




4 Operation

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4.1 Description of System

This chapter describes the procedure to operate X-ray inspection system. To prevent the occurrence of malfunction while using the product, read this chapter carefully and operate the product according to the procedure described in this chapter.

	<p>Read and understand the safety instructions described in Chapter 1 before operating the system.</p>
	<p>The system should be operated only by the trained person who understands the danger of system and knows the operation procedure.</p>
	<p>After installation, check if the test was completed without any problem before operating it.</p> <p>Before applying the power, check if the power specified in the name plate is connected right.</p> <p>Before applying the power, check if control panel and various sensors are connected properly.</p> <p>Before starting the operation, check the location of emergency switch.</p>

4.1.1 Notices before Operation

1. Before applying the power to the system, check if the moving parts contacted to people (including a part of human body or clothes) or things or if there is such potential danger.
2. If there is a possibility of danger which will affect to human body, remove the dangerous elements completely before starting the work.
3. Carry out the routine repair or checking completely before applying the power.
4. The operation or maintenance of equipment should be limited **to the person who completed the training for system use and maintenance**

4.1.2. Notices during Operation

1. Never contact the moving parts by people (including a part of human body or clothes) or things.
2. If the error is found in the system, identify the type and status sufficiently and if necessary, shutdown the power and take the necessary action.
3. Be sure to open the door after X-ray OFF.
4. Pay attention not to contact the Beryllium of tube window.
(If contacted, wash with fresh water immediately.)
5. Pay attention not to enter within the operation range except for the operator.
6. If the system operates differently from as usual, stop the system first and shut down the power if necessary.

4.1.3 X-ray inspection system operation overview

1) X-ray On Lamp

Displays the running status of X-ray with RED lamp

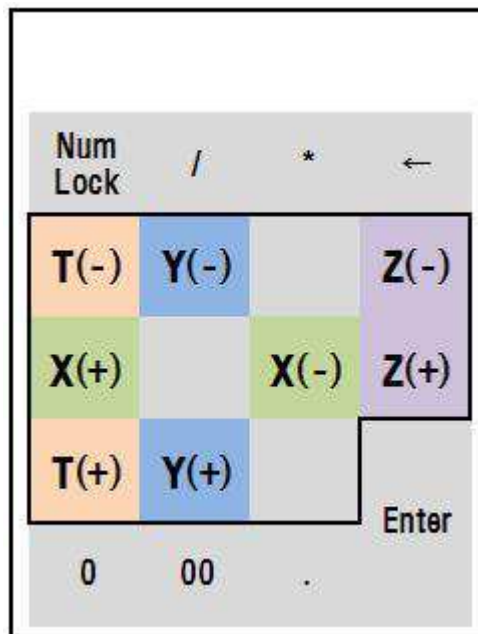
If X-ray is ON, the RED lamp is lit while the equipment is running and indicates that the system is running currently.

2) COMPUTER MONITOR

Displays the current status of equipment and shows the image.

3) KEYBOARD&MOUSE / CONTROLPAD

Use a Control Pad to control each axis and move the table or use a Keyboard & Mouse to help the detailed setting and efficient operation of equipment.



ControlPad

4.2 Power

4.2.1. Power supply

- 1) Check if [EMERGENCY SWITCH] is locked. If locked, turn it to the right to release.
- 2) Turn the POWER ON KEY of equipment to START and locate it to ON direction.
- 3) Turn X-RAY ON KEY of equipment to START and locate it to ON direction.

4.2.2. Power Shutdown

- 1) Check if X-RAY is OFF. (Shutdown the power when X-RAY is OFF)
- 2) Locate X-RAY ON KEY of equipment to OFF direction.
- 3) Locate POWER ON KEY of equipment to OFF direction.

4.2.3. Emergent power shutdown

- 1) If the danger situation occurs, press [EMERGENCY SWITCH] and all power shall be OFF except for PC power.

4.3 Operation

When starting the inspection system at first, check if X-ray discharge quantity of X-ray inspection system is less than $1\mu\text{Sv/h}$ through radiation detector. For operation of inspection system, observe the following procedure.

4.3.1 X-ray tube Warm-up (AGING)

In order to use X-ray tube safely and long, warm-up the tube as described below.

MAIN POWER : Place POWER ON KEY switch on ON position. (left)

1. Close X-ray shutdown door.
2. Place X-ray ON KEY switch on ON position.(right)
3. **Warm-up Start :** If X-ray tube needs warm-up, X-ray ON button shall be changed with Warm-up button automatically.
4. **Warm-up Run :** Warm-up shall be executed at optimal mode of X-ray tube automatically.(10~12 minutes required)
5. **Warm-up End :** Standby status shall be displayed on X-ray status window and X-ray ON button shall appear.

※ X-ray status : displays the status through X-ray Status window of control program such as Warm-up needed, Standby, X-ray On, Interlock release, Disconnect etc. X-ray tube voltage shall be displayed on Voltage panel measuring instrument and the current on Current panel measuring instrument.

4.3.2 X-ray Discharge

To generate X-ray, observe the following procedure. While X-ray is discharging, it is available to adjust the voltage and current of X-ray tube and preset the tube before starting the discharge. To secure the desired X-ray value efficiently, use two methods as follows.

1. Press X-ray ON switch.
3. Use the voltage and current scroll bar to adjust the necessary voltage and current.

While X-ray is discharging, it is available to adjust the voltage or current. Panel

measuring instrument shall be displayed differently whenever pressing Up or Down switch.

4.3.3 X-ray Stop

To stop X-ray discharge, observe the following procedure.

1. Press X-ray OFF switch.
2. To set X-ray tube current as '0', move the scroll bar to minimum.
3. To set X-ray tube voltage as '0', move the scroll bar to minimum.



Before opening the door of equipment, stop the X-ray discharge always. If Interlock does not function properly, check the status of X-ray to prevent the sudden exposure to X-ray before opening the door.

4.3.4 Operation method summary

1. Main Power ON (Left KEY: check Emergency Lock release)
2. X-RAY Power ON (Right KEY)
3. PC Power ON
4. Execute the program on the screen (check the origin of X,Y,Z,T table)
5. X-ray ON (Warm-up shall be executed automatically, 10~30 min required)
6. If Warm-up is ready, Interlock and Standby Lamp shall be ON. Voltage and Current panel measuring instrument shall be set as '0' and the front Lamp shall be OFF and the icon shall be released.
7. Press [LOAD] switch on the panel. (move the loading position of X,Y,Z table)
 8. (after opening the front Door), fix the specimen on the table.
9. (after closing the front Door), operate the table to locate the specimen on the position pointer.
10. X-ray ON
11. Inspection

4.4 Program

This manual describes X-eye 5100F control program to control the equipment. To use the equipment efficiently, understand the contents of this manual well.

