LG
Life's Good

OWNER'S MANUAL

Flat Panel Digital X-ray Detector

Please read this manual carefully before operating your set and retain it for future reference.

14HK701G-W

www.lg.com

CONTENTS

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In addition to the source code, all referred license terms, warranty disclaimers and copyright notices are available for download.

LG Electronics will also provide open source code to you on CD-ROM for a charge covering the cost of performing such distribution (such as the cost of media, shipping, and handling) upon email request to *opensource@lge.com*.

This offer is valid for a period of three years after our last shipment of this product. This offer is valid to anyone in receipt of this information.

ON CLEANING

Recommended Cleaning Chemicals

- Isopropanol 100%
- Ethanol 70%
- Cidex® OPA
- 0.9% NaCl solution
- Biospot 500 ppm

How to Use Cleaner

- Prior to cleaning, turn off the Detector and remove the power cable.
- Soak a soft cloth in a recommended cleaner, then lightly rub the screen with no more than 1 N of force.
- The cleaner could cause serious damage if it leaks inside the Detector while cleaning.
- Do not use benzene, thinner, acids or alkaline cleaners or other such solvents.
- Cleaning guidelines for Detector must only be carried out by medical professionals (doctors or nurses) and must not be handled by patients.

GENERAL DESCRIPTION

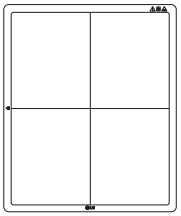
Overview

This model is an x-ray imaging device, a system that can acquire and process X-ray images as digital images. It utilizes amorphous silicon and a high-performance scintillator to ensure sharp high-definition image quality with the resolution of 3.6 lp/mm and the pixel pitches of 140 um. This device is a flat panel based X-ray image acquisition device. This device must be used in conjunction with an operating PC and an X-ray generator. This device can be used for digitizing and transferring X-ray images for radiological diagnosis. The data transmission between the Detector and PC can be enabled with a wired (cable) or wireless connection.

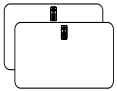
Product Component

- Detector: 14HK701G
- Control Box : LG Control Box
  - AC power cord for Control Box
- Battery Charger : LG Battery Charger
- 2 Battery (LBQ7222L)
- AC Power adapter for Charger (DA-65J19)
- AC Power cord for AC Power adapter
- Cable
  - Main Cable : Detector and Control Box link cable (Supply DC power, Ethernet data, control signals of X-ray Generator)
  - Trigger Cable: X-ray Generator to Control Box, transmit control signal between Detector and X-ray Generator. (Optional)
  - LAN Cable: Control Box to PC, exchanges Ethernet data between PC and Detector. (Optional)
- CD: Owner's Manual, Calibration Software
- Regulatory Manual, Inspection Report

Basic Accessories

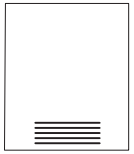


Detector 1 EA



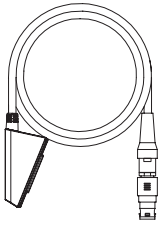
Battery 2 EA

AC Power cord for AC Power adapter 1EA

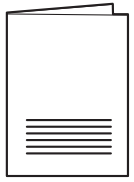


Inspection Report 1EA

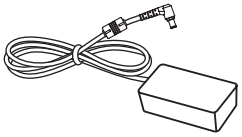
CD (Owner's Manual / Calibration Software) 1 EA



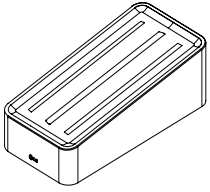
Main Cable 1EA



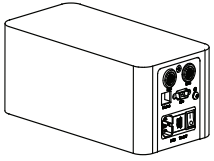
Regulatory Manual 1 EA



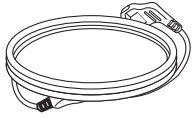
AC Power adapter for Charger 1 EA



Charger 1 EA

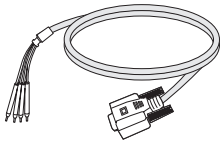


Control Box 1EA

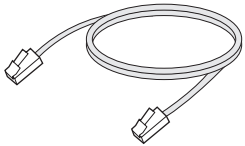


AC Power cord for Control Box 1EA

Optional Accessories



Trigger Cable 1EA



LAN Cable 1EA

- Some models may not include additional accessories.

⚠ CAUTION

- You must use the authorized components as per the specification below. Unauthorized components may cause damage and/or cause the product to malfunction.

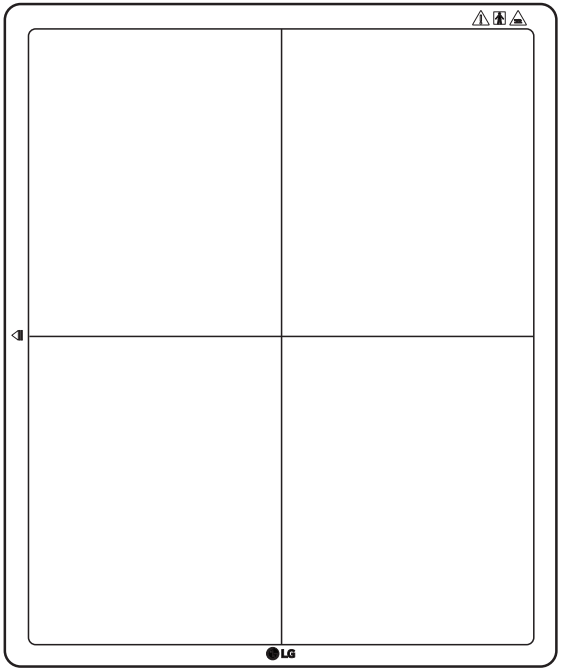
Component	Standard
LAN Cable	More than CAT5E Standard
Power Cord	US – Approved Medical grade regulation Others – Approved country safety regulation

- The AC/DC adapters etc. that are being used, with the exception of the upper components, must be supplied by the manufacturer.

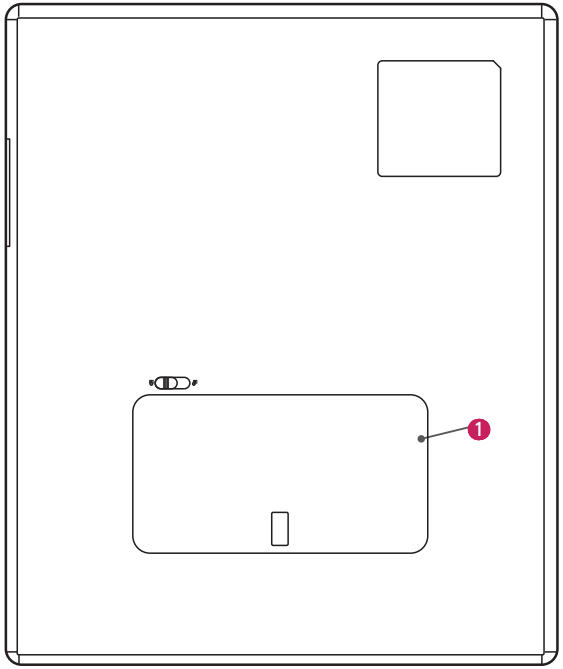
PART NAME AND FUNCTION

Detector

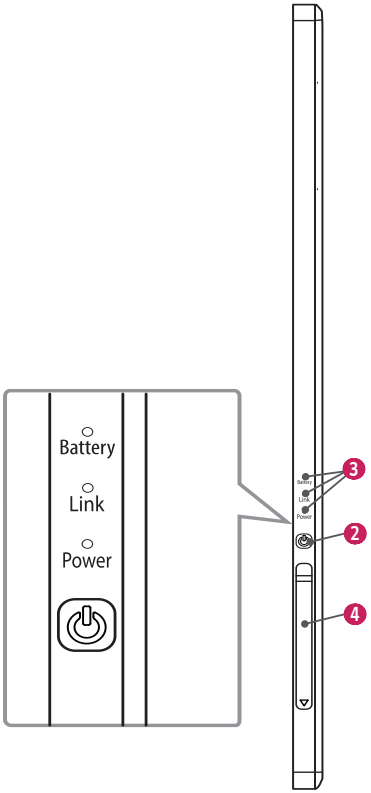
FRONT



BACK



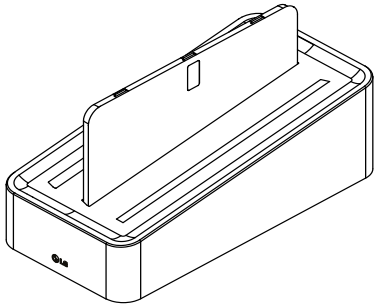
SIDE

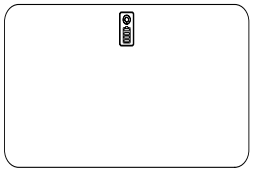


1	Battery
2	Power Button: Power on/off switch (On : press over 1 Sec, Off : press over 5 Sec)
3	LED Indicator: Indicating Detector's status
4	Connection to Main Cable

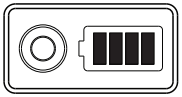
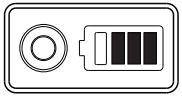
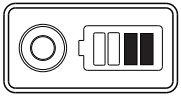
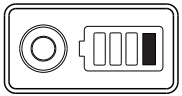
LED	LED Color	Status
Battery	Green	Battery is more than 30 % charged.
	Orange	Battery charging status is 10 ~ 30 %.
	Orange Blinking	Battery is less than 10 % charged.
Link	Green	Ethernet/Wireless(Station) connection
	Green Blinking	Wireless(Station) disconnected
	White	Wireless(AP) connection
	White Blinking	Wireless(AP) disconnected
	Off	Ethernet disconnected
Power	Green	Power On
	Green Blinking	Sleep mode
	Off	Power Off

Battery and Charger





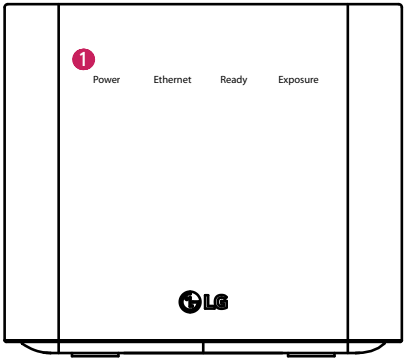
LED Indicator	Status
Green	Completion of charging
Orange	On charging
Orange Blinking	Error (Connection error, etc)

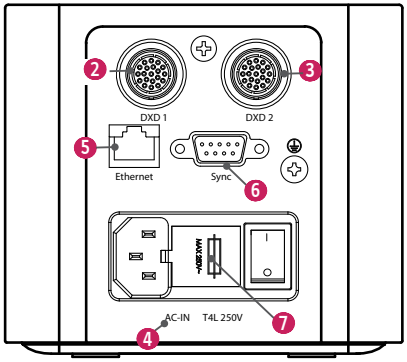
Battery Remain Indicator	Battery Level
	75 ~ 100%
	50 ~ 75%
	25 ~ 50%
	0 ~ 25%

NOTE

- Battery: Li-ion polymer battery (Charging time - Typ. 4 hours)
- Battery pack itself shows the remaining battery percentage.
- Battery charger: 3 ports cradle type
- LED Indicator: Following LEDs are located to each battery.

Control Box

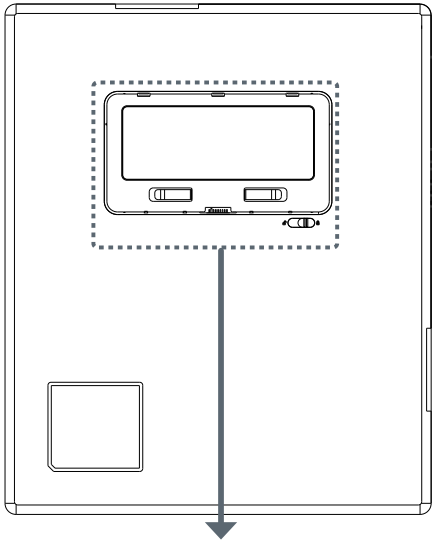


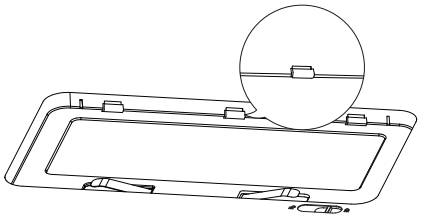


No.	LED Indicator	LED Color	Status
1	Power	Green	Power normal operation
		Off	Power off (AC power cord no connection or Power error)
	Ethernet	Green	Ethernet normal operation
		Green blink	On data communication
		Off	Ethernet disconnected
	Ready	Green	Ready signal from X-ray Generator is active
		Off	Ready signal from X-ray Generator is inactive
		Orange blink	Power error
	Exposure	Orange	Exposure signal from X-ray Generator is active
		Off	Exposure signal from X-ray Generator is inactive
		Orange blink	Power error

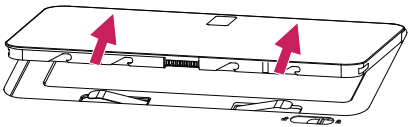
No.	LED Indicator	LED Color	Status
2	DXD 1	None	Connecting the Control Box and the Detector A. This connector supply power (24 V ⎓ 2.1 A) to the Detector, transmits X-ray synchronization signals and Ethernet image data.
3	DXD 2		Connecting the Control Box and the Detector B. This connector supply power (24 V ⎓ 2.1 A) to the Detector, transmits X-ray synchronization signals and Ethernet image data. Control Box supports 2 Detector connections. Usage is, one is for Bucky stand, the other is for table (bed). Generally, X-ray room of hospital installs 2 Detectors, Bucky stand and table type, it's far more convenient and efficient working environment. These 2 Detectors are not operated simultaneously, control box selects the operating Detector by AWS command.
4	AC IN		Connects AC power cord.
5	Ethernet		Ethernet port to transmit image/command between the Detector and PC.
6	Sync		This is to synchronize the Detector and X-ray Generator.
7	Fuse		Control box power fuses are 4A, 250V to Type T fuse. Power rating: T4L 250V

ASSEMBLING BATTERY

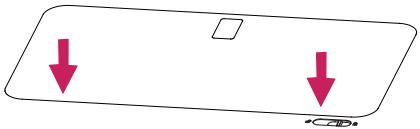




1 Check the battery mounting hole direction.

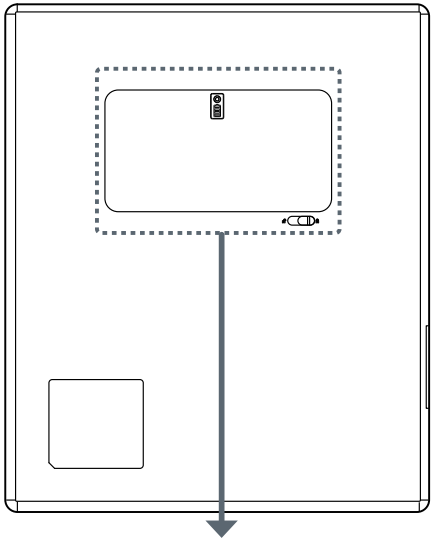


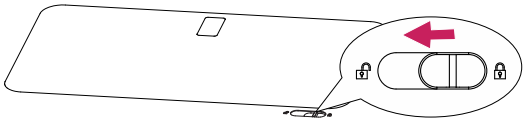
2 Insert into the hole on the side with the indicator.



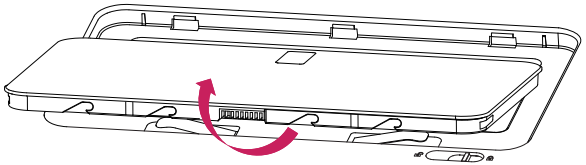
3 Press the opposite side to secure the battery indicator.

REMOVING BATTERY





1 Push the battery lock button in the direction of the picture.



2 Remove the battery by lifting it in the direction of the picture.

SPECIFICATION AND DIMENSION OF EACH PART

The product specifications are subject to change without prior notice for product improvements.
~ refers to alternating current (AC), ⎓ refers to direct current (DC).

Specifications

Detector

Item	Specification
Model	14HK701G
Sensor type	Amorphous Silicon TFT
Scintillator Type	CsI:Tl
Total Pixel Matrix	2500 x 3052 pixels
Total Pixel Area	350 x 427.28 mm
Pixel Pitch	140 um
Effective Pixel Matrix	2488 x 3040 pixels
A/D Conversion	16 bits
Data transmission	802.11 a/b/g/n/ac Wireless LAN Standard, 150 Mbps Wired Gigabit Ethernet Standard, 500 Mbps
Cycle time	Typ. 8 Sec (Wired) Typ. 11 Sec (Wireless)
Image Transmission	Typ. 2 Sec (Wired) Typ. 2.5 Sec (Wireless)
Image Storage	Stores up to 200 images
Energy range	40 kVp ~ 150 kVp
MTF	Typ. 89 % at 0.5 lp/mm
DQE	Typ. 72 % at 0.1 lp/mm

Item	Specification
Size (Width x Height x Depth)	384.0 x 460.0 x 15.2 mm (15.1 x 18.1 x 0.5 inch)
Weight	Typ. 2.95 kg (6.5 lbs)
Window material	Carbon Fiber
Trigger mode	Manual Mode Auto Mode (Auto Exposure Detection)
Power consumption	Typ. 28 W
Wireless	Standard: 802.11 a/b/g/n/ac compliance Peak mode: 867 Mbps Frequency: 2.4 GHz / 5 GHz Bandwidth: 20 MHz / 40 MHz / 80 MHz MIMO: 2X2
Rating	24 V ⎓ 2.1 A
Applied part	Type: BF Location: The front side of the Detector (Effective area only).

NOTE

- Maximum wireless signal rate derived from IEEE standard specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, lower actual data throughput rate.
- Recommended Maximum operable distance: 2 m (6.5 ft) (From the Access Point)
- Wireless antennas: The module adopts the latest 802.11ac technology. The transmitter of the module is powered by host equipment (Detector). The antennas are 2 printed-dipole antennas.
- Wireless module: 802.11 a/b/g/n/ac USB2.0 module is implemented. It supports 2T2R (2 transmit 2 receive) MIMO technology, which delivers throughput up to 300 Mbps.
- Images can be saved by the X-ray generator while the power of the detector is turned on without connecting to a PC. To produce images, X-ray is irradiated at intervals of more than 10 seconds. Check and load the saved images from LG Acquisition Workstation Software.

Detector has been tested with below table's X-ray condition. This table is only for reference. The legally certified radiologist expert should control X-ray dose.

