

How to acquire bright image with X-Ray shot. This procedure is also applied for pediatric patient.

X-ray generator connection is explained in this manual page from 46 to 48.

- 1 Click the "Acquisition" Button next to Bright Image(s) text.

The screenshot shows the LG DXD Calibration software interface. The main window is titled "LG DXD Calibration" and has tabs for "Calibration", "User BPM", "Validation", and "EI". The "User BPM" tab is active. The interface is divided into several sections:

- Navigator:** A large central area for image viewing.
- Histogram:** A section with a "Reset" button and a dark histogram area.
- BPM Analysis:** A table showing analysis results.
- History:** A section with an "Open" button and a list of items.
- Bright Image(s):** A section with a "Count: 0" and an "Acquisition" button, which is highlighted with a red box.
- Calibration:** A section with a "Calibration" button and an "Offset Remove" option with a "Count: 0".
- Result:** A section for displaying results.
- Log Table:** A table at the bottom showing system events.

Item	Count
Rows	0
Columns	0
Class 0	0
Class 1	0
Class 2	0
Class 3	0
Class 4	0
Class 5~8	0

Date	Time	Type	Details
2018-08-22	10:52:26	Settings	Ping succeeded to 127.0.0.1
2018-08-22	10:52:30	Settings	Failed to load factory calibration files
2018-08-22	10:52:31	Settings	Connected to detector successfully

- Implement "X-ray Shot". Calibration SW will wait X-Ray acknowledge signal from DXD and it will display waiting sign.

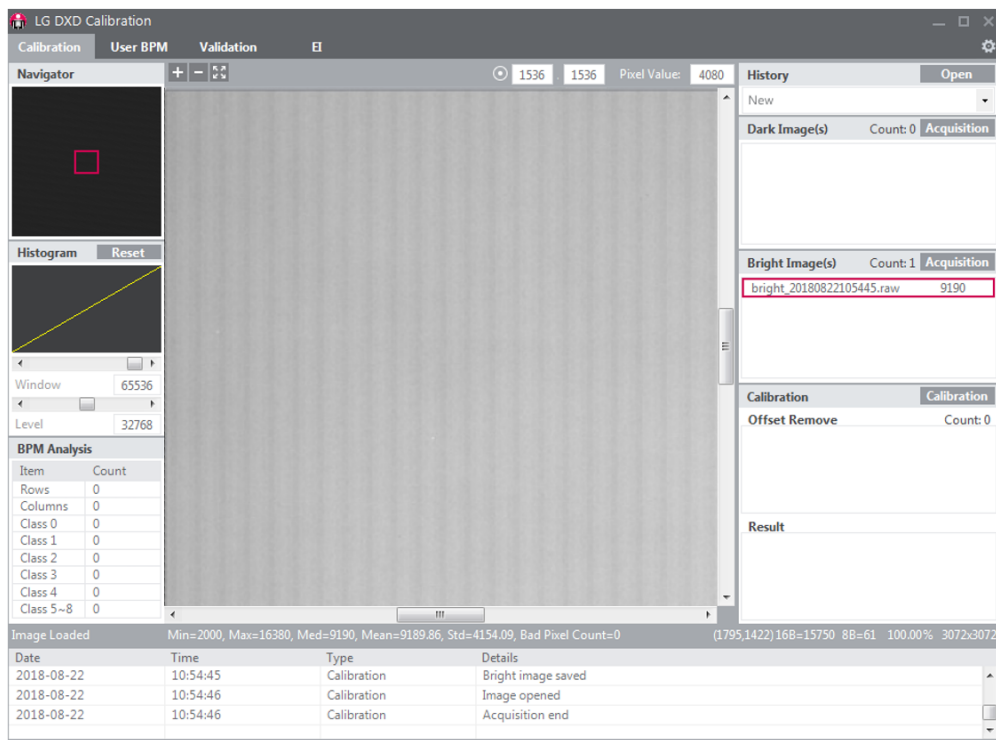
The screenshot shows the 'LG DXD Calibration' software interface. The main window is divided into several sections:

- Navigator:** A large central area for image display, currently showing a dark image.
- Histogram:** A section below the navigator, currently showing a dark histogram.
- BPM Analysis:** A table showing analysis results for various items.
- History:** A section on the right showing a list of events.
- Dark Image(s):** A section on the right showing the count of dark images and an 'Acquisition' button.
- Bright Image(s):** A section on the right showing the count of bright images and a 'Cancel' button. It displays a pink 'Waiting' message.
- Calibration:** A section on the right showing the count of calibration events and a 'Calibration' button.
- Result:** A section on the right showing the result of the calibration.
- Image not Loaded:** A section at the bottom showing a table of events.

Item	Count
Rows	0
Columns	0
Class 0	0
Class 1	0
Class 2	0
Class 3	0
Class 4	0
Class 5~8	0

Date	Time	Type	Details
2018-08-22	10:54:44	Calibration	Acquisition start
2018-08-22	10:54:44	Calibration	Waiting for prepare signal
2018-08-22	10:54:44	Calibration	Waiting for exposure signal

- Acquired bright image is displayed in list view, please check its name and median value. Actual file is saved "Image" folder in the workspace.



! NOTE

- These acquisition steps are all same to User BPM, Validation and EI image acquisition.
- Calibration SW support Window level adjustment, but does not support other image post-processing function.
- The process of obtaining the image for pediatric patients is same with other patients.

CALIBRATION SOFTWARE

To ensure that optimal image quality is obtained from the detector, the detector must be calibrated. The Calibration Software generates and verifies the values necessary for calibration.

! NOTE

- To ensure optimal image quality, you should calibrate every month for the first three months after the purchase and half-yearly calibration thereafter.
- It is recommended that you leave the detector on for 15 minutes before calibrating.
- The default value of Calibration Software could be changed depends on Detector.

Calibration Software

The features of the Calibration Software include **Settings**, **Calibration**, **User BPM**, **Validation** and **Exposure Index**.

Settings

Settings include **DXD** settings, **Calibration SW** settings and **Firmware Update**.

- **DXD**: Configures the settings required to obtain calibration images and detector settings.

The screenshot shows the 'LG DXD Calibration' software interface. The window title is 'LG DXD Calibration' and it has tabs for 'Calibration', 'User BPM', 'Validation', and 'EI'. The 'DXD' tab is active, showing sections for 'Connection & File Save', 'Network Options', and 'Installation Info.' on the left, and 'Detector Parameters' and 'Power Options' on the right. A log table is at the bottom.

Connection & File Save

DXD Serial Number: [Text Field]

DXD IP: [10] . [10] . [10] . [100]

Timeout: [5000] msec. (3000~10000) [Ping]

Save Location: [D:\] [Open]

[Apply]

Network Options

Current Status: Wired [Change DXD IP] [Wireless Setup]

Installation Info.

Date Format: [YYYY/MM/DD]

Current Date: 2018/01/19 [Register]

Detector Parameters

Trigger Mode: Auto Manual

Sensitivity: [15] (0-63)

Window Time: [5] 00 msec (1-40)

Frame Width: [2500]

Frame Height: [3052]

! Press 'Reset' to load factory-default Detector [Reset]

[Save] [Cancel]

Power Options

Auto Sleep: [Off]

Auto Power-Off: [Off]

[Save] [Cancel]

[Exit]

Date	Time	Type	Details
2018-01-19	15:04:12	Settings	Ping succeeded to 10.10.10.100
2018-01-19	15:04:14	Settings	Failed to load factory calibration files
2018-01-19	15:04:14	Settings	Connected to detector successfully

- **Calibration SW:** Configures the settings required for to calibrate software algorithms.

Calibration Parameters

Target Gain: (0.0~255.0)

Gain Margin: (0.0~1.0)

Offset Margin: (0~1000)

Std Margin: (0~1000)

Ref sat value: (28000~65534)

Surr Margin: (0~3000)

Image Edit

Rotation:

Flip:

Invert:

Cut Edge

T: (6~1000)

L: (6~1000) R: (6~1000)

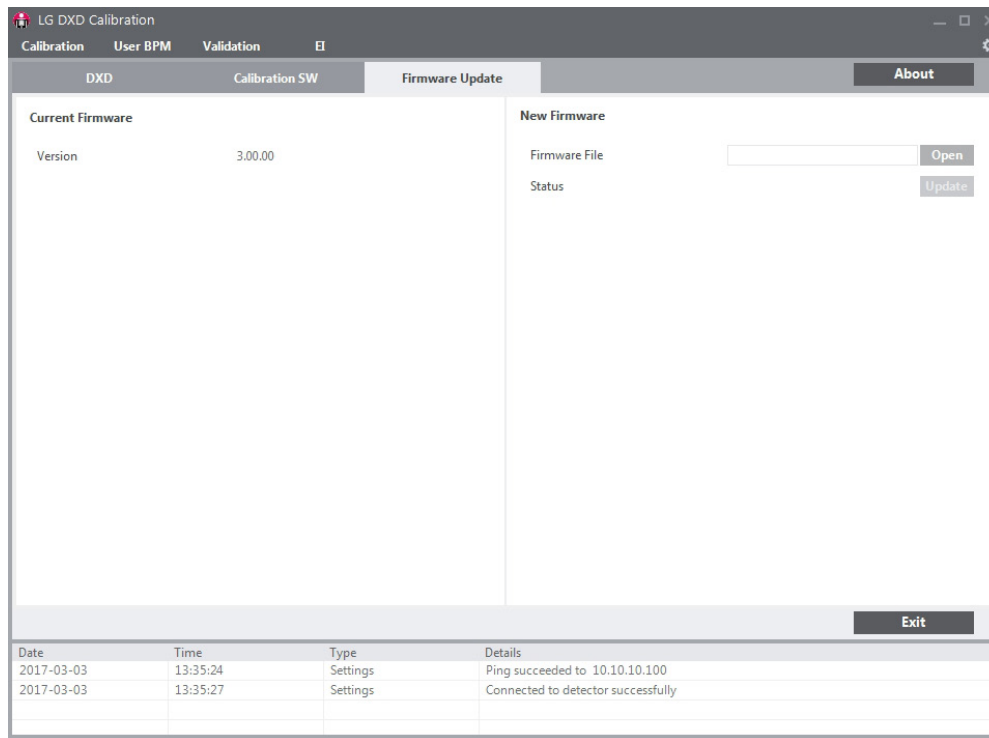
B: (6~1000)

! Press 'Reset' to load factory-default Calibration SW

Buttons: Reset, Save, Cancel, Exit

Date	Time	Type	Details
2017-12-07	13:32:21	Settings	Ping failed to 10.10.10.100
2017-12-07	13:48:46	Settings	Ping succeeded to 10.10.10.100
2017-12-07	13:48:50	Settings	Connected to detector successfully

- **Firmware Update:** Checks the firmware version of the detector or performs the firmware update.

