so that the matching is not affected by changes in the total image brightness or the lighting fluctuations. When normalization is performed on the measured objects without patterns, the total image brightness is changed and the extraction does not work correctly. Model image  Inspection image (When there is an overall darkness) 
Perturbation	Checked [Unchecked]	If you place a check here, in order to prevent mistaken detection of slight positional deviation of measurement objects as differences, image subtraction can be performed after making corrections. However, this requires more processing time.

2. Set the difference judgement value in the "Subtract parameter" area.

Setting item	Setting value [Factory default]	Contents
Difference	0~255 [50]	This sets the reference grayscale used when calculating differences between the model and the inspected object image. Pixels with a difference equal to or greater than Difference are converted to white and other pixels are converted to black, so that only defects are converted to white and measured. 

3-5 Color Setting

Set the background color of the difference image (color of area that could not be recognized as difference).
Perform settings as necessary like when the background and glueing colors are similar and difficult to tell apart.



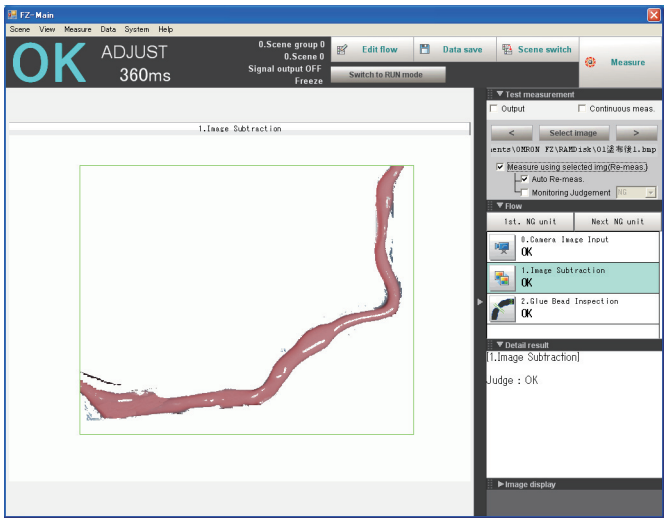
Setting Methods

1. **Set the background color using the color chart in the "Fill color" area.**
2. **When all of the settings are completed, tap [OK].**

3-6 Extraction Results Display

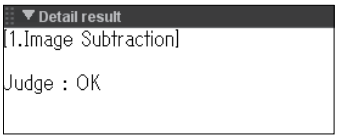
The extraction results are displayed as in the following screen.

- [OK] display example



Display the Detailed Results

The extraction results are displayed in the [Detail result].



3-7 Environment Setting (External Reference Tables)

Measurement Results for Which Output Is Possible (Calculation)

The following values can be output using processing items related to results output. It is also possible to reference measurement values from expressions and other processing units.

Data name	Character string	Output range	Description
Overall judgement result	JG	1, 0, -1	Unit judgement result. 1: OK 0: Unmeasured -1: NG

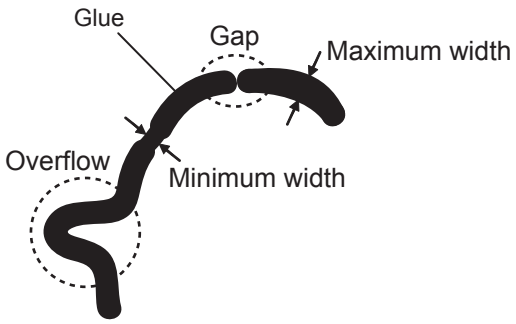
External Reference Table

No.	Data name	Set/Get	Data range
0	Overall judgement result	Get only	1: OK 0: Unmeasured -1: NG
111	Model re-registration graph	Set/Get	0: OFF 1: Reregister
120	Boundary inspection	Set/Get	0: OFF 1: ON
121	Boundary level	Set/Get	0~9
122	Normalization	Set/Get	0: OFF 1: ON
123	Perturbation	Set/Get	0: OFF 1: ON
124	Difference	Set/Get	0~255
125	Model Registration	Set/Get	0: Not registered 1: Registered
126	Fill color R	Set/Get	0~255
127	Fill color G	Set/Get	0~255
128	Fill color B	Set/Get	0~255
129	Extracted image	Set/Get	0: OFF 1: ON
130	Operation mode	Set/Get	0: Subtract only 1: DI Register 2: Subt./Reg.
131	Input DI Code	Set/Get	0~31
132	Subt./Reg. Set	Set/Get	0: Register Model 1: Subtract