- Sensor Type: a-Si TFT, X-ray conditions

	Adult			
	SID (inch / cm)	Tube Voltage (KV)	Tube Current (mA)	Tube Current x Time (mAs)
Chest P-A	72 inch / 182.8 cm	110 KV	320 mA	3.2 mAs
C-spine LAT	72 inch / 182.8 cm	75 KV	200 mA	20 mAs
L-spine A-P	40 inch / 101.6 cm	70 KV	250 mA	25 mAs
Abdomen A-P	40 inch / 101.6 cm	75 KV	320 mA	20.48 mAs
Pelvic A-P	40 inch / 101.6 cm	70 KV	250 mA	25 mAs
Wrist A-P	40 inch / 101.6 cm	50 KV	250 mA	5 mAs
Elbow A-P	40 inch / 101.6 cm	55 KV	250 mA	5 mAs
Shoulder AP	40 inch / 101.6 cm	65 KV	200 mA	8 mAs
Foot A-P	40 inch / 101.6 cm	50 KV	250 mA	5 mAs
Ankle A-P	40 inch / 101.6 cm	55 KV	100 mA	6.4 mAs
Knee A-P	40 inch / 101.6 cm	60 KV	100 mA	8 mAs

- Sensor Type: Oxide TFT, X-ray conditions

	Adult			
	SID (inch / cm)	Tube Voltage (KV)	Tube Current (mA)	Tube Current x Time (mAs)
Chest P-A	72 inch / 182.8 cm	110 KV	320 mA	2.56 mAs
C-spine LAT	72 inch / 182.8 cm	75 KV	200 mA	16 mAs
L-spine A-P	40 inch / 101.6 cm	70 KV	250 mA	20 mAs
Abdomen A-P	40 inch / 101.6 cm	75 KV	250 mA	16 mAs
Pelvic A-P	40 inch / 101.6 cm	70 KV	250 mA	20 mAs
Wrist A-P	40 inch / 101.6 cm	50 KV	200 mA	4 mAs
Elbow A-P	40 inch / 101.6 cm	55 KV	200 mA	4 mAs
Shoulder AP	40 inch / 101.6 cm	65 KV	200 mA	6.4 mAs
Foot A-P	40 inch / 101.6 cm	50 KV	200 mA	4 mAs
Ankle A-P	40 inch / 101.6 cm	55 KV	100 mA	4.8 mAs
Knee A-P	40 inch / 101.6 cm	60 KV	100 mA	6.4 mAs

NOTE

- In the case of the Oxide TFT X-ray condition table, it is only applicable to 14HQ901G-B and 17HQ901G-B models. If the condition table is applied to other models, the desired image may not be obtained.
- Regarding paediatric dosage, it should be much less than for an adult. The certified radiologist should pay special attention to paediatric X-ray dosage levels.

GRID

Item	Recommended Specification
SID	100 cm / 130 cm / 150 cm / 180 cm (39.3 inch / 51.1 inch / 59 inch / 70.8 inch)
Size	384 x 460 mm (15.1 x 18.1 inch)
Ratio	10 : 1
Frequency	215 Line / Inch
Inter Spacer	AL

Battery

Item	Specification
Model	LBQ7222L
Size (Width x Height x Depth)	204.6 x 110.5 x 7.8 mm (8.0 x 4.3 x 0.3 inch)
Weight	Typ. 0.24 kg (0.5 lbs)
Output Nominal voltage	Typ. 7.5 V ⎓
Operation Temp	10 ℃ (50 ℉) ~ 35 ℃ (95 ℉)
Charging time	4 hours (standard) when charging with the Detector. 3 hours (standard) when charging two batteries with the charger.
Capacity	Typ. 4000 mAh, Min. 3850 mAh
Battery performance	Typ. 260 shots/6.5 hours Min. 160 shots/4 hours (Cycle time 90 Sec, with Full charged battery)

Battery Charger

Item	Specification
Model	LG Battery Charger
Size (Width x Height x Depth)	125.0 x 90.0 x 255.0 mm (4.9 x 3.5 x 10.0 inch)
Weight	Typ. 0.9 kg (1.9 lbs)
Input	19 V ⎓ 3.42 A
Output Nominal voltage	8.7 V ⎓

Battery Charger Adapter

Item	Spec
Model	DA-65J19
Manufacturer	Asian Power Devices Inc. (APD)
Size (Width x Height x Depth)	134.0 x 59.8 x 31 mm (5.2 x 2.3 x 1.2 inch)
Weight	Typ. 0.3 kg (0.6 lbs)
Input	AC 100-240 V~ 50-60 Hz, 1.5 A-0.7 A
Output	19 V ⎓ 3.42 A
Classification by protection type against Electric Shock	Class Ⅱ equipment
Cable length	1.5 m (4.9 ft)

Control Box

Item	Specification
Model	LG Control Box
Size (Width x Height x Depth)	125.0 x 109.8 x 255.0 mm (4.9 x 4.3 x 10.0 inch)
Weight	Typ. 1.3 kg (2.8 lbs)
Input	AC 100-240 V~ 50/60 Hz, 1.4-0.7 A
Output	DXD 1 24 V ⎓ 2.1A, Trigger signals, Ethernet data for Detector A.
	DXD 2 24 V ⎓ 2.1A, Trigger signals, Ethernet data for Detector B. Control Box supports 2 Detector connection. Usage is, one is for Bucky stand, the other is for table (bed). Generally, X-ray room of hospital installs 2 Detectors, Bucky stand and table type, it's far more convenient and efficient working environment. These 2 Detectors are not operated simultaneously, control box selects the operating Detector by AWS command.
	Ethernet Transmission image/command between the Detector and PC.
	Sync Transmission control signals between the Detector and X-ray Generator.

Cables

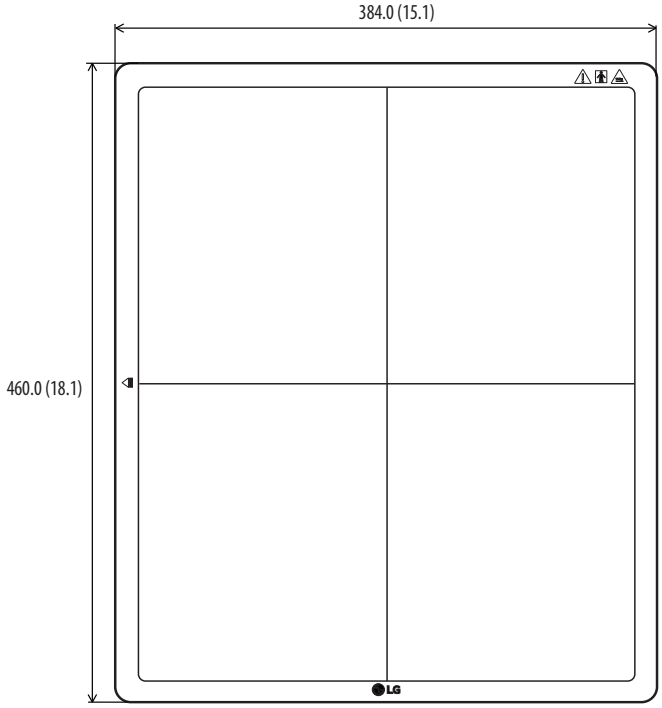
Item	Length	Qty
Main Cable	7 m (22.9 ft)	1
LAN cable (Optional)	10 m (32.8 ft)	1
Power cord (110 V or 220 V)	1.5 m (4.9 ft)	2
Trigger Cable (Optional)	15 m (49.2 ft)	1

Dimension

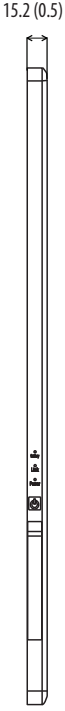
Detector

Unit: mm (inch)

Front



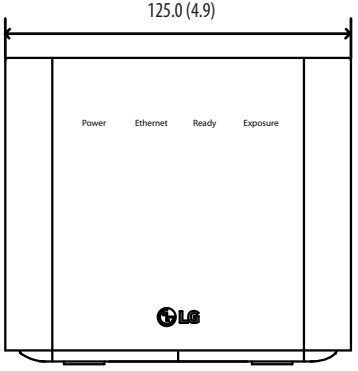
Side



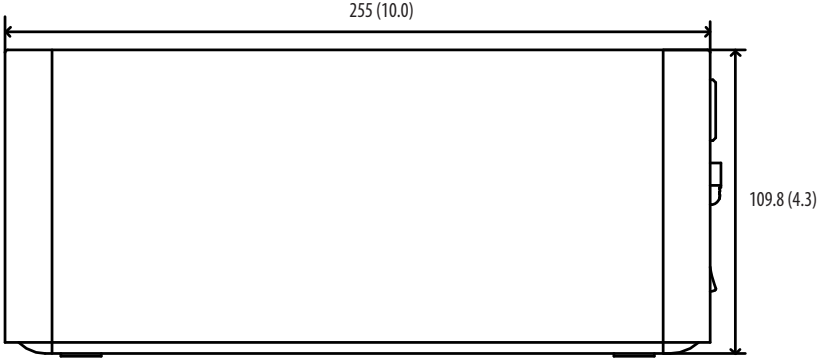
Control Box

Unit: mm (inch)

Front



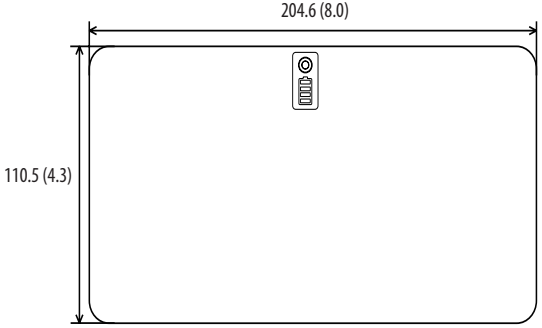
Side



Battery

Unit: mm (inch)

Front

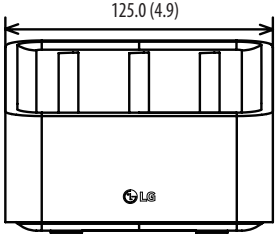


Side

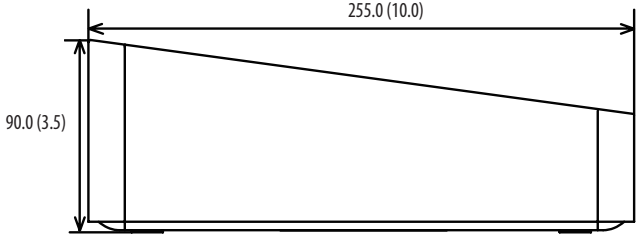
Battery Charger

Unit: mm (inch)

Front



Side



ENVIRONMENTAL REQUIREMENT

PC System requirement

PC Specification	
CPU	Intel i5
Memory	4 GB
Disk capacity	At least 10 GB ~ 500 GB recommended
Network card	Dual Ethernet 100/1000 Mbps
OS	Windows 7/8.1/10 (32bit, 64bit)
Monitor	Min. Resolution 1280x720
AP	Cisco models recommended (e.g. Linksys EA9200)

CALIBRATION SOFTWARE INSTALL

How to install

Run the calibration software installation file. Once the installation file has been executed, follow the installation instructions on the screen.

How to delete

You can delete the Calibration Software in the following ways:

Deleting from the Control Panel

1 Select Control Panel from the Start menu.
2 Select Programs and Features in Control Panel.
3 Select the [LG DXD Calibration] on the lists.
4 When the program installation and deletion screen appears on the screen, select the [Delete] button.
5 Follow the deletion instructions on the screen and click the [Next] button to proceed.

Deleting with the installation file

1 Run the calibration software installation file, then follow the deletion instructions on the screen.

NOTE

- When using the installation file to delete the program, the [Installation file] must be the same version as the current software.

CONNECTION TYPES

Connection of X-ray Generator - Detector

Select Trigger Mode in accordance with the acquisition method.

- Auto Mode : Detector detects the image obtained after the X-ray.
- Manual Mode : Detector acquires image by pressing Generator exposure switch.

Connection of Detector - PC

The connection mode used between the Detector and PC.

- Wired Mode: The wired connection between the Detector and a PC through the Control Box.
- Wireless mode: The wireless connection between the Detector and a PC through a wireless AP.

Network Connection Mode

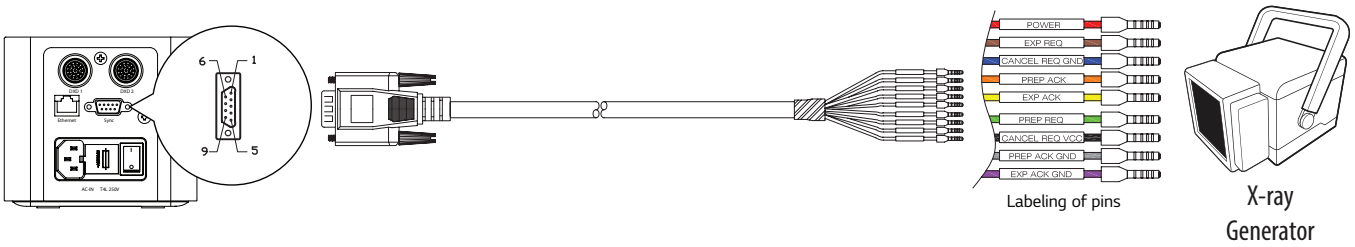
When the Detector is booted, either the wired mode or wireless mode is automatically set depending on whether or not the Main Cable is connected.

1. Power on after connecting the Main Cable: wired mode.
2. Power on after removing the Main Cable: wireless mode.
3. Removing the cable in the wired mode: switch to the wireless mode.
4. Connecting the cable in the wireless mode: maintain the wireless mode (charging).

Mode	Generator - Detector	Detector - PC
Case 1	Auto Mode	Wired Mode
Case 2	Auto Mode	Wireless Mode
Case 3	Manual Mode	Wired Mode
Case 4	Manual Mode	Wireless Mode

Trigger Cable

- Trigger Cable is connected between control box and X-ray Generator, and used only for manual mode, not auto mode.



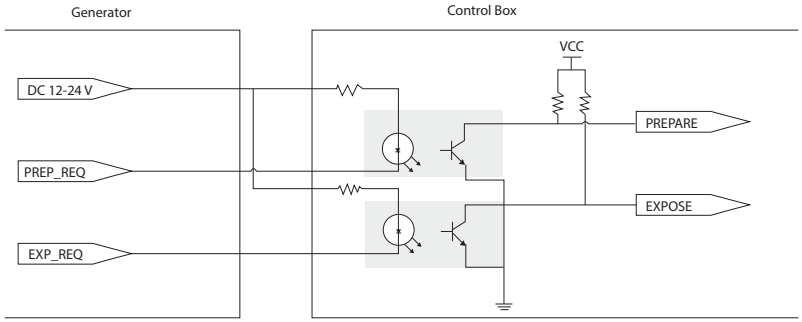
NC : No Connection

No.	Labeling of pins color	Description	
1	Red	Power : X-ray Generator Supply Voltage (DC 12V ~24V)	Use
2	Brown	Expose signal from Generator to Control Box	Use
3	Blue	Cancel REQ Ground	NC
4	Orange	Prepare Acknowledge signal from Control Box to Generator	Use
5	Yellow	Expose Acknowledge signal from Control Box to Generator	Use
6	Green	Prepare signal from Generator to Control Box	Use
7	Black	Cancel request VCC	NC
8	Gray	Prepare Acknowledge Ground	NC
9	Violet	Ground of Signals	Use

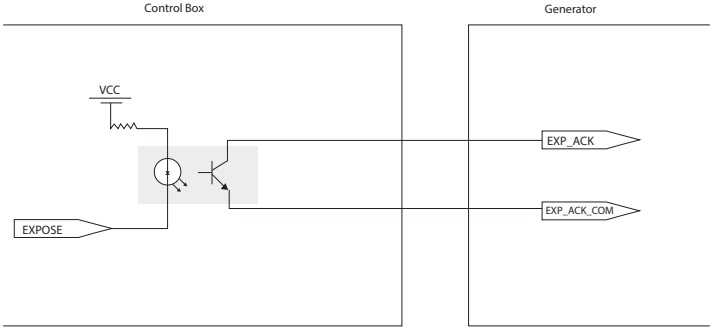
NOTE

- Trigger Cable and X-ray Generator connection is implemented by expert of X-ray system manufacture. Description of each pin is common language of this industry.

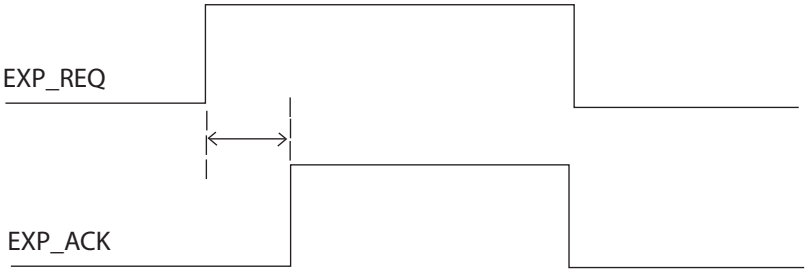
Block diagram of Trigger Cable connection



<Connection of X-ray Generator - Control Box>



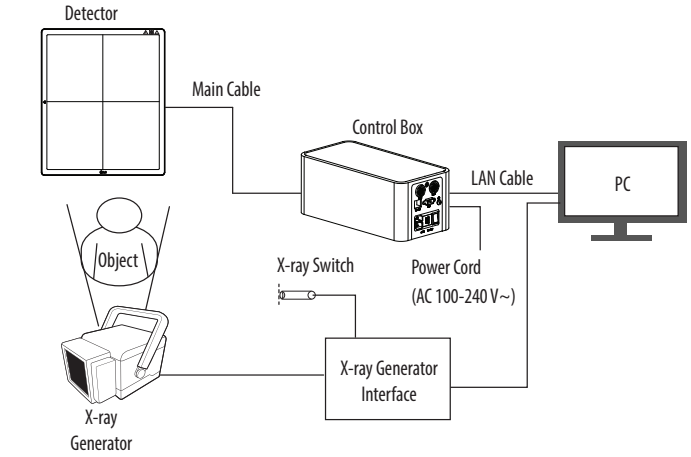
<Assembly drawing>



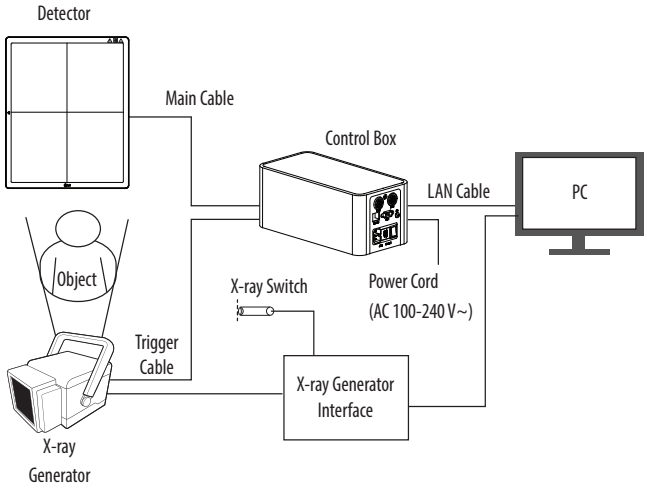
<Timing Chart>

Detector and PC (Wired mode)

Auto Mode



Manual Mode



Connecting cable

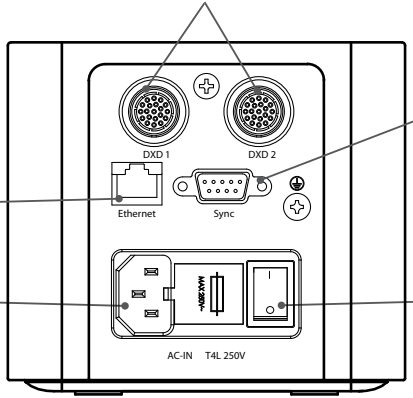
Main Cable : Connects between Control Box and Detector.
2 Detectors can be connected, in case of 1 Detector, connection of any port is acceptable.

