PV Module Equipment

npcgroup. net

Camera Inspection Manual

Omron FZ3

Revision 14.1



NPC Incorporated

Thank you for your selecting our product. Please keep this manual handy for future reference.

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1. How to Create Alignment Template for OMRON FZ3

(For Tabbing & Stringing Machine: Busbar Inspection)

1-1. Outline

OMRON-FZ3 software automatically creates the flow for producing template which is necessary for the cell alignment inspection for tabbing & stringing machine. Use the flow for setting individual measuring items. The configuration of the created flow can be edited, too.

The flow of which each item has been set is called [Scene], and the group that has 101 scenes is called [Scene Group]. Up to 32 scenes can be set.

In the following page, the process to create template is shown in a flow chart.







1-2. Flow Chart of Template Creation



1-3. Switch language display



The controller is restarted when language is switched, Click [Data Save] button to save the setting before switching languages.

(1) Click [Language Setting] in [Controller] of [System].

ADJU	Camera I	10 Scene 10		_
	Communication Controller	Ad Date-time setting	just Camera0	Adj
	Screen capture	Language setting	Setting	Adju
		Startup settine Select RUN mode RUN mode view settin Oreate shortcut Encoder trigger setting Password setting	¢	
		System initialization System restart		
		System information		

(2) Select the target language and click [OK] button, then the PC restarts. Check that the machine is not in auto mode and there is no problem with restarting the controller, and then click [Yes] button. Data will be saved and the controller restarts. After restarting, the language switches and the main screen is displayed again.

Select language o	f the system.		
Language : En	(i sh panese		
Help	glish OK	Cancel	
Language setting			
Change language?			

1-4. How to Create Template

Copy the scene if the settings are same as other inspection template (scene) apart from cell size. 5 steps are required for scene setting. Refer to: [1-4-1. Switch User], [1-4-2. Copy], [1-4-4. Switch Screen (Importing Image)], [1-4-3. Edit Scene Name], [1-4-6. Save Inspection Template]

1-4-1. Switch User

Switch user setting and log in again, and then set the security level to "1". Some items cannot be edited if the security level is "0".

(1) Click [User Change] button on the main screen to display [User change] screen, then log in.

securityLevel 0	Adjust Camera0	Adjust Camera1	Initialize Flow	User Change
Switch to RUN	Area Setting	Adjust Threshold	Display Setting	🚹 Data save
SWITCHTO KON	Alea Setting	Aujust Threshold	Dispidy Setting	
r Change SecurityLavel :				
UserNane	*	Edit		

(2) Choose [admin] for user and click [...] button for password.

User Change		
SecurityLevel : 1		
UserName		Edit
Password		
	OK	Cancel

(3) Enter the password on the password entry screen and click [OK] button. The screen returns to [User Change]. Click [OK] button.

<Reference>

The initial password is "omron".

â		Ha	rk	Ð	-11										
1	a	ь	e.	d	e	f	x	h	1	7	0	9	1	DC DO	CLR
	1	k	1	n	n	٥	P	a	r	4	5	6		Enter	
	5	t	ų.	×.	v	×	Y	z		1	2	3		Shace	
										0	96			t	
												٨	/a	+ 1	->



(4) The screen returns to the main screen. Check that [Security Level] is "1".

4.Scene 4 SecurityLevel 1	Adjust Camera0	Adjust Camera1	Initialize Flow	User Change
Switch to RUN	Area Setting	Adjust Threshold	Display Setting	💾 Data save

1-4-2. Copy

The following describes the case that the outline alignment template for 125×125 size cell has been stored in "Scene 10" and you want to create the outline alignment template for 150×150 size cell for "Scene 15".

(1) Click [Scene maintenance] from the toolbar on the main screen to display [Scene maintenance] screen.

📰 FZ-Main	
Scene View Measure Data System	elp
Edit flow ADJUST	4.Scen SecurityLev Switch to RU
- Anno	cene maintenance
	Scene group 0.Scene group 0 Scene group name : Scene group name : Scene group 0 Scene group name : Scene group 0 Scene 1 Scene 3 A.Scene 4 A.Scene 5 Scene 7 Scene 7 Scene 8 Scene 9 II.Scene 10 II.Scene 11 Scene 12 Scene 13 I.Scene 14 Scene 18 Scene 18 Scene 10 Scene 18
	Close

(2) Choose the source scene number and click [Copy] button.

cene group	(C)		· · · · · · · · · · · · · · · · · · ·
0-Scene group 0	_	Suitch	MR FALA
Scene group name : Scene group 0		Bornen	
Scene			
0.Scone 0 1.Scone 1 2.Scone 2 3.Scone 3 4.Scone 4 5.Scone 5 5.Scone 6 0.Scone 6 0.Scone 6 1.Scone 10 1.Scone 12 13.Scone 13 14.Scone 15 15.Scone 15 16.Scone 18 19.Scone 18 19.Scone 18 19.Scone 18 19.Scone 18 19.Scone 18 19.Scone 19 19.Scone 19	Author : Note :	Copy Copy	Clear
Scene name : Scene 10			
<u></u>			

(3) Choose the destination scene number and click [Paste] button. The confirmation screen will be displayed. Click [Yes] button and [Close] button.

0.Scene group 0	-	The second secon	1
Scene group name : Scene group 0	!	🖶 Switch	🗂 Edit
Scana			
0-Scene 0 1-Scene 1 2-Scene 2 3-Scene 3 4-Scene 5 6-Scene 6 7-Scene 7 8-Scene 7 8-Scene 9 10-Scene 10 11-Scene 10 12-Scene 12 13-Scene 13 14-Scene 14 15-Scene 15 14-Scene 16 17-Scene 18 18-Scene 18 18-Scene 18 18-Scene 18 19-Scene 19 19-Scene 1	Author : Note :	Сору	Paste & Clear
Scene name : Scene 15			Close
+			
rwrite confirmation)verwrite 'Scene 10' to 'Scene 1	5' ?		

(4) The setting of "Scene 15" is exactly same as "Scene 10". Capture the image of 150 × 150 size cell, click [Scene switch] of [Scene] on the toolbar, choose [Scene 15], and click [OK] button to display the main screen. For importing image, refer to [1-4-4. Switch Screen (Importing Image)].

FZ-Main Scene View Measure Data	Switch scene		
Edit flow Scene switch	Scene group :	0.Scene group 0	Switch
Scene maintenance Unit setting	Scene :	15-Scene 15	-
		ОК	Cancel



(5) Edit copied scene's name. Refer to [1-4-3. Edit Scene Name].

1-4-3. Edit Scene Name

[Scene **group** 0] has 101 scenes which are numbered from 0 to 100. **Do not use [Scene 0].** [Scene **group**] can be edited with [Edit] button. However, only [Scene **group** 0] is used for this machine.

(1) Click [Scene maintenance] of [Scene] and choose the scene number to edit its name.

Scene View Measure Data System	yScene group	
Edit flow Scene switch Scene maintenance Unit setting ms	D.Scene group name : Scene group 0 Scene group name : Scene group 0 Scene fill	Cory Clear
	16.5cene 16 17.5cene 17 18.5cene 18 19.3cene 18 Scene 18 Scene 18 Scene 10	

(2) Edit the name using the entry keyboard which appears by clicking [...] button next to [Scene group name].

After editing the name, click [OK] button, then it returns to [Scene maintenance] screen. Click [Close] button to return to the main screen.

**The number of characters which can be entered is limited.



1-4-4. Switch Screen (Importing Image)

Switch the camera images in order to import image of the cell for template.

(1) Click [Image display] to show the detail of the display.



(2) Switch [Image mode] from [Freeze] to [Through].

The image which is currently on camera is displayed on the screen.

📱 🔻 Image display	
Image layout	1 image 💌
Active image	Image number 0
Image mode	Freeze 👻
Positions	Through
Sub image	Freeze Last NG

(3) Set a cell on the camera inspection position; turn on vacuum of LED table turn on the LED lamp with manual operation.

*Refer to the operating manual for manual operation.

(4) Edit each setting item of copied scene. Refer to: [1-4-5. Set Each Setting Item].

1-4-5. Set Each Setting Item

The scene copied for busbar inspection as in [1-4-2. Copy] has flow which has fifteen setting items.



Busbar Inspection Flow

*You can change flow order or setting item is each flow. For editing flow, refer to: [1-4-5. Set Each Setting Item]

Flow Setting Item	Description
0 Comoro Imago Innut	Adjust camera's shutter speed so that busbar image of cell in copied
	scene is sharply defined. Refer to: [1-4-5-1. [0. Camera Image Input]]
1 Coloulation	Set the reference value to judge each inspection.
	Refer to: [1-4-5-2. [1.Calculation]]
	Detect cell edge with light-dark change in the region.
2 Soon Edge Desition	This setting is necessary for correcting the gradient of cell's bottom
2.5can Euge Position	edge measured in [3. Position Compensation].
	Refer to: [1-4-5-3. [2.Scan Edge Position]]
	The cell edge location on the camera image (reference position) is set
2 Desition Componention	based on the gradient data of cell bottom edge (measurement position)
5.Position Compensation	detected in [2.Scan Edge Position]. You do not need to edit setting if
	you copied scene.

Flow Setting Item	Description
	This setting is to detect cell edge accurately, and it is necessary for
	correcting cell edge's gradient in [6. Position Compensation].
4. Scan Edge Position	[6. Position Compensation] is for correcting left and bottom cell edges.
	[4.Scan Edge Position] is for cell's bottom edge, while [5. Scan Edge
	Position] is for left edge. Refer to: [1-4-5-5. [4.Scan Edge Position]]
	This setting is to detect cell edge accurately, and it is necessary for
	correcting cell edge's gradient in [6. Position Compensation].
5. Scan Edge Position	[6. Position Compensation] is for correcting left and bottom cell edges.
	[4.Scan Edge Position] is for cell's bottom edge, while [5. Scan Edge
	Position] is for left edge. Refer to: [1-4-5-6. [5. Scan Edge Position]]
	The cell edge location on the camera image is set in order to capture
	the entire cell image. You need to change the reference position
6. Position Compensation	according to the cell size. Reference position is the location of the cell
	edges set in [4.Scan Edge Position] and [5.Scan Edge Position] on the
	camera image. Refer to: [1-4-5-7, [6, Position Compensation]]
	This setting is for measuring cell center misalignment with reference to
7.Busbar Alignment	busbar position. Refer to: [1-4-5-8. [7.Busbar Alignment]]
	This setting is necessary to measure the difference between width and
	height of the cell [8 Scan Edge Width] is for measuring width of the
8. Scan Edge Width	cell Values set in [8 Scan Edge Width] and [9 Scan Edge Width] are
	used for [1 Calculation] Refer to: [1-4-5-9] [8 Scan Edge Width]]
	This setting is necessary to measure the difference between width and
	height of the cell [9 Scan Edge Width] is for measuring height of the
9.Scan Edge Width	cell Values set in [8 Scan Edge Width] and [9 Scan Edge Width] are
	used for [1 Calculation] Refer to: [1-4-5-10 [9 Scan Edge Width]]
	This setting is to reject cell if the difference between the cell center
	based on husbar print position measured in [7 Busbar Alignment] and
10.Outline Alignment	the cell center based on cell outline is bigger than the value set in
	[1 Calculation] Refer to: [1-4-5-11 [10 Outline Alignment]]
	This setting is to reduce shutter speed of the camera in order to get
11 Camera Image Input	darker cell image for [12 Outline Detect Inspection]
	Refer to: [1_4_5_12_[11 Camera Image Input]]
	It is the setting for detecting location where the perimeter and shape
	differ with the outline after extracting cell outline automatically and
12.Outline Detect Inspection	while tracing the extracted outline points
	Pefer to: [1.4.5.13, [12 Outline Detect Inspection]]
	In the outline detect inspection, the locations that are indented in
	relation to the perimeter edge is detected. However, detection can be
	difficult at the chamfer of a cell corner area where there is no
13.Corner Defect Height	indentation. Therefore, the distance from vertex of the cell
	circumscribed rectangle to the corner is measured to detect the
	chamfer defects. Refer to: 11-4-5-14 [13 Corner Defect Height]]
12.Outline Detect Inspection 13.Corner Defect Height	it is the setting for detecting location where the perimeter and shape differ with the outline, after extracting cell outline automatically and while tracing the extracted outline points. Refer to: [1-4-5-13. [12.Outline Detect Inspection]] In the outline detect inspection, the locations that are indented in relation to the perimeter edge is detected. However, detection can be difficult at the chamfer of a cell corner area where there is no indentation. Therefore, the distance from vertex of the cell circumscribed rectangle to the corner is measured to detect the chamfer defects. Refer to: [1-4-5-14. [13.Corner Defect Height]]

Flow Setting Item	Description
	This setting is to enter expression to judge each inspection.
14.Calculation	You do not need to edit setting if you copied scene.
	Refer to: [1-4-5-15. [14.Calculation]]
15 Data Quitaut	This setting is for the signal to be transmitted to PLC.
15.Data Output	Refer to: [1-4-5-16. [15.Data Output]]

1-4-5-1. [0. Camera Image Input]

Adjust camera's shutter speed so that busbar image of cell in copied scene is sharply defined.