4 Glue Bead Inspection

These processing items make it possible to carry out the following inspections:

- Glue bead inspection of specified colors
- Measurement of the maximum width, minimum width and average width for the glueing
- Inspection for glueing overflow from route



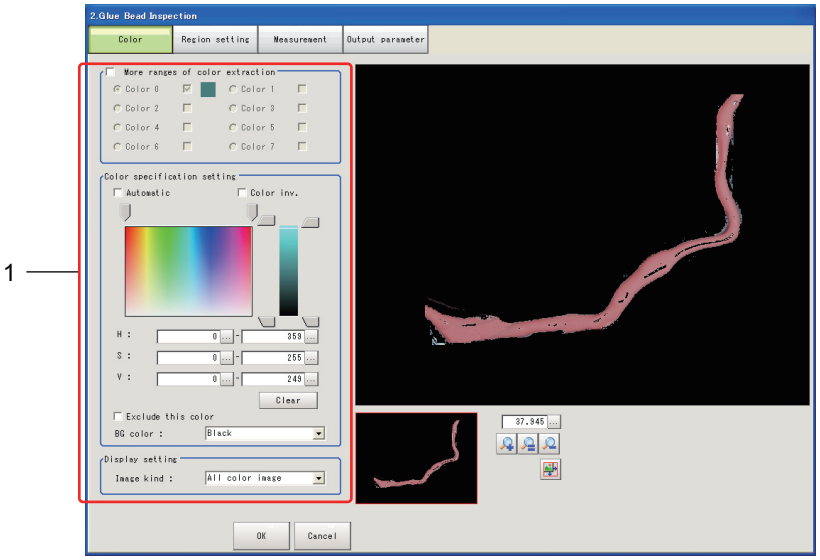
4-1 Inspection Flow

Carry out the settings for glue bead inspection according to the sequence in the following flow.

Color specification	Specify the glueing color and extract it. ➡ P11
Region setting	Set the glueing inspection region. ➡ P13
Measurement parameter	Set the measurement conditions and judgement conditions. ➡ P15
Output parameter	Set the data handling method for outputting the measurement results to an external device. ➡ P17

4-2 Color Specification

Specify the glueing color and extract it.
Perform settings so that everything besides the glueing changes to the background color.



Note

When performing difference extraction
The background color is also one color. Therefore, it is necessary to specify again which color the glueing is.
Easy way to extract glue color.
- In the Image Subtraction setting, set background color with maximum brightness.
- In the Glue Bead Inspection setting, set color brightness 0~254.

Setting Methods

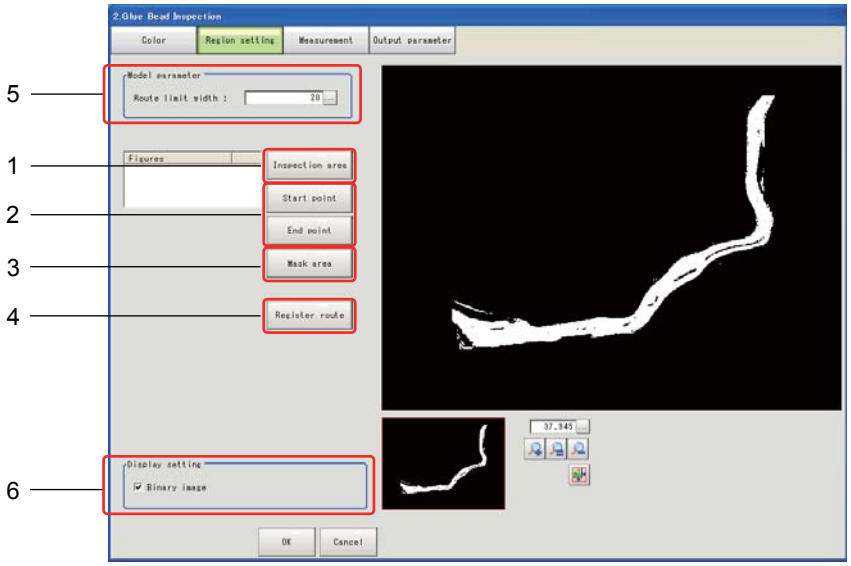
1. Set the following parameters.