For the method how to use the measuring program for image measurement, refer to the corresponding manual.

How to mark



- Menu item display : Ex) [Main>End]

Indicates End menu among sub menu of main menu.

- Command button display : Ex) <Print>

Indicates the button which is displayed on the screen

Icon display



- Describes the contents for reference



- Describes the notices





- Describes the work procedure.

4.4.1. Getting Started and Program Start & End

1-1. Getting Started

Before starting X-eye 5100F control program, check the following items.

	<p>Power check</p> <p>For X-eye 5100F, the power of controller (PC) and the power of each drive part of other equipment are separated and thus even if the power of PC is applied, the power may not applied to the monitor, X-ray Power etc. Check if power switch of control panel is ON.</p>
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	<p>Door Check</p> <p>X-eye 5100F control program carry out motor home check automatically to run the equipment after the initialized is completed according to the setting. At this time, the motor starts to run, check if the door of equipment is closed.</p>
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1-2. Program Run



If X-eye 5100F control program is installed, the icon seen in the left shall be created on desktop.

Double click the icon to start the program.

	<p>If X-eye 5100F control program runs, the main screen shall be displayed after the initialization is completed automatically and then you can use the program. For initialization, refer to 4.4.2. Initialization.</p>
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1-3. Initialization

If X-eye 5100F control program runs at first, the screen shall be displayed as below and the initialization will start.

During initialization, check the controller (PC) environment to run the equipment, and read the initialization of each parts and the setting value or data that program needs.



- ① The No.① on the above indicates the processing status.
- ② The arbitral operation of program installation information may cause the error or warning during initialization.

1-4. Origin

When initialization is completed, the message 'Do you want to initialize table?' shall be displayed in the center of screen. To run the motor, the origin check is essentially needed.

While the origin checking is running, other works are not available.



1-5. Program End


Click X[Close] button of system menu on the right top of X-eye 5100F control program or click [Main>End]. To confirm, the dialogue box shall be displayed as below and if you press <Yes> to end the program.



4.4.2. Quick Guide

This chapter guides you to use the basic operation fast before describing the program in detail. If the program initialization and origin check was completed successfully, you can use the equipment.

2-1. X-ray

 Check if Door is closed.



Press <X-ON/OFF> button from tool box on the top of main screen.
Adjust voltage (kV), current (μA) through scroll bar or input window.

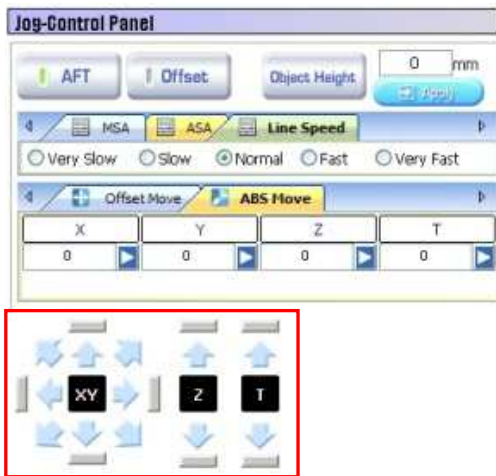
2-2. Image



Press <Live/Stop> button from tool box on the top of main screen.
The real time image shall be displayed on Display Window or stop.

2-3. Move

Use ControlPad connected to the equipment or Use JogControl button on the right bottom [JogControl Panel] of main screen to move the Table.

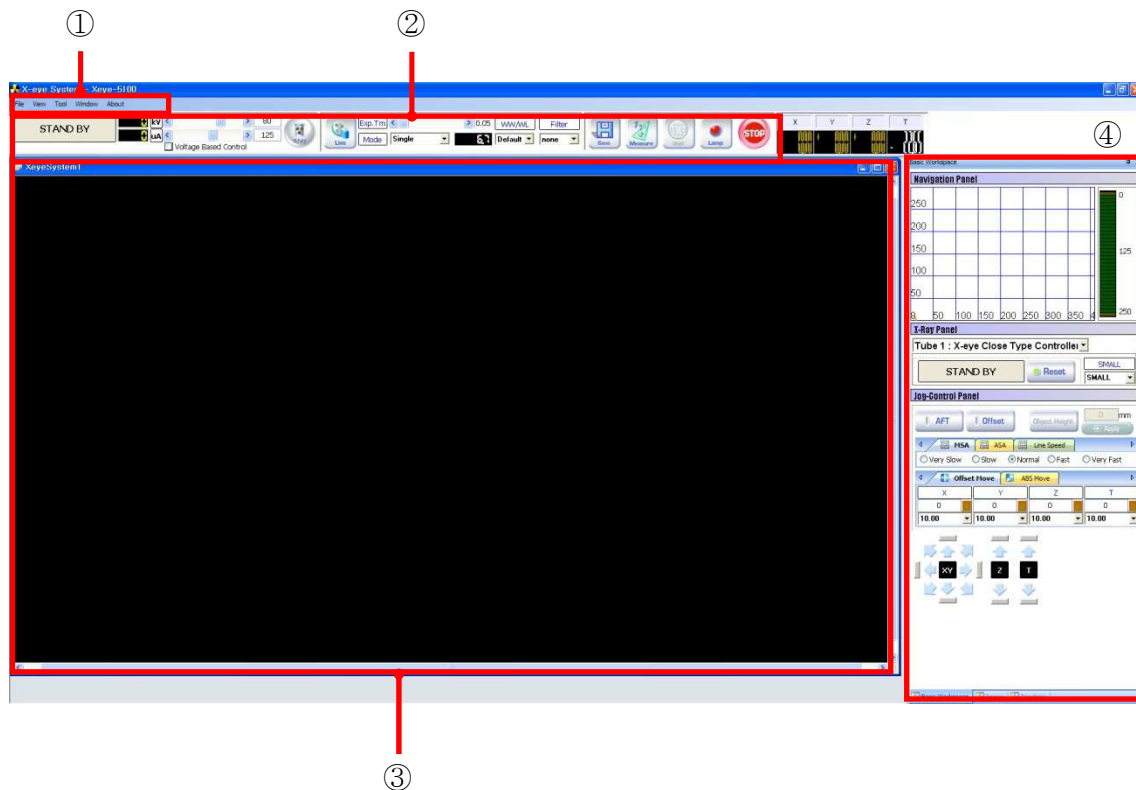


- Use 8 buttons of Up, Down, Left, Right and 45° directions to move the stage on the first.
- Use 2 buttons of Up/Down on the second and third to move Z axis and T axis.
- Press the left button of mouse and the motor will start. Release the button and the motor will stop.