(1) Click [0.Camera Image Input] icon button in the flow, and choose [Camera 0] and [Camera setting] screen.

Πr		
	OK	CameraD Camera1 Camera2 Camera3 Select camera Camera setting Screen adjust Vnite balance Oal bration
	0K	Camera settings Shulter speed : G Select typical value 17/1000 Is
	2.Scan Edge Position OK	C Set by number 1/ 1000 s Gain : 20 >
	3.Position Compensation OK	Number of lines to be read
	4.Scan Edge Position OK	Start line :
	5.Scan Edge Position OK	Electronic Flab setting STEP - STGUT delay : 80 us 0
	6.Position Compensation OK	STGQUT polarity : @ Pesitive @ Regative
	7.Busbar Alignment OK	
	8.Scan Edge Width OK	He to OK. Cencel

(2) Adjust shutter speed on [Camera settings] so that busbar image is clearly defined.

.Camera Image Inp	ut		
CameraO	Camera1	Camera2	Camera3
Camera setting	Screen adjust	White balance	Calibration
Camera setting Shutter speed © Select ty © Set by nu Gain :	s : pical value [1, mber 1/ [/1000 ▼ s 1000 s 20	
Number of line Start line : End line :	<	······································	

1-4-5-2. [1.Calculation]

Set the reference value to judge each inspection.

(1) Click [1.Calculation] icon button in the flow and display [Setting] screen.



(2) Setting items for No.0 to No.4 are as follows.

Setting	Output parameter		
(Expression set	ting		
No. Commen	t	Expressio	n
O MAX ER	ROR(CELL WIDTH)	0.5	
1 MAX ER	ROR(PRINT)	0.5	
2 MAXER	ROR(ANGLE)	0.5	
3 pixcel	<==>mm	0.1576	
4 STD CE	LL SIZE	156	
5			
8			

No.0	Input cell outline alignment's tolerance.
No.1	Input busbar print position's tolerance.
No.2	Input cell angle's tolerance.
No.3	Input converted value between 1 pixel and mm. (You need not to edit the setting.)
No.4	Input cell size in use in millimeter.

*Refer to following pages for how to input.

(3) Choose the expression number to be edited and click [...] button of [Expression].

No.	Comment	Expression	
0 1 2 3 4	MAX ERROR(CELL VIDTH) MAX ERROR(PRINT) MAX ERROR(ANGLE) pixcel(==>nm STD CELL SIZE	0.5 0.5 0.1576 156	
5 6 7 •			
No. 1			
Expre	ession :		
0.5			

(4) Enter tolerance value with keypad and clock [OK] button.

).Camera Image Input	•				FUN	IC>>
RotationPolar RP		В	s	DEL	←	→
		7	8	9	()
		4	5	6	1	*
		1	2	3	-	,
		0			+	TJ

(5) After filling each setting item, click [OK] button on [Setting] screen.

Ho. Common 2 MA3 1 3 pixes 4 STE 1 5 6	nt Exerced on 2015 - 0.5 2015 - 0.5 2015 - 0.5 1(CTONE 0.150 1(CTONE 0.150	
1	[]	 1.
0	×	
No. C		
Convent :	AK ERROR(CELL #107H)	let
Expression	r	200
Desident of the	1.5007	100
NP2014 - 1		
Judgement of	199311109	

1-4-5-3. [2.Scan Edge Position]

Setting of [2.Scan Edge Position] is designed **to detect cell edge with light-dark change in the region**. This setting is necessary for correcting gradient of cell bottom edge measured in [3. Position Compensation]. In this setting, the region is adjusted in [Region setting] screen and then the parameter is checked in [Measurement] screen.

(1) Click [2.Scan Edge Position] icon button in the flow and click [Edit] button on [Region setting] screen.



- (2) Display the region to be edited by zooming in the image and shifting the red rectangle on the left in the picture below with the mouse.
- (3) The green lines indicate the region to be measured, while gray rectangles indicate the midpoint of the region. The region size changes by dragging the gray rectangle on cell image. The region shifts by dragging the center green line. Include enough wide part of bottom cell edge to detect cell's gradient accurately, as shown in the picture below.



(4) Click [Measurement] tab to check if edge is detected accurately. If detected, click [OK] button to display the main screen.



1-4-5-4. [3.Position Compensation]

In [3. Position Compensation], the cell edge location on the camera image (reference position) is set based on the gradient data of cell bottom edge (measurement position) detected in [2.Scan Edge Position]. **You do not need to edit setting if you copied scene.**

0.Camera Image Input							
K IK	Position Com ensation						
OK	Scroll method Regi	ion setting		_			
2.Scan Edge Position	Method :	Dalculation	*				
UK	Course Incore a	E Vith rotation					
B.Position Compensation	⊂ Camera image	☞ Prev laage	2				
4.Scan Edge Position OK	Interpolation : C None	¢ Bilinear					
5.Scan Edge Position	Reference X :						
6.Position Compensation OK	Υ: θ:	0					
7.Busbar Alignment OK	Position	1					
8.Scan Edge Width OK	Υ: 0:	02.TH					
	Help	04	Gancel		40.000		

1-4-5-5. [4.Scan Edge Position]

In this setting, the region is adjusted in [Region setting] screen and then the parameter is checked in [Measurement] screen.

This setting is to detect cell edge accurately, and it is necessary for correcting cell edge's gradient in [6. Position Compensation].

[6. Position Compensation] is for correcting left and bottom cell edges. [4.Scan Edge Position] is for cell's bottom edge, while [5. Scan Edge Position] is for left edge.

(1) Click [4.Scan Edge Position] icon button in the flow and click [Edit] button on [Region setting] screen.



(2) Display the region to be edited by zooming in the image and shifting the red rectangle on the left in the picture below with the mouse.



(3) The green lines indicate the region to be measured, while gray rectangles indicate the midpoint of the region. The region size changes by dragging the gray rectangle on cell image. The region shifts by dragging the center green line. Include some part of cell's bottom edge to detect cell's gradient accurately as shown below.



(4) Click [Measurement] tab to check if edge is detected accurately. If detected, click [OK] button to display the main screen.

A.Scan Edge Position				A REAL PROPERTY AND A REAL
Region setting R	ef.position	Veasurenent	Judgement	Output parameter
Display area Display area No.	: [77 En	0) belde		
Measurement Veasure type : (Density change : (Edge No. : Edge No. : Edge No. : (C Position () C Value (205	♥ Projection ♥ Light→Dark () () for vidth at the saxim	C Derivation C Dark→Light 0 >> of a density w) of density C		Edge
Noise removal Noise level : Noise vidth :	5	·		
Approximate line - Noise cancel : Help	ie (rF	C ON OK Cancel		

(5) Click [Measure] button on the main screen and write down the value on [Edge Position Y Ave.] for entering cell's reference position in [6.Position Compensation].



1-4-5-6. [5. Scan Edge Position]

In this setting, the region is adjusted in [Region setting] screen and then the parameter is checked in [Measurement] screen.

This setting is to detect cell edge accurately, and it is necessary for correcting cell edge's gradient in [6. Position Compensation].

[6. Position Compensation] is for correcting left and bottom cell edges. [4.Scan Edge Position] is for cell's bottom edge, while [5. Scan Edge Position] is for left edge.

(1) Click [5.Scan Edge Position] icon button in the flow and click [Edit] button on [Region setting] screen.



(2) Display the region to be edited by zooming in the image and shifting the red rectangle on the left in the picture below with the mouse.



(3) The green lines indicate the region to be measured, while gray rectangles indicate the midpoint of the region. The region size changes by dragging the gray rectangle on cell image. The region shifts by dragging the center green line. Include some part of cell's left edge to detect cell's gradient accurately, as shown in the picture below.



(4) Click [Measurement] tab to check if edge is detected accurately. If detected, click [OK] button to display the main screen.



(5) Click [Measure] button on the main screen and write down the value on [Edge Position X Ave.] for entering cell's reference position in [6.Position Compensation].



1-4-5-7. [6. Position Compensation]

In [Position Compensation], the cell edge location on the camera image is set in order to capture the entire cell image. You need to change the reference position according to the cell size.

Reference position is the location of the cell edges set in [4.Scan Edge Position] and [5.Scan Edge Position] on the camera image.

If the same reference position (indicated with red lines) is set for the cells of different sizes, the cell images are eccentrically located as shown below.



To center cells of different sizes on camera image, set the reference position of each cell according to cell size in this setting.



Refer to the following page for the detail setting of the reference position.

The coordinate on Omron's camera is shown below.



(1) Click the icon button of [6.Position Compensation] to display [Scroll method] screen for setting [Reference].



	X:position of the left side cell edge detected in [5.Edge Position] on the
Deference (V.V)	X-coordinate in the compensated image
Reference (A, f)	Y: position of the bottom side cell edge detected in [4.Edge Position] on the
	Y-coordinate in the compensated image

(2) To set the cell image as shown in the drawing below, perform the following steps:

Click [...] button of [Reference] X and enter the value (A) in [Edge Position X Ave.] measured in [5.Scan Edge Position].

Click [...] button of [Reference] Y and enter the value (B) in [Edge Position Y Ave.] measured in [4.Scan Edge Position]. These values are for reference position of measured cell.



Reference	
X :	300
Υ:	1100
θ:	0
Position	
X :	U5.X
Υ:	U4.Y
θ:	0

(A)

T D-4-31	
S.Scan Edge Position]	
Judge : OK Peak edge position X : 302.1985 Peak edge position Y : 226.0000 Bottom edge position X : 300.5584 <u>Bottom edge position Y : 800.0000</u> Edge position X Ave. : 301.1262 Edge position Y Ave. : 1088.0404 Long distance Max. : 0.2522 Short distance Max. : 0.5044 Deviation : 0.3567 Line angle : -89.8363 Lost point count : 0	ſ

(B)

▼ Detail result
[4.Scan Edge Position]
Judge : OK
Peak edge position X : 425.0000
Peak edge position Y : 1087.7275
Bottom edge position X : 811.0000
Bottom edge position Y : 1088.5965
Edge position X Ave. : 811.0000
Edge position Y Ave. : 1088.0404
Long distance Max. : 0.2780
Short distance Max. : 0.5561
Deviation : 0.3932
Line angle : 0.0052
Lost point count : 0

1-4-5-8. [7.Busbar Alignment]

This setting is for measuring cell center misalignment with reference to busbar position.

(1) Click [3.Scan Edge Position] icon button in the flow and display [Region setting] screen.



(2) Click [Edit] button and display region setting screen.