Setting item		Setting value [Factory default]	Contents
More ranges of color extraction	Color 0~7	Checked [Unchecked]	If you place a check at this option, you can set up to 8 colors.
Color specification setting	Automatic	Checked [Unchecked]	Specifying the color to be measured on the image automatically sets the hue, saturation, and brightness.
	Color inv.	Checked [Unchecked]	Everything other than the specified color becomes the measurement target.
	H	0~359	Specify the color phase (difference of color hues).
	S	0~255	Specify color saturation (difference of color saturation).
	V	0~255	Specify the brightness (difference of brightness).
	Exclude this color	Checked [Unchecked]	If you place a check at this option, pixels within the HSV range are excluded from color extraction. The priority order for exclusion is that the higher color extraction range numbers are given priority. This setting is disabled if "More ranges of color extraction" is unchecked.
	BG color	[Black] White Red Green Blue	The background section outside the extracted image is filled with the specified colors.
Display setting	Image kind	Measurement image [All color image] Selection color image Binary image	This sets the state of the image to display.

For details on how to specify colors, see the FZ3 User's Manual.

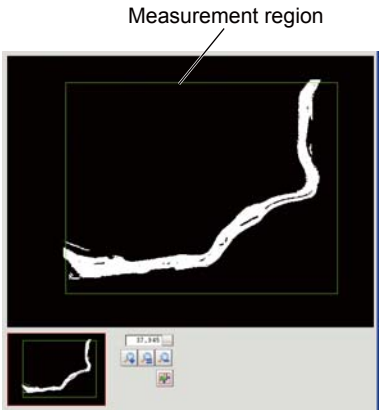
4-3 Region Setting

Set the inspection area and glueing route.
The route can be automatically extracted just by registering the start line and end line and tapping [Register route].

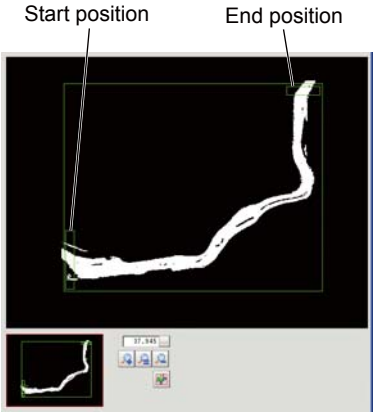


Setting Methods

1. Tap [Inspection area] to register the measurement region.



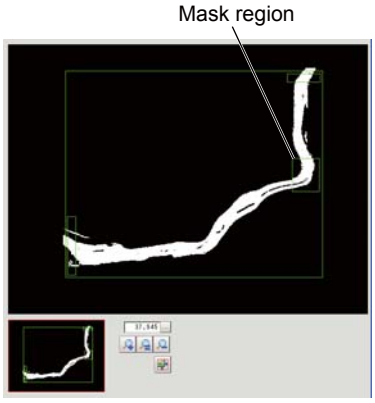
2. Register the start position of the region with [Start point] and the end position with [End point].
Register the positions so that they perpendicularly bisect the glueing.



Important

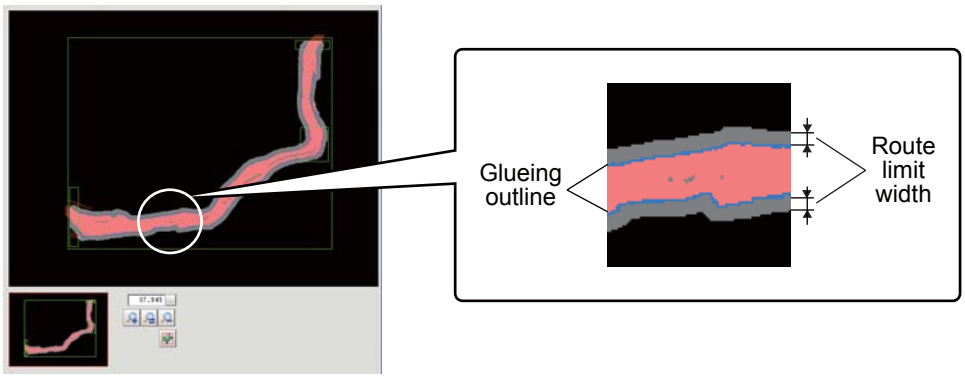
- Make sure that nothing protrudes from the measurement region set in Step 1.
- If they diagonally bisect the glueing, the areas will become the maximum width making it impossible to accurately measure the area.