Trigger Cable : Connects between control box and Generator.
In case of auto mode, this connection is not necessary.

LAN Cable: Connects between Control Box and PC.

AC power cord connection.

AC Switch : This switch is for AC On/Off switching.
Mark I : AC On / Mark O : AC Off



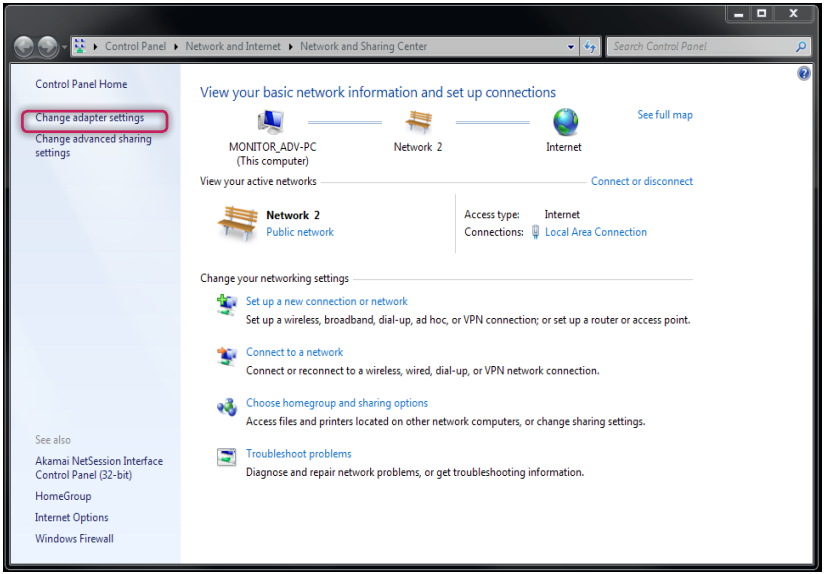
Connect - Wired Connection

1 Use the LAN cable to connect a PC to the Control Box and connect the Detector to the Control Box with the Main Cable.

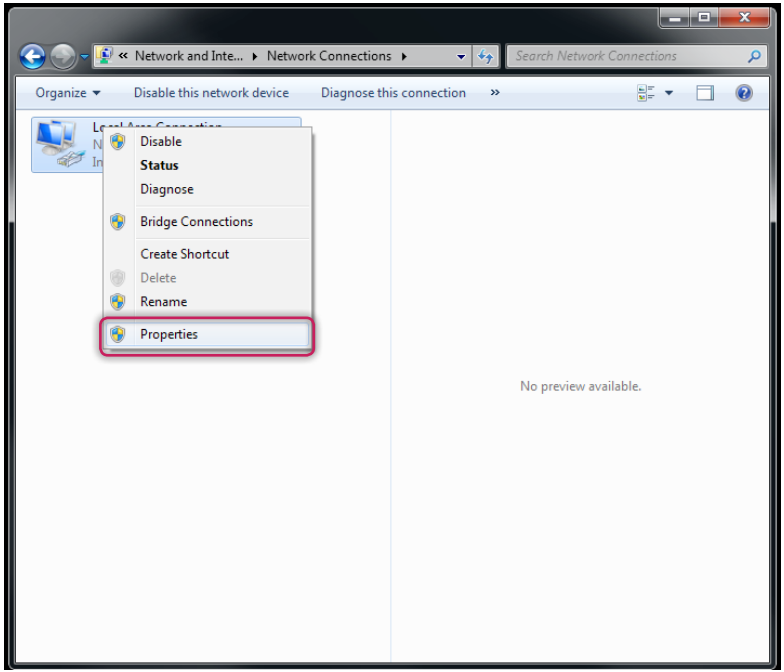
2 Follow the steps below to set up the PC.

❶ Launch the [Network and Sharing Center] and click [Change adapter settings].

- ([Control Panel] > [Network and Internet] > [Network and Sharing Center] > [Change adapter settings])

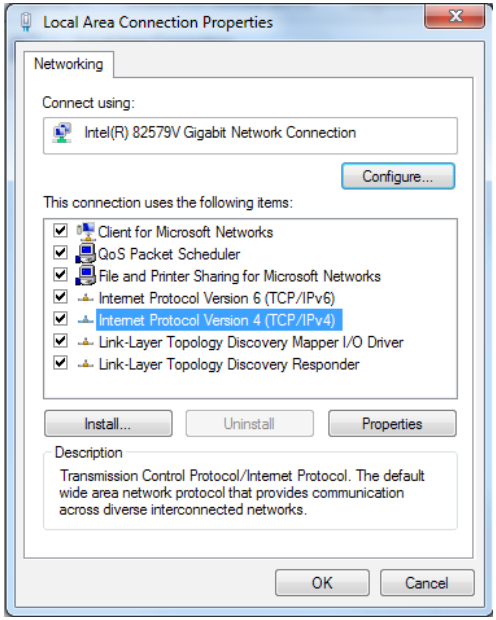


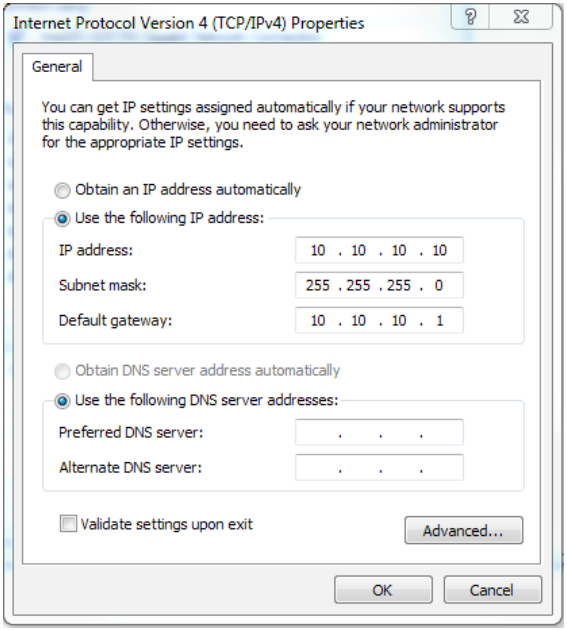
2 Right-click Local Area Connection, and click [Properties].



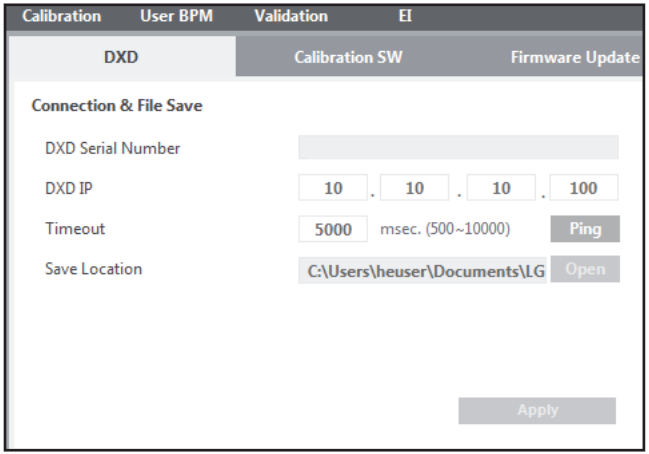
❸ Select [Internet Protocol Version 4 (TCP/IPv4)], and then click [Properties] to set the IP address as follows:

- IP address: Input anyone from 10.10.10.2 to 10.10.10.254
  However, IP 10.10.10.100 is not allowed, because Detector IP is set to 10.10.10.100 in factory.
- [Subnet Mask]: 255.255.255.0.
- [Default Gateway]: 10.10.10.1.
- DNS setting is not needed.

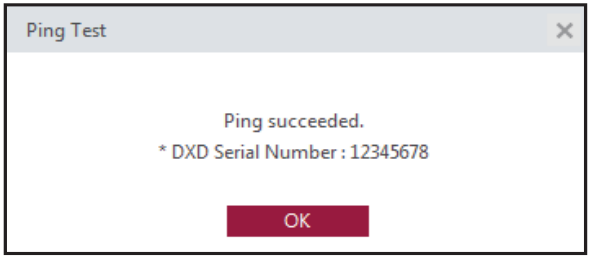




4 Run the LG DXD Calibration program. Go to ⚙ > [DXD] > [Connection & File Save], enter DXD IP (10.10.10.100), then run the [Ping] to check the connection.



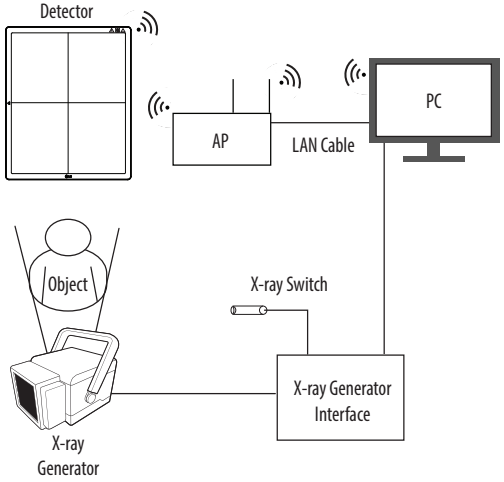
If following screen is pop-up after [Ping] click, connection is successful, everything for system operation is ready.



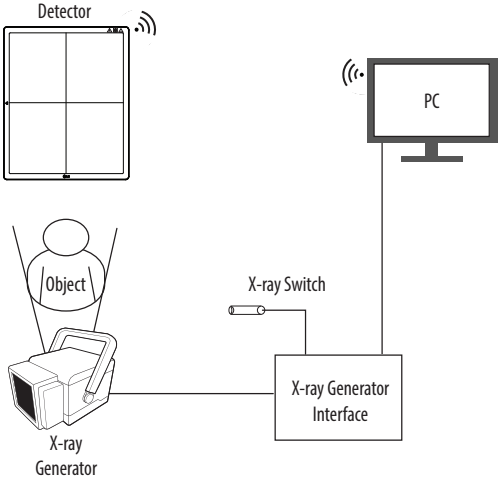
Detector and PC (Wireless mode)

Auto Mode

1. Station mode (for the use of external AP)



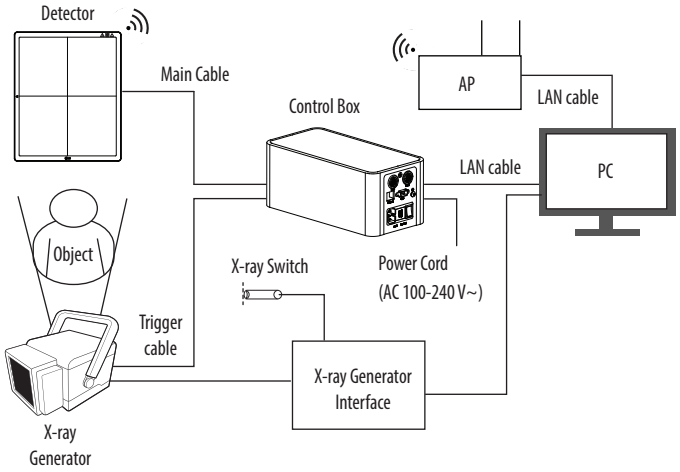
2. AP mode (for the use of detector internal AP)



NOTE

- Please install the AP and Detector as near as possible without obstacles in between them.

Manual Mode



Making connections-Wireless connection

1 The Default Wireless Settings as below.

- Station mode (connection via external AP)
  - SSID: LGEDXD
- AP mode (connection via detector AP)
  - SSID: LGEDXD_SOFTAP

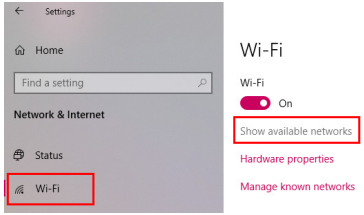
2 It is possible to change the Wireless Settings using LG DXD Calibration Software.
- Please see " Wireless AP configuration" for details.

3 Please reboot the Detector after removing the Main Cable on Detector. (When the power is turned on after removing the main cable: The device switches to wireless mode. The device initially starts in station mode. If the user changes to station mode or AP mode, the device operates in the changed mode.)

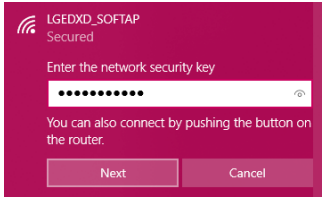
4 The wireless mode changes when the power button is pressed for about 1 second after rebooting with the main cable removed.

5 The Connection method as below.

- Station mode
  - PC settings and connection with Detector are same with wired Connection.
- AP mode
  - Enter [Wi-Fi] under PC Settings, and enter [Show available networks].



  - Attempts are made to connect after checking the DXD wireless AP SSID, which is shown as the research result (the initial value is LGEDXD_SOFTAP). Enter the password to connect.



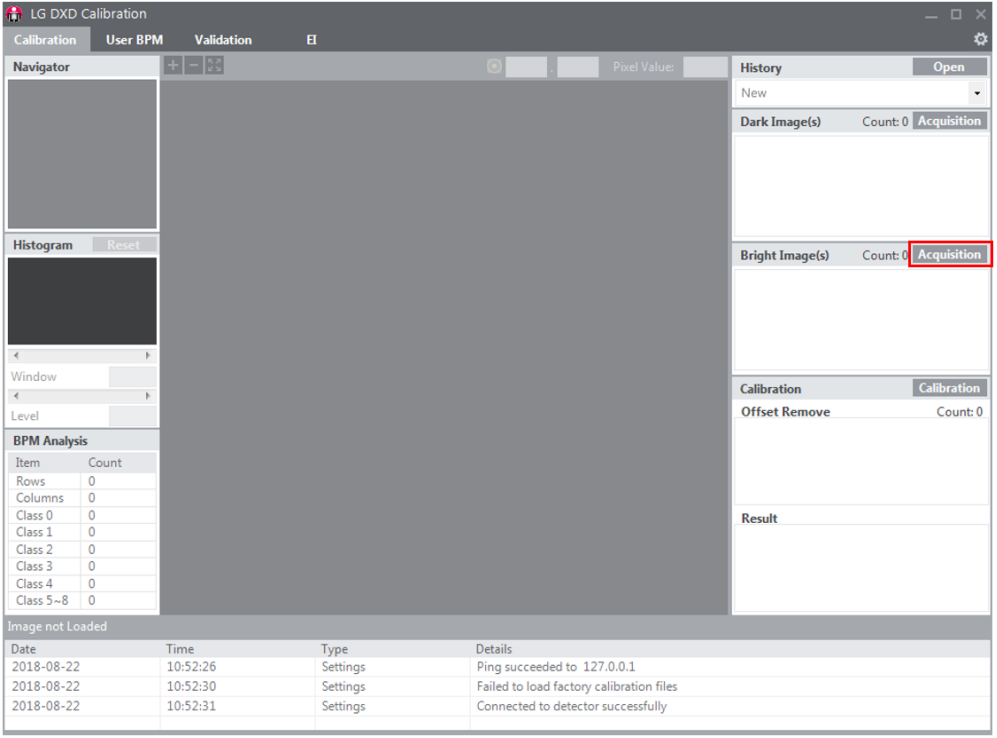
NOTE

- Tip: Refer to Wireless AP Set Up Guide
  - Supplement. Wireless Access Point Setup Guide (Model: Cisco Linksys EA9200)

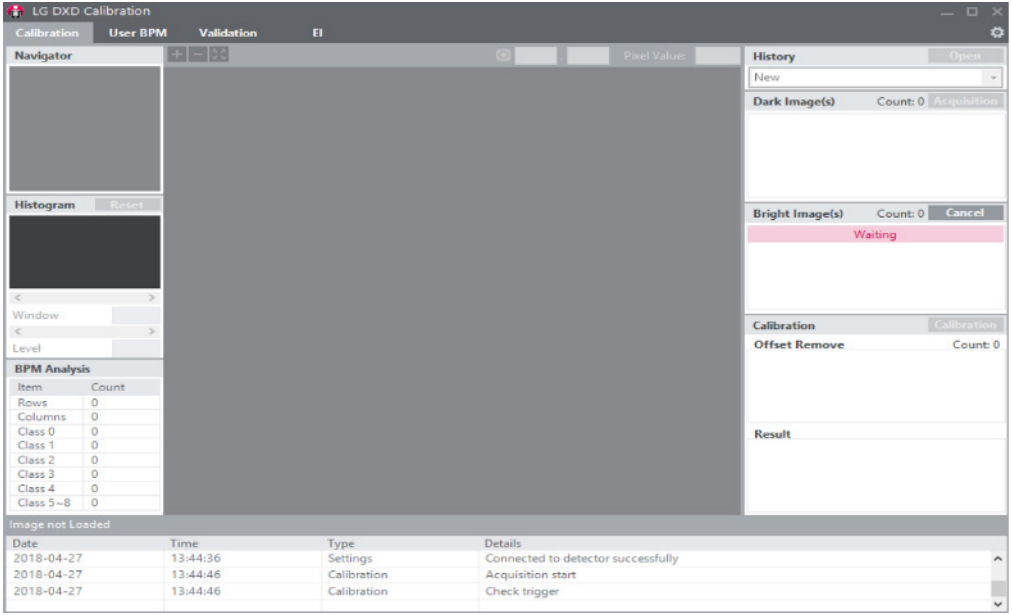
How to acquire bright image with X-Ray shot. This procedure is also applied for pediatric patient.

X-ray Generator connection is explained in this manual.

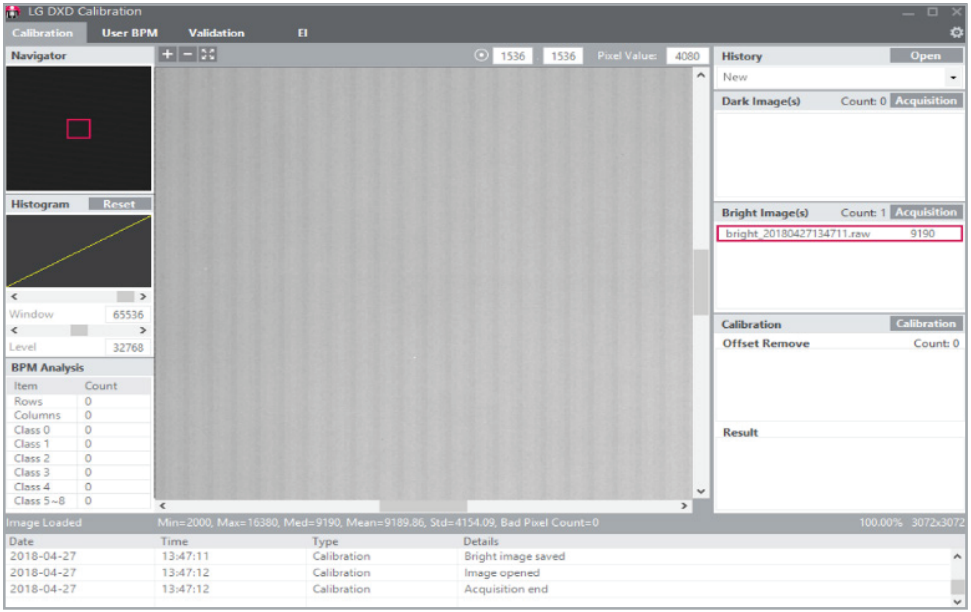
1 Click the [Acquisition] Button next to [Bright Image(s)] text.