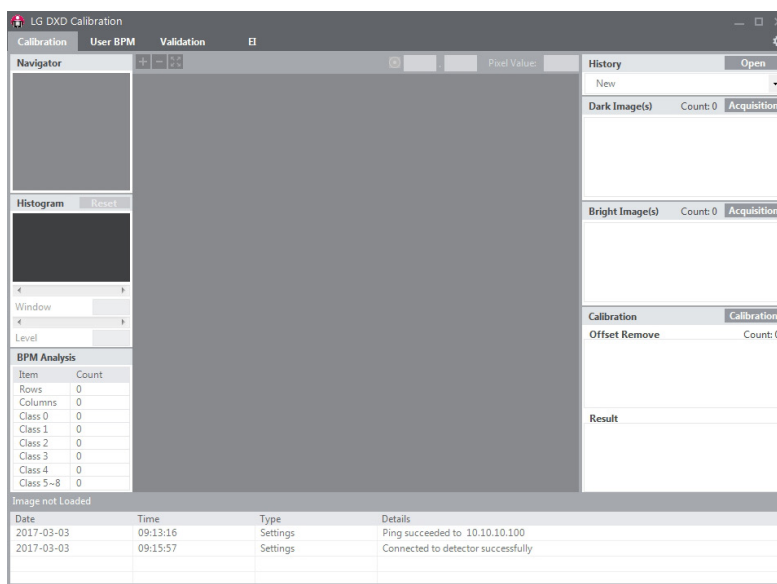


<Settings Screen: Firmware Update>

Calibration

Calibration involves the following procedures.

- **Dark Image** and **Bright Image** are obtained from the detector.
 - **Dark Image:** An image obtained without generating X-rays.
 - **Bright Image:** An image obtained by generating X-rays without a phantom or any other object on the detector.
- Generate Avg dark, Offset, and Gain: Used for Corrected Image calculations.
 - **Corrected Image:** An image generated by applying calibration results to a raw image.
- Generate Bad Pixel Map: Bad pixel values are calibrated using surrounding pixel values.



<Calibration Screen>

User BPM

This is used to assign additional bad pixels in BPM.raw after calibrating.

The screenshot shows the 'User BPM' screen in the LG DXD Calibration software. The interface is divided into several sections:

- Navigator:** A large central area for viewing and editing bad pixels.
- Histogram:** A panel on the left showing a histogram with a 'Reset' button.
- BPM Analysis:** A table showing the current state of the BPM analysis.
- History:** A panel on the right showing a list of recent actions.
- Pixel View:** A panel on the right showing a detailed view of a selected pixel.

The BPM Analysis table is as follows:

Item	Count
Rows	0
Columns	0
Class 0	0
Class 1	0
Class 2	0
Class 3	0
Class 4	0
Class 5~8	0

The History panel shows the following entries:

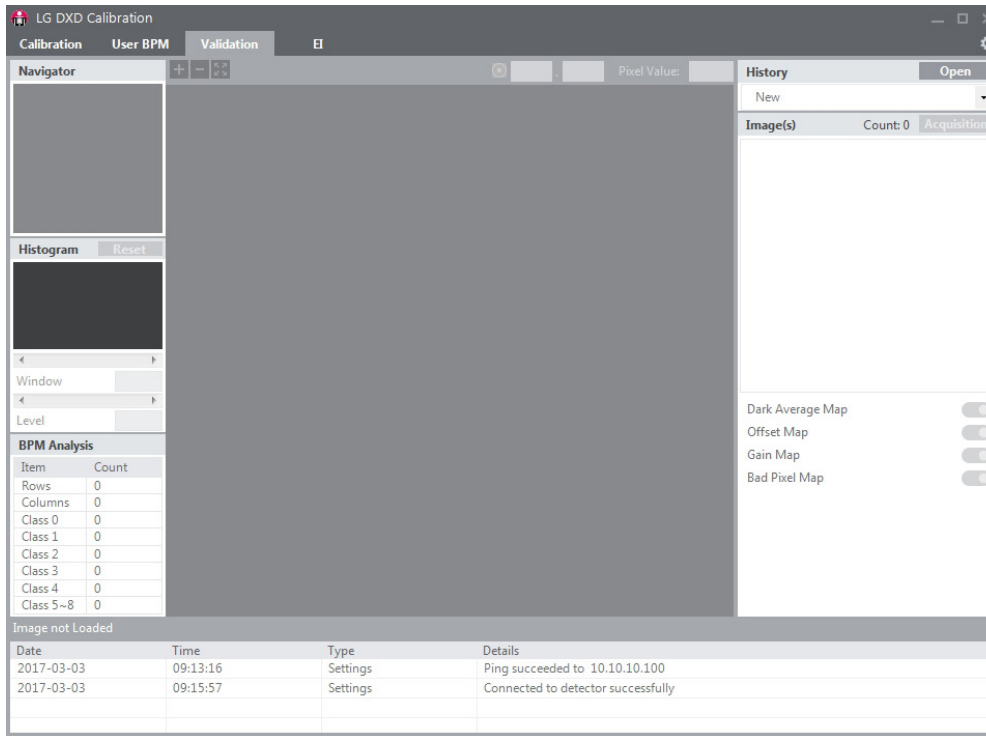
Date	Time	Type	Details
2017-03-03	09:13:16	Settings	Ping succeeded to 10.10.10.100
2017-03-03	09:15:57	Settings	Connected to detector successfully

The Pixel View panel contains the text: "Double click a point to update to bad/live pixel."

<User BPM Screen>

Validation

This is used to validate the final image by applying calibration results to the image.



<Validation Screen>

EI(Exposure Index)

This calculates and saves median output value per input dose as a linear expression and a table.

The screenshot shows the 'EI' screen in the 'LG DXD Calibration' software. The interface is divided into several sections:

- Navigator:** Contains zoom controls (+, -, x) and a 'Pixel Value' field.
- Histogram:** A dark area with a 'Reset' button.
- Window:** A field for window size.
- Level:** A field for level.
- BPM Analysis:** A table showing analysis results.
- History:** A table showing acquisition history.
- Measure & Save:** A button to save the current data.

Item	Count
Rows	0
Columns	0
Class 0	0
Class 1	0
Class 2	0
Class 3	0
Class 4	0
Class 5~8	0

Date	Time	Type	Details
2017-03-03	09:13:16	Settings	Ping succeeded to 10.10.10.100
2017-03-03	09:15:57	Settings	Connected to detector successfully

<EI Screen>

Image Functions

The screenshot shows an image analysis software interface. The main image area is dark with a yellow circle (1) and a yellow square (2) overlaid. The top right shows coordinates 1664, 1408 and Pixel Value: 2727 (4). The left sidebar contains a Navigator (2), a Histogram (3) with a yellow line and a window value of 16384, and a BPM Analysis table (5) with a level of 8192. The bottom status bar shows: Image Loaded, Min=0, Max=3312, Med=2721, Mean=2709.358, Std=96.76997, Bad Pixel Count=484.

1

2

3

4

5

Item	Count
Rows	0
Columns	0
Class 0	476
Class 1	4
Class 2	4
Class 3	0
Class 4	0
Class 5~8	0

Image Loaded Min=0, Max=3312, Med=2721, Mean=2709.358, Std=96.76997, Bad Pixel Count=484

1 Image Viewer

- The **Calibration**, **User BPM**, **Validation**, and **EI** menus include an image viewer that lets you view the acquired images.
- An image is loaded and displayed when it is acquired or clicked.
- Information about the image is displayed in the following sections.
 - **Image Loaded:** Indicates whether an image is loaded in the image area.
 - * When an image is loaded: **Image Loaded.**
 - * When no image is loaded: **Image not Loaded.**
 - **Min:** Minimum pixel value within the image area.
 - **Max:** Maximum pixel value within the image area.
 - **Med:** Median value of the image.
 - **Mean:** Mean value of the image.
 - **Std:** Standard deviation value of the image.
 - **Bad Pixel Count:** Bad pixel count in the image area.
 - $16B = N$, $8B = M$: Representation of the pixel value at (x,y) in bits.
 - %: Percentage of the image shown in the image area compared to the entire image size.
 - $(W \times H)$: Size of the entire image.

2 Navigator

- The **Navigator** shows the entire area of the acquired image and indicates the zoomed in/out area.
- The red rectangle in the **Navigator** indicates the area shown in the Image Viewer.
- Clicking a position in the **Navigator** moves the red rectangle to the position and displays the area in the Image Viewer.

3 Histogram

- Histogram of the acquired image is shown here.
- **Window / Level** can be adjusted for better image distinction.
- Use the $\langle \rangle$ buttons or the scroll bars below the **Histogram** graph to adjust **Window / Level**.
- Click the **Reset** button to restore the default values.

4 Reference Point

- When you click a position inside the Image Viewer, a reference point is specified, and the coordinates and pixel value of the reference point are shown at the top. You can also move the reference point by entering the x and y values manually.
 - Since reference point coordinates are numbers, only numeric values can be entered.

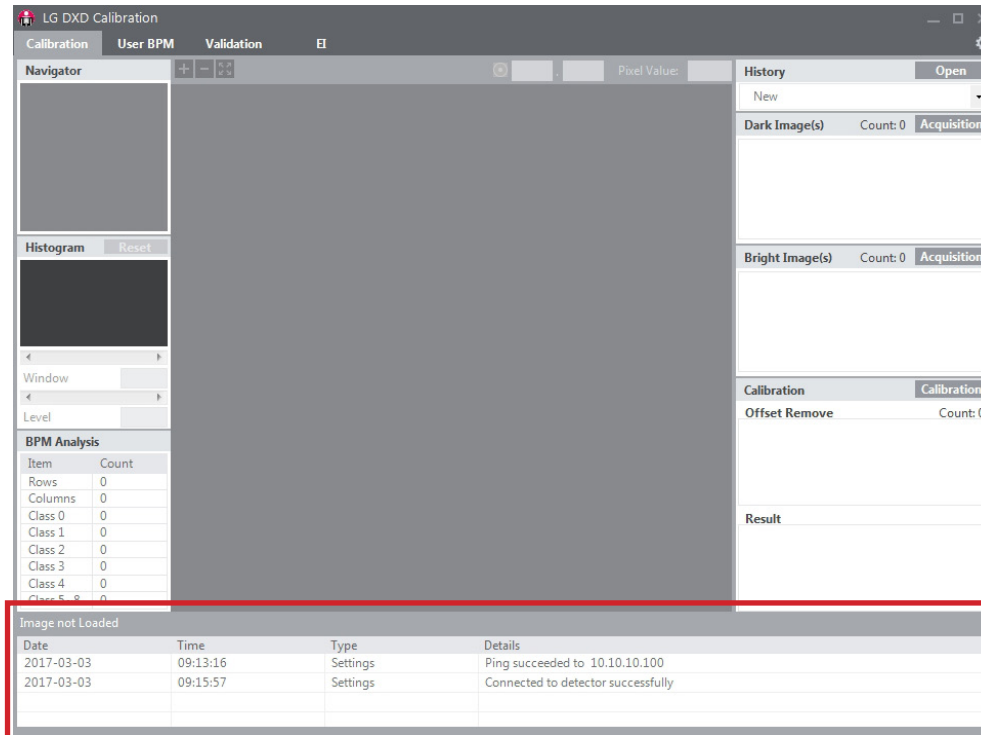
5 Bad Pixel Map Analysis

- Displays the results of bad line and bad pixel class analysis based on the Bad Pixel Map after calibration.