3. If necessary, use [Mask area] to register the mask region (region in which the measurement results get ignored).



4. Tap [Register route].

Create an outline of the glueing.



Glueing outline (blue, mask region is red): Calculates the width based on this outline information.

Route limit width (gray): The outline + route limit width outline areas are registered. When the glueing exceeds the width it will recognize that the glueing was applied outside of the route and show as an error.

Important

A route creation related error occurs in the following cases.

- Either the start position or the end position are set outside the measurement region.
- Either the start position or the end position are not set.
- The start position and the end position are not in a position where the glueing completely crosses through them.
- There is glue bead somewhere between the start position and the end position.

When there is a break along the way, register multiple glue bead inspections and divide the inspected areas and adjust the settings.

5. If necessary, set the following parameters in the "Model parameter" area.

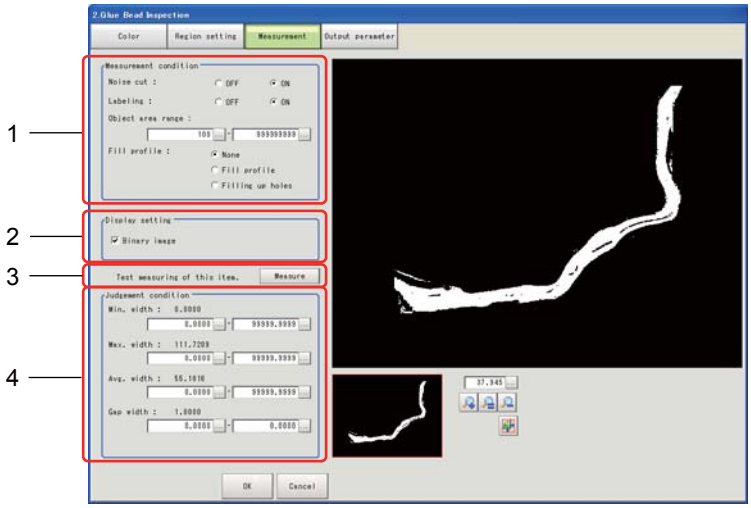
Setting item	Setting value [Factory default]	Contents
Route limit width	0~100 [10]	Specify a glueing route width to be judged as “OK”. When it exceeds the set area the inspection result will be "NG". The unit is pixel.

6. If necessary, set up display settings for the images in the "Display setting" area.

Setting item	Setting value [Factory default]	Contents
Binary image	[Checked] Unchecked	When checked, the binary image is displayed.

4-4 Measurement Parameter

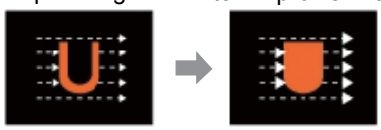
This item specifies the judgement conditions and measurement conditions for the glueing.



Setting Methods

1. If necessary, set the following measurement conditions in the "Measurement condition" area.

Setting item	Setting value [Factory default]	Contents
Noise cut	OFF [ON]	Set when fine pixel noise exists. For stable measurements, in general set processing to "ON".
Labeling	OFF [ON]	Set when fine noise exists. Only the section of the grid specified in the object area range is measured. For stable measurements, in general set processing to "ON".
Object area range	100~999999999	Specify the range of the area to be judged as a label.

Setting item	Setting value [Factory default]	Contents
Fill profile	[None]	The empty section in the center is not filled in.
	Fill profile	In the measurement region, the part between the extracted-color start point and end point in the X-axis direction is filled with the extracted color. Since filling is applied only to the X-axis direction, the processing is faster than filling up holes. Input image After fill profile image 
	Filling up holes	The part surrounded by the extracted color, like a doughnut hole, is filled with the extracted color. Input image After filling up holes image 

2. If necessary, set up display settings for the images in the "Display setting" area.

Setting item	Setting value [Factory default]	Contents
Binary image	[Checked] Unchecked	When checked, the image is displayed in binary with black and white.