4.4.3. Main Screen

If the first program run and the home check of motor is completed, the screen as below shall be displayed and this screen is Main Screen of X-eye 5100F control program.

Use each command button of Main Screen to operate X-ray equipment.



3-1. Description of Each Part

No.	Name	Description
①	Menu	Shows various menus.
②	Tool box	Various command buttons
③	Image output window	The window to output X-ray image.
④	Work space	The space using various functions

4.4.4. Menu

4-1. File

	Name	Description
File	New	Create new Display Window
	Open	Bring the file
	Close	Close Display Window
	Save	Save the file
	Exit	program end

4-2. View

	Name	Description
View	Application Look	Change program theme
	WorkSpace1~5	View work space
	Save as Default Layout	Set the current layout as default layout
	Load Default Layout	Bring default layout

4-3. Tool

	Name	Description
Tool	Changer User	User change
	IO map	IO map view
	Motor Status	Motor status view
	Measure Tool	Measure tool
	Void Inspection	Inspect void
	Find Origin-Point	Find the origin
	Draw cross	Draw cross
	Use a Screen Navigation	Use a screen navigation
	Recording Images	Record the images
	Register Offset/Gain Image(Batch)	Register offset image by batch
	Register Gain Image(OneShot)	Register current gain image (Gain)
	Register Offset Image(OneShot)	Register current offset image (Offset)
	Make Pixel Map	Execute DeadPixelFinder
	Setting	Environment setting

4-4. Window

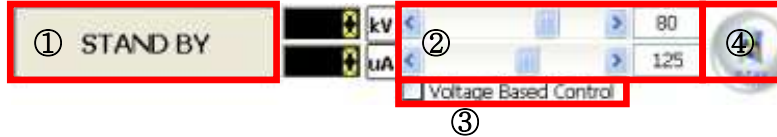
	Name	Description
Window	New Window	Create new Display Window
	Arrange	Window arrangement
	Cascade	Window cascade
	Tile Horizontal	Window horizontal arrangement
	Tile Vertical	Window vertical arrangement

4-5. Help


	Name	Description
Help	About X-eye System	program information

4.4.5. Tool Box

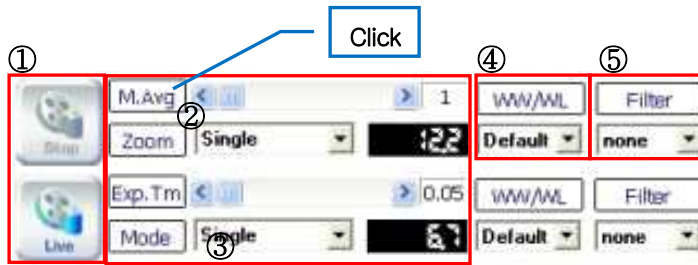
5-1. X-ray basic tool



No.	Name	Description
①	Status display window	Displays X-ray status
②	voltage/current adjustment	Adjust voltage/current
③	Voltage Based Control	Fix the voltage not to change by current value
④	X-ray On/Off button	X-ray On/Off

 For information of X-ray operation, refer to 4.4.9 Additional Description.

5-2. Image Tool



No.	Name	Description
①	Live/Stop button	Real time image Display Start/Stop
②	M.Avg	Adjust Average value
③	Exp.Tm	Adjust Exposure Time value
④	WW/WL	Apply WW/WL setting value
⑤	Filter	Apply image Filter

- ✓ M.Avg : Make average various images corresponding to the setting value and display.
If lots of noise on the screen, increase Average value to see the soft screen.
- ✓ Exp.Tm : sets ExposureTime of Detector.(unit:sec)
If the screen is dark, increase ExposureTime to see the bright screen.
- ✓ WW/WL : apply the preset Histogram range value.
- ✓ Filter : apply various filter effects to the image.

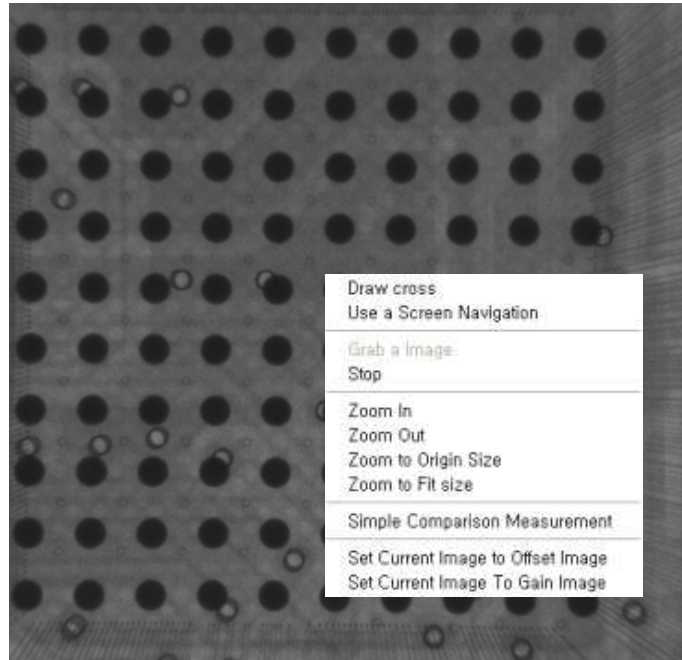
5-3. Tool button / Position display



No.	Name	Description
①	Save	Save the image
②	Measure	Measure tool
③	Void	Measure void
④	Lamp	Fluorescent lamp inside equipment On/Off
⑤	STOP	Motion Stop

⑥	Axes Position	Display position information of each axis
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4.4.6. Display Window



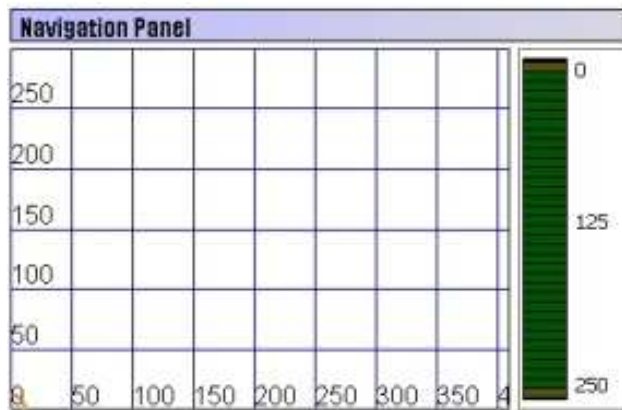
This is the window to output X-ray image. In addition, use the right button of mouse for popup command.