Log

This shows the necessary information about the application execution process that is helpful to the user.

It consists of the **Date**, **Time**, **Type** and **Details**, which are saved as a log file.



The screenshot displays the 'LG DXD Calibration' application window. The interface includes a 'Navigator' on the left, a 'Histogram' with a 'Reset' button, a 'Window' section, and a 'Level' control. The 'BPM Analysis' section contains a table with the following data:

Item	Count
Rows	0
Columns	0
Class 0	0
Class 1	0
Class 2	0
Class 3	0
Class 4	0
Class 5	0

On the right side, there is a 'History' panel with an 'Open' button and a 'New' dropdown menu. Below it are sections for 'Dark Image(s)' and 'Bright Image(s)', each with a 'Count: 0' and an 'Acquisition' button. Further down is a 'Calibration' section with a 'Calibration' button and an 'Offset Remove' button with a 'Count: 0'. A 'Result' section is also present.

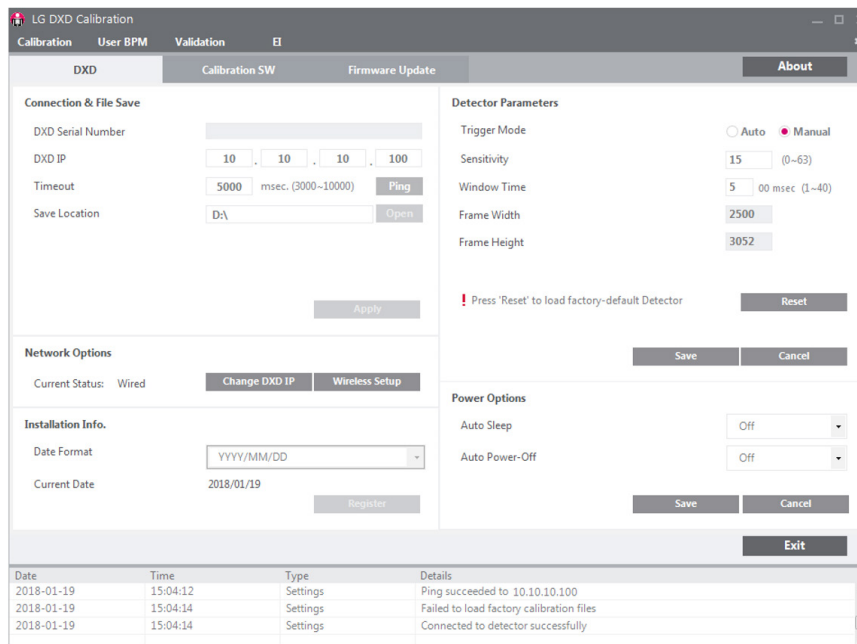
At the bottom, a log table is highlighted with a red border. It has the following data:

Date	Time	Type	Details
2017-03-03	09:13:16	Settings	Ping succeeded to 10.10.10.100
2017-03-03	09:15:57	Settings	Connected to detector successfully

USAGE

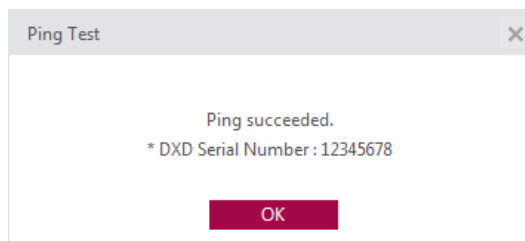
Launching the Program

- Double-click the executable file installed on your PC to launch the calibration software.
- If launching for the first time, the Settings screen appears.

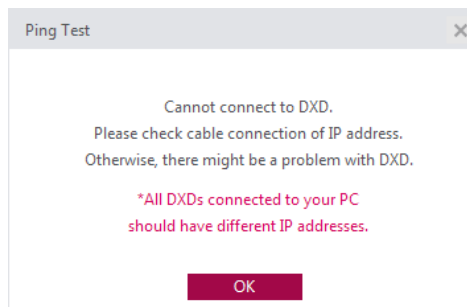


Checking IP Address and Ping Test

- A default IP address is entered for the detector.
- If you change the IP address of the detector, enter the new detector IP address in the detector IP field of the calibration tool.
- For instructions on changing the detector IP address, see "Detector and PC (Wired mode)".
- After entering the IP address, set a timeout value and click the **Ping** button to perform a **Ping Test**. A pop-up message appears if the **Ping Test** is successful.



- The following pop-up window appears if the **Ping Test** is unsuccessful. If the pop-up window appears, check your PC's network settings, the connection between the detector and PC, the detector status, the Control Box status and the IP address, then perform the **Ping Test** again.



Checking Save Location

While the calibration software is run, the acquired images, logs, result files and factory-default calibration results are saved in the designated location.

You can change the storage path in the **Save location**.

Click the **Apply** button when a folder is created in the specified path.

! NOTE

- Default: C:\Users\heuser\Documents\LG DXD Calibration
- heuser: User name

Calibration	User BPM	Validation	EI
DXD		Calibration SW	Firmware Update
Connection & File Save			
DXD Serial Number	<input type="text"/>		
DXD IP	<input type="text" value="10"/>	<input type="text" value="10"/>	<input type="text" value="100"/>
Timeout	<input type="text" value="5000"/>	msec. (3000~10000)	<input type="button" value="Ping"/>
Save Location	<input type="text" value="C:\Users\heuser\Documents\LG"/>		<input type="button" value="Open"/>
<input type="button" value="Apply"/>			

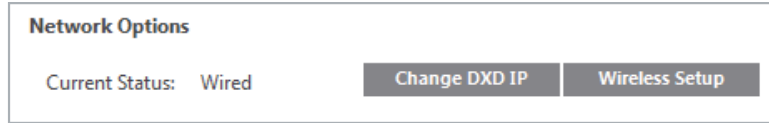
Apply

After performing the **Ping Test** and verifying the **Save Location**, click the **Apply** button to perform the following procedures.

- 1 Automatically create the necessary folders in the save location designated in the Checking **Save Location** stage.
- 2 Load from the detector and save the factory-default calibration results.
- 3 Load the detector's settings.

User-specified folders	Automatic creation of the Serial Number folder (Created when Apply is complete) Condition: Created if the same Serial Number folder is not found in the custom folder	Creation of date/time folder (Created when the Calibration button is clicked)	Avgdark.raw
			Gain.raw
			Offset.raw
			BPM.raw
			El results (A folder is created for the date/time applied at the time of El.)
			History file
	Log	Shows logfile including connections	
	Image	Bright Images	
		Dark Images	
		User BPM images	
		Validation images	
		El images	
	Factory calibration (Created when Apply is complete if the folder or files do not exist or if the files are abnormally small)	Raw images	
Avgdark.raw			
Gain.raw			
Offset.raw			
		BPM.raw	

- 4 When **Apply** is successful, the detector's network status is displayed.
Current Status : **Wired** Connection.
Wireless Connection (Only for wireless model)



! NOTE

- Other menus remain inaccessible until you perform **Apply**. (**Calibration, User BPM, Validation, EI**)

Checking and Changing Detector Settings

Upon **Apply**, the current detector settings are loaded on the settings screen below.

The screenshot shows the 'LG DXD Calibration' application window. The interface is divided into several sections:

- Navigation Tabs:** Calibration (selected), User BPM, Validation, EI, and About.
- Sub-Tabs:** DXD, Calibration SW, Firmware Update, and About.
- Connection & File Save:**
 - DXD Serial Number: [Empty text box]
 - DXD IP: 10 . 10 . 10 . 100
 - Timeout: 5000 msec. (3000~10000) [Ping button]
 - Save Location: D:\ [Open button]
 - [Apply button]
- Network Options:**
 - Current Status: Wired [Change DXD IP button] [Wireless Setup button]
- Installation Info:**
 - Date Format: YYYY/MM/DD [Dropdown arrow]
 - Current Date: 2018/01/19 [Register button]
- Detector Parameters:**
 - Trigger Mode: Auto Manual
 - Sensitivity: 15 (0-63)
 - Window Time: 5 00 msec (1-40)
 - Frame Width: 2500
 - Frame Height: 3052
 - [! Press 'Reset' to load factory-default Detector] [Reset button]
 - [Save button] [Cancel button]
- Power Options:**
 - Auto Sleep: Off [Dropdown arrow]
 - Auto Power-Off: Off [Dropdown arrow]
 - [Save button] [Cancel button]
- Exit:** [Exit button]
- Log Table:**

Date	Time	Type	Details
2018-01-19	15:04:12	Settings	Ping succeeded to 10.10.10.100
2018-01-19	15:04:14	Settings	Failed to load factory calibration files
2018-01-19	15:04:14	Settings	Connected to detector successfully

- **Detector Parameters** are parameters used when obtaining images from the detector.
- Click the **Save** button to apply the settings entered.
- Descriptions of the data are as follows.
 - **Trigger Mode** : This sets Trigger Mode.
 - * **Auto** : Enables the Auto Exposure Detection feature.
 - * **Manual** : Disables the Auto Exposure Detection feature.
 - **Sensitivity** : This is the panel sensitivity.
 - **Window Time** : This sets the time taken to read the values after the x-ray exposure. (An input value of 5 means 500 ms)
 - **Frame Width / Frame Height** : Pixel number of width / height of Detector.
- Descriptions of the buttons are as follows.
 - **Save** : Applies the changes.
 - **Reset** : Loads the factory default settings.
 - **Cancel** : Loads the last saved values.