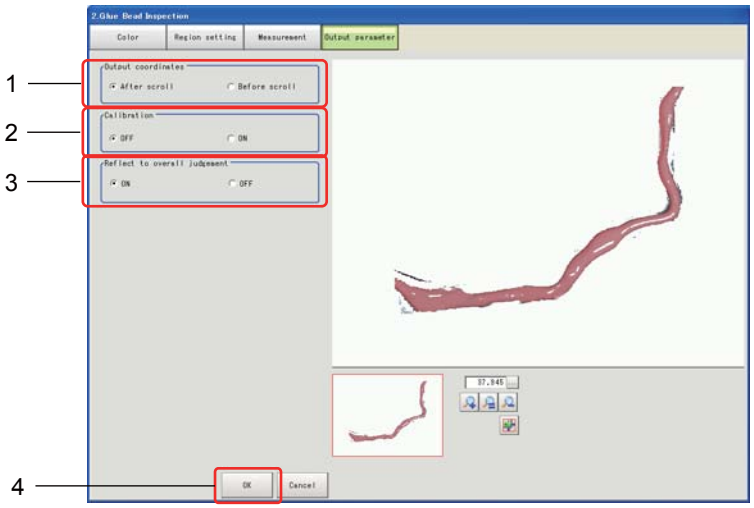
3. When the measurement parameter has been changed, tap [Measure] to verify whether the image is being displayed according to the settings.

4. Specify the judgement conditions in the "Judgement condition" area.

Setting item	Setting value [Factory default]	Contents
Min. width	0~9999.99999	Specify a minimum glueing width to be judged as OK.
Max. width	0~9999.99999	Specify a maximum glueing width to be judged as OK.
Avg. width	0~9999.99999	Specify an average glueing width to be judged as OK.
Gap width	0~9999.99999	Specify a glue bead width to be judged as OK.

4-5 Output Parameter

This sets the data handling methods when measurement results are output to the external devices.



General Information

Normally, the factory default value will be used for this item.
Change the settings only when necessary.

Setting Methods

1. **If necessary, specify the parameters below.**

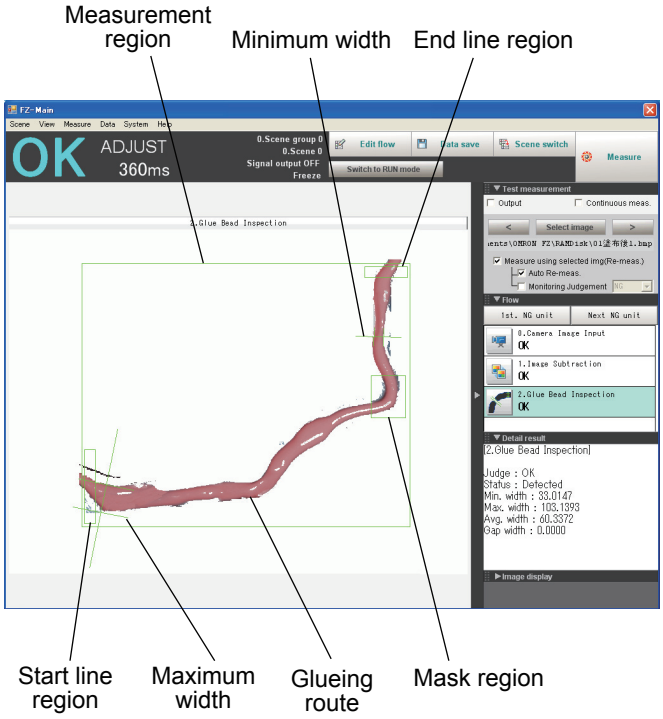
Setting item	Setting value [Factory default]	Contents
Output coordinates	[After scroll] Before scroll	As measurement results, select whether to output coordinate values to external devices before or after the position deflection correction is applied.
Calibration	[OFF] ON	Select whether to reflect the calibration in the values output to the external device as measurement results. ON: Output the coordinates converted into actual dimensions. OFF: Output the camera coordinate values.
Reflect to overall judgement	[ON] OFF	Enables choosing whether or not the judgement results of this processing unit is reflected in the scene overall judgement.