7 Buschar Alignmunt	
Finnes Rectangle	
	7 Busbar Allenment
	Rectangle
	$\begin{array}{c} \text{Diver 11 site position} & \uparrow \\ \hline 1817 \\ \hline 1817 \\ \hline \end{array}, \hline 1145 \\ \hline \end{array} \leftrightarrow \rightarrow \end{array}$
	Cancel

(3) The rectangle enclosed by green lines represents the measurement region. Adjust the measurement region around 3 to 5mm from the cell edge, dragging the small square on each corner of the rectangle with the mouse.



(4) Click [OK] button to set the edited region.



(5) Click [Edge region] and [Auto] button.

Region setting	Edge region	Aufer, setting	Measurement	Output paramater		
Region setting Making odge re Gr Auto Display detail Binary setting Bina	c Manual	nt Qeneration Hido detail Reverse Auto				
Octail setting Region num (Oor Region num (Bu Region midth : Region height Init. Pos. from	of region ntour) :	2 > 2 > 30 < > 5 < > 10 < >			Display setting & Veasure image C Sinary image	
		OK Cancel				

(6) Click [...] button of [Region num (Busbar)] in [Detail setting of region] and enter "2".

It is recommended to enter the number of busbar that is near LED light, not the whole number of busbar.

L.Babar Alexand	
Realize celliner Edge realizer Sufer- settliner fossurvasent Cul-	nt no smoto
Bactine older for the extend Bactine older for the extend of Accor (* Bossol Onimative Depter also all tables (1.57, 10104)	
Illiner ser-lag	
C - 22	Detail setting of region
Display rate (Decard) : 7 5 Display a light : 11 C (y) Display fridge : 5 C (x)	Region num (Contour) : 2 < >
Internet and a second sec	Region num (Busbar) : 2 < >
S Lers	Region width : 30 < >
******	Region height: 5 < >
· · · ·	Init. Pos. from edge(%): 10 <>

(7) Click [Manual] button of [Region setting] and [Generation] button.

7.Busbar Alignment Region setting Edge region Refer.setting	Neasurement	Output parameter		
Region setting Making edge region for Alignment O Auto Manual Generation Display detail setting Hide detail (Binary setting Reverse Auto Binary level: 0 125 Region num (Contour): Region num (Busbar): 2				
Region height : 5 < > Init. Pos. from edge(%): 10 < >			Display setting G Measure image C Binary image	
0K Cancel				

(8) Set eight regions in total. When making edge region, choose side to be edited from [Select Side Line], zoom the image and note the contents in the following pages.

Select Side Line C Upper C Left C Lower		
Select Side Line C Left C Lower Figures		

* Before clicking [Generation] button, check the following settings.

[Region setting indicated with red rectangle]

Setting the region indicated with red rectangle is necessary to recognize busbar position. Set four regions so that the outline of the busbar is at the center of each region.





[Region setting indicated with blue rectangle]

Setting the region indicated with blue rectangle is necessary to recognize cell edge. Set four regions so that the cell edge is at the center of each region.



(9) After setting, click [OK] button.

exite setting	LOVE LEXION	neters selling	Measurement	Town and manager		
Hegion setting Making edge ra	agion for Alignme	ato				
(* Luto	C Barual	Ceneral ion				
Display detai	setting	Hide detail		-		
Elnary setting	geometrice La					
		∏ Reverse				
	100					
		luto				
fina	ry level :					
	0	125				
Detail setting	of region -					
Region num (Co	rtour) : 🕅	2 2				
Region run (Bu	sbar) : [2 >				
Region width :		S0 X >				
Region height	· –	5 < 5			@ Measure image	
Init. Pos. fra	n edga(#):	10 < >		제문제	C Binary image	
					C	
	-		1			
		100				

1-4-5-9. [8.Scan Edge Width]

This setting is necessary to measure the difference between width and height of the cell. [8.Scan Edge Width] is for measuring width of the cell, while [9.Scan Edge Width] is for the height. Values set in [8.Scan Edge Width] and [9. Scan Edge Width] are used for [1.Calculation].



(1) Click [Edit] button and display region setting screen.


(2) The green lines indicate the region to be measured, while gray rectangles indicate the midpoint of the region. The region size changes by dragging the gray rectangle on cell image. The region shifts by dragging the center green line. Include the horizontally whole center part of the cell with a margin of 3 to 5mm from the cell edge.



(3) After setting region, click [OK] button, and then, click [OK] button on [Region setting] screen.



1-4-5-10. [9.Scan Edge Width]

Set for cell height in the same way as in [1-4-5-9. [8.Scan Edge Width]].



1-4-5-11. [10.Outline Alignment]

In this screen, only [Region setting] and [Edge region] are edited.

This setting is necessary to reject cell if the difference between the cell center based on busbar print position measured in [7.Busbar Alignment] and the cell center based on cell outline is bigger than the value set in [1.Calculation].

(1) Click [10.Outline Alignment] icon button in the flow and display [Region setting] screen.



(2) Click [Edit] button on [Region setting] screen to display the setting screen for measurement region.



(3) The rectangle enclosed by green lines represents the measurement region. Adjust the measurement region around 3 to 5mm from the cell edge, dragging the small square on each corner of the rectangle with the mouse.



(4) Click [OK] button to set the edited region.



(5) Click [Edge region] tab to display the edge measurement region for alignment.



(6) Click [Display detail] button to show the region setting parameter. Click [Auto] button of [Binary setting].



(7) Choose [Auto] button on the [Region setting] field and click [Generation] button. The edge region for the alignment is displayed automatically. If the setting is appropriate, click [OK] button.
 (Refer to the following pages if you want to edit the region annually.) The main screen will be

(Refer to the following pages if you want to edit the region **I** manually.) The main screen will be displayed.

Setting on [Refer. setting], [Measurement], and [Output parameter] screens is not necessary.

@ Auto	← Nanua.I	Generation
Display detail	setting	Hide detail
Jinary setting —	_	□ Reverse
		Auto
Binar	y level :	128
Detail setting o Region num :	f region	3
Region width :		30 < >
Region height :		30 < >
Init. Pos. from	edge (%) :	20 < >



Detail Setting of Region



In order to set the edited region as [Edge region], click [Generate] button. The region will be regenerated.



Pagion num	The number of edge regions on side line.					
Region num	The region number is set to [3] in the above picture.					
	Vidth is the region side which is vertical to the cell edge.					
Region width	The guideline width for 6 inch cell is "20~30".					
	(Wider region is preferable as long as the region is inside the white plate.)					
Region height	Height is the region side which is parallel to the cell edge.					
	The position from which an edge region of the side line will be generated.					
mil. Fos. nom edge (%)	(Unit :%)					

If region setting is edited after automatic edit of [Edge region], the image changes as follows:



Automatically set [Edge region]



[Edge region] set on the detail setting of the region.

1-4-5-12. [11.Camera Image Input]

This setting is to reduce shutter speed of the camera in order to get darker cell image for [12.Outline Detect Inspection].

(1) Click [11.Camera Image Input] icon button in the flow, and choose [Camera 0] and [Camera setting] screen.

10.Outline Alignment OK 11.Camera Image Input OK 2.Outline Detect Inspec OK 13.Corner defect height OK 14.Calculation OK 15.Data Output 15.Data Output	E	9.Scan Edge Width OK					
11. Camera Image Input OK 9 Butter speed: OK 12. Outline Detect Inspec OK 13. Corner defect height OK 13. Corner defect height OK 14. Calculation OK 15. Data Output OK	X	10.Outline Alignment OK	Cameral Camera setting	Caneral Caneral Screen adjust	Canera2 White balance	Demera3 Calibratien	Select camera
BTOOUT width : 90 us STOUUT palarity : @ Positive @ Nesative Hele Hele DK Garcet		11.Camera Image Input OK 12.Outline Detect Inspec OK 13.Corner defect height OK 14.Calculation OK 15.Data Output OK	Comera setting Shutter speed G Select t G Select t Gain : Number of line Start line : rElectronic fiz STEP - STGOU STGOUT vieth STGOUT polari	s to be read ch setting delay : ty : © Positive	Vhite tal ance //2000 ≤ 10000 ≤ 50	Cational ion	4.000 m 2.000 m 2.000 m

(2) Adjust [Shutter speed] of [Camera settings], and click [OK] button if there is no problem.

Camera settings
Shutter speed :
💿 Select typical value 🛛 1/2000 🗨 💺
C Set by number 1/ 2000 s
Gain: 50
11 Store and Bed
Common Setting Screen subst Multi-thickee Gali profiles
Image: A state 7 (all out) Mark (result) 8 (all out) C factor 7 (all out) Golf v: 7 (all out) C factor 7 (all out)
(Election: / fold: will is a Election: fold: will does : Election: Election Election: Election
EBD21 Jank-102 = (F Saction - C Sandian
Hv 3 Cr Hunst

1-4-5-13. [12.Outline Detect Inspection]

It is the setting for detecting location where the perimeter and shape differ with the outline, after extracting cell outline automatically and while tracing the extracted outline points.

(1) Click [12.Outline Detect Inspection]'s icon button to display the outline detect inspection screen. Edit only [Region setting] among four setting parameter in the outline detect inspection.



(2) Click [Edit] button on [Region setting] screen to display the region setting items.



(3) The rectangle enclosed by green lines represents the measurement region for outline detect inspection. The whole measurement target object needs to be included in the rectangle. Adjust the measurement region around 3 to 5mm from the cell edge, dragging the small square on each corner of the rectangle with the mouse.

Click [OK] button to set the edited region. Proceed to (4) for fine adjustment.



(4) For fine adjustment, adjust with allow buttons or [...] button in the picture below. Click [OK] button to decide the region.

Region setting	dge regio	1	Refer:	settin	ıg
Figures Rectangle			/	0	
		0	9	\diamond	
				OR/NOT	
Rectangle					
Upper left posit	ion	1			
235 <mark></mark> ,	22 ←	Ť	→		
Lower right posi	tion	↑	1		
1387 , 11	60 ←		\rightarrow		
		Ţ		▼	
	04	(Car	icel	

(5) After clocking [OK] button on (3) or (4), click [OK] button on [Outline Detect Inspection] screen to decide the setting for the whole measurement. It changes to the main screen.

Setting of [Output parameter] is not necessary. For [Detection] and [Measurement], edit as needed after checking the condition of the produced string cell.

Refer to (6) for [Detection] setting, (7) for [Measurement].



(6) Produce a string cell with the setting decided in (5) and check the condition of the string cell. If the defect cell is judged as an acceptable cell, adjust with [Defect width] in [Measurement conditions] and [Defect] in [Judgment] on [Outline Detect Inspection] screen.

The defect as in Ex.A is easily detected in [Outline Detect Inspection]. However, the defect with smooth curve may be difficult to detect. This setting is useful in this case.



Click [Detection] tab in [Outline Detect Inspection] screen to display the setting screen.

You need not to edit setting if scene is copied.

Set [Defect width] in [Measurement condition] and [Defect] in [Judgment]. Click [OK] button to decide the set value.

Mask size :	3X3		3	
Measurement cond Target type :	itions reentran	t j	3	
Defect width :		20 < >		
Defect number :		0 >		
				It is recommended to perform
Test measuring (Judgement Count :	of this item. O	Measure 1		It is recommended to perform test measuring with the condition set in this screen.
Test measuring (Judgement	of this item. O 3	Measure -	▲	It is recommended to perform test measuring with the condition set in this screen.

	Settable between 1 and 1000. The guideline value is "20".						
	Sets the target defect width which to be detected. The defect is detected by						
	comparing each outline point with the outline point in this range.						
Defect width							
	Defect width						
	Settable between 1 and 180. The guideline value is "25".						
	The defect higher than the value in [Defect] is detected. [Defect] is the difference						
Defect	between the peripheral outline points. (Sharpness of the defect)						
Delect							
	High defect Low defect						

(7) Produce a string cell with the setting decided in (5), and check the condition of the string cell.