Command	Function
Draw cross	Draw cross line based on the center of screen
Use a Screen Navigation	Set the use of Screen Navigation. (move the selected point with mouse to the center of the screen)
Grab a Image	Gain the current screen
Live/Stop	Start/stop the shooting of X-ray at the real time
Image Effect	A command to see the image after effect treatment
Zoom in	Enlarge the current image size
Zoom Out	Reduce the current image size
Zoom to Origin Size	Restore the current image size to the original size
Zoom to Fit Size	Enlarge/reduce the current image size to fit the screen size
Simple Comparison Measurement	Set the simple comparison measurement

Set Current Image to Offset Image	Set the current image to Offset Image
Set Current Image to Gain Image	Set the current image to Gain Image

4.4.7. WorkSpace

7-1. Navigation Panel



This displays the position of X,Y,Z axis of inspection system table briefly. The grid scale indicates which position X-RAY TUBE is located on the table (Orange circle), and the number between grid scales means the coordinate value of each position. Green bar means Z axis and the distance separated between X-RAY TUBE and table.

Navigation



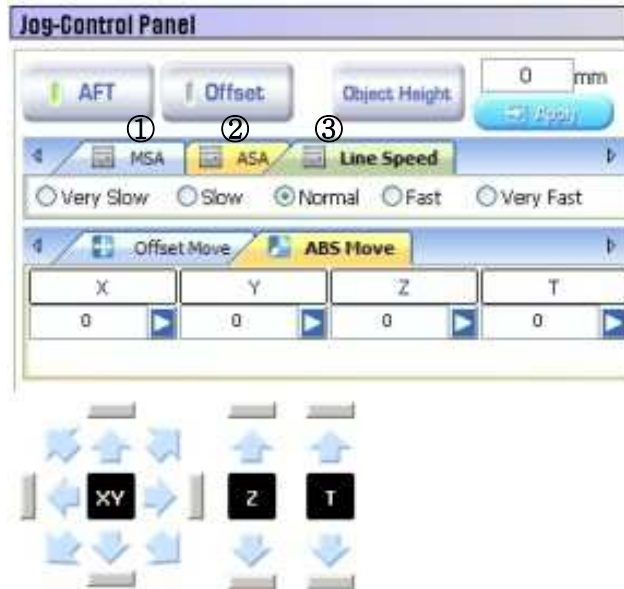
Identify which position the specimen to inspect is located on the table and use the mouse to click the position and the table (tube position) shall move to that position automatically.

7-2. X-ray Control Panel



This displays the type and status of X-ray Tube and controls each tube.

7-3. Jog Control Panel

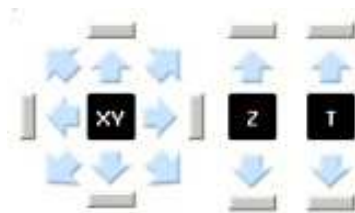


The functions related to motion control such as Table basic move, velocity adjust, absolute move, relative move etc. are arranged.

- ① MSA : Designate the move velocity of basic motion operation.
- ② ASA : Designate the move velocity of PPS mode.
- ③ Line Speed : Designate the move velocity of Navigation and Teaching .

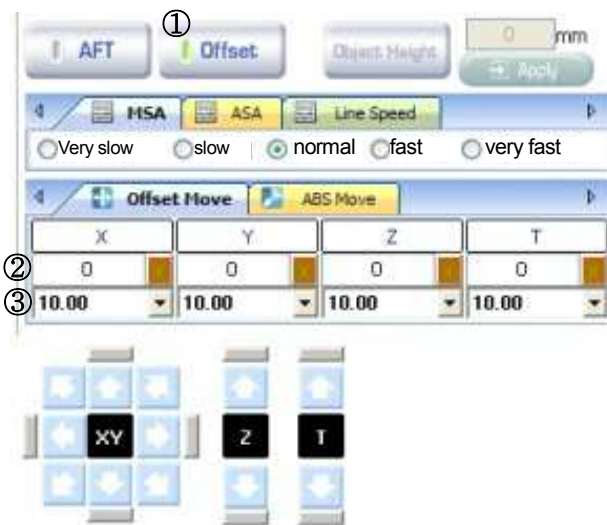
1) Velocity Move

Use the direction button of each axis without designating the specific position and move at the designated velocity.(Direction button has the same function as using the ControlPad.)



2) Offset Move

Move the position as much as the designated value from the current position. Activate Offset function and the direction button and ControlPad shall be converted into Offset mode for operation.



- ① Press Offset button to activate the function. (The direction button on the bottom shall be changed into Offset mode.)
- ② Manual setting: Enter the number in the input column and press <X> button on the right to change with <O> status.
- ③ Default setting : Select the default setting value for use. (Apply when manual setting button is 'X')

3) Absolute Move

Move to the position which corresponds to the designated value regardless of the current position. Available to operate regardless of Offset mode.



- ① Enter the number in the input column and press <▶> execute button on the right to move.
- ② Move to the origin after using Tilt axis so that the table can be horizontal.

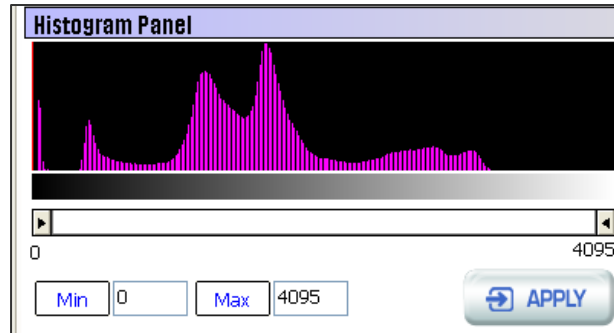
4) AFT Mode

To prevent the change of center position of specimen when using a Tilt axis, this mode performs the function to calibrate the Y axis position. Activate AFT function and the input column of Object Height shall be activated. Enter the height of point which is the center of

specimen correctly for correct calibration.

7-4. Histogram Panel

Histogram represents the distribution of brightness of obtained image by graph and X axis indicates the degree of brightness (Gray Value) and Y axis indicates how much the portion having the brightness of X axis covers .