2. **When all of the settings are completed, tap [OK].**

4-6 Measurement Results Display

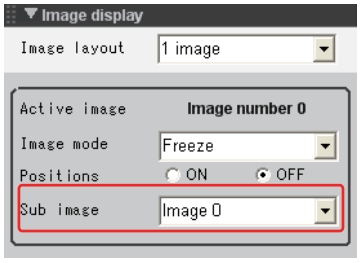
The measurement results are displayed as in the following screen.
When the glueing state is within the set judgement conditions, [OK] is green, and when there is gap, overflow or the glueing state is not within the judgement conditions, [NG] is displayed in red.

- [OK] display example

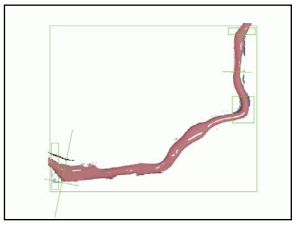


Note

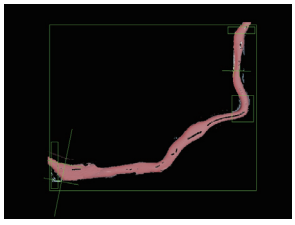
By selecting [Sub image] in [Image display] in the bottom right of the screen the following image is displayed.



・Image 0 : Before color extraction image + inspection results cursor

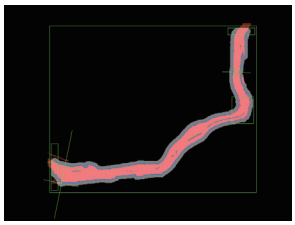


・Image 1 : After color extraction image + inspection results cursor

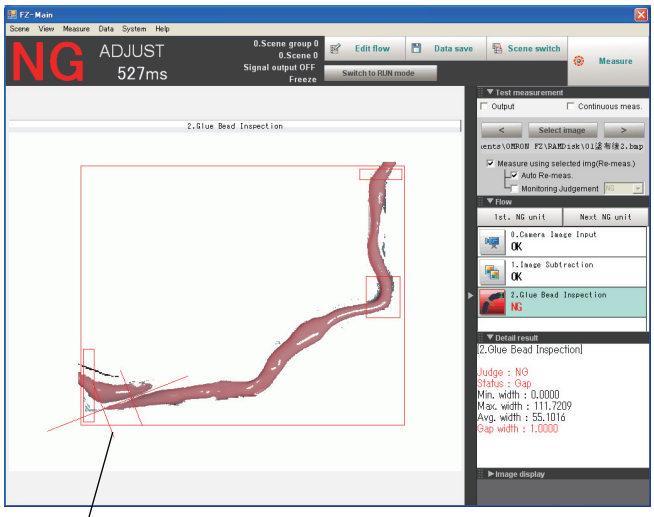


・Image 2 : Before color extraction image + inspection results cursor + route

・Image 3 : After color extraction image + inspection results cursor + route



- [NG] display example

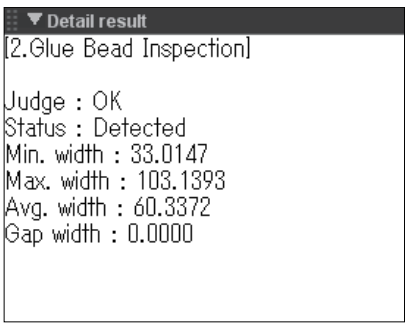


Gap width

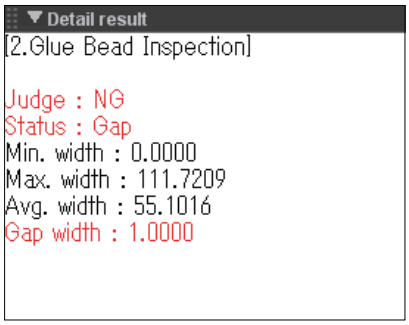
Display the Detailed Results

In the [Detail result], the measured glueing state of the glueing, minimum width, maximum width, average width and gaps are text displayed as follows.