To change the threshold value (defect width and depth) between the rejected cell and the accepted cell, **prepare a sample cell which has the defect of the minimum size to be detected**. Check [Measure depth and width] and select judge type from [AND] and [OR] to set judgment condition. Adjust [Depth] and [Width]. Click [OK] to decide the setting.

odugement condi I▼ Measure depti	n and width		
Judge Type :	€ AND		
	⊂ OR		
Depth :	0.00		
		1.00	
Width :	0.00		
		1.00	. < >

1-4-5-14. [13.Corner Defect Height]

In the outline detect inspection, the locations that are indented in relation to the perimeter edge is detected. However, detection can be difficult at the chamfer of a cell corner area where there is no indentation, as shown below.

In [Corner defect height], the distance from vertex of the cell circumscribed rectangle to the corner (indicated with red arrow) is measured to detect the chamfer defects.





Corner of acceptable cell

Chamfered corner of unacceptable cell

(1) Click [Corner defect height]'s icon button on the main screen to display [Corner defect height] screen. In this screen, only [Region setting] and [Measurement] are to be edited. Click [Edit] button on [Region setting] screen.



(2) The rectangle enclosed by green lines represents the measurement region for corner defect height. The whole measurement target object needs to be included in the rectangle. Adjust the measurement region by dragging the small square on each corner of the rectangle with the mouse.



(3) Click [OK] button in the setting region is appropriate. For fine adjustment, adjust with allow buttons or [...] button in the picture below. Click [OK] button to decide the region.



(4) Click [Edge region] tab to set the edge region. This setting is necessary to calculate the center coordinates and slanting of the cell.

Region setting Edge region		Measurement	Output parameter		
Figures Rectangle		Edit			
Rectangle					

(5) Click [Display detail] button to display detail setting parameters.

Corner delect he	isht			Region setting	Edge region	Measurement
ion setting gion setting Waking edge ri Auto	Edge region egion for Alignee C Wanual	Measurement nt Generation	Output parameter	rRegion setting Making edge re	egion for Alignme C Manual	nt Generation
isplay detail	l setting D	iselay detail		Display detail	l setting	Hide detail
						Automatic
				Bina	ry level :	130
				Region num : Region width : Region height		3 < > 30 < >
				Region skip :		30 < >

- (6) Click [Automatic] button on [Binary Setting].
- (7) Check [Auto] button in [Region setting] and click [Generation] button to set the edge regions automatically. (Refer to the following pages to edit the region.)



- =Reference=
 - <Region detail setting>
- * When editing [Edge region], click [Generation] button to regenerate the region.



Degion num	The number of edge regions on side line.					
Region num	The region number is set to [3] in the above picture.					
Degion width	Width is the region side which is vertical to the cell edge.					
Region width	The guideline width for 6 inch cell is "20~30".					
Region height	Height is the region side which is parallel to the cell edge.					
	The position from which an edge region of the side line will be generated.					
mit. Pos. nom edge (%)	(Unit :%)					

(8) Click [Measurement] tab to display the setting screen. In this screen, the parameters for [Judgment] are set. (Factory setting is shown in the picture below.)

..........

 $\langle \rangle$

 $\langle \rangle$ Cancel

> <

3.Corner defect he	sight				Test measu	uring of	this it	em.	Me	asure	a
Region setting	Edge region	Measurement	Output parameter		Judgement Distance(II DII)	• 1 99	1	19	•••••	
					Distance(L	D PD)	• 1 94	1	19		
					Distance(L	.D, ND)	. 1.24		2 00		Ι,
	The inspec	tion accordin	g to the height	thas	Distance	· •	0.08	2			Ľ
(three inspe	ction items.)	Distance g	sap .	0.00	, (3.50	<	
	• Judam	ent based on	the distance		XY gap :		0.30)			_
	betwee	en the vertice	s of the rectar	nale		/	$\overline{\gamma}$	().50	<	2
to the corner.				°			/	n	ık	C:	anı
									т		
	differe	nce from the	maximum and	. I		1					
	minim	um corner		·	The	auto	matic	calcu	lated	ga	ıр
	iudame	ant based on	the difference		indic	atas				Ũ	•
	juugine		and the width		indicates.						
	betwee	en the height	and the width	·	* Re	fer to	the drav	wings	in the	Э	
	Completing	the above th	aroo itomo olo		foll	owina	nage	•			
	Completing				1011	owing	pago.				
	[Corner de	tect neightj.									
(*Measurer	nent result r	o less than t	he							
	value in	[Judgment] i	is judged as								

	Sets the corner distance range to be judged as acceptable.
	It is the distance between the vertices of the rectangle to the corner.
	* Measurement result no less than the value in [Judgment] is judged as
Distance	unacceptable.
Distance	For Ex B, set "4.81" to complete the distance judgment. Entering "4.8" or less than it
	causes the distance of the top-right corner to be judged as unacceptable.
	For Ex A, enter "2.2" or more. If "2.2" is entered, the corner distances of the top left
	and the bottom two corners are judged as unacceptable.
	Set the corner difference range judged as acceptable.
	It is the difference between the maximum and minimum distance between the vertices
	of the rectangle to the corner.* Measurement result no less than the value in
	[Judgment] is judged as unacceptable.
	Distance gap: the difference between the maximum and minimum distances among
Distance gap	the distances at the four corners.
	For Ex B, the corner difference is "1.3". Set "1.31" to complete the distance gap
	judgment. Entering "1.3" or less than it causes the distance gap is judged as
	unacceptable.
	For Ex. A, enter "2.61" or more. If "2.6" or less is entered, the distance gap is judged
	as unacceptable.
	Set the vertical and horizontal distance difference (the absolute value expressing the
	difference between entire vertical and horizontal length of the cell) judged as
	acceptable.* Measurement result no less than the value in [Judgment] is judged
XY gap	as unacceptable.
	For Ex C, set "2.00" to complete the XY gap judgment, as the vertical and horizontal
	distance difference of the acceptable is "0.00". As seen in the drawing of its right, the
	cell whose vertical distance difference is "3.50" exceeds the set value, therefore
	judged as unacceptable.



The corners of the cell are cut from the beginning; the corner depth (distance) is "2.2"; the chamfer defect whose corner depth (distance) is "4.8" at the top right and "3.4" at the bottom right. As a result, the distance gap is "2.6".

The corner of the acceptable cell is square; the chamfer defect whose depth is "1.5" at the top right, "0.8" at the bottom right and "0.2" at the bottom left. As a result, the distance gap is "1.3".

... The location where the cell is broken.



When the horizontal distance is "50.00" and the vertical distance is "50.00", the XY gap of the cell is "0.00".

With the same setting as the cell in the left, the XY gap of this cell is "3.50" as the vertical distance is only "46.50" due to the breakage at the upper side.

(Obtained by subtracting the horizontal distance from the vertical distance)

Vertical distance 46.

. ຕ

(9) Preparing the cell with the minimum defect, enter the value in the parameters and click [OK] button.



(10) Click [OK] button after editing. Editing [Corner defect **height**] is completed and the main screen is displayed again.

Test measuring of	t	his item.	Me	asure
ouugement				
Distance(LU, RU)	÷	4.85	5.34	
Distance(LD, RD)	:	4.99	5.79	
	Γ		999.99	$\langle \rangle$
Distance gap :		0.79		
	Γ		1.00] <] >]
XY gap :		3.83		
	Γ		5.00	$ \langle \rangle$
			ок	Cance I

1-4-5-15. [14.Calculation]

You don't need to edit the setting.

9.Scan Edge Width	
10.0utline Alignment	14 Coloulation Setting Output parameter
ОК	Pypressing setting
0K	No. Rewant - Homovies
12.Outline Detect In:	0 ABS(01-004-UT-005FUB-40EY)-UT-000 1 ABS(01-004-UT-005FUB-40EY)-UT-000 2 ABS(01-004-UT-005FUB-40EY)-000 2 ABS(01-0
L 0K	3. ABS(UT,TH=UD,TH)-U1,002: 4 U1,003408.4VEV 5 U1,109408.4VEV
OK	
4.Calculation	
K	No. 0
	Connent :
	Expression : [ABS(U1.004-U1.005+U8.4VEV)-U1.000
	Result : -0.1088
	Judgement condition :
	Help OK Cancel
	14.Calculation
	Setting Output parameter
	Expression setting
	Expression setting
	No Commont Expraction
	0 ABS (U1.D04-U1.D03*U8.AVEW)-U1.D00
	1 ABS(U1.D04-U1.D03*U9.AVEW)-U1.D00
	2 ABS (U7.RX-U10.RX)-U1.D01 3 ABS (U7.TH-U10.TH)-U1.D02
	4 U1.DO3*U8.AVEW
	5 U1.DU3*U9.AVEW
	Ť

1-4-5-16. [15.Data Output]

This setting is for the signal to be transmitted to PLC.

Check [Calculation] and [Output format] which are already copied from the template master.

You don't need to change the setting.

(1) Click the icon button of [15.Data Output] to display [Data Output] screen.

9.Scan Edge Width OK	16 Data Gulput Setting Qatput fermat
10.Outline Alignment OK	Octoat data No: Concent Exprassion U Units Vision U Units Vision
0K 11.Camera Image Input	2 07.37 0 07.71400.59 4 (07.3041)/2000 5 7
12.Outline Detect Inspection OK	
13.Corner defect height OK	Convert :
0K	Result : 0-0010
15.Data Output OK	
	Fe or OK Gancel

(2) Check that expressions are entered in No.0 to 4 as shown below.

If you need to enter expression, choose the corresponding number and enter expressions with keyboard after clicking [...] button.

f ^{0u}	tput	data								
	No.	Comment	Expression							
	0		(TJG+1)/2000							
	1 2 3 4		U7.RX U7.RY U7.TH*U0.RP (U7.JG+1)/2000	Setting expression - Expression :0						
	5			0.Camera Inage Input	-				FUN	ic>>
				1.Calculation 2.Scan Edge Position			BS	DEL	+	->
				4-Scan Edge Position 5-Scan Edge Position 6-Position	1	7	8	9	()
				7.Busbar Alignment	-	4	5	6	1	*
						1	2	3	-	•
						0			+	TJG
							N	umeri	ical	icel

Keyboard

Output	data	
No.	Comment	Expression
0		(TJG+1)/2000
1 2 3 4 5 6 7		U7.RX U7.RY U7.TH*U0.RP (U7.JG+1)/2000

No.0	To send each inspection's result to PLC.
10.0	Enter "(TJG+1)/2000)".
No.1	Enter "U7.RX"
No.2	Enter "U7.RY"
No.3	Enter "U7.TH * U0.RP"
No.4	Enter "(U7.JG+1)/2000"

(3) Click [Output format] tab to display [Output Setting] screen. Set [Record separator] to [Comma].

(OL	itput Setting
C	ommunication method :
	© RS-232C/RS-422 C Ethernet
	Format setting :
	Output form : 👁 ASCII
	Digits of integer : 2 💌 Digits
	Digits of decimal : 🛛 🕄 Digits
	Minus: 🔹 — 🤆 8
	0 suppress : C Available 🕫 None
	Field separator : Comma 💌
	Record separator : Comma
	Output IP address setting : Comma
	@ Refer System(Ethernet) Space Space
	The following IP address
	Output IP address :
	182 188 100 100
	PLC link setting :
	Decimal output form :
	☞ Fixed point

Perform this setting every time you set for the serial data output.

(4) Click [OK] button on [Output format] screen.



All setting is completed.

We recommend saving the edited data after all the settings. Refer to [1-4-6. Save Inspection Template] to save the data.

1-4-6. Save Inspection Template

Saves edited templates to register them in the scene No. as templates.

Alignment template's setting is stored in RAM, as Omron FZ3 does not use hard disk.

Clicking [Data Save] button on the main screen saves the setting already stored in the RAM in the flash memory. Therefore, the setting will be lost if the machine power is turned off before [Data Save] button is clicked.