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



3 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.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SOFTWARE MANUAL

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CONTENTS

CALIBRATION SOFTWARE

When acquiring images from the detector, calibration is essential to obtain images of high quality. Calibration Software enables you to create and check the necessary values for the calibration.

NOTE

- It is recommended to perform a calibration once per month for the following three months after the purchase, and then once every six month to ensure the quality of images.
- It is also recommended to turn on the detector for 15 minutes before the Calibration.
- The default values set in Calibration Software can be changed depending on the actual conditions of use.

Security

Calibration Software cannot be used independently without being connected to the detector. The software cannot perform all actions, including moving to another menu and confirming settings, without the actual connection. In addition, even if the software is connected to the detector, Calibration cannot be performed before the initial date of the product installation is registered.

Calibration Software

The features of the Calibration Software include (Settings), [Calibration], [User BPM], [Validation] and [Exposure Index].

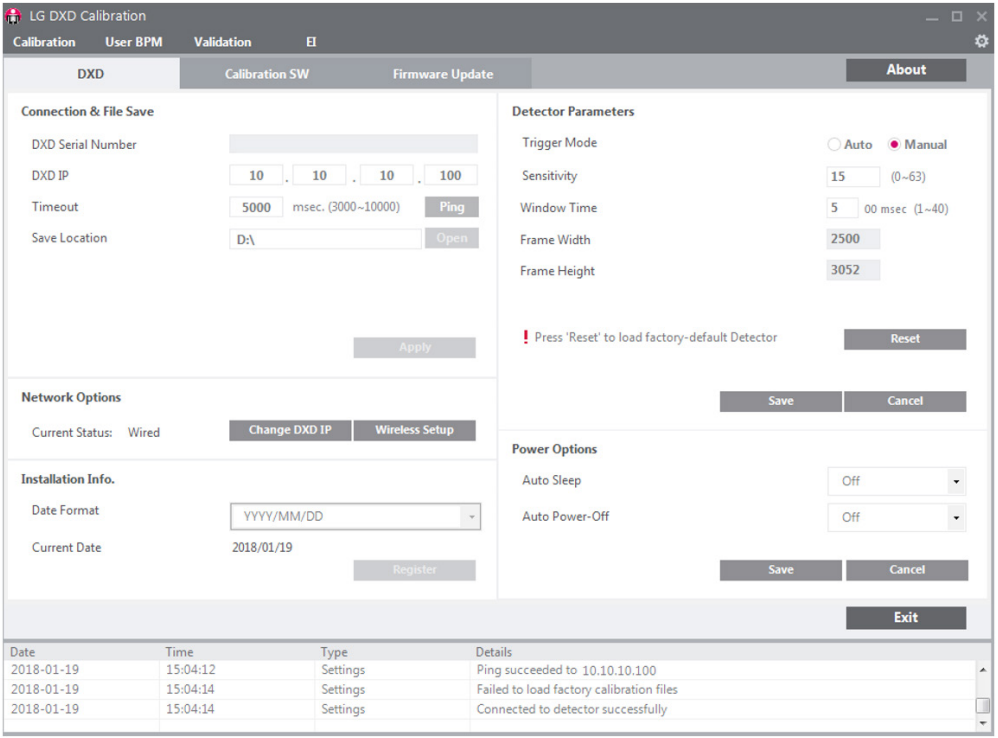
Settings

include [DXD] settings, [Calibration SW] settings and [Firmware Update].

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

NOTE

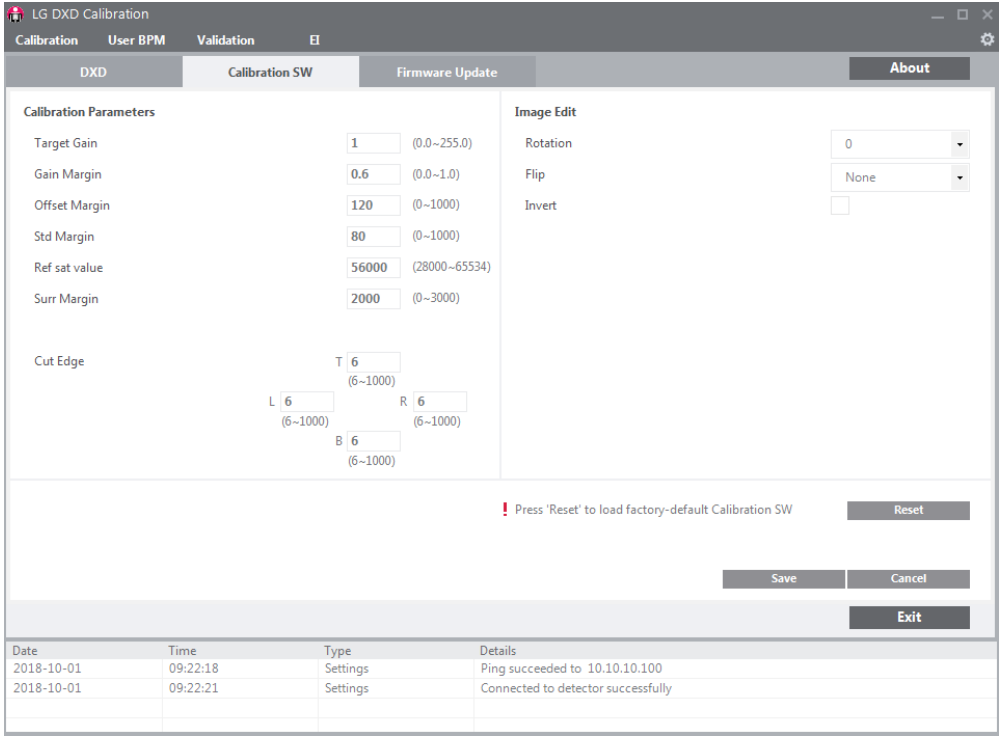
- Detail explanation of each icons is explained at the back page.



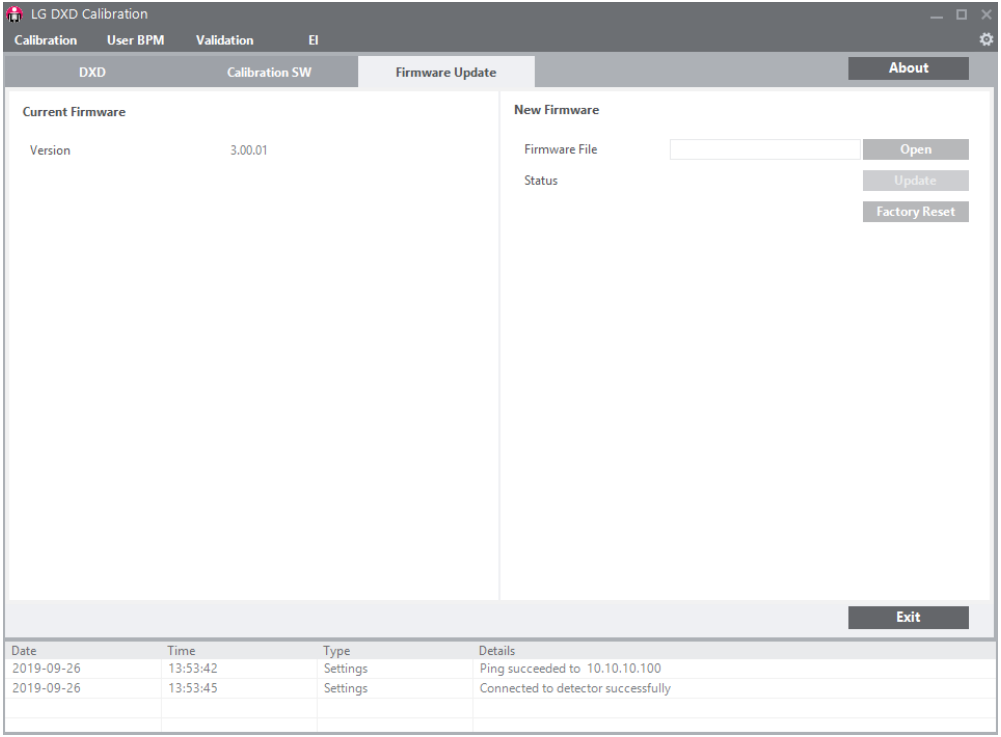
- [Calibration SW]: Configures the settings required for to calibrate software algorithms.

NOTE

- Detail explanation of each icons is explained at the back page.



- [Firmware Update]: Checks the firmware version of the detector or performs the firmware update. You can update firmware by this menu.



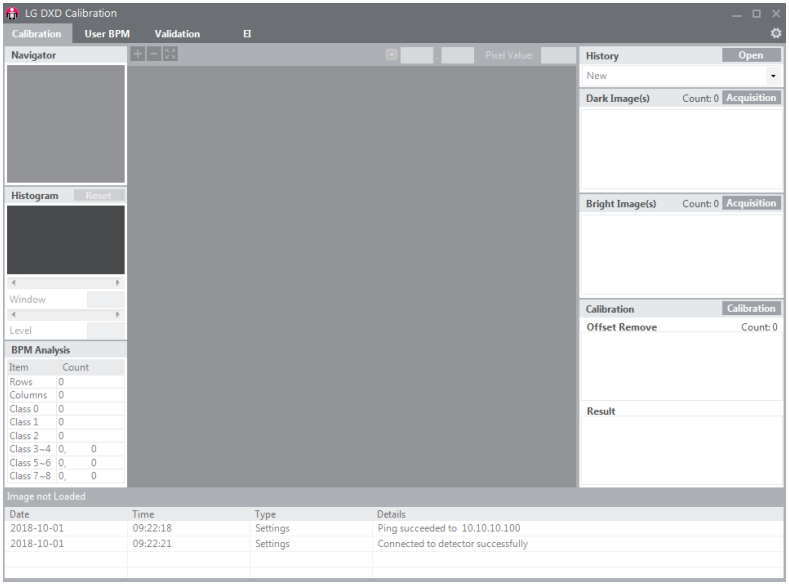
Calibration

[Calibration] involves the following procedures.

- Dark Image and Bright Image are obtained from the detector.
  - [Dark Image(s)]: An image obtained without generating X-rays.
  - [Bright Image(s)]: An image obtained by generating X-rays without a phantom or any other object on the detector.
- Generate [Avgdark.raw], [Offset.raw], [Gain.raw], [BPM.raw]: Used for Corrected Image calculations.
  - Corrected Image: An image generated by applying calibration results to a raw image.
- Creates a Bad Pixel Map. Uses the surrounding pixel values to calibrate the bad pixel values.

NOTE

- This page is for brief explanation, you can see details at the back pages.

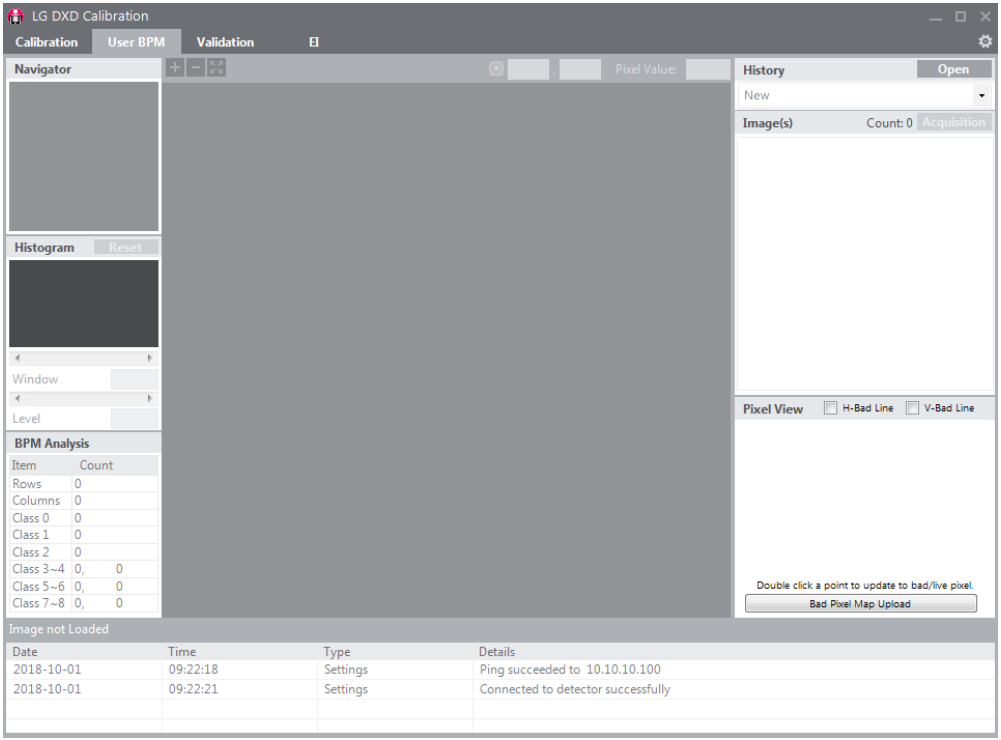


User BPM

Enables users to manually make changes in the [Bad Pixel Map] (BPM.raw) created from [Calibration].

NOTE

- This page is for brief explanation, you can see details at the back pages.

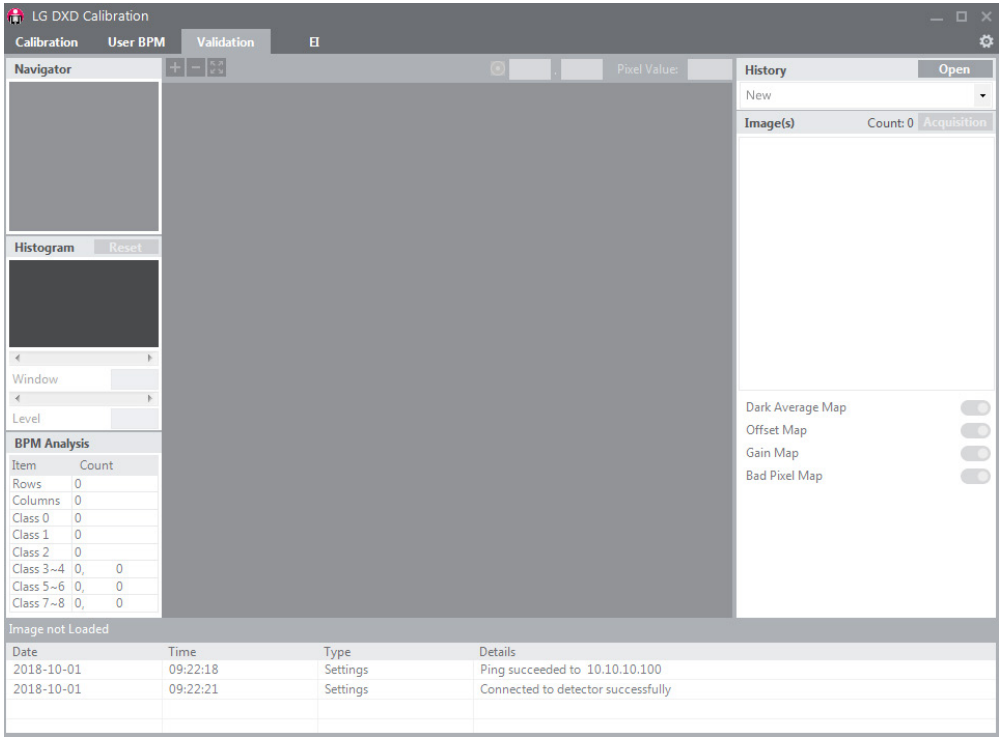


Validation

This is used to validate the final image by applying [Calibration] results to the image.

NOTE

- This page is for brief explanation, you can see details at the back pages.



EI (Exposure Index)

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

NOTE

- This page is for brief explanation, you can see details at the back pages.

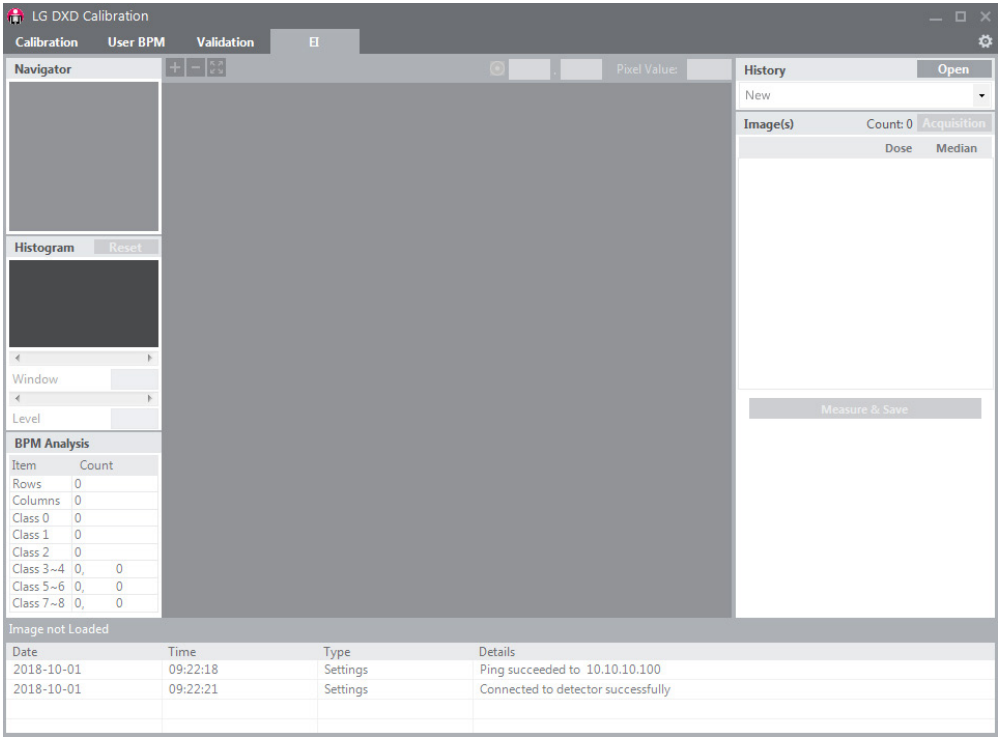
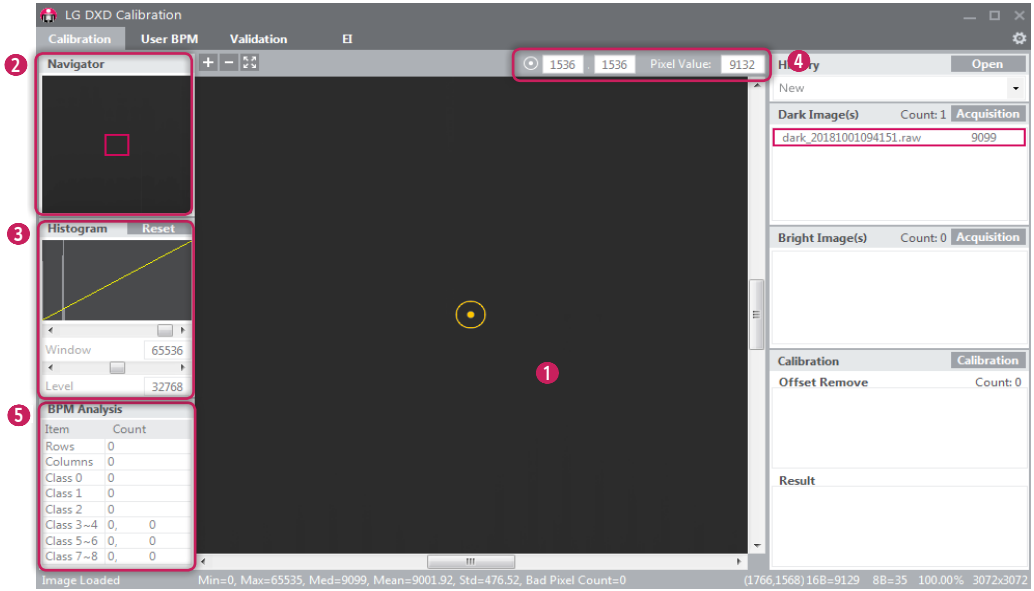


Image Functions



1 Image Viewer

- [Calibration], [User BPM], [Validation] and [EI] menu have an image viewer to show the images acquired.
- When creating or clicking an image, the image is loaded and shown in the viewer.
- Information about the image will be shown in the areas below.
  - [Image Loaded]: displays whether the image is loaded in the image area or not.