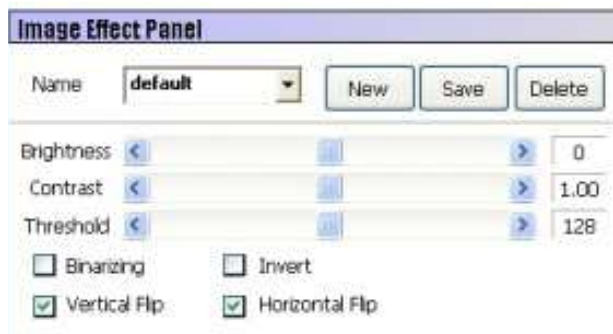


- ① X-eye 5100F image is 14bit ($2^{14}=16384$ gray level) and represents one image.
- ② If represented by gray level from 0 ~16383, remove the unused gray level to see the clear image.
- ③ Use scroll bar to adjust ADJ.MIN value and ADJ.MAX value or enter the number in the input window and then use <APPLY> button to remove the corresponding distribution value. The histogram shall be soft a little and the user enables to make the image to the desired level clearly.

7-5. Image Effect Panel

Set various effects on the image and display it on the screen.

The setting Parameter data can be saved for management and enables to verify the application image at the real time.



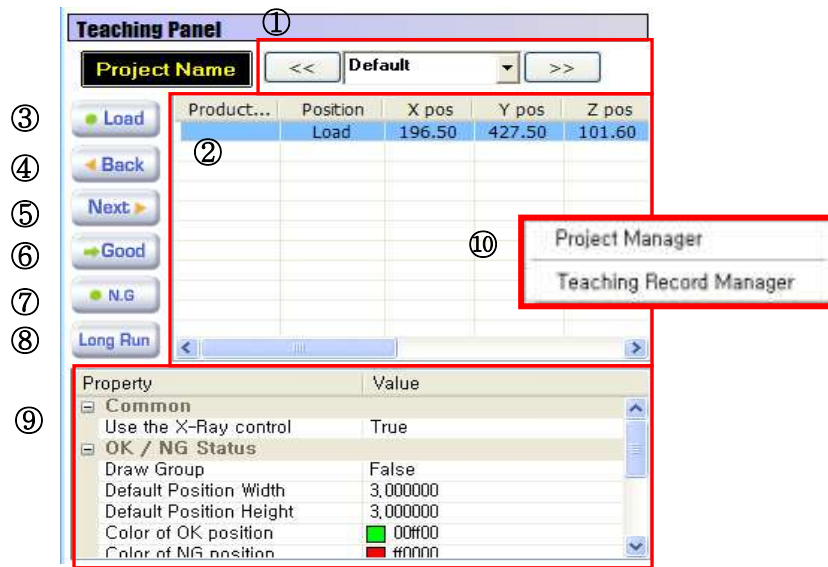
For the description of each item, refer to the following table.

Button	Function
Name	Save and import the setting value of image effect.
Brightness	Adjust the brightness of image.
Contrast	Adjust the comparison value of image.
Threshold	Adjust the binary default value after activating Binarizing.
Binarizing	Binarize the value of image
Invert	Invert the value of image
Vertical Flip	Invert the image into left/right to the vertical direction
Horizontal Flip	Invert the image into up/down to the horizontal direction.

7-6. Teaching Panel

This manages the designated position and Teaching Data such as X-ray setting value etc.

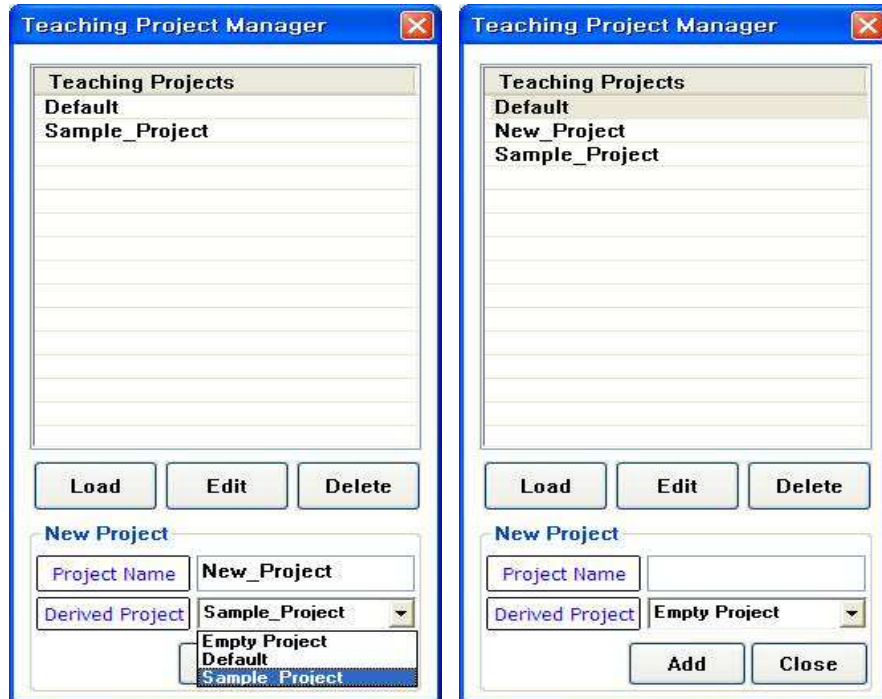
Each Teaching Data is named as Record in the list and the collection of Records shall be managed by the unit of Project.



No.	Name	Description
①	Project List	Project list
②	Record List	Record list (double click Record to move the corresponding position)
③	LOAD	Move the specimen to the Table for Load/Unload
④	BACK	Move to the previous Record position by one step
⑤	NEXT	Move to the next Record position by one step
⑥	GOOD	After designating the current specimen as 'GOOD', move to next position (apply in Auto Teaching function)
⑦	N.G	After designating the current specimen as 'NO GOOD', move to next position (apply in Auto Teaching function)
⑧	Long Run	Not applicable
⑨	Property	Set AutoTeaching function
⑩	Popup Menu	Project/Record Manager execute command