It is recommended to save data frequently by clicking [Data Save] button in order to avoid loss of data due to sudden trip.

(1) Click [Data Save] button on [FZ-Main] screen. Click [Yes] button of the confirmation screen to save the data in the flash memory and register the edited inspection template.

Data in RAM will be erased when the machine power is turned off, but the data in the flash memory is still saved.

EZ-Main Scene View	Measure Data System Help					
NI/	ADJUST	4.Scene 4 SecurityLevel 1	Adjust Camera0	Adjust Camera1	Initialize Flow	User Change
INC	27ms	Switch to RUN	Area Setting	Adjust Threshold	Display Setting	💾 Data save
						▼ Test measurement
Data save Save s	ettings?					
		Yes	No]		

(2) Created template data is stored in the machine, but it is recommended to back up the data. Click [Save to file] from [Data] on the toolbar to display [Save to file] screen to choose the data to be saved and its destination.

Scene View Measure	Data System Help Data save	4.Scene 4	Save to file		
	Save to file	SecurityLevel 1 Switch to RUN 4.Data Out	Setting data Data to be saved — & Scene data C Scene zroup da C System data	Logging image [4.Scene 4	Copy files
	L		Destination File name :	p:\Ny Documents\OMRON F	Z\U3BDisk\Scen
			Heip		OK Cance I

(3) Insert USB into the machine.

(4) To save the scene number (scene data) stored in FZ3, click [Scene data] and choose the data to be saved from the pull-down menu.

Choose [Scene group data] to save the whole scene group.

It is recommended to save [System data] as well.

After choosing the data to be saved, click $[\ldots]$ button to choose the destination

oetting sata	Logging (Mage	Copy files
ata to be saved		
Cene data	4.Scene 4	
C)cene group data	a	
🔿 vsten data		
C System + Scene -	eroun A data	
C System + Scene :	group O data	
C System + Scene : estimation	grous O data	
C System + Scene : estimation File name : D	group 0 data :\By Documents\08R08 F;	Z\USBDisk\Sc
C System + Scene ; estimation File name : p	grous 0 data :\My Documents\005005 F;	Z\U38D13k\Sc
C System + Scene estination File name : D	group () data	Z\U88Diek\Sc <mark>n</mark>
C System + Scene ; estimation File name : p	grous O data :\Ny Documents\OMROM F:	2\U38D1sk\Sc <mark>n</mark>

(5) Choose [USBDisk] and click <u>[OK]</u> button to return to [Save to file] screen.



(6) Click [OK] button on [Save to file] screen to save the data in the designated destination and it returns to the main screen.

setting data	Logging image	Copy files
ata to be saved —		
🕫 Scene data	4.Scene 4	<u>×</u>
C Scene group data	a	
C System data		
C System + Scene ;	group O data	
estination —		
estination File name : D	:\My Doruments\OMRON F	(\USBDisk\Scen)
estination — File mane : p	:\My Documents\OMRON F:	(\USBDisk\Scen

1-4-7. Edit Flow

The order of the flow and items can be edited.

The following describes how to change [3.Corner defect width] to [3. Corner defect height] in the flow.

▼ Flow	
1st. NG unit	Next NG unit
0.Camera Ima NG	ge Input
1.Outline Al	ignment
2.Outline De	tect Inspection
3.Corner def	ect width
4.Data Outpu	t

(1) Click [Edit Flow] of [Scene] in the toolbar of [FZ-Main] screen to display [FZ-Flow] screen.



(2) Click [3. Corner defect width] and [Delete]. Click [Yes] button on the confirmation screen to delete [3. Corner defect width] from the flow list in its left.

🗱 FZ-Flow	
0.Camera Image Input	
1.Outline Alignment	Rename
2.Outline Detect Inspection	Edit flow
3.Corner defect width	Selected units will be removed. OK?
4.Deta Output	Yes No
5.	
	Shift area
	Delete
	J Wuitiple selection
📰 FZ-Flow	
0.Camera Image Input	
1.Outline Alignment	
2.Outline Detect Inspection	
3.Data Output	
4.	

(3) Choose (click) <u>the number before which the new item is to be inserted</u>. Then, choose the item to be inserted from [Measurement] folder in the right and click [Insert] button.

📓 FZ-Flow		
0.Camera Image Input		- Measurement
1 Outline Alignment	Rename 🏠 🚱 Append	
2.Outline Detect Inspection	Move up	🥶 Classification 🍢 Gravity and Area
3Data Output		💰 Color Data 🎼 Labeling
	Copy	Corner defect width
	E Pere	
	Delete	EC Gircle Search
	Multiple selection	Edge Pitch

(4) After checking [3. Corner defect height] has been inserted in the flow, click [Close] button on [FZ-Flow] screen. It returns to the main screen. Check that the flow has been changed.



- (5) This is the end of editing flow. However, parameter setting of the newly added item is necessary.
- (6) After editing, make sure to click [Data Save] button on the main screen to read the setting. Refer to [1-4-6. Save Inspection Template] for detail.
- (7) It is recommended to save (backup) the data when editing the template. Refer to [1-4-6. Save Inspection Template] for detail.

2. How to Create Alignment Template for OMRON FZ3

(For Tabbing & Stringing Machine: Alignment Inspection)

2-1. Outline

OMRON-FZ3 software automatically creates the flow for producing template which is necessary for the cell alignment inspection for tabbing & stringing machine. Use the flow for setting individual measuring items. The configuration of the created flow can be edited, too.

The flow of which each item has been set is called [Scene], and the group that has 101 scenes is called [Scene Group]. Up to 32 scenes can be set.

In the following page, the process to create template is shown in a flow chart.





Scene Group 2

Scene Group 1

Scene Group 0

Scene 2

Controller

:To be saved into USB memory

ene 1

2-2. Flow Chart of Template Creation



2-3. Switch language display



The controller is restarted when language is switched, Click [Data Save] button to save the setting before switching languages.

(1) Click [Language Setting] in [Controller] of [System].

🔚 FZ-Main				
Scene View Measure Data	System Help			
ADJI	Camera Communication Controller	10.Scene 10 ecurity/ evel 1 Date-time settine	Camera0	Adj
	Screen capture	Language setting Fair control setting Startup setting	Setting	Adju
		Select RUN mode RUN mode view setting Oreate shortcut Encoder trigger setting Password setting		
		System initialization System restart		
		System information		

(2)Select the target language and click [OK] button, then the PC restarts. Check that the machine is not in auto mode and there is no problem with restarting the controller, and then click [Yes] button. Data will be saved and the controller restarts. After restarting, the language switches and the main screen is displayed again.

Language setting				
Select language of t	he system.			
Language : Engli	sh	<u> </u>		
Engli	ese sh			
Help	OK	Cancel		
Language setting	•			

2-4. How to Create Template

Copy the scene if the settings are same as other inspection template (scene) apart from cell size. 5 steps are required for scene setting. Refer to: [2-4-1. Switch User] [2-4-2. Copy] [2-4-3. Edit Scene Name] [2-4-4. Switch Screen (Importing Image)] [2-4-6. Save Inspection Template]

2-4-1. Switch User

Switch user setting and log in again, and then set the security level to "1". Some items cannot be edited if the security level is "0".

(1) Click [User Change] button on the main screen to display [User change] screen, then log in.

4.Scene 4 SecurityLevel 0	Adjust Camera0	Adjust Camera1	Initialize Flow	User Change
Switch to RUN	Area Setting	Adjust Threshold	Display Setting	Data save
lser Chance				
SecurityLavel :				
UserNaae	•	Edit		

(2) Choose [admin] for user and click [...] button for password.

User Change		
SecurityLevel : 1		
UserName		Edit
Password		
	OK	Cancel

(3) Enter the password on the password entry screen and click [OK] button. The screen returns to [User Change]. Click [OK] button.

<Reference>

The initial password is "omron".

â		Ha	rk	Ð	-11										
1	a	ь	e.	d	e	f	x	h	1	7	0	9	1	DC DO	CLR
	1	k	1	n	n	٥	P	a	r	4	5	6		Enter	
	5	t	ų.	×.	v	×	Y	z		1	2	3		Shace	
										0	96			t	
												٨	/a	+ 1	->



(4) The screen returns to the main screen. Check that [Security Level] is "1".

4.Scene 4 SecurityLevel 1	Adjust Camera0	Adjust Camera1	Initialize Flow	User Change
Switch to RUN	Area Setting	Adjust Threshold	Display Setting	💾 Data save

2-4-2. Copy

ſ

The following describes the case that the outline alignment template for 125×125 size cell has been stored in "Scene 10" and you want to create the outline alignment template for 150×150 size cell for "Scene 15".

(1) Click [Scene maintenance] from the toolbar on the main screen to display [Scene maintenance] screen.

📰 FZ-Main	
Scene View Measure Data System	Help
Edit flow ADJUST	4.Scen SecurityLev Switch to RU
Jun setting ////S	Scene maintenance
	Scene group Scene group 0 Scene group near Scene group 0 Scene 1 Scene 9 Scene 67 Scene 8 Scene 8 Scene 9 Scene 10 Scene 13 Scene 15 Scene 18 Scene 18 Scene 18 Scene 19 Scene 10 Scene 11 Scene 12 Scene 13 Scene 14 Scene 15 Scene 18 Scene 18 Scene 18 Scene 18 Scene 19 Scene 10 Scene 10 Scene 10 Scene 10 Scene 10 Scene 10

(2) Choose the source scene number and click [Copy] button.

0+Scelle group 0	15 Switch	TH Edit
Scene group name : Scene group O		
Scene		
0.8come 0 1.8come 1 2.8come 2 3.8come 3 4.8come 4 5.8come 5 6.8come 6 7.8come 6 8.8come 8	Author :	Clear
O Scone Q		
12.Scene 12 13.Scene 12 14.Scene 14 15.Scene 14 15.Scene 15 16.Scene 16 17.Scene 16 18.Scene 18 19.Scene 18		- 1
Scene name : Scene 10	in l	

(3) Choose the destination scene number and click [Paste] button. The confirmation screen will be displayed. Click [Yes] button and [Close] button.

•	Switch	Edit
*		
Author : Note :	C COPY	este 🗶 Clear
[]		
		Close
	Author : Note :	Author : Note :

(4) The setting of "Scene 15" is exactly same as "Scene 10". Capture the image of 150 × 150 size cell, click [Scene switch] of [Scene] on the toolbar, choose [Scene 15], and click [OK] button to display the main screen. For importing image, refer to [2-4-4. Switch Screen (Importing Image)].

🔜 FZ-Main	Switch scene		
Scene View Measure Data	Scene group :	0.Scene group 0	Switch
	Scene :	15.Scene 15	
Unit setting		0	Cancel



- Do not use [Scene 0]. Match the scene number with the scene number of the recipe on the
- (5) Edit copied scene's name. Refer to [2-4-3. Edit Scene Name].
2-4-3. Edit Scene Name

[Scene **group** 0] has 101 scenes which are numbered from 0 to 100. **Do not use [Scene 0].** [Scene **group**] can be edited with [Edit] button. However, only [Scene **group** 0] is used for this machine.

(1) Click [Scene maintenance] of [Scene] and choose the scene number to edit its name.

cene View Measure Data System	riscone group	
Edit flow ADJUST Scene switch Scene maintenance Unit setting ms	D-Scene group 0 Scene group name : Scene group 0 Scene 1 D-Scene 2 D-Scene 3 D-Scene 4 D-Scene 5 D-Scene 6 D-Scene 7 D-Scene 7 D-Scene 7 D-Scene 7 D-Scene 7 D-Scene 7 D-Scene 12 D-Scene 13 14-Scene 14 15-Scene 13 14-Scene 14 15-Scene 17 18-Scene 18 19-Scene 19	h Cier
	Scene name : Scene 18	

(2) Edit the name using the entry keyboard which appears by clicking [...] button next to [Scene group name].

After editing the name, click [OK] button, then it returns to [Scene maintenance] screen. Click [Close] button to return to the main screen.