  * When the image is loaded: [Image Loaded]

  * When the image is not loaded: [Image not Loaded]
  - [Min]: The minimum pixel value in the image area.
  - [Max]: The maximum pixel value in the image area.
  - [Med]: The median value of the image.
  - [Mean]: The mean value of the image.
  - [Std]: The standard deviation of the image.
  - [Bad Pixel Count]: The number of bad pixels.
  - 16B= N, 8B= M: Representation of pixel values in (x, y) in bits.
  - %: The rate of the image displayed in the image area against the entire image.
  - (W x H): The size of the entire image.

2 Navigator

- [Navigator] shows the entire area of the image acquired and also indicates the enlarged or reduced area.
- [Navigator] has a red box that indicates the area shown in the image viewer.
- [Navigator] moves the red box to wherever you click, and the selected area appears in the image viewer.

3 Histogram

- Shows the [Histogram] of the image acquired.
- [Window] / [Level] are used to adjust Histogram to help reading the image.
- [Histogram] controls [Window] / [Level] with the <> buttons and the scroll bar under the Histogram graph.
- When the [Reset] button is clicked, it resets to the default values.

4 Reference Point

- A reference point can be set by clicking on any location in the image viewer, and the coordinates and pixel values for the reference point will be shown on the top. You can also move the reference point by manually entering the x and y values.
  - Only numbers can be entered for a reference point.

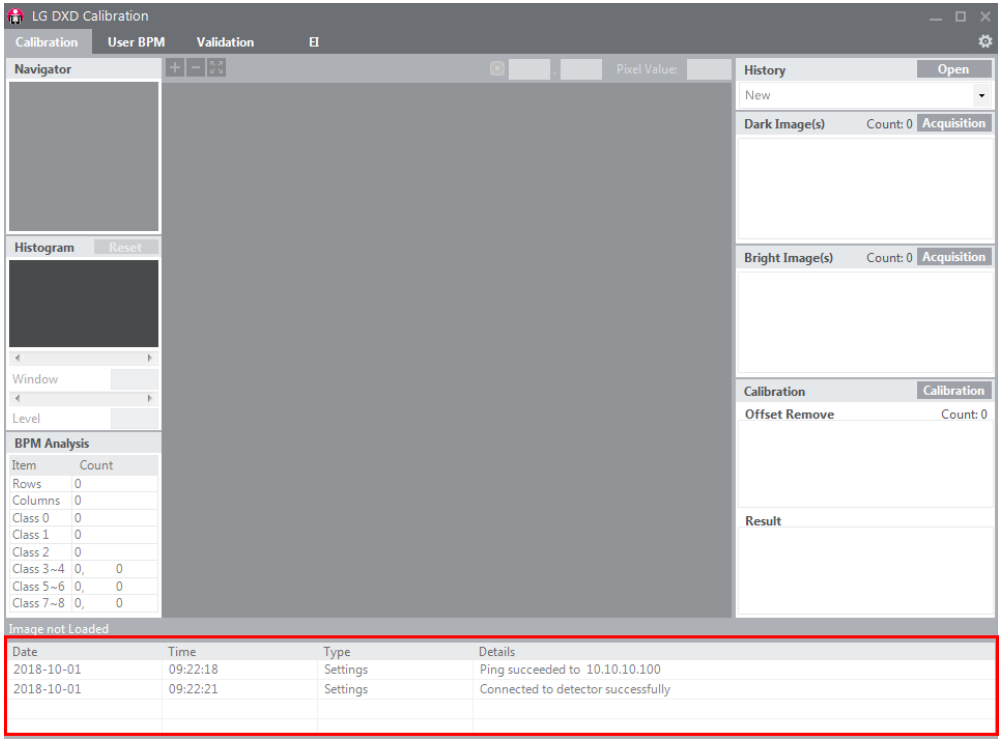
5 BPM Analysis

- Shows the result of the analysis of the Bad Line and Bad Pixel Class based on the [Bad Pixel Map] after the Calibration.

Log

Shows necessary information for users to understand the process to perform Calibration Software.

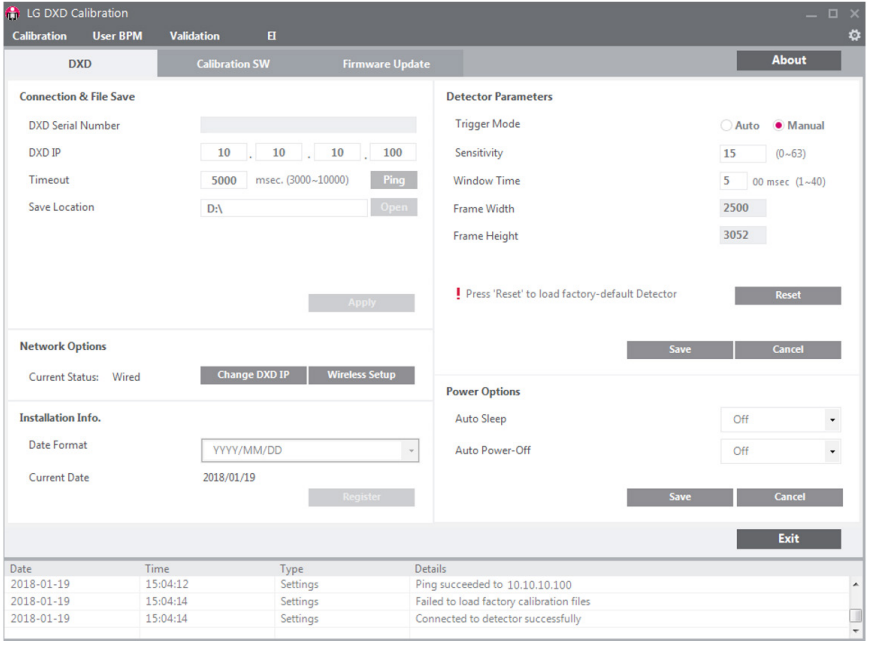
Consists of [Date], [Time] [Type] and [Details], and the data will be saved in a log file.



OPERATION

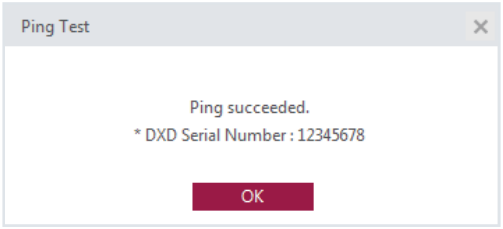
Launching Program

- Double-click the executable file installed on the PC to launch Calibration Software.
- When launching it for the first time, you will be directed to the Settings screen.

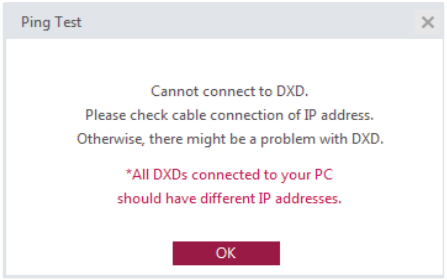


IP Address Check and Ping Test

- The detector has a default IP address.
- If the IP address of the detector is changed, a new IP address must be entered in the detector IP in the Calibration tool.
- After completing the IP Address and Timeout settings, click the [Ping] button to run a [Ping Test]. A pop-up message appears when the [Ping Test] is successful.



- If the [Ping Test] fails, a pop-up appears as shown below. If this pop-up appears, check your PC network settings, detector-to-PC connection, status of the detector, status of the Control Box, and IP address, and run the [Ping Test] again.

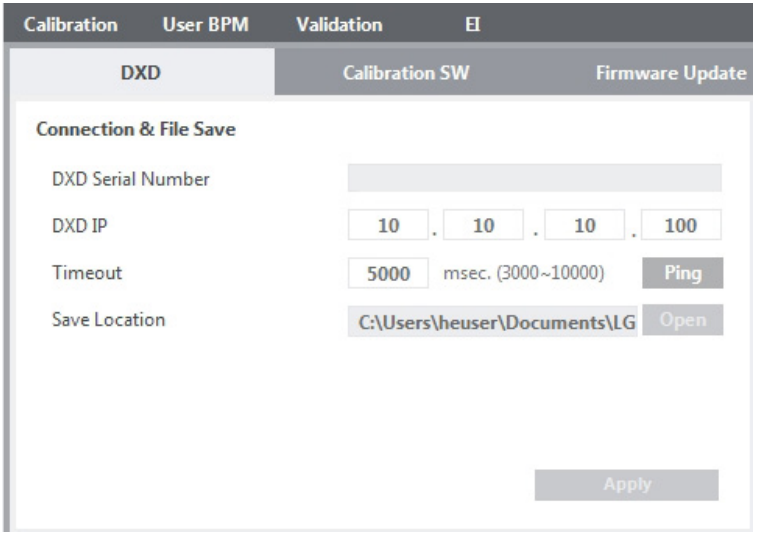


Save Location Check

Calibration Software stores images acquired, logs, result files, and factory Calibration results in the specified location.

This location can be changed from [Save Location].

Click the [Apply] button to create a folder in the specified location.



Apply

After completing the [Ping Test] and [Save Location] check, click the [Apply] button to perform the following tasks.

1 Automatically create necessary folders under the specified folder in the [Save Location].

2 Load and save the factory Calibration results from the detector.

3 Load the detector settings.

<table>
<tr><td rowspan="17">Custom folder</td><td rowspan="17">Auto-create a serial number folder
(created when completing Apply)
Condition: create a folder when there is no folder with the same serial number in the specified folder</td><td rowspan="6">Creating a date-time folder
(Created when the [Calibration] button is clicked)</td><td>[Avgdark.raw]</td></tr>
<tr><td>[Gain.raw]</td></tr>
<tr><td>[Offset.raw]</td></tr>
<tr><td>[BPM.raw]</td></tr>
<tr><td>EI result
(the applied date-time folder is created when an EI is performed)</td></tr>
<tr><td>History file</td></tr>
<tr><td>Log</td><td>Logfile (connection logs, etc.)</td></tr>
<tr><td rowspan="6">Image</td><td>Bright image</td></tr>
<tr><td>Dark image</td></tr>
<tr><td>User BPM image</td></tr>
<tr><td>Validation image</td></tr>
<tr><td>EI image</td></tr>
<tr><td>Raw image</td></tr>
<tr><td rowspan="4">Factory Calibration
(Created when there is no folder or file upon the completion of Apply or if the file is abnormally small in size)</td><td>[Avgdark.raw]</td></tr>
<tr><td>[Gain.raw]</td></tr>
<tr><td>[Offset.raw]</td></tr>
<tr><td>[BPM.raw]</td></tr>
</table>

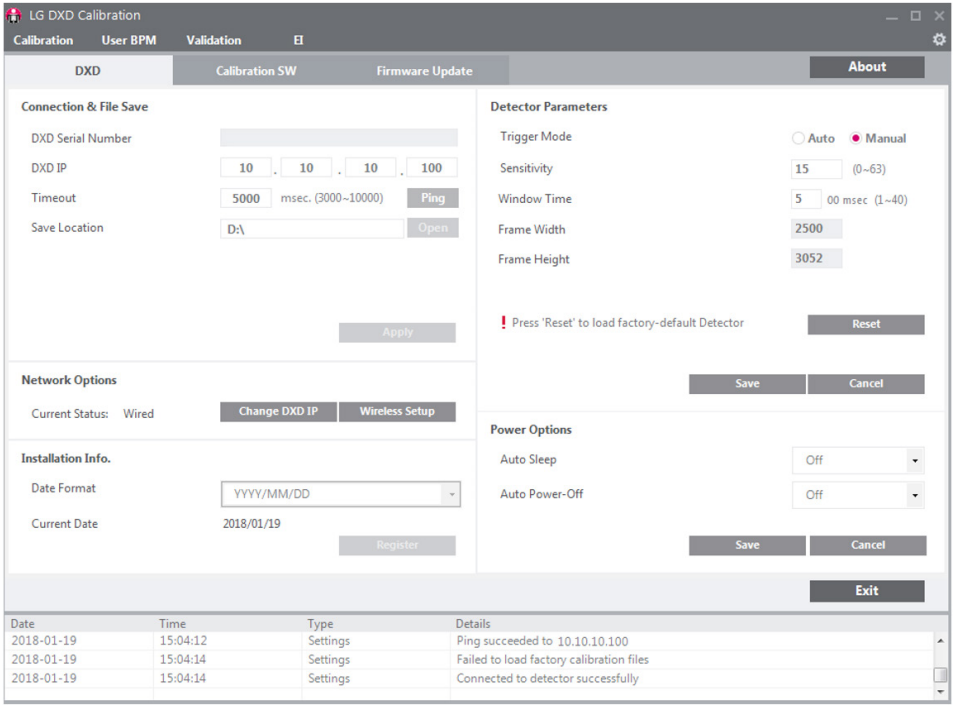
4 Display the network status of the detector once the Apply process is completed.
[Current Status]: [Wired] connection.
[Wireless] connection. (Available only with a wireless model)

NOTE

- You must complete the Apply process before moving to another menu. ([Calibration], [User BPM], [Validation], and [EI])

Checking and Changing Detector Settings

During the Apply process, the current settings of the detector will be loaded on the setting screen as shown below.



- [Detector Parameters]: Settings used when acquiring an image from the detector.
- Click the [Save] button to apply the settings entered.
- Details of the settings are as follows:
  - [Trigger Mode]: Set the [Trigger Mode].

  * [Auto]: Enable the Auto Exposure Detection feature.

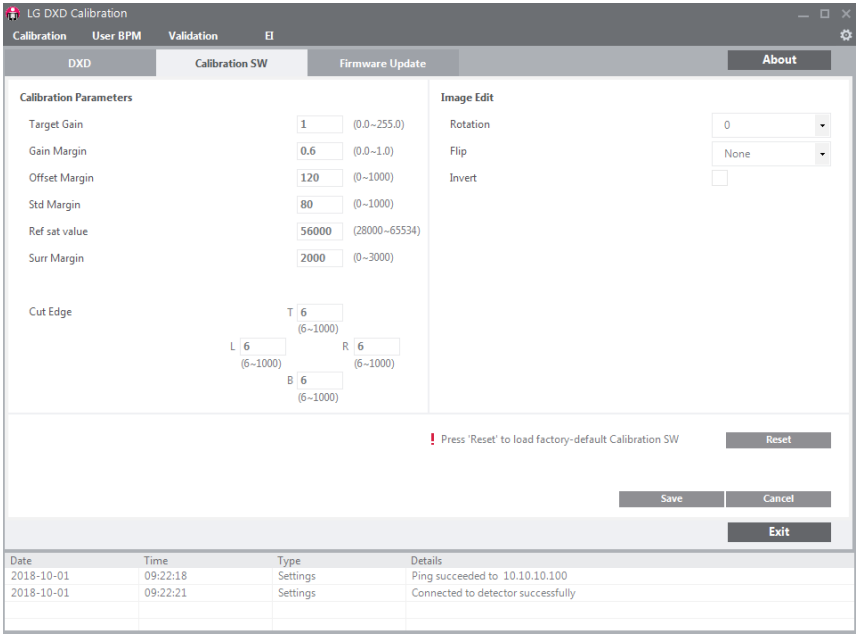
  * [Manual]: Disable the Auto Exposure Detection feature.
  - [Sensitivity]: Sensitivity of the panel.
  - [Window Time]: Set the time to read the data after the X-ray exposure. (Unit: 100 ms, when you enter 5, the time is set to 500 ms)
  - [Frame Width] / [Frame Height]: Number of pixels in the detector.
- The operations of each button are as follows:
  - [Save]: Apply the changed settings.
  - [Reset]: Load the factory settings.
  - [Cancel]: Load the last saved settings.

Checking and Changing Calibration Software Settings

Click the [Calibration SW] tab to update [Calibration Parameters].

Calibration Parameters

These parameters are the settings used in the Calibration process. These settings can be adjusted according to the actual operating environment.



- Details of the settings are as follows:
  - [Target Gain]: Gain in the algorithm.
  - [Gain Margin]: Set as a bad pixel if it exceeds the [Gain Margin].
  - [Offset Margin]: Set as a bad pixel if it exceeds the [Offset Margin].
  - [Std Margin]: Set as a bad pixel if it exceeds the [Std Margin].
  - [Ref Sat Value]: The maximum pixel value that can be displayed.
  - [Surr Margin]: Set as a bad pixel if the difference between the reference pixel value and the surrounding pixel value is greater than the [Surr Margin] in the corrected bright image.
  - [Cut Edge]: Display the pixel values to cut off from the frame image (top/bottom/left/right). After acquiring an image through [Validation] or [EI], display the image data shown in the image viewer as a line.

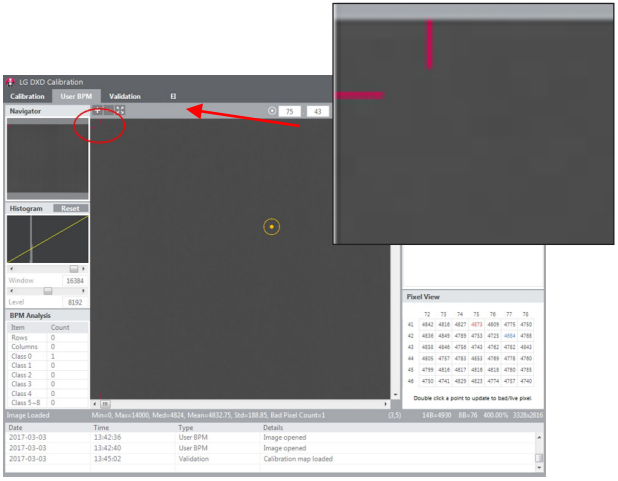


Image Edit

These settings are used in the image viewer.

- [Rotation]: Set the rotation angle of the image. ([0˚], [90˚], [180˚], and [270˚])
- [Flip]: Set whether to rotate the image shown in the image viewer. ([None], [Horizontal], and [Vertical])
- [Invert]: Reverse the image data shown in the image viewer.
- Click the [Save] button to apply the settings entered.
- The operations of each button are as follows:
  - [Save]: Apply the changed values.
  - [Reset]: Load the factory values.
  - [Cancel]: Load the last saved values.
  - [Exit]: Returns to the last screen.