- When OK



- When NG



4-7 Environment Setting (External Reference Tables)

Measurement Results for Which Output Is Possible (Calculation)

The following values can be output using processing items related to results output. It is also possible to reference measurement values from expressions and other processing units.

Data name	Character string	Output range	Description
Overall judgement result	JG	1, 0, -1, -10~-20	Unit judgement result. 1: OK 0: Unmeasured -1: NG -10~-20: Error
Measurement result status	ST	0, 1, 2, -1, -2, -3, -4	This is the measurement results status. 0: Detection possible 1: Gap 2: Route abnormality -1: Unmeasured -2: Region not registered -3: Glueing not detected -4: Route exceedance (insufficient memory)
Minimum width measurement result	MINWD	0~99999.9999	This is the minimum width measurement result.
Maximum width measurement result	MAXWD	0~99999.9999	This is the maximum width measurement result.
Average width measurement result	AVGWD	0~99999.9999	This is the average width measurement result.
Gap width measurement result	GAPWD	0~99999.9999	This is the gap width measurement result.
Coordinates of the minimum width measurement result X1	MINX1	-99999.9999 ~99999.9999	This is the coordinates of the minimum width measurement result X1.
Coordinates of the minimum width measurement result Y1	MINY1	-99999.9999 ~99999.9999	This is the coordinates of the minimum width measurement result Y1.
Coordinates of the minimum width measurement result X2	MINX2	-99999.9999 ~99999.9999	This is the coordinates of the minimum width measurement result X2.

Data name	Character string	Output range	Description
Coordinates of the minimum width measurement result Y2	MINY2	-99999.9999 ~99999.9999	This is the coordinates of the minimum width measurement result Y2.
Coordinates of the maximum width measurement result X1	MAXX1	-99999.9999 ~99999.9999	This is the coordinates of the maximum width measurement result X1.
Coordinates of the maximum width measurement result Y1	MAXY1	-99999.9999 ~99999.9999	This is the coordinates of the maximum width measurement result Y1.
Coordinates of the maximum width measurement result X2	MAXX2	-99999.9999 ~99999.9999	This is the coordinates of the maximum width measurement result X2.
Coordinates of the maximum width measurement result Y2	MAXY2	-99999.9999 ~99999.9999	This is the coordinates of the maximum width measurement result Y2.
Coordinates of the gap width X1	GAPX1	-99999.9999 ~99999.9999	This is the coordinates of the gap width X1.
Coordinates of the gap width Y1	GAPY1	-99999.9999 ~99999.9999	This is the coordinates of the gap width Y1.
Coordinates of the gap width X2	GAPX2	-99999.9999 ~99999.9999	This is the coordinates of the gap width X2.
Coordinates of the gap width Y2	GAPY2	-99999.9999 ~99999.9999	This is the coordinates of the gap width Y2.

External Reference Table

No.	Data name	Set/Get	Data range
101	Coordinates mode	Set/Get	0: After position compensation 1: Before position compensation
102	Calibration	Set/Get	0: Calib OFF 1: Calib ON
103	Reflect to overall judgement	Set/Get	0: ON 1: OFF
126	Extracted image	Set/Get	0: ON 1: OFF
127	Background color	Set/Get	0: Black 1: White 2: Red 3: Green 4: Blue
128	Fill profile presence	Set/Get	0: OFF 1: Fill profile 2: Filling up holes
129	Inverse area presence	Set/Get	0: OFF 1: ON
130	Noise cancel	Set/Get	0: OFF 1: ON
131	Route limit width	Set/Get	2~100
132	Upper limit of minimum width	Set/Get	0~99999.9999
133	Lower limit of minimum width	Set/Get	0~99999.9999
134	Upper limit of maximum width	Set/Get	0~99999.9999
135	Lower limit of maximum width	Set/Get	0~99999.9999
136	Upper limit of average width	Set/Get	0~99999.9999
137	Lower limit of average width	Set/Get	0~99999.9999
138	Upper limit of gap width	Set/Get	0~99999.9999
139	Lower limit of gap width	Set/Get	0~99999.9999
142	Upper limit of the binary level	Set/Get	0~99999.9999
143	Lower limit of the binary level	Set/Get	0~99999.9999
144	Binary image	Set/Get	0: OFF 1: ON
145	Straight line 0 scanned direction	Set/Get	0: Clockwise direction 1: Counterclockwise direction
146	Straight line 1 scanned direction	Set/Get	0: Clockwise direction 1: Counterclockwise direction
152	Display image type	Set/Get	0: Measurement image 1: All color image 2: Selection color image 3: Binary image
153	Upper limit of the object area range	Set/Get	0~999999999
154	Lower limit of the object area range	Set/Get	0~999999999
155	Labeling	Set/Get	0: OFF 1: ON