**The number of characters which can be entered is limited.



2-4-4. Switch Screen (Importing Image)

Switch the camera images in order to import image of the cell for template.

(1) Click [Image display] to show the detail of the display.



(2) Switch [Image mode] from [Freeze] to [Through].

The image which is currently on camera is displayed on the screen.

🛛 🔻 Image display	
Image layout	1 image 🔍 👻
Active image	Image number 0
Image mode	Freeze 🗸
Positions	Through
Sub image	Freeze Last NG

(3) Set a cell on the camera inspection position; turn on vacuum of LED table turn on the LED lamp with manual operation.

*Refer to the operating manual for manual operation.

(4) Edit each setting item of copied scene. Refer to: [2-4-5. Set Each Setting Item].

2-4-5. Set Each Setting Item

The scene copied for outline alignment inspection as in [2-4-2. Copy] has flow which has fourteen setting items.

0.Camera Image Input	7.Outline Alignment
OK	OK
0K	8.Outline Detect Inspection OK
2.Scan Edge Position	9.Corner defect height
OK	OK
3.Position Compensation	10.Scan Edge Width
OK	OK
4.Scan Edge Position	11.Scan Edge Width
OK	OK
5.Scan Edge Position	12-Calculation
OK	OK
6.Position Compensation	13.Data Output
OK	OK

Outline Alignment Inspection Flow

*You can change flow order or setting item is each flow. For editing flow, refer to: [2-4-7. Edit Flow]

Flow Setting Item	Description
0 Camora Imago Input	Capture and set the image of cell in copied scene.
0.Camera image input	You don't need to change the setting, as the scene is copied.
1 Oplaulation	Set the reference value to judge each inspection.
1.Calculation	Refer to :[2-4-5-2. [1.Calculation]]
	Detect cell edge with light-dark change in the region.
2 Scon Edge Desition	This setting is necessary for correcting gradient of cell's bottom edge
2.3can Euge Position	measured in [3. Position Compensation]. Refer to:[2-4-5-3. [2.Scan
	Edge Position]]
	Set cell edge location on the camera image (reference position) in
2 Position Componention	reference to the gradient data of cell bottom edge (measurement
5.F05ilion Compensation	position) detected in [2.Scan Edge Position]. You do not need to edit
	setting if you copied scene.

Flow Setting Item	Description
	This setting is to detect cell edge accurately, and it is necessary for
	correcting cell edge's gradient in [6. Position Compensation]. [6.
4.Scan Edge Position	Position Compensation] is for correcting bottom and left cell edges.
	[4.Scan Edge Position] is for cell's bottom edge, while [5. Scan Edge
	Position] is for left edge. Refer to:[2-4-5-5. [4.Scan Edge Position]]
	This setting is to detect cell edge accurately, and it is necessary for
	correcting cell edge's gradient in [6. Position Compensation]. [6.
5. Scan Edge Position	Position Compensation] is for correcting bottom and left cell edges.
	[4.Scan Edge Position] is for cell's bottom edge, while [5. Scan Edge
	Position] is for left edge. Refer to:[2-4-5-6. [5.Scan Edge Position]]
	The cell edge location on the camera image is set in order to capture
	the entire cell image. You need to change the reference position
	according to the cell size.力
6.Position Compensation	Reference position is the location of the cell edges set in [4.Scan Edge
	Position] and [5.Scan Edge Position] on the camera image.
	Refer to:[2-4-5-7. [6.Position Compensation]]
7 Outline Alignment	The setting to measure cell outline.
	Refer to:[2-4-5-8. [7.Outline Alignment]]
	It is the setting for detecting location where the perimeter and shape
9 Outline Detect Increation	differ with the outline, after extracting cell outline automatically and
8.Outline Detect inspection	while tracing the extracted outline points.
	Refer to:[2-4-5-9. [8. Outline Detect Inspection]]
	In the outline detect inspection, the locations that are indented in
	relation to the perimeter edge is detected. However, detection can be
9 Corper Defect Height	difficult at the chamfer of a cell corner area where there is no
3.comer Delect height	indentation. Therefore, the distance from vertex of the cell
	circumscribed rectangle to the corner is measured to detect the
	chamfer defects. Refer to:[2-4-5-10. [9. Corner Defect Height]]
	This setting is necessary to measure the difference between width and
	height of the cell. [10.Scan Edge Width] is for measuring width of the
10.Scan Edge Width	cell. Values set in [10.Scan Edge Width] and [11. Scan Edge Width] are
	used for [12.Calculation].
	Refer to:[2-4-5-11. [10.Scan Edge Width]]
	This setting is necessary to measure the difference between width and
	height of the cell. [11.Scan Edge Width] is for measuring height of the
11. Scan Edge Width	cell. Values set in [10.Scan Edge Width] and [11. Scan Edge Width] are
	used for [12.Calculation].
	Refer to:[2-4-5-12. [11.Scan Edge Width]]
	This setting is to enter expression to judge each inspection.
12.Calculation	You do not need to edit setting if you copied scene.
	Refer to:[2-4-5-13. [12.Calculation]]
13 Data Output	This setting is for the signal to be transmitted to PLC.
	Refer to:[2-4-5-14. [13.Data Output]]

2-4-5-1. [0.Camera Image Input]

Capture and set the image of cell in copied scene.

You don't need to change the setting, as the scene is copied.

(1) Click [0.Camera Image Input] icon button in the flow, and choose [Camera 0] and [Camera setting] screen. Check that the shutter speed is"1 /2000".

	ę	O.Camera Image Input OK	B.Comera Imare In	nut			
-	_	1.Calculation	Cameral	Canera1	Oanera2	Canera3	Select camera
	111	OK	Camera setting	Screen adjust	White balance	Calibratien	
	ŧ	2.Scan Edge Position OK	Shutter speed G Select t C Set by n	p I: ypicalvalue [ī umbar [/[/2000 • s		
	E	3.Position Compensation OK	Gain :	٦ 	50		
	Ŧ	4.Scan Edge Position OK	Number of line	99 to be read			
	#	5.Scan Edge Position OK	End line : Electronic fi	wh setting			
	I	6.Position Compensation OK	BTGOUT width	delay :	90 µs		
			STGOUT polar	ty : @ Positive	C Negative		2000
			Help		OK Cancel		

(2) Adjust shutter speed on [Camera settings]. If there is no problem, click [OK] button.

<mark>(</mark> Camera :	settings						
Shutter	- speed	:					
● Se	lect typ	pical val	lue	1/2000	•	s	
O Se	et by nur	nber	1/		2000	s	
Gain :			[50		
		<			- >	ī	
			Y		–		
B Comora (mago inc	ul				_		
CareraD	Coneral	Otmero2	Carera3	Select samera			
Concra solting	Screen acjust	While balance	Gal librat I on				
Harber of Line Gain : Harber of Line Start line : End line : STGOUT width STGOUT width	at satting the ext ing at a first of the satting at satting the ext ing the ex	2000 ■ : 2000 = 2000 =					
Hela		OK Cancel			40.000 A A E		

2-4-5-2. [1.Calculation]

Set the reference value to judge each inspection.

(1) Click [1.Calculation] icon button in the flow and display [Setting] screen.



(2) Setting items for No.0 to No.3 are as follows.

Calculation							
Setting	Output parameter						
Expression set	Expression						
O MAX ER	ROR(CELL WIDTH)		0.5				
1 2 pixcel 3 STD CE 4 5 6 7	<==>mm LL SIZE		0.1576 156				

No.0	Inputs cell outline alignment's tolerance.
No.2	Inputs converted value between 1 pixel and mm. (You need not to edit the setting.)
No.3	Inputs cell size in use in millimeter.

* Refer to following pages for how to input.

(3) Choose the expression number to be edited and click [...] button of [Expression].

No.	Comment	Expression	
0	MAX ERROR(CELL WIDTH)	0.5	
-234567	pixcei<==>mm STD CELL SIZE	0.1576	
			¥
43			
No.	0		
Conne	ent : MAX ERROR (CELL WIDTP	5	
Expre	ession :		
0.5			

(4) Enter tolerance value with keypad and clock [OK] button.

.Camera Image Input	•				FUN	IC>>
otationPolar RP		B	S	DEL	←	→
	7	7	8	9	()
	4	4	5	6	1	*
	1	1	2	3	-	,
	0	0			+	TJO

(5) After filling each setting item, click [OK] button on [Setting] screen.

lculation	1 I		
Setting	Culput parameter		
xpression se	atting		
So. Com	ANT AND A REAL PROPERTY AND A DATE	Expression 085	
2 pixe 3 810 4	al (ss) an XLL 817E	0-1578 156	
7 81	1		
No. 0	×		
Connent :	AX ENHOR(CELL MIDTH)		
Expression	-		
10-0			
hesult :	12000		
dudgement (condition :		
1-896666888	1-2000 [1-1 36888888	18-5558	
Help	0	Cancel	

2-4-5-3. [2.Scan Edge Position]

Setting of [2.Scan Edge Position] is designed **to detect cell edge with light-dark change in the region.** This setting is necessary for correcting gradient of cell's bottom edge measured in [3. Position Compensation]. In this setting, the region is adjusted in [Region setting] screen and then the parameter is checked in [Measurement] screen.

(1) Click [2.Scan Edge Position] icon button in the flow and click [Edit] button on [Region setting] screen.



(2) Display the region to be edited by zooming in the image and shifting the red rectangle on the left in the picture below with the mouse.



(3) The green lines indicate the region to be measured, while gray rectangles indicate the midpoint of the region. The region size changes by dragging the gray rectangle on cell image. The region shifts by dragging the center green line. Include enough wide part of bottom cell edge to detect cell's gradient accurately, as shown in the picture below.



(4) Click [Measurement] tab to check if edge is detected accurately. If detected, click [OK] button to display the main screen.



2-4-5-4. [3.Position Compensation]

In [3. Position Compensation], the cell edge location on the camera image (reference position) is set based on the gradient data of cell bottom edge (measurement position) detected in [2.Scan Edge Position]. **You do not need to edit setting if you copied scene.**



2-4-5-5. [4.Scan Edge Position]

In this setting, the region is adjusted in [Region setting] screen and then the parameter is checked in [Measurement] screen. This setting is to detect cell edge accurately, and it is necessary for correcting cell edge's gradient in [6. Position Compensation].

[6. Position Compensation] is for correcting bottom and left cell edges. [4.Scan Edge Position] is for cell's bottom edge, while [5. Scan Edge Position] is for left edge.

(1) Click [4.Scan Edge Position] icon button in the flow and click [Edit] button on [Region setting] screen.



(2) Display the region to be edited by zooming in the image and shifting the red rectangle on the left in the picture below with the mouse.



(3) The green lines indicate the region to be measured, while gray rectangles indicate the midpoint of the region. The region size changes by dragging the gray rectangle on cell image. The region shifts by dragging the center green line. Include some part of cell's bottom edge to detect cell's gradient accurately as shown below.



(4) Click [Measurement] tab to check if edge is detected accurately. If detected, click [OK] button to display the main screen.



(5) Click [Measure] button on the main screen and write down the value on [Edge Position Y Ave.] for entering cell's reference position in [6.Position Compensation].



2-4-5-6. [5.Scan Edge Position]

In this setting, the region is adjusted in [Region setting] screen and then the parameter is checked in [Measurement] screen. This setting is to detect cell edge accurately, and it is necessary for correcting cell edge's gradient in [6. Position Compensation].

[6. Position Compensation] is for correcting bottom and left cell edges. [4.Scan Edge Position] is for cell's bottom edge, while [5. Scan Edge Position] is for left edge

(1) Click [5.Scan Edge Position] icon button in the flow and click [Edit] button on [Region setting] screen.



(2) Display the region to be edited by zooming in the image and shifting the red rectangle on the left in the picture below with the mouse.