NOTE

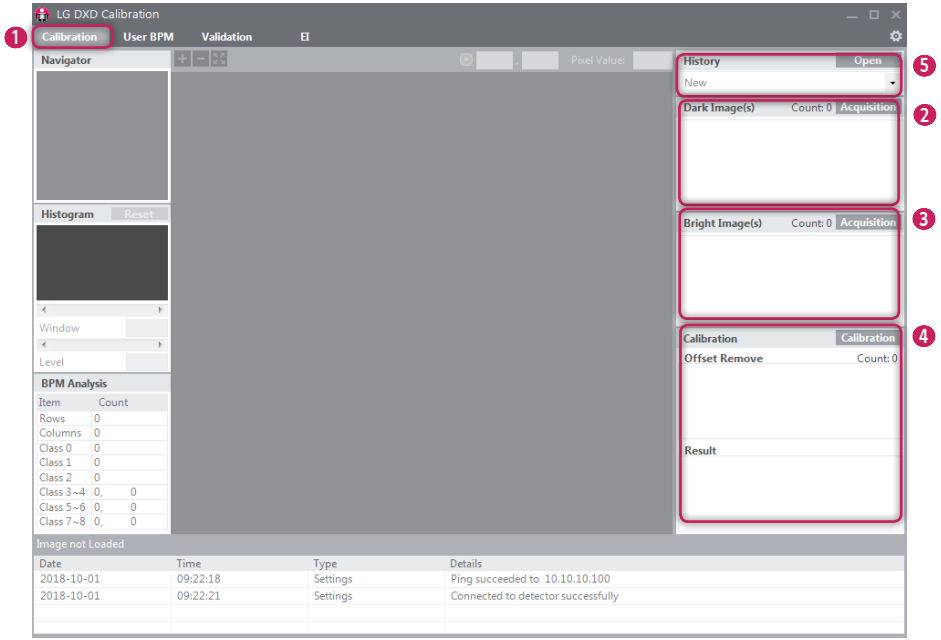
- You must complete the Apply process before proceeding with the next step.

Calibration

When all settings are completed, click the [Calibration] tab to go to the [Calibration] menu.

NOTE

- All settings must be complete before entering into the tab.



1 Enter into the [Calibration] menu
- Click the [Calibration] menu to enter.

2 Acquire a Dark Image
- Acquire a Dark Image needed for the [Calibration].
  - When Dark Image is acquired, images increase, and the file is saved in the image folder specified in .
  - The median value of the image is displayed next to the image file name.
  - Compare multiple images and remove any faulty image by right-clicking the image.
  - When deleting a file, the file list and saved file are also deleted.

3 Acquire a Bright Image
- Acquire a Bright Image needed for the [Calibration].
  - When Bright Image is acquired, images increase, and the file is saved in the image folder specified in .
  - The median value of the image is displayed next to the image file name.
  - Compare multiple images and remove any faulty image by right-clicking the image.
  - When deleting a file, the file list and saved file are also deleted.

NOTE
- Up to 10 Dark Image and Bright Image each can be saved. When the number of images exceeds 10, the oldest image will be deleted first.
- For a bright image, X-ray must be irradiated during image acquisition.
- Images are acquired automatically in Calibration Software Version 3.00.16 and higher. Four images are acquired automatically among dark images and ten images among bright images. For Calibration Software version 3.00.16 or lower, you must select the [Acquisition] button whenever acquiring an image.

4 [Calibration]
- [Calibration] is performed in this menu.
  - Dark Image: 4 images (minimum)
  - Bright Image: 5 images (minimum), 10 images (maximum)
- When [Calibration] is performed, the standard pixel values of a bright image are as follows.
  - For Calibration Software version 3.00.16 or lower
    Bright images are acquired within the pixel range of 1500 – 15000. (Examples of acquisition points in case of 10 images: 1500, 1700, 2200, 2500, 3300, 4000, 5000, 6500, 8500, 10500, 15000)
  - For Calibration Software version 3.00.16 and higher
    Bright images are acquired with a pixel value close to 6000 when the tube voltage is 60 kv - 70 kv. (The acceptable range is -10 % - 20 % for a pixel range of 5400 - 7200. Images outside this range are not included.)
- The result of the [Calibration] will be saved in a folder created based on the date and time of performing [Calibration].
- When the [Calibration] is completed, [BPM Analysis] will be updated.

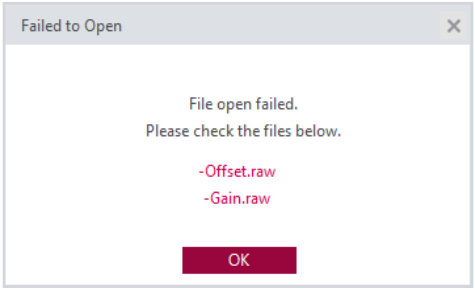
NOTE
- When running more than 5 [Calibration], the sixth [Calibration] is saved after the first [Calibration] is automatically deleted.
- If you wish to make a backup, copy the folder containing the result and paste in another location.

5 [History]

- You can load the result of the [Calibration] performed previously. Click the [Open] button to open the file.

NOTE

- You only need to select one file to load all relevant files. (select one from [Avgdark.raw], [Offset.raw], [Gain.raw], and [BPM.raw] to load all four files)
- If an error occurs while loading the files, the following pop-up appears. When the following pop-up appears, check the file size, location, file name, and access privilege to the folder and try again.

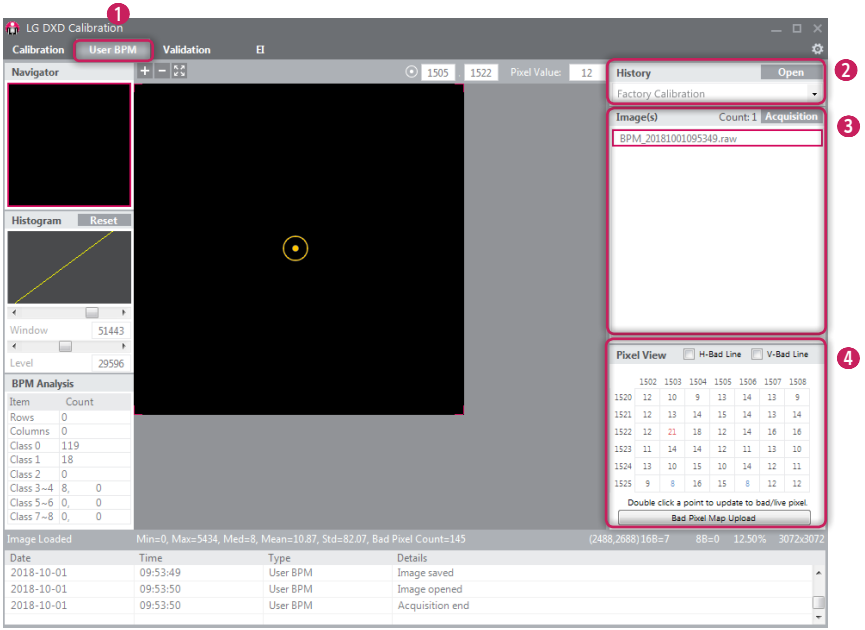


User BPM

Use this menu to manually edit the [Bad Pixel Map] created from the [Calibration].

NOTE

- You can skip the [User BPM] process and proceed with the [Validation] process.

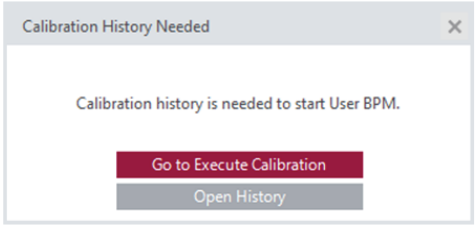


1 Enter into the [User BPM] menu

- Click the [User BPM] menu to enter.
- The [User BPM] requires image acquisition because it visually examines the image to which the result of the [Calibration] is applied.

NOTE

- The following pop-up appears when entering into the menu without completing the [Calibration].



2 Check the History file

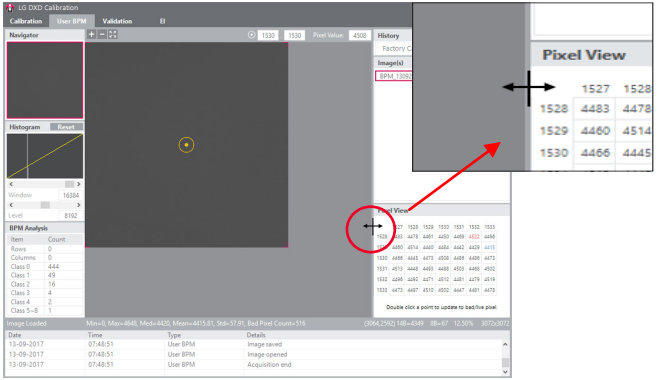
- Check if the History name created from the [Calibration] matches the name shown in the current History window.
- Apply the selected History and carry out the [User BPM] process.

3 Acquire Images

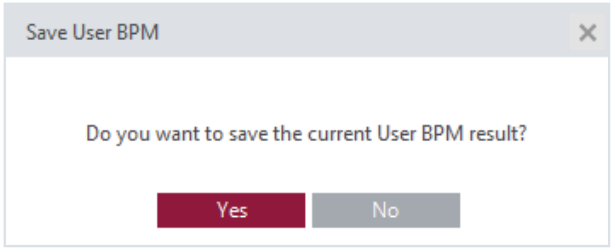
- Click the [Acquisition] button and acquire a Bright Image. The image name will be shown in the image list.
- The information about the image will be shown below the image view.

4 Pixel View

- Check the pixel values in the [Pixel View].
  - Pixel values from the center of the image viewer are provided in the [Pixel View].
  - Here, minimum value, maximum value, and possible bad pixel are shown as follows:
    * Minimum value: Shown in blue numbers.
    * Maximum value: Shown in red numbers.
    * Possible bad pixel: Shown in the grey background.
  - The window size of [Pixel View] can be changed using the ◂▸ icon. The ◂▸ icon appears when hovering the mouse over the border between the [Pixel View] and the image viewer.

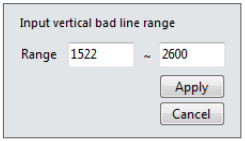


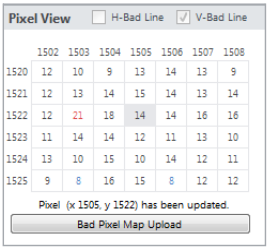
- Set additional bad pixels in [Pixel View]
  - Double click a pixel in the [Pixel View] to set the pixel as a bad pixel. Double-click the same pixel specified as a bad pixel again to cancel the selection.
  - If a pixel is set as a bad pixel, the value will be updated in the [BPM Analysis]. The specified bad pixel will be replaced with the calibrated pixel value.
- Save the final [User BPM].
  - When entering into another menu, the result file will be saved.
  - A pop-up message appears asking to select whether to save the file when leaving the current menu and entering into another one.
  - When saved, one [History] is added and the [BPM.raw] file is updated and saved.

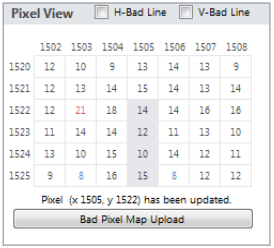


Assigning a Bad Line in Pixel View

- When specifying Bad pixel, it is a function to specify line unit instead of pixel unit.
- After checking the check box in the vertical or horizontal direction, double-click the pixel in [Pixel View] to specify the line in the specified direction.
  - If you specify a line from point 1522 to point 2600, select the Apply button after entering a value to assign the line as a bad line.

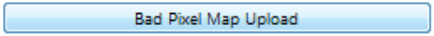






Bad Pixel Map upload function

- The newly modified Bad pixel map can be uploaded to the detector for use in future calibration.
- [Bad Pixel Map Upload] button When you select some of the generated map files (BPM.raw, AvgDark.raw, Offset.raw, Gain.raw), upload them.



- If the upload is successful, it can be confirmed through Log.

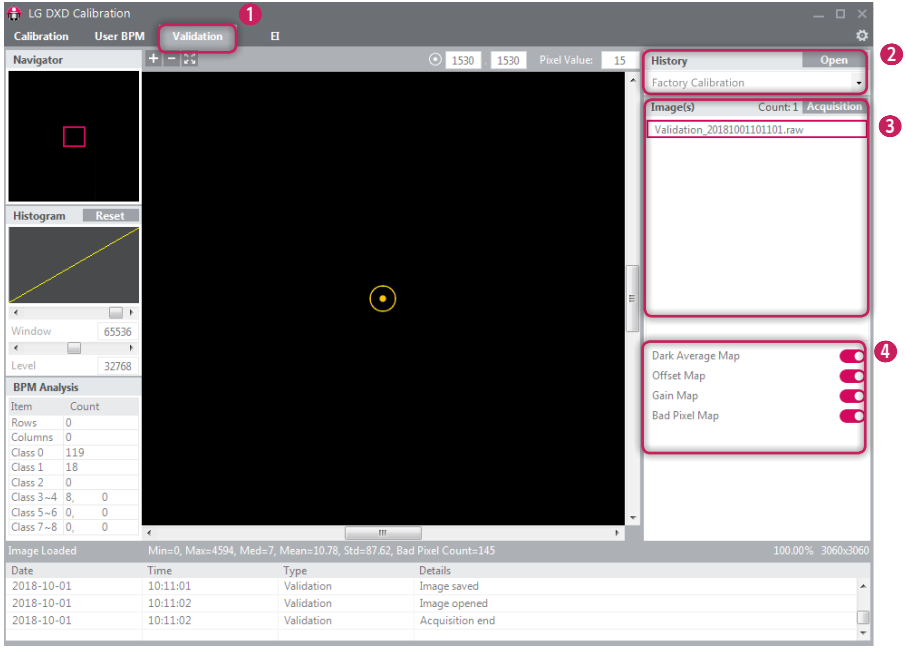
Date	Time	Type	Details
2018-10-01	10:15:53	User BPM	[FILE INFO] avg_dark_size=18874368, offset_size=18874368, gain_size=37748736, bpm_size=18874368
2018-10-01	10:15:53	User BPM	[Warning] Do not click any buttons or tab during upload.
2018-10-01	10:15:56	User BPM	Package file creation success
2018-10-01	10:15:56	User BPM	Uploading calibration map to dxd... map size = 94371872
2018-10-01	10:15:56	User BPM	[Warning] Do not click any buttons or tab during upload.
2018-10-01	10:16:02	User BPM	New map upload success. Previous map files are all deleted.

NOTE

- [Bad Pixel Map] When uploading, delete the map of the existing [Factory Calibration] folder. In order to preserve it, it must be done after backup in separate path.
- [Bad Pixel Map] When selecting a file to upload for upload, all four [Bad Pixel Map] files must be in the path. ([BPM.raw], [AvgDark.raw], [Offset.raw], [Gain.raw])

Validation

This menu enables users to visually check the [Calibration] result after completing the [Calibration].

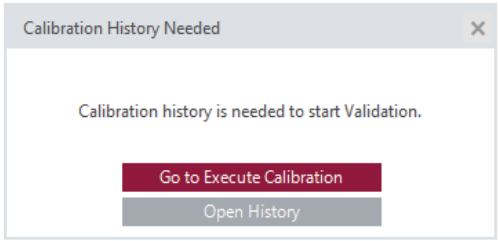


1 Enter into the [Validation] menu

- Click the [Validation] menu to enter.

NOTE

- The following pop-up appears when entering into the menu without completing the [Calibration].



2 Check the History file

- Check if the [History] name created from the [Calibration] matches the name shown in the current [History] window.

3 Acquire Images

- Click the [Acquisition] button and acquire a Bright Image. The image name will be shown in the [Image(s)] list.
- The information about the image will be shown below the image view.

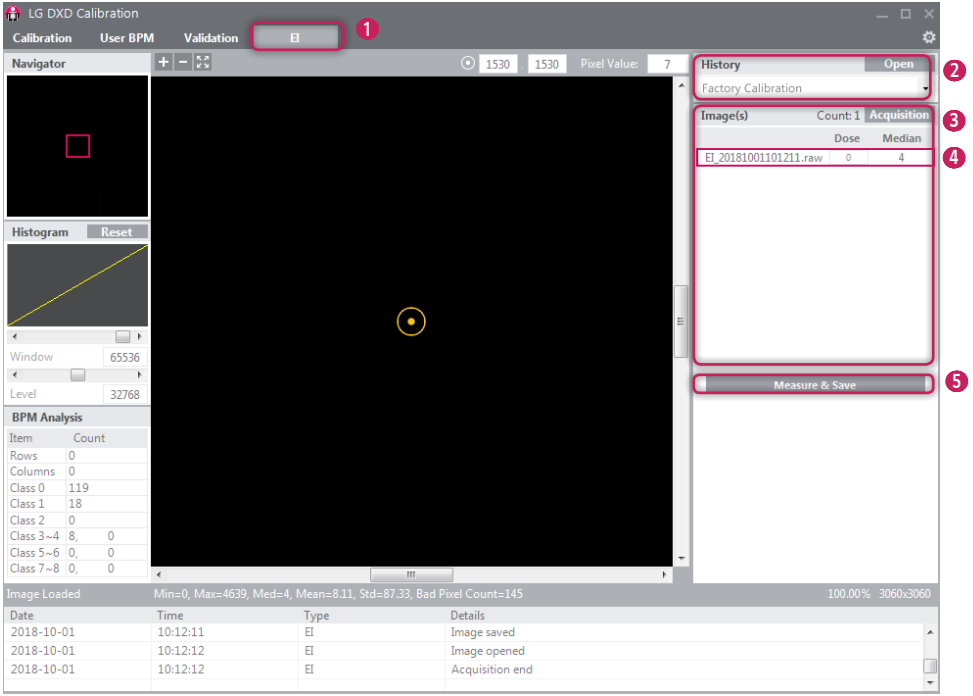
4 Apply or Do Not Apply the Calibration Result

- You can decide whether to apply each of the Calibration results ([Dark Average Map], [Offset Map], [Gain Map], [Bad Pixel Map]) to the image acquired.
  : Apply
  : Do Not Apply

NOTE

- When the first image is acquired and loaded, all results are set to .
- When no image is acquired, the / button is disabled.

EI (Exposure Index)

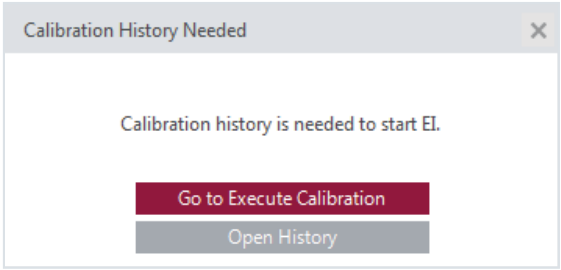


1 Enter into the [EI] menu

- Click the [EI] menu to enter.

NOTE

- The following pop-up appears when entering into the menu without completing the [Calibration].



2 Check the History file

- Check if the [History] name created from the [Calibration] matches the name shown in the current [History] window.