1) Project Manager

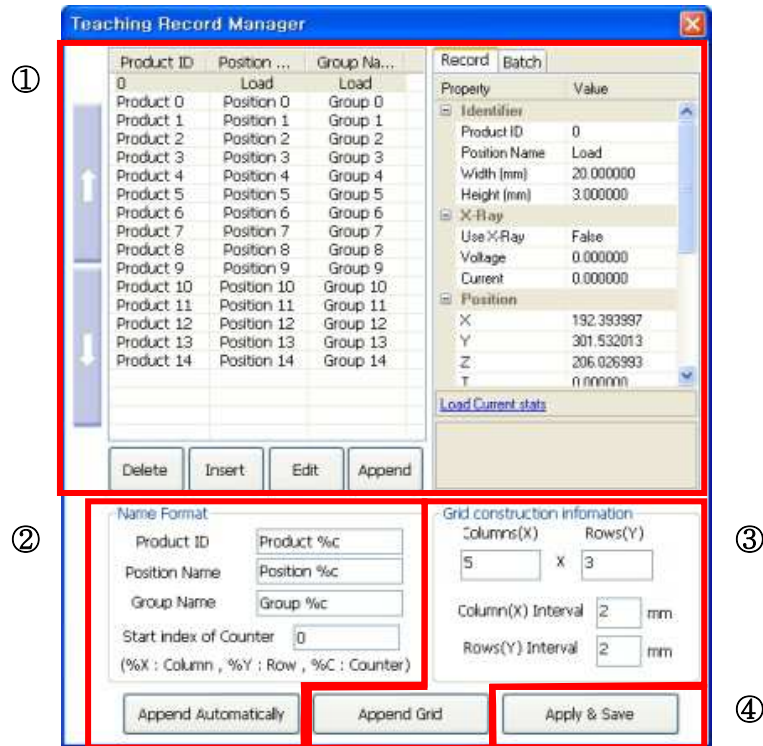
Teaching Panel – Execute Project Manager from Popup Menu 행



No.	Name	Description
①	New Project	The area to add new Project. Project Name : the name of Project Derived Project : Project to bring the default Record
③	Add	Add project
③	Load	Import the selected Project Record to Teaching Panel Record List.
④	Edit	Change the project name.
⑤	Delete	Delete project.

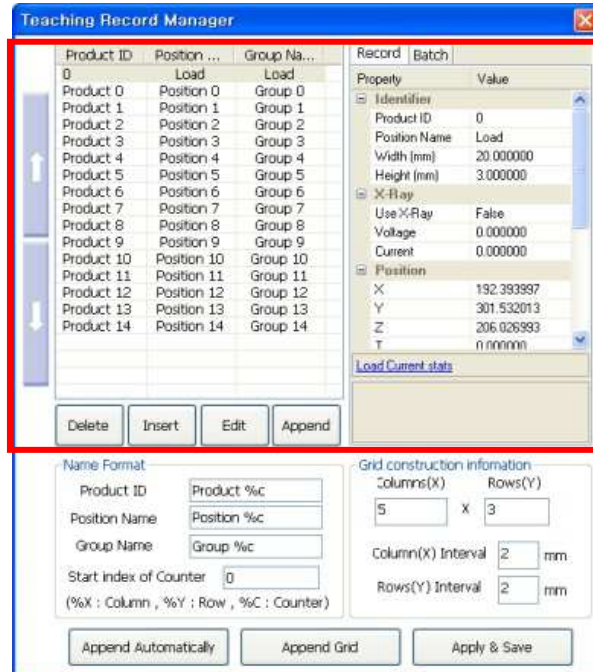
2) Record Manager

Teaching Panel – execute Record Manager from Popup Menu



No.	Name	Description
①	Record List	Record List and Record property
②	Append Automatically	Add the position automatically
④	Append Grid	Add the grid coordinate
④	Apply & Save	Apply & Save button

2-1) Record List Manage



- ① Record Append : After entering the information in Record information window on the right, press <Append> button to add below the list. Press <Insert> button to add just below Record selected from Record list.
- ② Record Change : After selecting Record to change from the list window on the left, and changing the information in Record information window, press <Edit> button to change.
- ③ Record Delete : After selecting Record to delete from the Record list window on the left, press <Delete> button to delete.

<table border="1"> <thead> <tr> <th>Record</th> <th>Batch</th> </tr> </thead> <tbody> <tr> <td>Property</td> <td>Value</td> </tr> <tr> <td>[-] Size</td> <td></td> </tr> <tr> <td>Width (mm)</td> <td>0.000000</td> </tr> <tr> <td>Height (mm)</td> <td>0.000000</td> </tr> <tr> <td>Commit Ch...</td> <td>Commit</td> </tr> <tr> <td>[-] X-Ray</td> <td></td> </tr> <tr> <td>Use X-Ray</td> <td>False</td> </tr> <tr> <td>Voltage</td> <td>0.000000</td> </tr> <tr> <td>Current</td> <td>0.000000</td> </tr> <tr> <td>Commit Ch...</td> <td>Commit</td> </tr> </tbody> </table>	Record	Batch	Property	Value	[-] Size		Width (mm)	0.000000	Height (mm)	0.000000	Commit Ch...	Commit	[-] X-Ray		Use X-Ray	False	Voltage	0.000000	Current	0.000000	Commit Ch...	Commit	<p>Batch change function</p> <p>Batch tab is the function to change the product size information and whether to use X-ray, voltage, current value in a batch.</p> <p>After entering the corresponding item, press <Commit> button to apply.</p>
Record	Batch																						
Property	Value																						
[-] Size																							
Width (mm)	0.000000																						
Height (mm)	0.000000																						
Commit Ch...	Commit																						
[-] X-Ray																							
Use X-Ray	False																						
Voltage	0.000000																						
Current	0.000000																						
Commit Ch...	Commit																						

2-2) Append Automatically

- ① Append Automatically : Press <Append Automatically> button to add the current position automatically.
- ② Enables to enter product ID, position, group name in accordance with Name Format.
- ③ Use %X, %Y to add the grid configuration coordinate in the position input .
- ④ Use %C to add counter number which increase by 1 in the position input.

2-3) Append Grid / Apply & Save

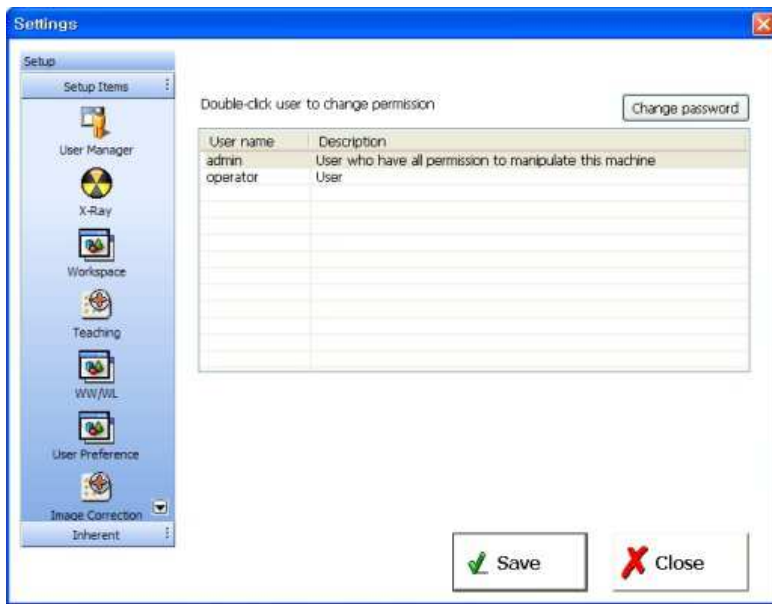
- ① After entering the number and interval of X and Y direction, press <Append Grid> button to add the grid teaching position at the regular interval easily.
- ② After changing the Record information, press <Apply & Save> button to reflect the changed.