(3) The green lines indicate the region to be measured, while gray rectangles indicate the midpoint of the region. The region size changes by dragging the gray rectangle on cell image. The region shifts by dragging the center green line. Include some part of cell's left edge to detect cell's gradient accurately, as shown in the picture below.



(4) Click [Measurement] tab to check if edge is detected accurately. If detected, click [OK] button to display the main screen.



(5) Click [Measure] button on the main screen and write down the value on [Edge Position X Ave.] for entering cell's reference position in [6.Position Compensation].



2-4-5-7. [6.Position Compensation]

In [Position Compensation], the cell edge location on the camera image is set in order to capture the entire cell image. You need to change the reference position according to the cell size.

Reference position is the location of the cell edges set in [4.Scan Edge Position] and [5.Scan Edge Position] on the camera image.

If the same reference position (indicated with red lines) is set for the cells of different sizes, the cell images are eccentrically located as shown below.



To center cells of different sizes on camera image, set the reference position of each cell according to cell size in this setting.



Refer to the following page for the detail setting of the reference position.

The coordinate on Omron's camera is shown below.



(1) Click the icon button of [6.Position Compensation] to display [Scroll method] screen for setting [Reference].



(3) To set the cell image as shown in the drawing below, perform the following steps:

Click [...] button of [Reference] X and enter the value (A) in [Edge Position X Ave.] measured in [5.Scan Edge Position].

Click [...] button of [Reference] Y and enter the value (B) in [Edge Position Y Ave.] measured in [4.Scan Edge Position]. These values are for reference position of measured cell.



Reference	
X :	300
Υ:	1100
θ:	0
Position —	
x :	U5.X
Υ:	U4.Y
θ:	0



I ▼ Detail result [5.Scan Edge Position]	
Judge : OK Peak edge position X : 302. Peak edge position Y : 226. Bottom edge position X : 30 Bottom edge position Y : 80 Edge position X Ave. : 301. Edge position Y Ave. : 1088. Long distance Max. : 0.252 Short distance Max. : 0.504 Deviation : 0.3567 Line angle : -89.8363 Lost point count : 0	1985 0000 10.5584 10.0000 1262 .0404 2 14

(B)

•	▼Detail result [4.Scan Edge Position]
	Judge : OK Peak edge position X : 425.0000 Peak edge position Y : 1087.7275 Bottom edge position X : 811.0000 Bottom edge position Y : 1088.5965 Edge position X Ave. : 301.1262 Edge position Y Ave. : 1088.0404
	Long distance Max. : 0.2780 Short distance Max. : 0.5561 Deviation : 0.3932 Line angle : 0.0052 Lost point count : 0

2-4-5-8. [7.Outline Alignment]

In this screen, only [Region setting] and [Edge region] are edited.

(1) Click [7.Outline Alignment] icon button in the flow and display [Region setting] screen.



(2) Click [Edit] button on [Region setting] screen to display the setting screen for measurement region.

Outline Alignment		
Region setting	Edge region	Refer. setting
Figures Rectangle		Edit
		hutline Allgeneent Constant There a Editaries Lease Defan-Seattline all Estatements Allgesterents a Addition and the
		Rectargle Upper left position 247., 52. Concer right position 1342., 1172. Conce l
		Cancel

(3) The rectangle enclosed by green lines represents the measurement region. Adjust the measurement region around 3 to 5mm from the cell edge, dragging the small square on each corner of the rectangle with the mouse.



(4) Click [OK] button to set the edited region.



(5) Click [Edge region] tab to display the edge measurement region for alignment.



(6) Click [Display detail] button to show the region setting parameter. Click [Auto] button of [Binary setting].



(7) Choose [Auto] button on the [Region setting] field and click [Generation] button. The edge region for the alignment is displayed automatically. If the setting is appropriate, click [OK] button.

(Refer to the following pages if you want to edit the region **I** manually.) The main screen will be displayed.

Setting on [Refer. setting], [Measurement], and [Output parameter] screens is not necessary.



Detail Setting of Region



In order to set the edited region as [Edge region], click [Generate] button. The region will be regenerated.



Pogion num	The number of edge regions on side line.		
Region num	The region number is set to [3] in the above picture.		
	Width is the region side which is vertical to the cell edge.		
Region width	The guideline width for 6 inch cell is "20~30".		
	(Wider region is preferable as long as the region is inside the white plate.)		
Region height	Height is the region side which is parallel to the cell edge.		
Init Dec from odge (0()	The position from which an edge region of the side line will be generated.		
mil. Fos. nom edge (%)	(Unit :%)		

If region setting is edited after automatic edit of [Edge region], the image changes as follows:



Automatically set [Edge region]



[Edge region] set on the detail setting of the region.

2-4-5-9. [8. Outline Detect Inspection]

It is the setting for detecting location where the perimeter and shape differ with the outline, after extracting cell outline automatically and while tracing the extracted outline points.

(1) Click [8.Outline Detect Inspection]'s icon button to display the outline detect inspection screen. Edit only [Region setting] among four setting parameter in the outline detect inspection.



(2) Click [Edit] button on [Region setting] screen to display the region setting items.



(3) The rectangle enclosed by green lines represents the measurement region for outline detect inspection. The whole measurement target object needs to be included in the rectangle. Adjust the measurement region around 3 to 5mm from the cell edge, dragging the small square on each corner of the rectangle with the mouse.

Click [OK] button to set the edited region. Proceed to (4) for fine adjustment.



(4) For fine adjustment, adjust with allow buttons or [...] button in the picture below. Click [OK] button to decide the region.

8.Outline Detect Inspection Region setting Detection	n:	Ness	surament ^r
Figures Rectangle		1	0
	0	6	\odot
Pa 💼 🗙 🖭	·		(F)492)
Upper left position	↑ ↓ ↓	→ →	
40	(Can	cel

(5) After clocking [OK] button on (3) or (4), click [OK] button on [Outline Detect Inspection] screen to decide the setting for the whole measurement. It changes to the main screen.

Setting of [Output parameter] is not necessary. For [Detection] and [Measurement], edit as needed after checking the condition of the produced string cell.

Refer to (6) for [Detection] setting, (7) for [Measurement].



(6) Produce a string cell with the setting decided in (5) and check the condition of the string cell. If the defect cell is judged as an acceptable cell, adjust with [Defect width] in [Measurement conditions] and [Defect] in [Judgment] on [Outline Detect Inspection] screen.

The defect as in Ex.A is easily detected in [Outline Detect Inspection]. However, the defect with smooth curve may be difficult to detect. This setting is useful in this case.



Click [Detection] tab in [Outline Detect Inspection] screen to display the setting screen.

You need not to edit setting if scene is copied.

Set [Defect width] in [Measurement condition] and [Defect] in [Judgment]. Click [OK] button to decide the set value.

Defect width : 20 < >	
	It is recommended to perform
Test measuring of this item. Measure Judgement Count : 0	test measuring with the condition set in this screen.

	Settable between 1 and 1000. The guideline value is "20"			
	Settable between 1 and 1000. The guideline value is 20.			
Defect width	Sets the target defect width which to be detected. The defect is detected by			
	comparing each outline point with the outline point in this range.			
	Defect width			
	Settable between 1 and 180. The guideline value is "25".			
	The defect higher than the value in [Defect] is detected. [Defect] is the difference			
	between the peripheral outline points. (Sharpness of the defect)			
Delect				
	High defect Low defect			

(8) Produce a string cell with the setting decided in (5), and check the condition of the string cell.

To change the threshold value (defect width and depth) between the rejected cell and the accepted cell, **prepare a sample cell which has the defect of the minimum size to be detected**. Check [Measure depth and width] and select judge type from [AND] and [OR] to set judgment condition. Adjust [Depth] and [Width]. Click [OK] to decide the setting.

odugement condi I▼ Measure depti	n and width		
Judge Type :	€ AND		
	⊂ OR		
Depth :	0.00		
		1.00	
Width :	0.00		
		1.00	. < >

2-4-5-10. [9. Corner Defect Height]

In the outline detect inspection, the locations that are indented in relation to the perimeter edge is detected. However, detection can be difficult at the chamfer of a cell corner area where there is no indentation, as shown below.

In [Corner defect height], the distance from vertex of the cell circumscribed rectangle to the corner (indicated with red arrow) is measured to detect the chamfer defects.





Corner of acceptable cell

Chamfered corner of unacceptable cell

Click [Corner defect height]'s icon button on the main screen to display [Corner defect height] screen.
 In this screen, only [Region setting] and [Measurement] are to be edited. Click [Edit] button on [Region setting] screen.





(2) The rectangle enclosed by green lines represents the measurement region for corner defect height. The whole measurement target object needs to be included in the rectangle. Adjust the measurement region by dragging the small square on each corner of the rectangle with the mouse.



(3) Click [OK] button in the setting region is appropriate. For fine adjustment, adjust with allow buttons or [...] button in the picture below. Click [OK] button to decide the region.



(4) Click [Edge region] tab to set the edge region. This setting is necessary to calculate the center coordinates and slanting of the cell.

9.Corner defect hei	ght		
Region setting	Edge region	Measurement	Output
Figures Rectangle		Edit	

(5) Click [Display detail] button to display detail setting parameters.

Region setting	Edge region	Neasurenent	Output parameter	Region setting	Edge region	Measurement
Naking edge re	egion for Alignwer	ıt		Region setting Making edge re	gion for Alignm	ent
€ Auto	← Vanual	General ion		(* Auto	C Manual	Generation
lisplay detail	satting	splay detail		Display detail	setting	Hide detail
				Annary setting		□ Reverse
				Bina	ry level :	Automatic
				/Detail setting Region num : Region width : Region height	of region	3 < > 30 < >
				Region skip :		30 < >

- (6) Click [Automatic] button on [Binary Setting].
- (7) Check [Auto] button in [Region setting] and click [Generation] button to set the edge regions automatically. (Refer to the following pages to edit the region.)



- =Reference=
 - <Region detail setting>
- * When editing [Edge region], click [Generation] button to regenerate the region.



Degion num	The number of edge regions on side line.
Region num	The region number is set to [3] in the above picture.
Degion width	Width is the region side which is vertical to the cell edge.
Region width	The guideline width for 6 inch cell is "20~30".
Region height	Height is the region side which is parallel to the cell edge.
Init Dec from odge (0/)	The position from which an edge region of the side line will be generated.
mit. Fos. nom edge (%)	(Unit :%)

(8) Click [Measurement] tab to display the setting screen. In are set. (Factory setting is shown in the picture below.)

Region setting Output parameter Edge region Measurement The inspection according to the height has three inspection items. · Judgment based on the distance between the vertices of the rectangle to the corner. · Judgment based on the distance difference from the maximum and minimum corner. ·judgment based on the difference between the height and the width. Completing the above three items clears [Corner defect height]. *Measurement result no less than the

value in [Judgment] is judged as

Test measuring of this item. Measure Judgement _____ Distance(LU, RU) : 1.14 1.13 Distance(LD, RD) 🚅 🔟 - 20 💶 🗕 1.08 999.99 0.07 Distance gap : 1.00 0.29 XY gap : 5.00 L 0K Cancel

The automatic calculated gap indicates.

* Refer to the drawings in the following page.

Distance	Sets the corner distance range to be judged as acceptable.
	It is the distance between the vertices of the rectangle to the corner.
	* Measurement result no less than the value in [Judgment] is judged as
	unacceptable.
	For Ex B, set "4.81" to complete the distance judgment. Entering "4.8" or less than it
	causes the distance of the top-right corner to be judged as unacceptable.
	For Ex A, enter "2.2" or more. If "2.2" is entered, the corner distances of the top left
	and the bottom two corners are judged as unacceptable.
Distance gap	Set the corner difference range judged as acceptable.
	It is the difference between the maximum and minimum distance between the vertices
	of the rectangle to the corner.* Measurement result no less than the value in
	[Judgment] is judged as unacceptable.
	Distance gap: the difference between the maximum and minimum distances among
	the distances at the four corners.
	For Ex B, the corner difference is "1.3". Set "1.31" to complete the distance gap
	judgment. Entering "1.3" or less than it causes the distance gap is judged as
	unacceptable.
	For Ex. A, enter "2.61" or more. If "2.6" or less is entered, the distance gap is judged
	as unacceptable.
XY gap	Set the vertical and horizontal distance difference (the absolute value expressing the
	difference between entire vertical and horizontal length of the cell) judged as
	acceptable.* Measurement result no less than the value in [Judgment] is judged
	as unacceptable.
	For Ex C, set "2.00" to complete the XY gap judgment, as the vertical and horizontal
	distance difference of the acceptable is "0.00". As seen in the drawing of its right, the
	cell whose vertical distance difference is "3.50" exceeds the set value, therefore
	judged as unacceptable.