Checking and Changing Calibration Software Settings

The **Calibration Parameters** are updated when the **Calibration SW** tab is clicked.

Calibration Parameters

These settings are used to Calibration Parameters.

The screenshot shows the 'LG DXD Calibration' software window. The 'Calibration SW' tab is active, displaying the following parameters:

- Target Gain: 1 (0.0~255.0)
- Gain Margin: 0.5 (0.0~1.0)
- Offset Margin: 120 (0~1000)
- Std Margin: 80 (0~1000)
- Ref sat value: 56000 (28000~65534)
- Surr Margin: 2000 (0~3000)
- Cut Edge: T 6 (6~1000), L 6 (6~1000), R 6 (6~1000), B 6 (6~1000)

The 'Image Edit' section includes:

- Rotation: 0
- Flip: None
- Invert:

At the bottom, there is a warning: '! Press 'Reset' to load factory-default Calibration SW'. Below this are buttons for 'Reset', 'Save', 'Cancel', and 'Exit'.

Date	Time	Type	Details
2017-12-07	13:32:21	Settings	Ping failed to 10.10.10.100
2017-12-07	13:48:46	Settings	Ping succeeded to 10.10.10.100
2017-12-07	13:48:50	Settings	Connected to detector successfully

- Descriptions of the data are as follows.
 - **Target Gain** : Amplification level within algorithms.
 - **Gain Margin** : Pixels with values that exceed the **Gain Margin** are specified as bad pixels.
 - **Offset Margin** : Pixels with values that exceed the **Offset Margin** are specified as bad pixels.
 - **Std Margin** : Pixels with values that exceed the **Std Margin** are specified as bad pixels.
 - **Ref Sat Value** : Maximum lsb value of pixels.
 - **Surr Margin** : In corrected bright images, if the difference between the standard pixel value and surrounding pixel value exceeds the **Surr Margin**, the standard pixel is specified as a bad pixel.
 - **Cut Edge** : This indicates the pixel values to cut off in the top, bottom, left or right directions of the frame. After acquiring an image in **Validation** or **EI**, the border of the image to cut off is indicated as lines in the Image Viewer.

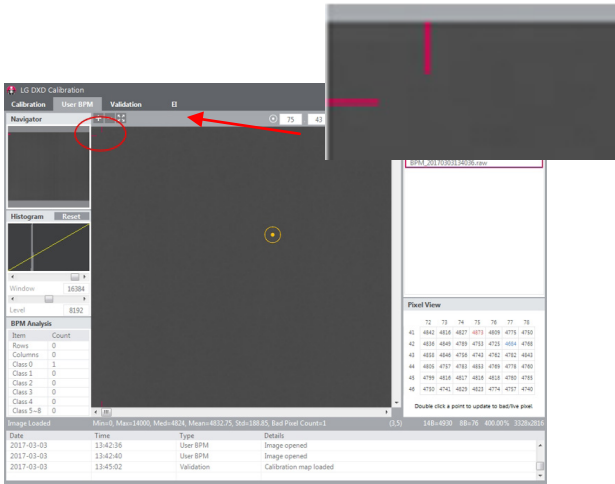


Image Edit

These are Image Viewer settings of the selected tool.

- **Rotation** : This sets the rotation angle of the image. (**0°**, **90°**, **180°**, **270°**)
- **Flip** : Sets how the image shown in the Image Viewer is rotated. (**None**, **Horizontal**, **Vertical**)
- **Invert** : Inverts the image data shown in the Image Viewer.
- Click the **Save** button to apply the settings entered.
- Descriptions of the buttons are as follows.
 - **Save** : Applies the changes.
 - **Reset** : Loads the factory default settings.
 - **Cancel** : Loads the last saved values.
 - **Exit** : Return to the previous screen.

! NOTE

- The next stage will not be accessible until you perform **Apply**.

Calibration

After configuring all settings, click the **Calibration** tab to open the Calibration menu.

! NOTE

- This tab cannot be accessed until the settings have been configured.

The screenshot shows the LG DXD Calibration software interface. The main window has a title bar 'LG DXD Calibration' and a menu bar with 'Calibration', 'User BPM', 'Validation', and 'EI'. The 'Calibration' tab is highlighted with a red circle and the number 1. The interface is divided into several panels:

- Navigator**: A large empty area for image navigation.
- Histogram**: A panel showing a dark histogram with a 'Reset' button.
- BPM Analysis**: A table showing analysis results.
- History**: A panel with an 'Open' button and a 'New' dropdown menu.
- Dark Image(s)**: A panel with 'Count: 0' and an 'Acquisition' button, highlighted with a red circle and the number 2.
- Bright Image(s)**: A panel with 'Count: 0' and an 'Acquisition' button, highlighted with a red circle and the number 3.
- Calibration**: A panel with a 'Calibration' button, 'Offset Remove' option, 'Count: 0', and a 'Result' section, highlighted with a red circle and the number 4.
- Image not Loaded**: A table at the bottom showing a log of events.

At the bottom right of the interface, there is a 'Pixel Value' field and a settings gear icon. The number 5 is placed near the settings gear icon.

Date	Time	Type	Details
2017-03-03	09:13:16	Settings	Ping succeeded to 10.10.10.100
2017-03-03	09:15:57	Settings	Connected to detector successfully

1 Open Calibration Menu

- Click the **Calibration** menu button to open the menu.

2 Get Dark

The menu is used to acquire dark images necessary for performing calibration.

- When a dark image is acquired, the image count increases and the image file is saved in the Image folder within the location specified in Settings.
- After acquiring an image, the median value of the image is shown next to the file name.
- After comparing multiple images, you can delete any abnormal images by right-clicking them.
- When deleted, both the list entry and the file are deleted.

3 Get Bright

The menu is used to acquire bright images necessary for performing calibration.

- When a bright image is acquired, the image count increases and the image file is saved in the Image folder within the location specified in **Settings**.
- After acquiring an image, the median value of the image is shown next to the file name.
- After comparing multiple images, you can delete any abnormal images by right-clicking them.
- When deleted, both the list entry and the file are deleted.

! NOTE

- All the images are deleted when Calibration SW ends. For backup, copy the images and paste them into another folder.
- Up to 10 images can be saved.
- Dark Image: An image obtained without generating X-rays.
- Bright Image: An image obtained by generating X-rays without a phantom or any other object on the detector.

4 Calibration

This area is used for **Calibration**.

- For Calibration, following images are required.
 - Dark Image : minimum 4 dark images.
 - Bright Image : minimum 5, maximum 10 bright image.
 - Lsb range is recommended from 8800 ~ 18000 lsb.
 - The recommended lsb level is 8900, 9100, 9200, 9300, 9600, 10000, 11000, 12000, 14000, 16000 lsb.
- **Calibration** result files are saved in a created new folder based on name of the date and time of the **Calibration**.
- The **BPM Analysis** is updated when the calibration is complete.

! NOTE

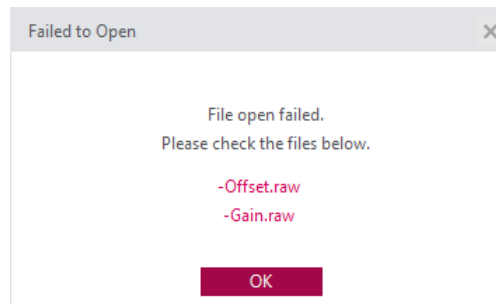
- When **Calibration** is performed more than five times, the oldest results are automatically replaced with new results.
- For backup, copy the results folder and paste the results into another folder.

5 History

- You can load previous calibration results. Click the **Open** button to load the previous **Calibration** result files.

! NOTE

- Selecting any one of the files also loads other associated files. (Select any one of the Avgdark, Offset, Gain or BPM files, and all the four associated files will be loaded)
- If there is a problem while loading the files, the following error popup window appears. If the popup window below appears, check the file sizes, path, file names and folder access permissions, and then try again.



User BPM

The user can manually edit the Bad Pixel Map created during **Calibration** in this menu.

! NOTE

- You can skip the **User BPM** stage and proceed to **Validation**.

The screenshot shows the 'User BPM' stage of the LG DXD Calibration software. The interface is divided into several sections:

- Navigator:** Shows a preview of the image with a yellow circle highlighting a pixel.
- Histogram:** Displays a graph of the image's pixel distribution.
- BPM Analysis:** A table showing the distribution of bad pixels across different classes.
- Pixel View:** A grid of pixel values with a double-click action to update bad/fix pixels.
- History:** A list of recent actions, including 'Factory Calibration' and 'BPM_20170303134036.raw'.

Item	Count
Rows	0
Columns	0
Class 0	1
Class 1	0
Class 2	0
Class 3	0
Class 4	0
Class 5-8	0

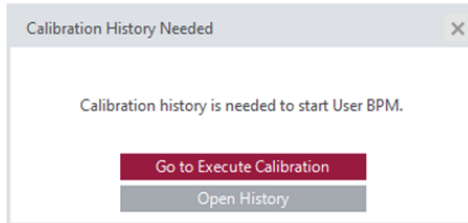
Date	Time	Type	Details
2017-03-03	13:42:35	User BPM	Image opened
2017-03-03	13:42:36	User BPM	Image opened
2017-03-03	13:42:40	User BPM	Image opened

1 Open User BPM Menu

- Click the **User BPM** menu button to open the menu.

! NOTE

- The pop-up window below will appear if you open this menu without performing **Calibration**.



2 Check History File



- Check that the **History** name created during **Calibration** matches the name shown in the current **History** window.
- The **User BPM** procedure is performed by applying the selected **History**.

3 Image Acquisition

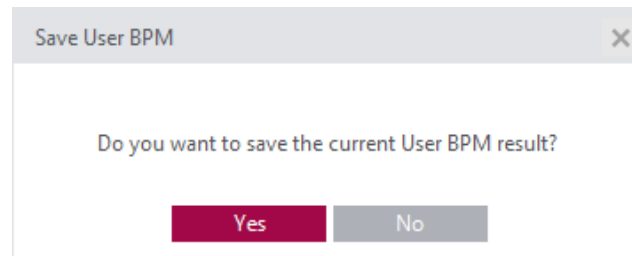
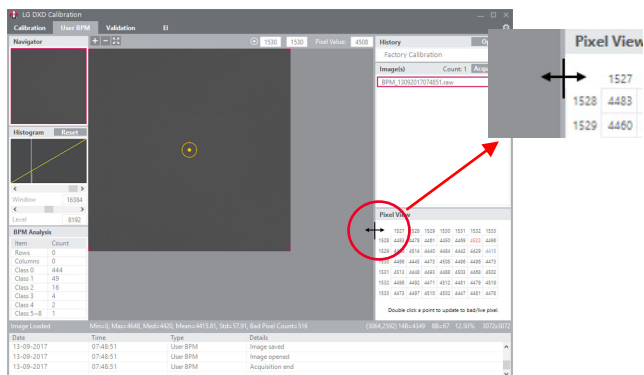
- **User BPM** requires image acquisition as it involves a visual inspection of images with applied **Calibration** results. When the Acquisition button is clicked and a **Bright Image** is acquired, the name of the image will appear in the image list.