3 Acquire Images

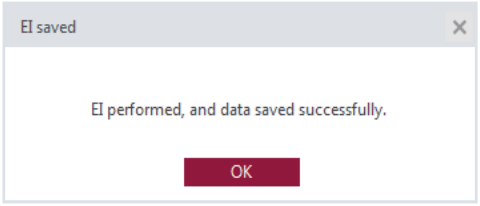
- Click the [Acquisition] button and acquire a Bright Image. The image name will be shown in the [Image(s)] list.
- The information about the image will be shown below the image view.

4 Enter Dose Values

- The Dose values must be entered in the Dose field when X-ray irradiation is performed. Unit : uGy)
- The EI value will be calculated based on the data entered.
- Dose values must be entered in numbers only. Texts will not be accepted by default.

5 Measure & Save

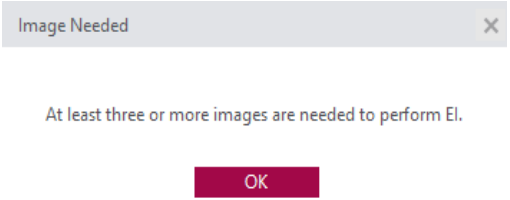
- Once image acquisition and dose value input are completed, click the [Measure & Save] button to save the result value and show a pop-up message as follows:



- The EI result file will be saved in the same location as the Calibration result file.
  (e.g. C:\Users\heuser\Documents\LG DXD Calibration\Serial Number\Calibration Result Folder (date-time) heuser: the user's name)

NOTE

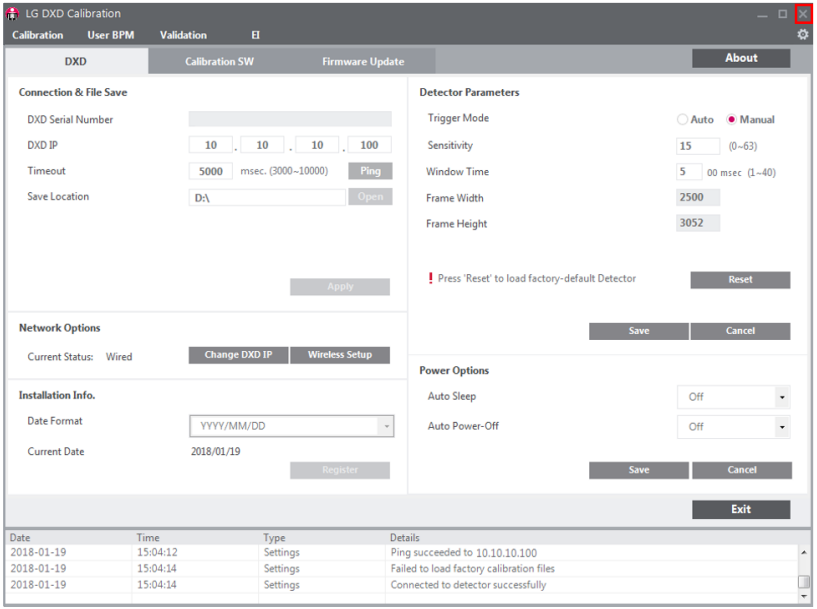
- Repeating [Measure & Save] will update the result file.
- The following pop-up appears when the minimum requirement (3 images) is not met.

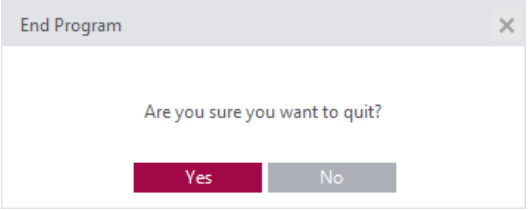


Exit

Click the ✕ (Exit) button to close Calibration Software.

Click the [Yes] button to close, or the [No] button to return to the last screen shown before the Exit button is clicked.





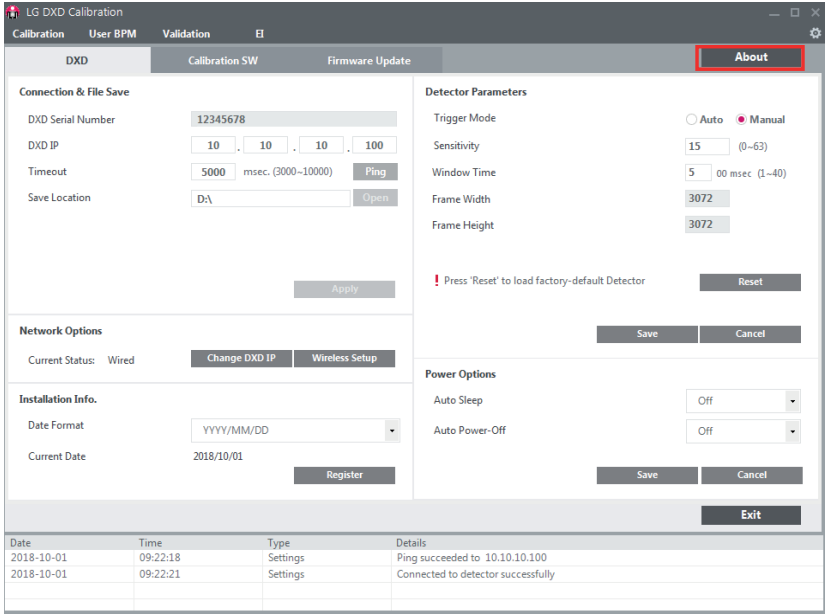
⚠ CAUTION

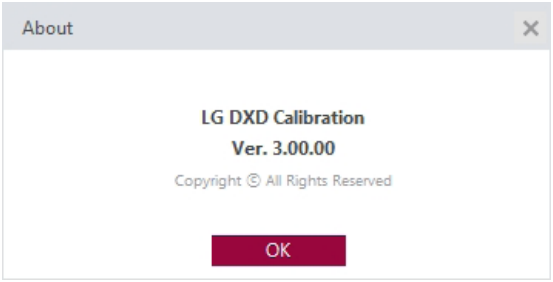
- Dark & Bright images will be deleted except Validation & raw images.

About

Click the [About] button in Settings to show a pop-up displaying the information about the application.

This pop-up provides the information about the application.



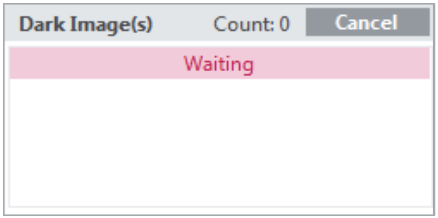


General Pop-Up

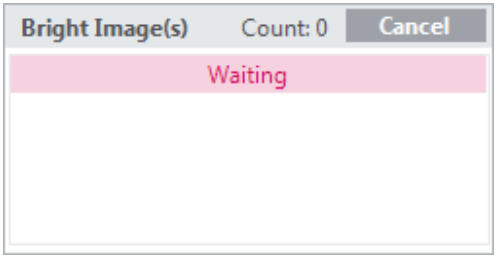
General pop-ups available in Calibration Software are explained below.

Cancelling Image Acquisition

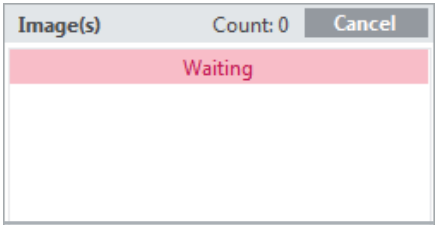
- If you click the [Acquisition] button to acquire each image, the [Acquisition] button switches to the [Cancel] button during the acquisition process.
- Once all the images are acquired, click the [Acquisition] button to return.
- Clicking the [Cancel] button while an image is being acquired will cancel the acquisition.



<The [Dark Image(s)] [Cancel] button>

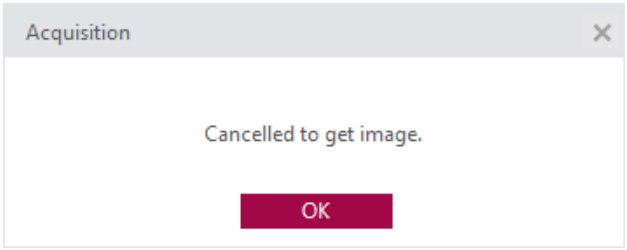


<The [Bright Image(s)] [Cancel] button>



<The [Image(s)] [Cancel] button>

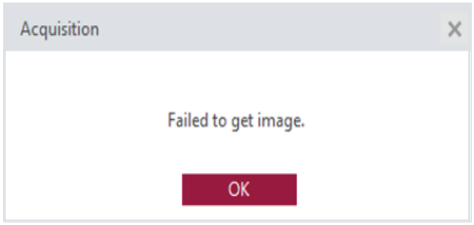
- The following pop-up appears when [Cancel] is successfully completed.



<The Get Image Cancel Completed pop-up>

Image Acquisition Failed

- If the image acquisition fails, the following pop-up message appears. Check the status of the network and detector and try again.

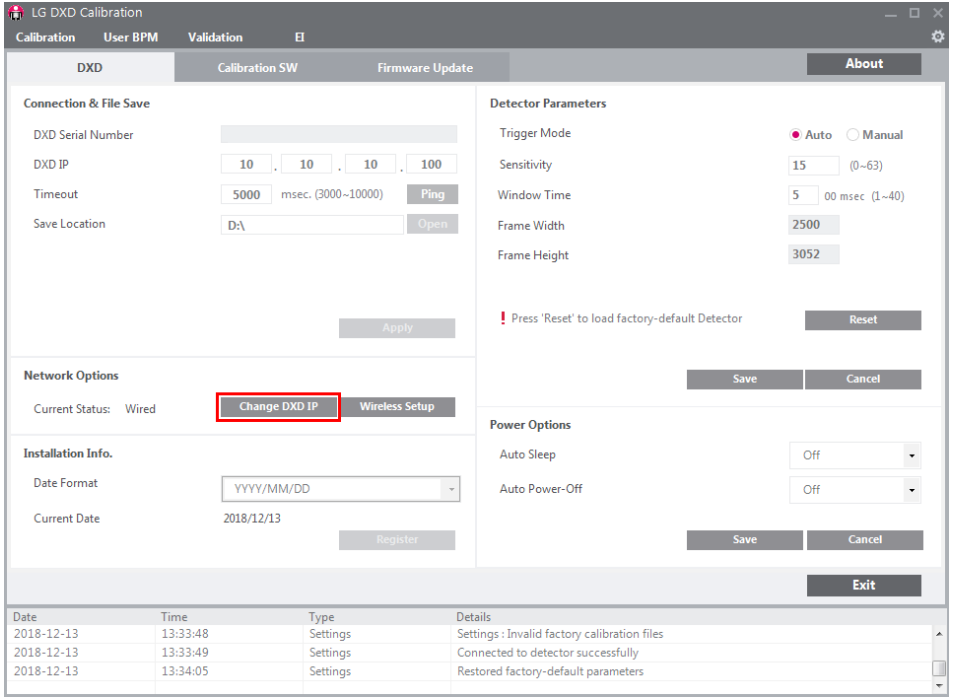


<The Image Acquisition Failed pop-up>

Setting IP address of Detector

1 Launch "Launching Program"> "IP Address Check and Ping Test"> "Save Location Check"> "Apply" in order.

2 Click the [Change DXD IP] button.

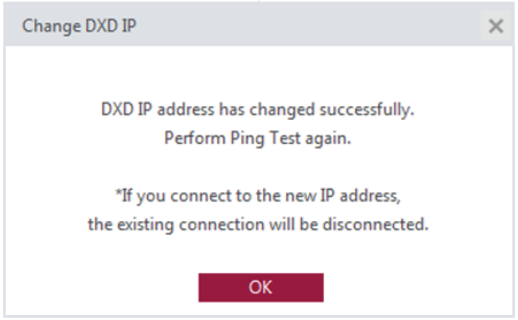


3 When a pop-up appears, change the settings and click the [Apply] button.

- Start changing the IP address by selecting the [Apply] button.

4 Check the result and re-boot the detector.

- A pop-up appears to with the following message whether the IP address is changed or not.



<A pop-up when the settings are made successfully>

- Once the IP address is changed, re-boot the detector to complete applying the changes to the IP.
- Click the OK button to automatically re-boot the detector.
- The detector will be disconnected during the re-boot process. Make sure to perform the [Connection & File Save] process again.

Wireless AP configuration

When the detector is connected wirelessly, AP information must be saved in the detector.

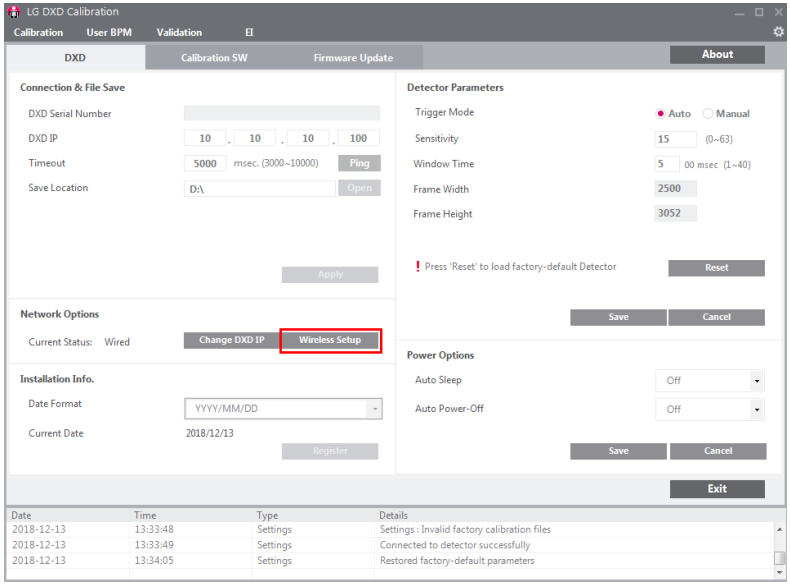
For station mode, enter the information of the external AP trying to access the detector. For AP mode, enter the information about the detector's AP.

- Default value of detector
  - SSID: LGEDXD

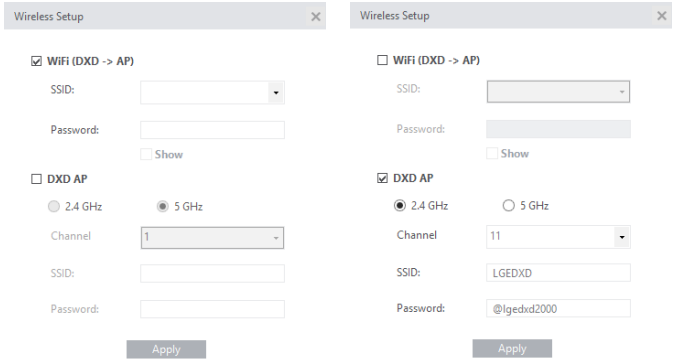
In station mode, the detector attempts to connect to the AP when the detector is rebooted after the AP information is saved in the detector. In AP mode, the detector uses its own AP, utilising the AP information saved on the user PC. You can see the saved AP information by using the web monitoring function.

1 Launch "Launching Program"> "IP Address Check and Ping Test"> "Save Location Check"> "Apply" in order.

2 After checking that wireless settings are enabled on the PC, click the [Wireless Setup] button.



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

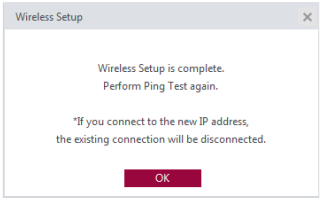


NOTE

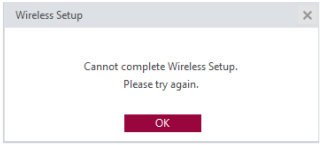
- Check the [Wi-Fi (DXD -> AP)] checkbox and enter the setting to use station mode.
- Check the [DXD AP] checkbox and enter the setting to use AP mode. The AP mode supports up to 11 channels (1-11) for the 2.4 GHz frequency. For the 5 GHz frequency, it only supports one channel.
- SSID can appear garbled, question marks, boxes, and others because of encoding or compatibly.

3 Check results.

- The following pop-up windows appear, depending on the result.



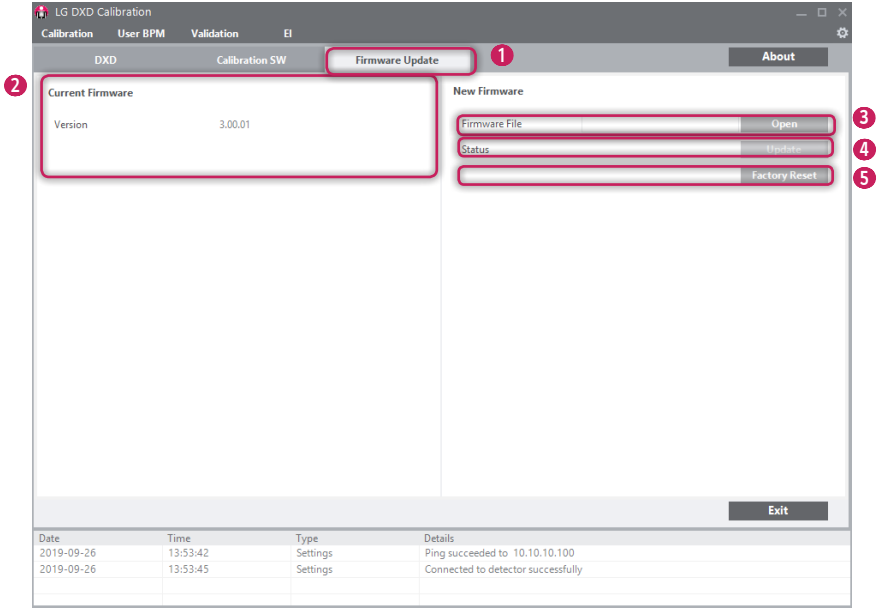
<Pop-up Window for Successful Configuration>



<Pop-up Window for Failed Configuration>

Updating Detector Firmware

Use this menu to check and update the firmware version of the detector.



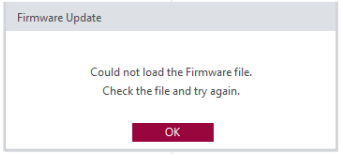
1 Select the [Firmware Update] tab.

2 Check the current firmware version.

- The current firmware version of the detector is indicated, and the version appears when a PC is connected to the detector.

3 Select the firmware file to update.

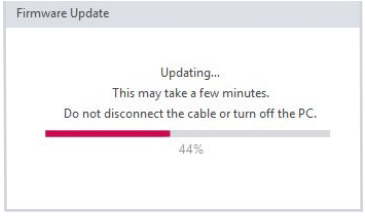
- Click [Open] to launch a file explorer. Select the file to update to perform a check to validate the selected file.
- If it is a correct firmware file, its name will be shown in the [Firmware File].
- If an incorrect file is selected, the following pop-up appears.



<A pop-up when the file loading fails>

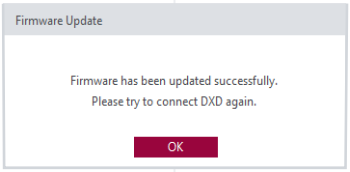
4 Update the file.

- Select the file and click the [Update] button to start updating the firmware.
- The progress will be indicated in the [Firmware Update].