4.4.8. Environment Setting

According to the user level, the setting item shall be displayed limitedly and enables to set various parameters necessary for each step.

8-1 User Manager

Enables to change the password for user account and set the authority etc.



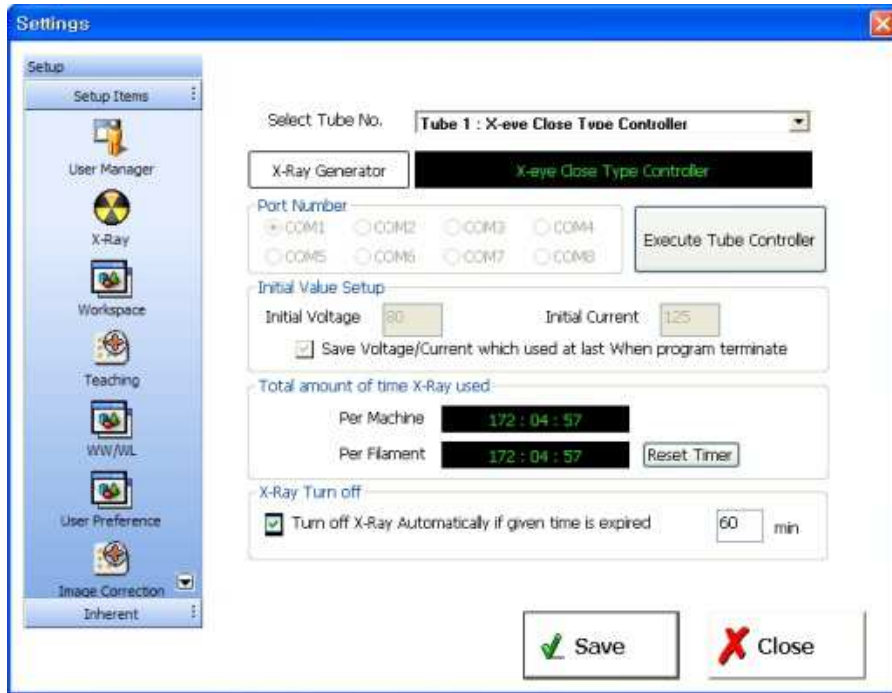
User Permission window



Password change window

8-2 X-ray

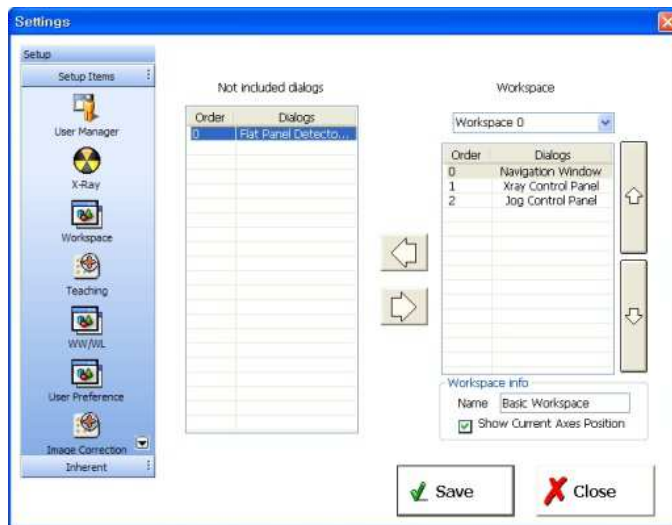
Enables to verify and set the information for X-ray device.



Name	Function
Port Number	Sets RS-232 port to connect to PC and X-ray controller.
Initial Value Setup	Sets the initial value when starting the program.
Total amount of time X-Ray used	Per Machine: indicates total used time of equipment. Per Filament: indicates total used time of filament. After replacing the filament, click [Reset Timer] to set the use time of filament as '0'.
X-Ray Turn off	When not used for a long period, set the function to turn X-ray Off automatically.

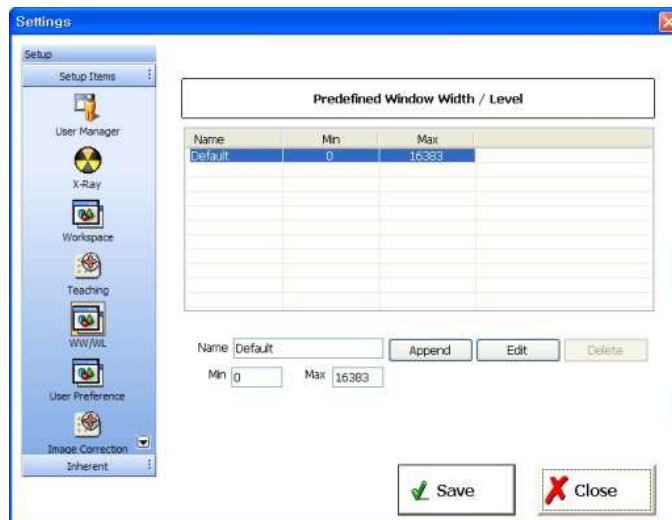
8-3 Work Space

Enables to add and delete the number of work space and panel per work space and set the position.



8-4 WW/WL

Enables to set/manage the WW/WL value to use.



8-5 Teaching

Enables to set the information related to Teaching.