4 Pixel View

- Check pixel values in **Pixel View**.

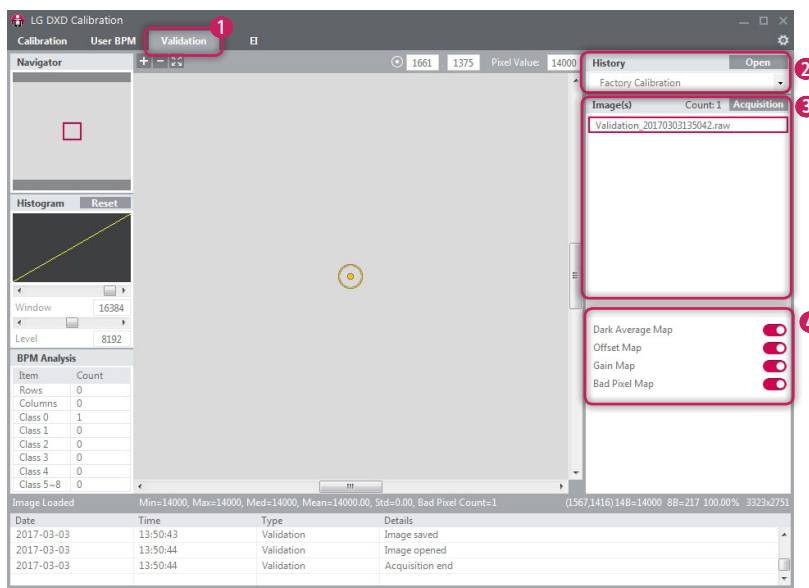
- Pixel values for the center of the Image Viewer are displayed in the **Pixel View** window.
- The minimum value, maximum value and pixels estimated as bad pixels are shown as below.
 - * Minimum value : Indicated as a blue number.
 - * Maximum value : Indicated as a red number.
 - * Estimated bad pixels : Indicated with gray background.
- The size of the **Pixel View** window can be adjusted using the  icon. The mouse pointer changes to a  icon when hovering over the border between the **Pixel View** and Image Viewer.

- Mark additional bad pixels in **Pixel View**.
 - Double-click a pixel in **Pixel View** to mark it as a bad pixel. Double-click a bad pixel again to unmark it.
 - As you mark bad pixels, the values in Bad Pixel Analysis are updated in real time. Also, pixels marked as bad pixels are replaced with calibrated pixel values.
- Saving Final User BPM.
 - The result file is saved when a different menu is opened.
 - When you attempt to exit the current menu and open another menu, a popup window appears asking whether you want to save the data.
 - Select Save to add a **History** entry and save an updated version of the BPM.raw file.



Validation

This procedure allows you to perform a visual inspection of the **Calibration** results after completing **Calibration**.

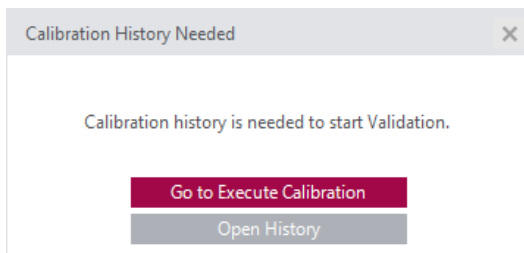


1 Open **Validation** Menu

- Click the **Validation** menu button to open the menu.

! **NOTE**

- The pop-up window below will appear if you open this menu without performing calibration.



2 Check **History** File

- Please confirm whether the name of the History file created during calibration matches the name displayed in the **History** window.

3 **Image Acquisition** (Procedure matches that from the User BPM stage)

- When the **Acquisition** button is clicked and a bright image is acquired, the name of the image will appear in the image list.
- Information about the image is displayed below the Image Viewer.

4 Apply/Unapply Calibration Results

- You can apply/unapply calibration results (**Dark Average Map, Offset Map, Gain Map, Bad Pixel Map**) to the acquired image.

: Apply

: Unapply

! **NOTE**

- When an image is acquired and loaded for the first time, all results are (Apply) by default.
- If no image has been acquired, the (Apply)/ (Unapply) button is disabled.

EI (Exposure Index)

The screenshot shows the LG DXD Calibration software interface. The main window is titled "LG DXD Calibration" and has a menu bar with "Calibration", "User BPM", "Validation", and "EI" (highlighted with a red box and number 1). Below the menu bar is a "Navigator" section with a small image preview and a "Histogram" section with a "Reset" button. The main image area shows a dark image with a yellow circle around a point. Below the image are "Window" and "Level" sliders. On the right side, there is a "History" panel with an "Open" button (highlighted with a red box and number 2). Below the history panel is a table with columns "Image(s)", "Count", and "Acquisition". The table has one row with "EI_20170303135125.raw", "0", and "4823" (highlighted with a red box and number 4). Below the table is a "Measure & Save" button (highlighted with a red box and number 5). At the bottom of the window, there is a status bar with "Image Loaded" information and a table with columns "Date", "Time", "Type", and "Details".

Image(s)	Count	Acquisition
EI_20170303135125.raw	0	4823

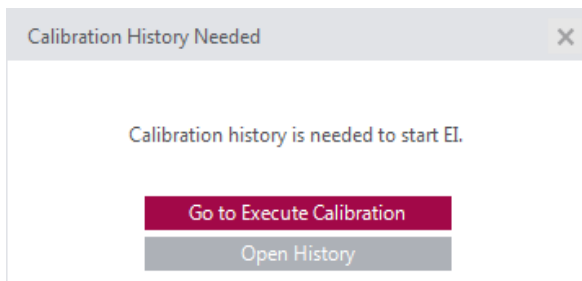
Date	Time	Type	Details
2017-03-03	13:56:50	EI	Calibration map loaded
2017-03-03	13:56:50	EI	History loaded
2017-03-03	13:56:53	EI	Image opened

1 Open EI Menu

- Click the **EI** menu button to open the menu.

! NOTE

- The pop-up window below will appear if you open this menu without performing calibration.

**2 Check History File**

- Please confirm whether the name of the History file created during calibration matches the name displayed in the **History** window.

3 Image Acquisition (same as User BPM and Validation)

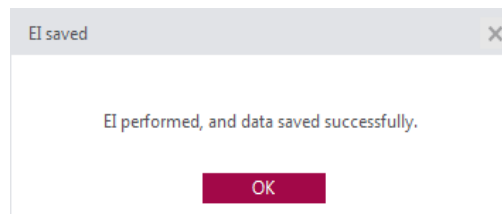
- When the **Acquisition** button is clicked and a **Bright image** is acquired, the name of the image will appear in the image list.
- Information about the image is displayed below the Image Viewer.

4 Enter Dose Value

- Enter an X-ray dose in the dose input field. (Unit: μGy)
- The EI value is calculated based on the input value.
- Because the dose value is a number, only numeric values can be entered. Non-number values cannot be entered automatically.

5 Measure & Save

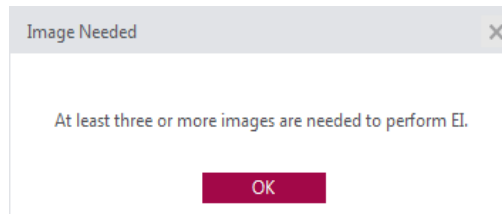
- When you click the **Measure & Save** button after acquiring an image and entering a dose value, the popup notification below appears.



- The results are saved in the save location specified for EI calculation.
(Example: C:\Users\heuser\Documents\LG DXD Calibration\Serial Number\Calibration Results Folder (Time and Date) heuser: Username)

! NOTE

- When **Measure & Save** is repeated, the results file in the folder is updated.
- The following pop-up window appears if the minimum number of images required (three) is not met.



Exit

When you click the Quit button, the calibration tool quit popup window appears.

In the popup window below, click the **Yes** button to quit or click the **No** button to return to the previous screen.

Connection & File Save

DXD Serial Number: []
DXD IP: [10] [.] [10] [.] [10] [.] [100]
Timeout: [5000] msec. (3000-10000) [Ping]
Save Location: [DA] [Open]
[Apply]

Detector Parameters

Trigger Mode: Auto Manual
Sensitivity: [15] (0-63)
Window Time: [5] 00 msec (1-40)
Frame Width: [2500]
Frame Height: [3052]
[Save] [Cancel]
! Press 'Reset' to load factory-default Detector [Reset]

Power Options

Auto Sleep: [Off]
Auto Power-Off: [Off]
[Save] [Cancel]

Installation Info.

Date Format: [YYYY/MM/DD]
Current Date: [2018/01/19] [Register]

Exit

Date	Time	Type	Details
2018-01-19	15:04:12	Settings	Ping succeeded to 10.10.10.100
2018-01-19	15:04:14	Settings	Failed to load factory calibration files
2018-01-19	15:04:14	Settings	Connected to detector successfully

End Program

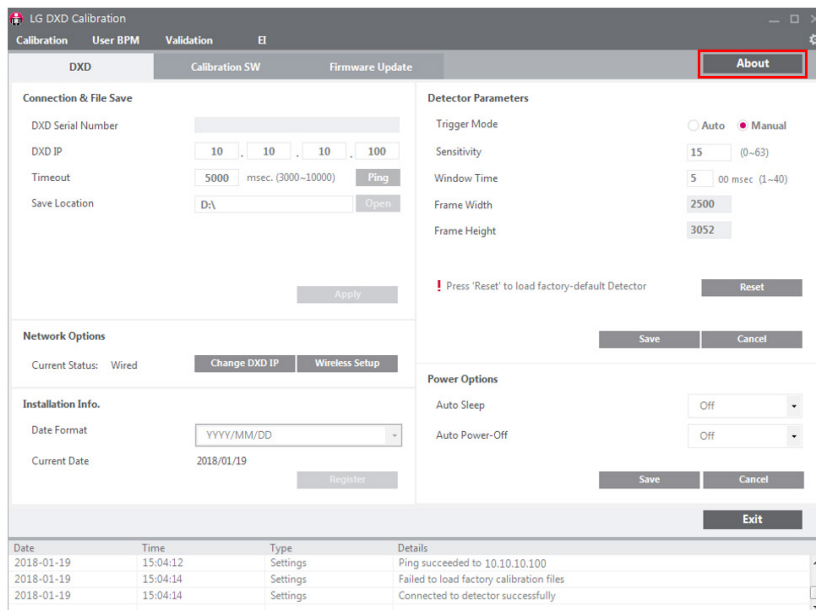
Are you sure you want to quit?