Appendix Processing Items List

The useable processing items with this software are shown below.

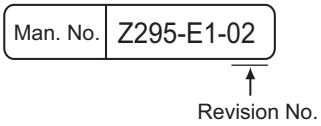
*Processing item names ending with "+" are only available on the model with advanced functions FZ3-UGIH.

Group	Processing item name	Functions included		Contents
		Full	Standard	
Inspecting and Measuring	Glue bead inspection	Yes	No	Performs a glue bead inspection and an glueing route inspection.
	Search	Yes	Yes	For more details about standard processing items, see "Vision Sensor FZ3 Series Processing Items List Manual" (Cat. No. Z291).
	Flexible search	No	Yes	
	Sensitive search	No	Yes	
	ECM search	Yes	Yes	
	EC circle search	No	Yes	
	Shape search +	No	Yes	
	Classification	No	Yes	
	Edge position	Yes	Yes	
	Edge pitch	No	Yes	
	Scan edge position	No	Yes	
	Scan edge width	No	Yes	
	Color data	No	Yes	
	Gravity and area	Yes	Yes	
	Labeling	No	Yes	
	Label data	No	Yes	
	Labeling +	No	Yes	
	Defect	No	Yes	
	Precise defect	No	Yes	
	Fine matching	No	Yes	
	Character inspection	Yes	Yes	
	Date verification	No	Yes	
	Model dictionary	Yes	Yes	
	Barcodes +	Yes	Yes	
	2D code +	Yes	Yes	
	Circle angle	No	Yes	
Loading images	Camera image input	Yes	Yes	
	Camera image input HDR+	Yes	Yes	
	Camera switching	Yes	Yes	
	Measurement image switching	Yes	Yes	

Group	Processing item name	Functions included		Contents
		Full	Standard	
Performing image compensation	Subtract	Yes	No	Extracts the differences between the before glueing image and the after glueing image.
	Position compensation	Yes	Yes	For more details about standard processing items, see "Vision Sensor FZ3 Series Processing Items List Manual" .
	Trapezoidal Correction +	Yes	Yes	
	Filtering	Yes	Yes	
	Background suppression	Yes	Yes	
	Color gray filter	Yes	Yes	
	Extract color filter	Yes	Yes	
	Anti color shading	Yes	Yes	
	Stripes removal filter +	Yes	Yes	
	Halation cut +	Yes	Yes	
	Panorama +	Yes	Yes	
	Polar transformation	Yes	Yes	
Supporting inspection and measurement	Calculation	Yes	Yes	
	Line regression	Yes	Yes	
	Circle regression	Yes	Yes	
	Calibration +	Yes	Yes	
	Set unit data	Yes	Yes	
	Get unit data	Yes	Yes	
	Set unit figure	Yes	Yes	
	Get unit figure	Yes	Yes	
	Trend monitor	Yes	Yes	
	Image logging	Yes	Yes	
	Data logging	Yes	Yes	
	Elapsed time	Yes	Yes	
	Wait	Yes	Yes	
Branch control of processing	Conditional branch	Yes	Yes	
	End	Yes	Yes	
	DI branch	Yes	Yes	
Externally outputting results	Data output	Yes	Yes	
	Parallel data output	Yes	Yes	
	Parallel judgement output	Yes	Yes	
Displaying results on screens/ windows	Result display	Yes	Yes	
	Display image file	Yes	Yes	
	Display last NG image	Yes	Yes	

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.



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01	Sep. 2009	First print
02	Jul. 2012	Compatible controllers are changed.

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