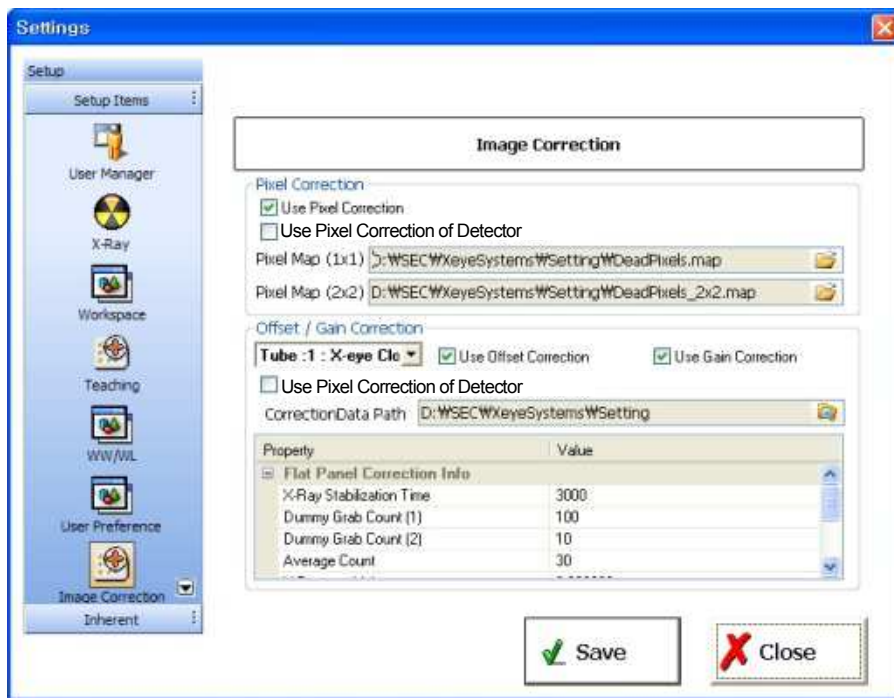
Name	Function
OK/NG Flags	Save the image per OK/NG, add print list, log save etc
Directory / Name template	Set the save path and name template
Image Format	Set the format of image to save
Long-Run	Set the use of Long-Run function
AXI	Set the use of AXI program

8-6 User Preference

The User Preference enables to set the screen configuration, preference option etc.

8-7 Image Correction

Image Correction enables to set the image correction entered in the plate of detector.



Name	Function
Use Pixel Correction	DeadPixel Correction function On/Off
Use Pixel Correction of Detector	Not applicable to the current equipment
Pixel Map File Path	Set the Pixel Correction Map file path (the current equipment supports only 1x1(normal) mode)
Use Offset Correction	Offset Image Correction function On/Off
User Gain Correction	Gain Image Correction function On/Off
Use Offset/Gain Correction	Not applicable to the current equipment
Correction Data Path	Save path of correction image file

X-RAY INSPECTION SYSTEM(X-eye 5100F)


Property	Set Correction funtion
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4.4.9. Other additional description

9-1. X-ray

If X-ray generated from X-ray Generator was irradiated to the object, some would be penetrated and some would not. Thus, Detector shows brightly for the area which penetrated the object and darkly for the area which failed to penetrate. The image obtained from this using a camera is X-ray image.

Notices



Before X-ray ON, check if Door is closed.

As this system operates with high voltage, frequent ON/OFF may cause the damage to the system.

1) Voltage and Current Adjust



As shown in the figure, the voltage and current value can be adjusted by dragging the scroll bar by a mouse.

The higher X-ray voltage is, the higher the penetration rate is. For example, PCB pattern among the specimen can not be seen well in the high voltage but efficient for the inspection of ball of BGA.

If the voltage is lowered for low penetration rate, X-ray image shall be darkened. To compensate this, increase the current capacity and the generating quantity of X-ray will be increased which leads to brighten the image more.

According to the desired part to inspect, adjust the proper voltage and current for the use.

2) X-ray Warm-up

When user turns X-ray ON, X-ray controller of X-EYE 5100F shall check automatically whether to need the warm-up for X-ray ON. If warm-up is needed, "Warm-up" shall be displayed for the proper warm-up. Use <Warm-up> button to start and if warm-up ends later, X-ray shall be OFF automatically.

3) X-ray ON/OFF



Press the left icon for X-ray ON and the voltage and current shall be increased according to the setting value.

If working at AUTO mode, the voltage and current value of the Teaching position shall be set but if ON/OFF manually by the user, the latest setting voltage and current value shall be set automatically.

4) Safety Device

X-EYE 5100F is designed to secure the maximum safety related to X-ray. In the level of hardware, when door is open, this shall shutdown the power of X-ray and even in control program, detect the door open and shutdown the power of X-ray as double safety device.



Notices

X-eye 5100F secures the maximum safety for X-ray but it is recommended for user to observe the following notices.

- 1) Before opening the door of equipment, check X-ray ON/OFF.
- 2) Before X-ray ON, check the door of equipment.

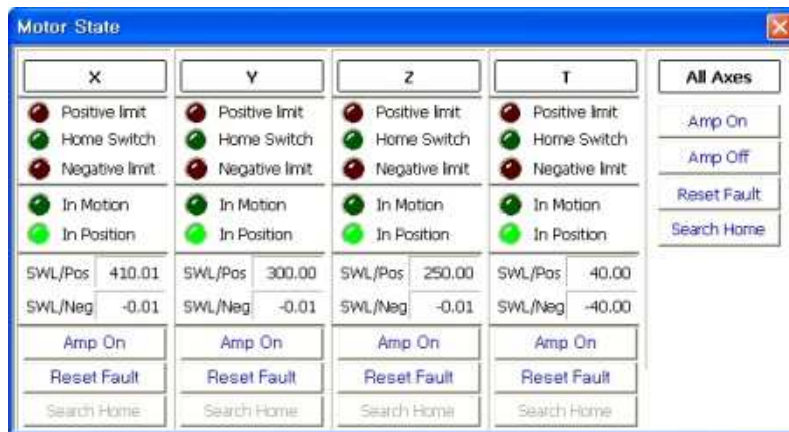
9-2. Motion

X-eye 5100F is consisted of 4 axes and the role of each axis is as follows.

- X, Y : form the Stage and move the position of specimen to X-Y direction.
- Z : adjust the height of Z axis to enlarge the X-ray image.
- T : adjust the Tilt angle of T axis to take a shot for the specimen from the diagonal position.

1) Motor State

Through [tool>motor state] menu, you can verify the motor state.



2) Drive condition of each axis

X-eye 5100F executes **Origin check per axis** for the correct position movement.

During the operation of equipment, AMP of motor shall be OFF automatically by specific event or the user will be able to turn AMP of motor OFF if necessary.

If AMP is OFF, the position information of motor shall be uncertain. Thus be sure to rerun the origin check [tool>origin check] after AMP ON.

At each axis, **Limit sensor of hardware and Limit of software** exist. HW Limit is fixed but SW Limit is variable and applicable at the real time to prevent the collision of apparatus per position of each axis.

Each axis can be AMP OFF by HW Limit sensor of -/+ direction or safety device.

In this case, rerun AMP ON → Origin check. To prevent this, -/+ direction SW Limit of each axis is set.



If the motor stops by the corresponding SW Limit, do not operate by force to the proceeding direction.

As the setting for SW Limit is limited, please contact us, SEC.

9-3. IO Map State

This menu enables to verify the state of various Input / Output signals and indicates I/O signal map.

If the problem occurs in the system, this helps to check the state as below and trace the cause of problem occurrence.