Yes [No]

About

When you click the **About** button in Settings, the following popup window appears.

It shows the information about the application.



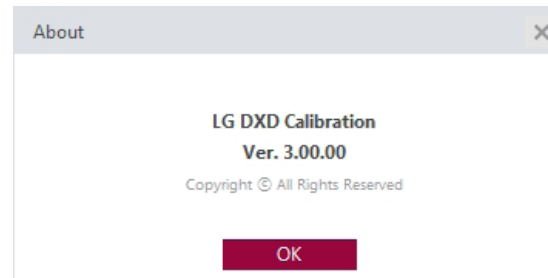
The screenshot shows the 'LG DXD Calibration' application window. The 'About' button in the top right corner of the settings pane is highlighted with a red box. The application has several tabs: Calibration, User BPM, Validation, and EI. The 'About' button is located in the 'Firmware Update' tab.

The application window is divided into several sections:

- Connection & File Save:** Includes fields for DXD Serial Number, DXD IP (10.10.10.100), Timeout (5000 msec), and Save Location (D:\).
- Network Options:** Shows 'Current Status: Wired' and buttons for 'Change DXD IP' and 'Wireless Setup'.
- Installation Info:** Shows 'Date Format' (YYYY/MM/DD) and 'Current Date' (2018/01/19).
- Detector Parameters:** Includes 'Trigger Mode' (Auto/Manual), 'Sensitivity' (15), 'Window Time' (5 00 msec), 'Frame Width' (2500), and 'Frame Height' (3052). A warning message says 'Press 'Reset' to load factory-default Detector'.
- Power Options:** Includes 'Auto Sleep' and 'Auto Power-Off', both set to 'Off'.

At the bottom of the window, there is a table with the following data:

Date	Time	Type	Details
2018-01-19	15:04:12	Settings	Ping succeeded to 10.10.10.100
2018-01-19	15:04:14	Settings	Failed to load factory calibration files
2018-01-19	15:04:14	Settings	Connected to detector successfully



The 'About' popup window displays the following information:

- LG DXD Calibration**
- Ver. 3.00.00**
- Copyright © All Rights Reserved

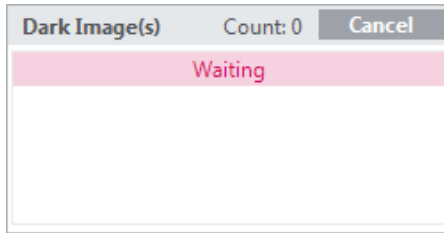
An 'OK' button is located at the bottom center of the window.

General PopUp

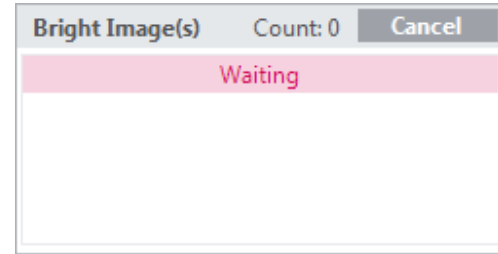
The following are descriptions of the general pop-up windows that may appear when the calibration software is being used.

Image Acquisition Cancellation

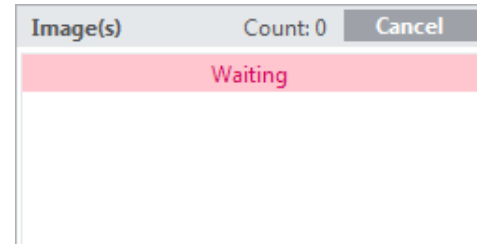
- When the **Acquisition** button is clicked for image **Acquisition**, it will be replaced with a **Cancel** button while the image is being acquired.
- Once image acquisition is complete, the button will revert to an **Acquisition** button.
- During image acquisition, you can cancel the process by clicking the **Cancel** button.



<Get Dark Image Cancel Button: Available in Calibration>

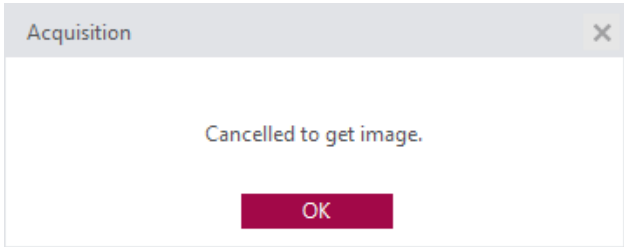


<Get Bright Image Cancel Button: Available in Calibration>



<Get Image Cancel Button: Available in User BPM, Validation, EI>

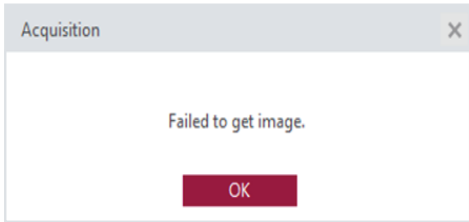
- The popup window below appears when the cancellation is complete.



<Get Image Cancel Complete Popup Window>

Image Acquisition Failure

- The popup window below appears when image acquisition fails. Check the network and Detector status, then try again.

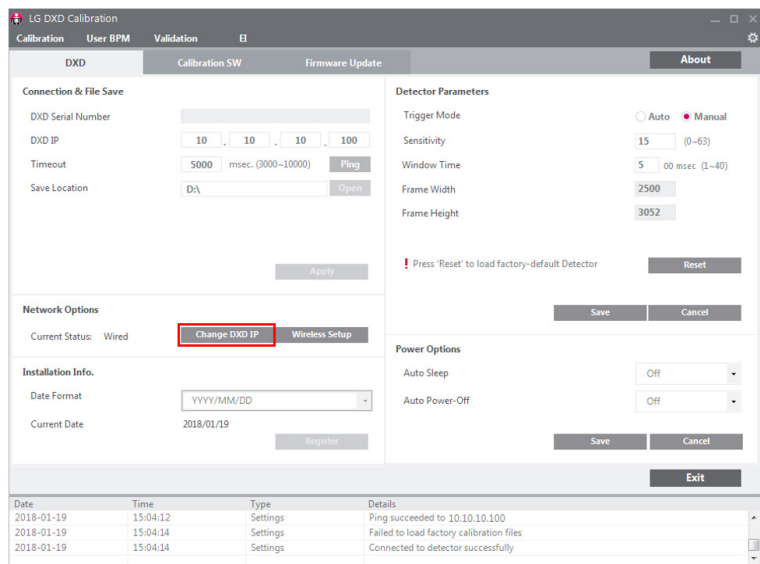


<Image Acquisition Failure Popup Window>

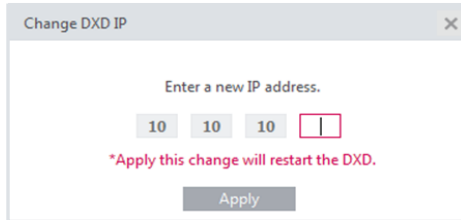
SERVICE MANUAL

Detector Wired IP Address Setting

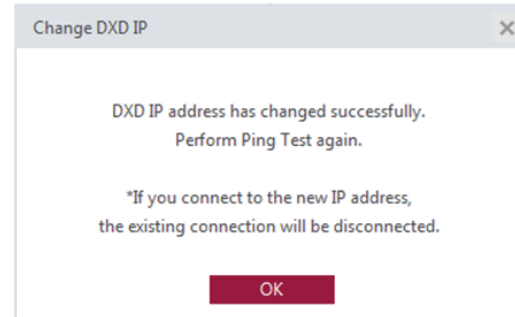
- 1 From the "Usage" section, perform "Launching the Program", "Checking IP Address and Ping Test", "Checking Save Location" and "Apply".
- 2 Click the **Change DXD IP** button.



- 3 At the popup window, change the setting and click the **Apply** button.
- When the **Apply** button is clicked, the system attempts to change the IP address.



- 4 Check the result and restart the detector.
- The following popup windows appear, depending on the successful and failed.



<Popup Window for Successful Configuration>

- Once the new IP address is applied, restart the detector so that the new setting takes effect.
- Restart the detector automatically using the program.
- Because the detector is disconnected when restarting, perform the Connection & File Save process again.

Wireless AP configuration

To have the Detector connect wirelessly to an AP, the AP information must be saved in the Detector in advance.

Once the AP information is transferred and saved in the Detector, the Detector attempts to connect to the AP.

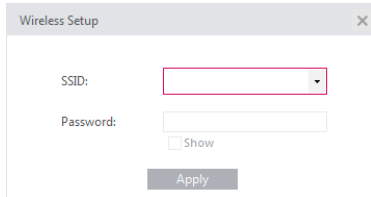
The saved AP information can be viewed in the Web Monitoring feature.

- 1 From the "Usage" section, perform "Launching the Program", "Checking IP Address and Ping Test", "Checking Save Location" and "Apply".
- 2 After checking that wireless settings are enabled on the PC, click the Wireless Setup button.

The screenshot shows the 'LG DXD Calibration' software window. The 'Calibration SW' tab is active. The 'Wireless Setup' button is highlighted with a red box. The interface includes sections for 'Connection & File Save', 'Detector Parameters', 'Network Options', 'Installation Info', and 'Power Options'. A log table at the bottom shows the status of various operations.

Date	Time	Type	Details
2018-01-19	15:04:12	Settings	Ping succeeded to 10.10.10.100
2018-01-19	15:04:14	Settings	Failed to load factory calibration files
2018-01-19	15:04:14	Settings	Connected to detector successfully

- If a pop-up appears, enter your SSID and password, then click **Apply**.



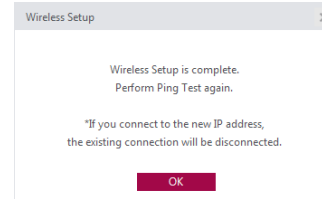
The image shows a 'Wireless Setup' dialog box with a title bar containing a close button (X). Inside the dialog, there are two input fields: 'SSID:' with a dropdown arrow and 'Password:' with a text box. Below the password field is a 'Show' checkbox. At the bottom center is an 'Apply' button.

! NOTE

SSID can appear garbled or as question marks or boxes and others because of encoding or compatibility.