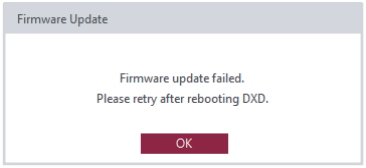


<A pop-up during file updates>

- Check the result.
  - The following pop-up appears when the update is completed.



<A pop-up when the file update is completed successfully>



<A pop-up when the file update fails>

5 [Factory Reset]

- Clicking the button will reset all the DXD settings.

⚠ CAUTION

- Do not remove the power cable until the update is completed. If the detector is turned off while the update is in progress, it may not work properly.

Saving Installation Date

The first Calibration date can be saved in the detector.

1 Launch "Launching Program"> "IP Address Check and Ping Test"> "Save Location Check"> "Apply" in order.

2 Select the > [DXD] tabs.

3 Check the installation date and choose the date format to be displayed.

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

NOTE

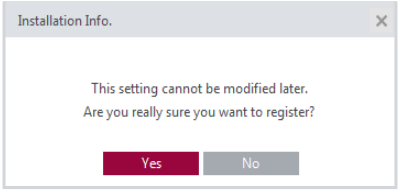
- The date will be loaded based on the date and time set in the PC that runs the program.

4 Select the [Register] button to open a pop-up. The installation date can be checked using the Web Monitoring feature.

CAUTION

- Please be careful to select the feature because this feature can be only saved once per detector and cannot be edited.
- You must proceed when using the detector for the first time. Otherwise, you will not be able to enter the menu.

5 Select the [Yes] button in the pop-up to store the information in the detector and disable the [Register] button.



Setting Power Options

The Power Options can be saved in the detector.

1 Launch "Launching Program"> "IP Address Check and Ping Test"> "Save Location Check"> "Apply" in order.

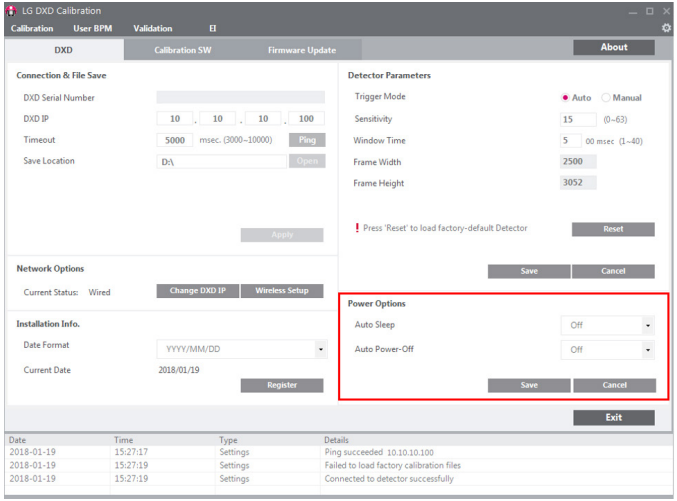
2 Select the > [DXD] tabs.

3 Select the option in [Auto Sleep] and [Auto Power-Off].

4 Click the [Save] button to save the [Power Options] in the detector.

NOTE

- Only the above settings will be saved in Calibration Software.
- The detector enters into Power mode (Standby/Power-Off) when there is no communication for a set period of time.
- The detector does not enter into Power mode (Standby/Power-Off) while Calibration Software is running (i.e., starting from Apply to the point the program ends).
- This feature is enabled in a wireless model only.



Web Monitoring

This feature allows users to check internal information such as shipping date, installation date, software version, etc. of the detector using a web browser.

Internal Information

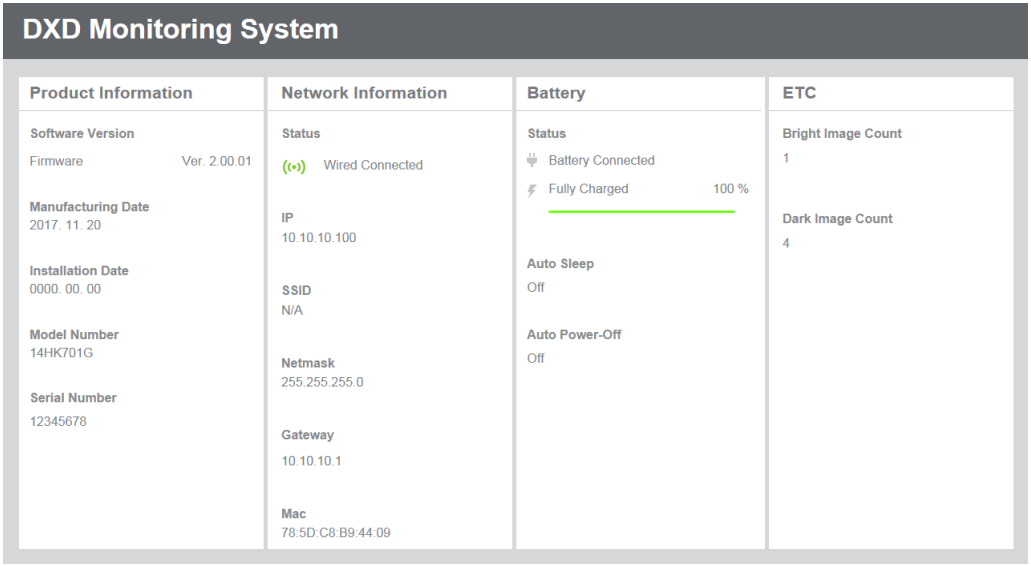
Category	Content	Explanation
Product Information	Software Version	• Version of the firmware currently installed in the detector
	Shipping Date	• Date on which the product is manufactured
	Installation Date	• Date on which the product is installed by the installation engineer
	Model No.	• Model number of the product
	Serial No.	• Serial number of the product
Network	Status of connection	• Mode of network connection
	IP	• IP address of the detector
	SSID	• Wireless AP SSID
	Netmask	• Netmask of the detector
	Gateway	• Gateway of the detector
	Mac	• Mac address of the product
Battery	Status	• Battery level, charged level alert, auto standby, auto power-off
Others	Bright Image Count	• No. of image acquisitions with X-ray exposure
	Dark Image Count	• No. of image acquisitions without X-ray exposure

Web Monitoring

1 Makes the wired/wireless connection between the detector and a PC.
- Please refer to the Detector and PC (Wired mode).

2 Enter the detector's IP address in the address field of the web browser in the PC.

3 Default IP address: 10.10.10.100 The following page appears:



MAINTENANCE

Cleaning

- Start cleaning after turning off the detector.

Test

- Carry out a regular test before use to ensure stable and normal operation of the detector. If the problem occurs, contact the manufacturer.
- Please perform tests based on items listed in the checklist below.

Checklist	Tester	Interval of Test
Are the cables damaged?	User	Daily
Are plugs or terminals loose or damaged?	User	Daily
Is the detector surface scratched or cracked?	User	Daily
Is the LED power working normally?	User	Daily
Perform a regular Calibration test	Supplier	3-6 months
Conduct a performance test	Supplier	1 year

TROUBLESHOOTING

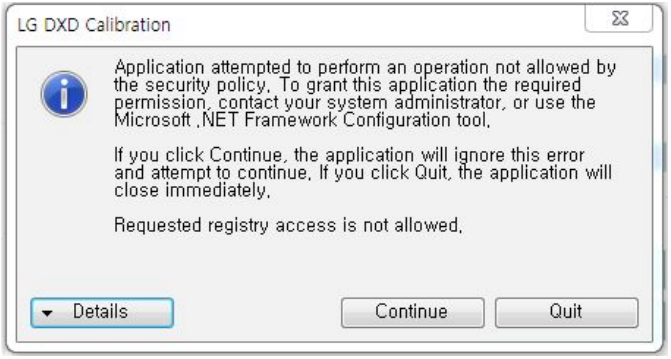
If you encounter problems when using the detector, use the guide provided in the corresponding section to solve the problem. If the problem persists, please contact the manufacturer.

Problem	Solution
When the detector is not turned on	• Check if the main cable is connected properly. • Disconnect and reconnect the main cable.
When the detector is suddenly turned off during the use	• Check if the main cable is connected properly.
When the LEDs of Ready/Exposure parts on the control box blink in orange	• Check the status of the power cable connection of the Control Box. • Check if the Control Box is properly connected to the X-ray generator or detector.
When the detector is not connected to the PC	• Check if the power is on. If the power is on, check the following items. • Check if they are connected in accordance with the instructions in the manual. Try connecting again. • Go to ⚙ > [DXD] > [Connection & File Save] in Calibration Software and run a [Ping Test] to check the connection. Alternatively, open a browser window and enter an IP in the address bar to check if a page is loaded properly. • Check if the PC's network IP uses the same IP as the detector. • In some cases, a connection issue may occur especially because of the firewall rules that block all ICMP packets coming from Win 8 OS. Please refer to the Troubleshooting Firewall Issues.
When there is a problem with the status of the acquired image	• Make sure that there is no foreign matter on the surface of the detector. • If an image is acquired immediately after turning on the detector, a poor image may be acquired due to an unstable panel. Open the [Calibration] menu in Calibration Software and acquire a couple of Dark Images first, or wait for a while and try again. • If the image is still unstable, run a [Calibration] and apply the result before proceeding.

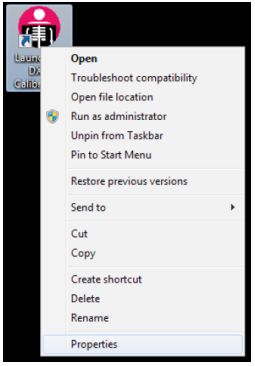
Problem	Solution
When some areas appear abnormal in the acquired [Validation] image	• When acquiring images in the [Validation] after creating the [Calibration] result file in the Calibration menu, an abnormal image may be acquired. Check the issues below and follow the guide. 1 When some areas appear in black or light bleeding occurs in the acquired image - Go to the [Calibration] menu > [BPM Analysis] on the left bottom corner and check if [Rows] and [Columns], [Class 5] ~ [Class 8] have more than dozens of values. If so, follow the steps below to run a new [Calibration] and acquire [Validation] images. 1) Adjust the X-ray generator's position so that the detector is within the X-ray irradiation range before running a [Calibration]. 2) Keep the distance at least 120 cm (47.2 inch) between the detector and the X-ray generator tube. 3) If the distance cannot be more than 120 cm (47.2 inch) in Step 2), change the detector settings as follows before proceeding with the [Calibration]. ① Go to ⚙ > [Calibration SW] and enter a value 0.05-0.1 higher than the existing value for [Gain] and [Save]. ② Go to ⚙ > [Calibration SW] and enter a value 1.5-2 times greater than the existing value for [Offset] and [Save]. **NOTE** • Due to the heel effect of the X-ray generator, if the distance is short, less X-ray irradiation may be applied to the edge of the detector. This difference makes it necessary to adjust the [Gain] and [Offset] values. The [Gain] adjustment is a required process, but the [Offset] adjustment may be skipped depending on the situation. 4) Go to the [Calibration] menu and acquire Dark Image and Bright Image to run a [Calibration]. If the [BPM Analysis] result is not improved, repeat Step 3). 2 When some areas appear in black in the form of the straight or curved line - Check if the problematic area is within the X-Ray irradiation range. - Check if foreign matters or other objects are on the detector. 3 When white or black pixels appear in the image - Run a [Calibration] again to create a new Calibration result, and, with the result, acquire [Validation] images. - It the problem persists even after the new Calibration, set the pixel as a bad pixel in the [User BPM] and go to [History] > [Open] on the top right corner to load the newly created calibration result and perform a [Validation] again.

PROGRAM NOT LAUNCHED DUE TO ACCESS PRIVILEGE ISSUES

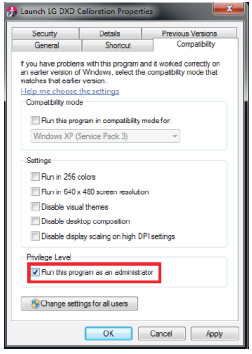
1 When the program is not launched with the following pop-up after going to "Launching Program"> "IP Address Check and Ping Test"> "Save Location Check"> "Apply", check the following items.



2 Right-click the launching icon of Calibration Software and select [Properties].



3 In the [Properties] window, enter into the [Compatibility] tab and select the Run this program as an administrator checkbox under the [Privilege Level].

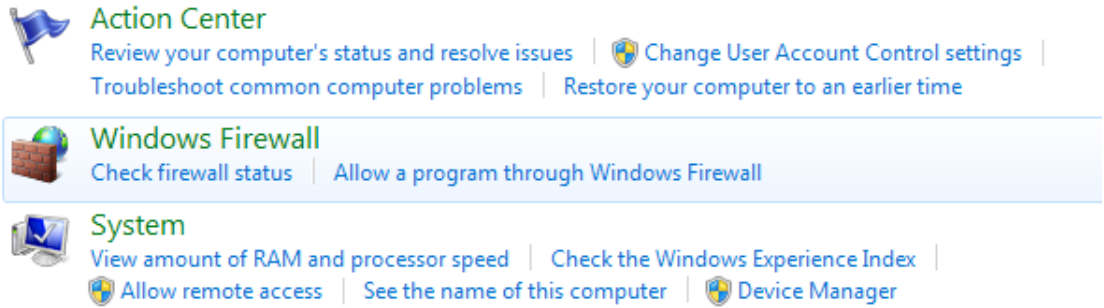


TROUBLESHOOTING FIREWALL ISSUES

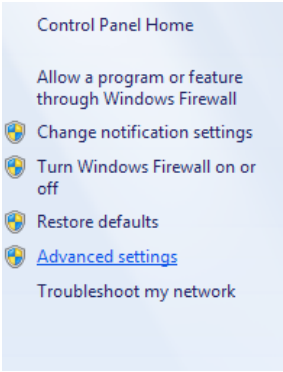
If the Link LED is off on the DXD set due to Windows Firewall, follow the steps below.

1 Go to [Control Panel] and select the [System and Security] menu.

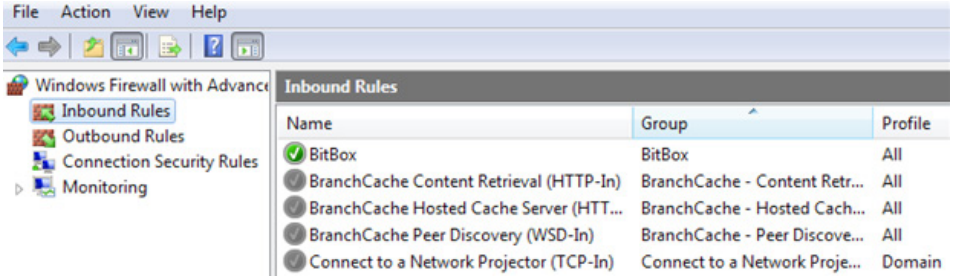
2 Click the [Windows Firewall] link.



3 On the left side of the pane, click the [Advanced Settings] link.

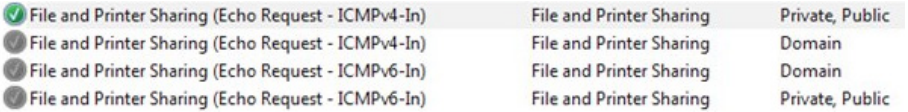


4 Under the Windows Firewall with Advanced Security, select [Inbound Rules].



5 Scroll down to find the [File and Printer Sharing] rule and click [Enable Rule].

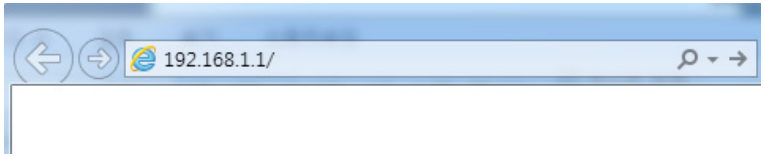
6 Check the status and connect the detector again.



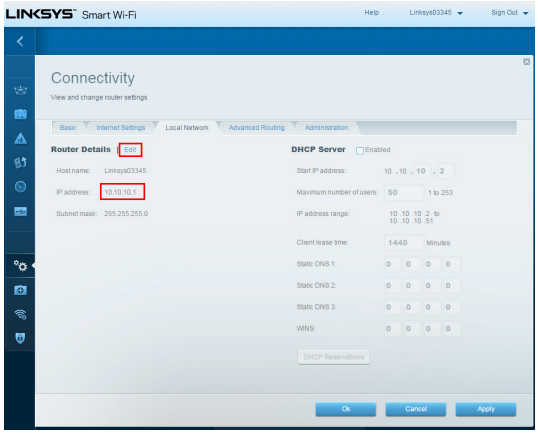
Wireless Access Point Setup Guide (Model: Cisco Linksys EA9200)

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 *linksyssmartwifi.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)

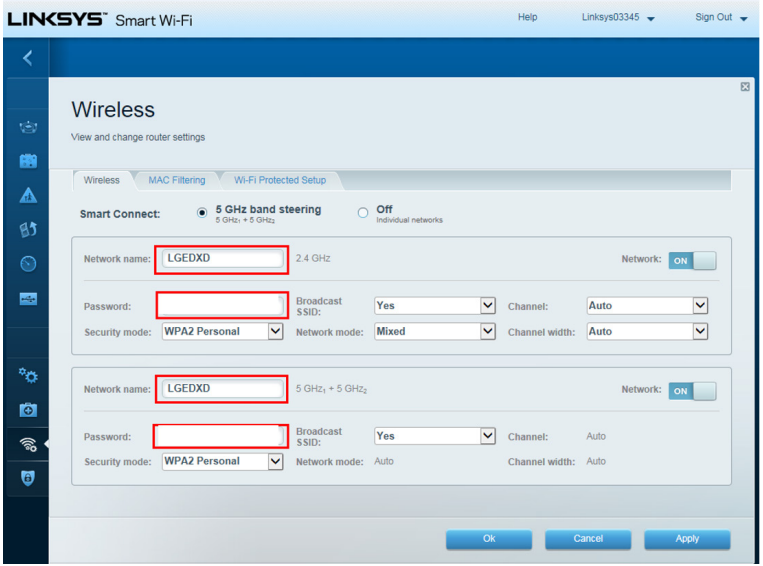


Enter into [Connectivity] > [Local Network]. Click [Edit] to change IP address to 10.10.10.1.



(You should click [Apply] button to apply current setting)

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



(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=01t80000003efNkAAI

Wireless module (LGSWFAC73) Specifications

Wireless LAN (IEEE 802.11a/b/g/n/ac)	
Frequency Range	Output power (Max.)
2400 to 2483.5 MHz	17.4 dBm
5150 to 5725 MHz	17.8 dBm
5725 to 5850 MHz	15.6 dBm

- As band channels can vary per country, the user cannot change or adjust the operating frequency. This product is configured for the regional frequency table.
- FCC ID: BEJLGSWFAC73 / IC: 2703H-LGSWFAC73

WARNING: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

The model and serial number of the product are located on the back and on one side of the product. Record them below in case you ever need service.

Model

Serial No.

Supplier's Declaration of Conformity

Trade Name	LG
Responsible Party	LG Electronics USA, Inc.
Address	111 Sylvan Avenue, North Building, Englewood Cliffs, NJ 07632
E-mail	lg.environmental@lge.com