The corners of the cell are cut from the beginning; the corner depth (distance) is "2.2"; the chamfer defect whose corner depth (distance) is "4.8" at the top right and "3.4" at the bottom right. As a result, the distance gap is "2.6".

The corner of the acceptable cell is square; the chamfer defect whose depth is "1.5" at the top right, "0.8" at the bottom right and "0.2" at the bottom left. As a result, the distance gap is "1.3".

... The location where the cell is broken.



When the horizontal distance is "50.00" and the vertical distance is "50.00", the XY gap of the cell is "0.00".

With the same setting as the cell in the left, the XY gap of this cell is "3.50" as the vertical distance is only "46.50" due to the breakage at the upper side.

(Obtained by subtracting the horizontal distance from the vertical distance)

Vertical distance 46.

. S
(9) Preparing the cell with the minimum defect, enter the value in the parameters and click [OK] button.



(10) Click [OK] button after editing. Editing [Corner defect **height**] is completed and the main screen is displayed again.

Test measuring of this item. Measure						
			4 05			
	Distance(LU, RU)	÷	4.85	5.34		
	Distance(LD, RD)	:	4.99	5.79		
		Γ		999.99 < >		
	Distance gap :	_	0.79			
		Γ		1.00 < >		
	XY gap :		3.83			
		Γ		5.00 < >		
	OK Cance I					

2-4-5-11. [10.Scan Edge Width]

This setting is necessary to measure the difference between width and height of the cell. [10.Scan Edge Width] is for measuring width of the cell, while [11.Scan Edge Width] is for the height. Values set in [10.Scan Edge Width] and [11. Scan Edge Width] are used for [12.Calculation].



(1) Click [Edit] button and display region setting screen.



(2) The green lines indicate the region to be measured, while gray rectangles indicate the midpoint of the region. The region size changes by dragging the gray rectangle on cell image. The region shifts by dragging the center green line. Include the whole center part of the cell with a margin of 3 to 5mm from the cell edge.



(3) After setting region, click [OK] button, and then, click [OK] button on [Region setting] screen.



2-4-5-12. [11.Scan Edge Width]

Set for cell height in the same way as in [2-4-5-11. [10.Scan Edge Width]]



2-4-5-13. [12.Calculation]

You don't need to edit the setting.

7.Outline Alignment	Setting Output parareter
8 Outline Detect Inspection	Leorestien setting
OK	No. 1 Concent - Excitence Con
9.Corner defect height	S S Unitable (Unitable (Un
■ 10.Scan Edge Width OK	
11.Scan Edge Width	Ingression : [65(07)00-01.605-016.000
	securit : -II,IIIII Judgement condition :
U.Calculation	
13.Data Output OK	
	liele 30. Cascel
	Expression setting
	No. Comment Expression 0 ABS(U1.D03-U1.D02*U10.AVEW)-U1.D00
	1 ABS(U1.D03-U1.D02*U11.AVEW)-U1.D00
	3
	4
	6 U1.D02*U10.AVEW
	7 UI.DU2*UII.AVEW
	No. U
	Comment :
	Expression :
	AB5(UI.DU3-UI.DU2*UIU.AVEW)-UI.DUU
	Result : -0.1030
	Judgement condition :

2-4-5-14. [13.Data Output]

This setting is for the signal to be transmitted to PLC.

Check [Calculation] and [Output format] which are already copied from the template master.

(1) Click the icon button of [13.Data Output] to display [Data Output] screen.

	13.Data Output
7.Outline Alignment OK	Satling Outout format Culturt data Usernas.co
8.Outline Detect Inspection OK	U UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
9.Corner defect height OK	
10.Scan Edge Width OK	Yer, 0 Ownert, 1 Impression : (Tr-Ge /V2200
11.Scan Edge Width OK	Seart : LUND
12.Calculation	
13.Data Output OK	
	lielp 39: Cancel

(2) Check that expressions are entered in No.0 to 4 as shown below.

If you need to enter expression, choose the corresponding number and enter expressions with keyboard after clicking [...] button.



Keyboard



No.	Comment	Expression
0		(TJG+1)/2000
1		U7.RX
2		U7.RY
3		U7.TH*UO.RP
4		(U7.JG+1)/2000
5		

No.0	To send each inspection's result to PLC.
NO.U	Enter "(TJG+1)/2000)".
No.1	Enter "U7.RX"
No.2	Enter "U7.RY"
No.3	Enter "U7.TH * U0.RP"
No.4	Enter "(U7.JG+1)/2000"

(3) Click [Output format] tab to display [Output Setting] screen. Set [Record separator] to [Comma].

and area	Output betting
No. Domen Typerceler	Communication method :
1 17-52 2 17-57 3 17-17-16-64	• RS-232C/RS-422 C Ethernet
4 IUT-U9-11/2000	Format setting :
1 6 X	Output form : 🖝 ASCII
1. J awer :[Digits of integer : 2 💌 Digits
enn sanlan 1 1722-11/2000	Digits of decimal : 3 💌 Digits
1222 1 : 0.0010	Minus: 🧿 — 🔿 8
	0 suppress : C Available 🕫 None
	Field separator : Comma 💌
	Record separator : Comma
leip Di Divisi	OFF Output IP address setting : Comma
	Refer System(Ethernet) Space
	The following IP address
	Output IP address :
	192 168 100 100
	PLC link setting :
	Decimal output form :



Perform this setting every time you set for the serial data output.

2-4-6. Save Inspection Template

Saves edited templates to register them in the scene No. as templates.

Alignment template's setting is stored in RAM, as Omron FZ3 does not use hard disk.

Clicking [Data Save] button on the main screen saves the setting already stored in the RAM in the flash memory. Therefore, the setting will be lost if the machine power is turned off before [Data Save] button is clicked.

It is recommended to save data frequently by clicking [Data Save] button in order to avoid loss of data due to sudden trip.

(1) Click [Data Save] button on [FZ-Main] screen. Click [Yes] button of the confirmation screen to save the data in the flash memory and register the edited inspection template.

Data in RAM will be erased when the machine power is turned off, but the data in the flash memory is still saved.

FZ-Main Scene View Measure Data	System Heip					
	UST	4.Scene 4 SecurityLevel 1	Adjust Camera0	Adjust Camera1	Initialize Flow	User Change
ING	27ms	Switch to RUN	Area Setting	Adjust Threshold	Display Setting	💾 Data save
						▼ Test measurement
Data save						
Save settings?						
		Yes	No	┃ ┥──		
				1		

(2) Created template data is stored in the machine, but it is recommended to back up the data. Click [Save to file] from [Data] on the toolbar to display [Save to file] screen to choose the data to be saved and its destination.

cene View Meas	re Data System Help	1 Scone J	ave to file		
NG	Save to file Load from file 44mt	4.Scone 4 SecurityLevel 1 Switch to RUN 4.Data Out	Setting data Data to be saved © Scene data C Scene group data C System data	Lossing image	Copy files
	L		C System + Scene grou Destination File name : D:\M	up 0 data Ty Documents\OMRON F:	Z\USBDisk\Scen
					0%

(3) Insert USB into the machine.

(4) To save the scene number (scene data) stored in FZ3, click [Scene data] and choose the data to be saved from the pull-down menu.

Choose [Scene group data] to save the whole scene group.

It is recommended to save [System data] as well.

After choosing the data to be saved, click $[\ldots]$ button to choose the destination

oetting sata	Logging (Mage	Copy files
ata to be saved		
Cene data	4.Scene 4	
C)cene group data	a	
🔿 vsten data		
C System + Scene -	eroun A data	
C System + Scene :	group O data	
C System + Scene : estimation	grous O data	
C System + Scene : estimation File name : D	group 0 data :\By Documents\08R08 F;	Z\USBDisk\Sc
C System + Scene ; estimation File name : p	grous 0 data :\My Documents\005005 F;	Z\U38D13k\Sc
C System + Scene estination File name : D	group () data	Z\U88Diek\Sc <mark>n</mark>
C System + Scene ; estimation File name : p	grous O data :\Ny Documents\OMROM F:	2\U38D1sk\Sc <mark>n</mark>

(5) Choose [USBDisk] and click <u>[OK]</u> button to return to [Save to file] screen.



(6) Click [OK] button on [Save to file] screen to save the data in the designated destination and it returns to the main screen.

Setting data	Logging image	Copy files
ata to be saved —		
🕫 Scene data	4.Scene 4	
C Scene group dat	a	
C System data		
C System + Scene)	group O data	
C System + Scene ;	group O data	
C System + Scene estimation File name : D	group O data :\Ky Doruments\OMRON F	Z\USBDisk\Scen
C System + Scene ; estination — File name : [D	sroup O data :\Xy Documents\OMRON F:	Z\USBDisk\Scen
C System + Scene ; estination File mane : p	group 0 data :\Xy Documents\OMRON F	Z\USBDisk\Scen

2-4-7. Edit Flow

The order of the flow and items can be edited.

The following describes how to change [3.Corner defect width] to [3. Corner defect height] in the flow.

Flow					
1st. NG unit	Next NG unit				
0.Camera Ima NG	ge Input				
1.Outline Alignment					
2.Outline De	tect Inspection				
3.Corner defect width					
4.Data Output					

(1) Click [Edit Flow] of [Scene] in the toolbar of [FZ-Main] screen to display [FZ-Flow] screen.



(2) Click [3. Corner defect width] and [Delete]. Click [Yes] button on the confirmation screen to delete [3. Corner defect width] from the flow list in its left.

🗱 FZ-Flow		
0.Camera Image Input		
1 Outline Alignment	Rename	
2.Outline Detect Inspection	Edit flow	
3.Corner defect width	Selected un OK?	its will be removed.
4.Data Output		Yes No
5.	Сору	
	Shift area	A
	Delete	
	Wuitipie selection	
🕌 FZ-Flow		
0.Camera Image Input		
1.Outline Alignment		
2.Outline Detect Inspection		
3.Data Output		
4.		

(3) Choose (click) <u>the number before which the new item is to be inserted</u>. Then, choose the item to be inserted from [Measurement] folder in the right and click [Insert] button.

📓 FZ-Flow		
0.Gamera Image Input		E- D Measurement
		Busbar Alignment
TOutline Alignment	Rename To Append	Character Inspection
		Gircle Angle
2.Outline Detect Inspection		Classification
3 Data Output		Gravity and Area
	Ch. Man June	Color Data
4		
S	1 New Folder	
	Copy	
	🚺 Shift area	Date Verification
		Defect
		EC Circle Search
	Delete	ECM Search
	Multiple selection	Edge Position

(4) After checking [3. Corner defect height] has been inserted in the flow, click [Close] button on [FZ-Flow] screen. It returns to the main screen. Check that the flow has been changed.



- (5) This is the end of editing flow. However, parameter setting of the newly added item is necessary.
- (6) After editing, make sure to click [Data Save] button on the main screen to read the setting. Refer to [2-4-6. Save Inspection Template] for detail.
- (7) It is recommended to save (backup) the data when editing the template. Refer to [2-4-6. Save Inspection Template] for detail.

ΜΕΜΟ

3. Contact

Network



Don't hesitate to contact us for any questions and inquiries.

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