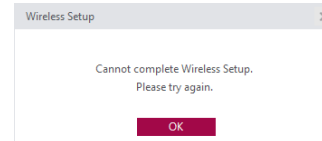
3 Check results.

- The following popup windows appear, depending on the result.



The image shows a 'Wireless Setup' dialog box with a title bar containing a close button (X). The main text reads: 'Wireless Setup is complete. Perform Ping Test again.' Below this is a note: '*If you connect to the new IP address, the existing connection will be disconnected.' At the bottom center is an 'OK' button.

<Popup Window for Successful Configuration>



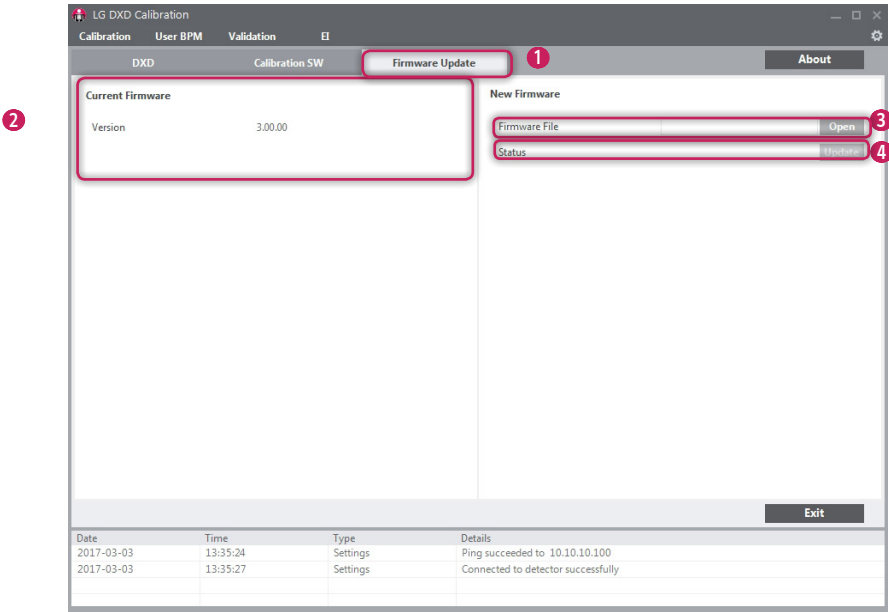
The image shows a 'Wireless Setup' dialog box with a title bar containing a close button (X). The main text reads: 'Cannot complete Wireless Setup. Please try again.' At the bottom center is an 'OK' button.

<Popup Window for Failed Configuration>

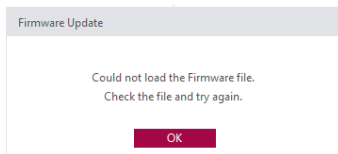
Detector Firmware Update

This menu allows you to check the firmware version of the detector or update the firmware.

From the "Usage" section, perform "Launching the Program", "Checking IP Address and Ping Test", "Checking Save Location" and "Apply".

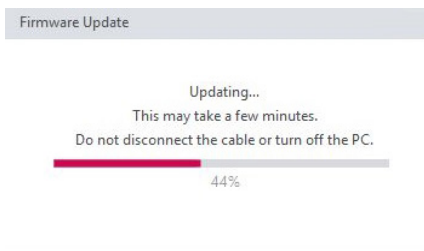


- 1 Select the **Firmware Update** tab.
- 2 Check the current firmware version.
 - The current firmware version of the detector is shown here when the PC is connected to the detector.
- 3 Select a firmware file to update.
 - Click the **Open** button to open a file browser window. When you select a file to update, the system validates the file.
 - If the file is correct, the file name appears in the **Firmware File** section.
 - If the file is invalid, the following popup window appears.



<Popup Window for File Loading Failure>

- 4 Perform the update.
 - Select a file, then click the **Update** button to start the Update process.
 - The progress status is shown in the **Status** field.

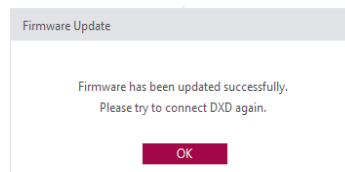


<File Updating Popup Window>

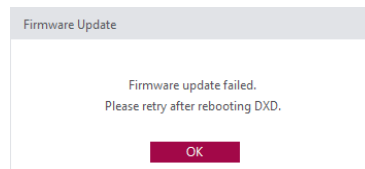
CAUTION

- Do not remove the power cable until the update is complete. The update may not be successful if the power is disconnected during the update process.

- 5 Check results. When the update is complete, the result is shown in a popup window.



<File Update Successful Popup Window>

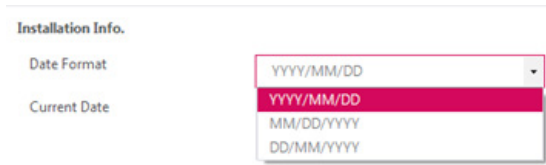


<File Update Failed Popup Window>

Storage of installation date

The date of the first calibration can be saved in the detector.

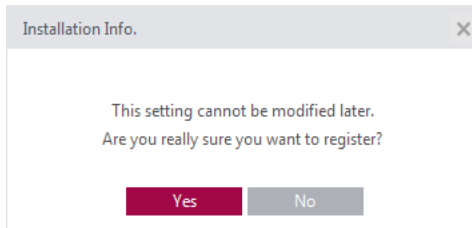
- 1 From the "Usage" section, perform "Launching the Program", "Checking IP Address and Ping Test", "Checking Save Location" and "Apply".
- 2 Select the **Settings** > **DXD** tab.
- 3 Check the installation date and select a date format.



- YYYY: Year
- MM: Month
- DD: Day

NOTE

- The date is displayed based on the OS information.

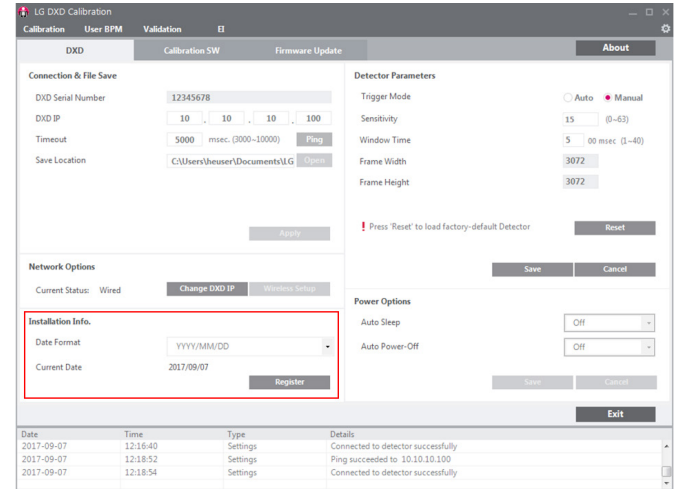


- 4 Click the **Register** button to open a pop-up window. The installation date can be checked through the Web Monitoring feature.

CAUTION

- Be careful, as this information is saved only once per detector and cannot be edited later.

- 5 Select the **Yes** button in the pop-up window to save the information in the detector. Once the information is saved, the **Register** button will be disabled.



Date	Time	Type	Details
2017-09-07	12:16:40	Settings	Connected to detector successfully
2017-09-07	12:18:52	Settings	Ping succeeded to 10.10.10.100
2017-09-07	12:18:54	Settings	Connected to detector successfully

Power Options Setting

This menu allows you to save the Power Options of detector.

- 1 From the "Usage" section, perform "Launching the Program", "Checking IP Address and Ping Test", "Checking Save Location" and "Apply".
- 2 Select the **Settings > DXD** tab.
- 3 Select the options of **Auto Sleep** and **Auto Power-Off**.
- 4 Click the Save button to save the options on Detector.

! NOTE

- Calibration Software only saves the options.
- Detector enters the the Power Mode when there is no communication during the setting times.
- The Detector does not enter the Power Mode while the Calibration Software runs(from the Apply to exit) because the Calibration Software checks the Detector's status Periodically.
- This feature is only enabled wireless models.

The screenshot shows the 'LG DXD Calibration' software window. The 'DXD' tab is selected. The 'Power Options' section is highlighted with a red box and contains the following settings:

- Auto Sleep: Off
- Auto Power-Off: Off

Other visible settings include:

- Connection & File Save: DXD Serial Number, DXD IP (10.10.10.100), Timeout (5000 msec), Save Location (D:\).
- Detector Parameters: Trigger Mode (Auto), Sensitivity (15), Window Time (5.00 msec), Frame Width (2500), Frame Height (3052).
- Network Options: Current Status (Wired), Change DXD IP, Wireless Setup.
- Installation Info: Date Format (YYYY/MM/DD), Current Date (2018/01/19).

Date	Time	Type	Details
2018-01-19	15:27:17	Settings	Ping succeeded 10.10.10.100
2018-01-19	15:27:19	Settings	Failed to load factory calibration files
2018-01-19	15:27:19	Settings	Connected to detector successfully

Web monitoring


This feature displays the detector's release date, installation date, software version and other internally managed information in a web browser.

Internal Information

Category	Content	Description
Product information	Software version	<ul style="list-style-type: none">• Currently installed detector firmware version
	Product release date	<ul style="list-style-type: none">• Product manufacture date
	Product installation date	<ul style="list-style-type: none">• Installation date as registered by the installer
	Model number	<ul style="list-style-type: none">• Product model number
	Serial No.	<ul style="list-style-type: none">• Product serial information
Network	Connection status	<ul style="list-style-type: none">• Network connection mode (wired)
	IP	<ul style="list-style-type: none">• Detector's IP address
	SSID	<ul style="list-style-type: none">• Connected wireless AP SSID
	Netmask	<ul style="list-style-type: none">• Detector Netmask
	Gateway	<ul style="list-style-type: none">• Detector Gateway
	Mac	<ul style="list-style-type: none">• Product MAC address
Battery	Status	<ul style="list-style-type: none">• Battery level, charging status notification, Auto Sleep , Auto Power off
ETC	Bright image count	<ul style="list-style-type: none">• Number of times images were acquired by generating X-Rays
	Dark image count	<ul style="list-style-type: none">• Number of times images were acquired without generating X-Rays

Web monitoring

- 1 Establish a wired/wireless connection between the detector and the PC.
 - Refer to the "Detector and PC (Wired mode)" section for instructions.
- 2 Enter the IP address in the address input of the detector PC web browser.
- 3 The default IP address: 10.10.10.100 enter the page as below appears.

DXD Monitoring System			
Product Information	Network Information	Battery	ETC
Software Version Firmware Ver. 2.00.01	Status (●●) Wired Connected	Status 🔋 Battery Connected 🔋 Fully Charged 100 % 	Bright Image Count 1
Manufacturing Date 2017. 11. 20	IP 10.10.10.100	Auto Sleep Off	Dark Image Count 4
Installation Date 0000. 00. 00	SSID N/A	Auto Power-Off Off	
Model Number 14HK701G	Netmask 255.255.255.0		
Serial Number 12345678	Gateway 10.10.10.1		
	Mac 78:5D:C8:B9:44:09		

MAINTENANCE

Cleaning

- Make sure to turn the detector off before cleaning.

Inspection

- Check the detector regularly to ensure that it operates stably and properly. If a problem occurs, please contact the manufacture.
- Use the checklist below as a reference for checking the product.

Checklist	Inspector	Cycle
Is the cable damaged?	User	Daily
Is the plug or are the connectors loose or damaged?	User	Daily
Is the detector scratched or cracked on the surface?	User	Daily
Is the LED power working properly?	User	Daily
Scheduled calibration	Vendor	3 to 6 months
Performance inspection	Vendor	Yearly

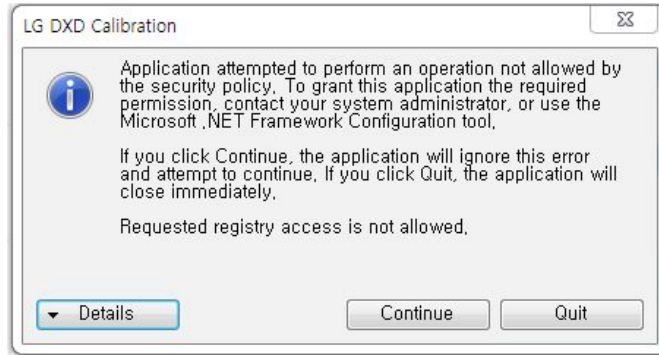
TROUBLESHOOTING

Problems that occur while using the detector can be solved by using the information on this page. If problems persist, please contact manufacturer.

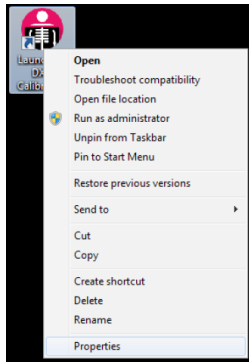
Problem	Action
The product does not turn on.	<ul style="list-style-type: none">• Check that the power cord is properly connected.• After disconnecting and reconnecting the power cord, press the power button on the product.
The product was suddenly turned off during use.	<ul style="list-style-type: none">• Check that the power cable is properly connected.
The Control Box Ready/Exposure LED flashes in orange.	<ul style="list-style-type: none">• Check the power cable connection of the control box.• Check that the control box is properly connected to the generator or the detector.
The PC and the detector are not connected.	<ul style="list-style-type: none">• Check the power supply. If on, check the following:• Check that the connection is made as instructed in the manual. Try connecting again.• Perform the Ping Test in Settings > Connection & Save Location section of Calibration Software to check your connection. You can also check your connection by entering the IP address in the address bar of the browser window and checking whether the page is properly loaded.• Check whether the network IP address of your PC is using the same IP address as the detector.• In some cases, especially Win 8 OS, it might be problem in connection because of firewall rule that blocks all incoming ICMP packets. Please refer to next page, "Solution for firewall block".
There is a problem with acquired images.	<ul style="list-style-type: none">• Check whether the detector surface is soiled.• Images acquired immediately after turning the detector on may be incorrect due to instability of the panel. Open the Calibration menu of the Calibration Software. Acquire some dark images first or wait a while before proceeding.• If the images continue to be unstable, perform Calibration, apply the results, then continue.

ACCESS PROBLEM TO START PROGRAM

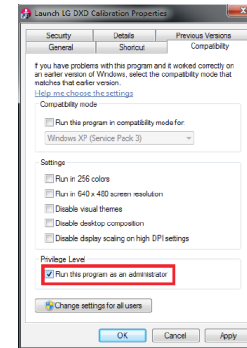
- 1 Launch program > Ping > Apply, check the access problem popup as below.



- 2 Click mouse right button on Calibration SW icon > Property.



- 3 Enter compatibility tab and check "Run this program as an administrator."



SOLUTION FOR FIREWALL BLOCK

If Calibration Software connection doesn't work for firewall in Windows 8, refer to instructions as below.

- 1 Enter into control panel and click on the **System and Security** link.

Adjust your computer's settings

View by: **Category** ▾



System and Security

Review your computer's status
Back up your data
Find and fix problems



Network and Internet

View network status and tasks
Choose homegroup and sharing options



Hardware and Sound

View devices and printers
Add devices and printers



Programs

Uninstall a program



User Accounts and Family Safety

Add or remove user accounts
Set up parental controls for any user



Appearance and Personalization

Change the theme
Change desktop background
Adjust screen resolution



Clock, Language, and Region

Change display language
Change keyboards or other input methods




Ease of Access

Let Windows suggest settings
Optimize visual display

- 2 Select the **Windows Firewall** link.



Action Center

Review your computer's status and resolve issues |  Change User Account Control settings |
Troubleshoot common computer problems | Restore your computer to an earlier time





Windows Firewall

[Check firewall status](#) | [Allow a program through Windows Firewall](#)



System

View amount of RAM and processor speed | [Check the Windows Experience Index](#) |
 [Allow remote access](#) | [See the name of this computer](#) |  [Device Manager](#)

- 3 Click on the **Advanced settings** link situated in the pane on the left hand side.

Control Panel Home

[Allow a program or feature through Windows Firewall](#)



[Change notification settings](#)



[Turn Windows Firewall on or off](#)



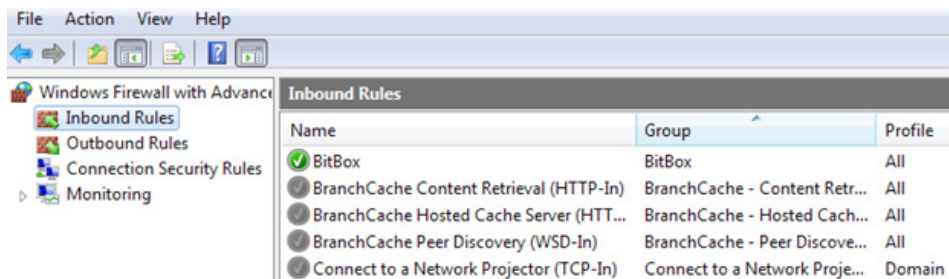
[Restore defaults](#)



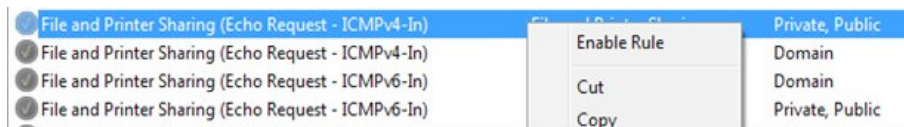
[Advanced settings](#)

[Troubleshoot my network](#)

- 4 Choose **Inbound rules** in Windows Firewall with Advanced Security. Scroll and find **File and Printer Sharing** rule to enable.



- 5 Click **Enable Rule**.

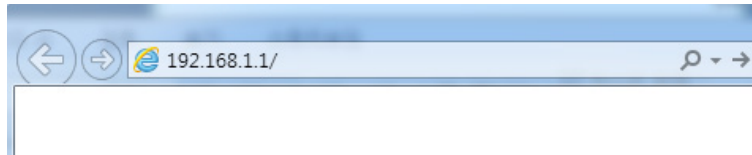


- 6 Check its status and try to connect detector again.

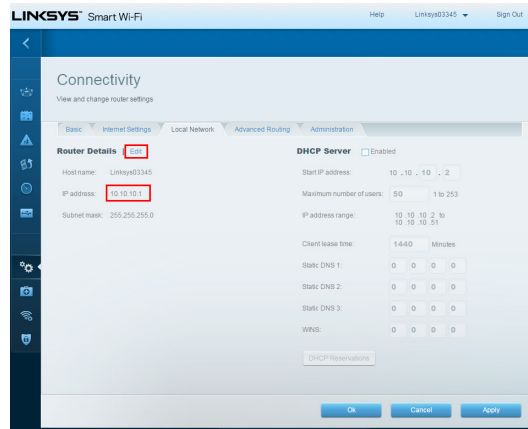
File and Printer Sharing (Echo Request - ICMPv4-In)	File and Printer Sharing	Private, Public
File and Printer Sharing (Echo Request - ICMPv4-In)	File and Printer Sharing	Domain
File and Printer Sharing (Echo Request - ICMPv6-In)	File and Printer Sharing	Domain
File and Printer Sharing (Echo Request - ICMPv6-In)	File and Printer Sharing	Private, Public

SUPPLEMENT. WIRELESS AP SET UP INSTRUCTION (MODEL : Cisco Linksys EA9200)

- 1 Connect the LAN Cable from the Ethernet port on the PC to the Ethernet port on the AP.
- 2 Launch your web browser and enter linkssystemsmartwifi.com or http://192.168.1.1 in the Address bar then press **Enter**
(IP number address for the 1st access is 192.168.1.1. However, IP number address for accessing will be 10.10.10.1 after changing 10.10.10.1)



Enter into Connectivity > Local Network. Click Edit to change IP address to 10.10.10.1.



(You should click Apply button to apply current setting)

3 Enter into **Wireless**. You can change network name and password like below.

The screenshot displays the Linksys Smart Wi-Fi interface for the 'Wireless' settings. At the top, there are tabs for 'Wireless', 'MAC Filtering', and 'Wi-Fi Protected Setup'. The 'Smart Connect' section is set to '5 GHz band steering'. Below this, there are two network configuration sections. The first section is for the 2.4 GHz network, which is currently 'ON'. Its settings include: Network name: LGEDXD, Password: lgedxd2000, Broadcast SSID: Yes, Security mode: WPA2 Personal, Network mode: Mixed, Channel: Auto, and Channel width: Auto. The second section is for the 5 GHz + 5 GHz network, which is currently 'OFF'. Its settings include: Network name: LGEDXD, Password: lgedxd2000, Broadcast SSID: Yes, Security mode: WPA2 Personal, Network mode: Auto, Channel: Auto, and Channel width: Auto. At the bottom of the page, there are three buttons: 'Ok', 'Cancel', and 'Apply'.

(You should click **Apply** button to apply current setting)

For more information, please visit the web site as below.

<http://www.linksys.com/sg/support-product?pid=01t8000003efnkAAI>



Model _____
Serial No. _____

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