



OWNER'S MANUAL

Flat Panel Digital X-ray Detector

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

10HQ701G-B



* M F L 7 1 8 8 9 7 1 0 *

(2608-REV03)

CE0123

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OPEN SOURCE SOFTWARE NOTICE INFORMATION ON CLEANING

To obtain the source code that is contained in this product, under GPL, LGPL, MPL, and other open source licenses that have the obligation to disclose source code, and to access all referred license terms, copyright notices and other relevant documents, please visit <https://opensource.lge.com>.

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

Recommended Cleaning Chemicals

- Isopropanol 70 %
- Ethanol 70 %
- 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.

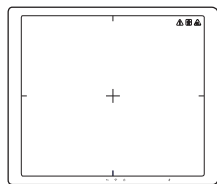
GENERAL DESCRIPTION

Overview

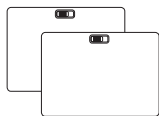
This model is an x-ray imaging device, a system that can acquire and process X-ray images as digital images. It utilizes amorphous silicon and a high-performance scintillator to ensure sharp high-definition image quality with the resolution of 3.6 lp/mm and the pixel pitches of 140 μm . This device is 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 Components

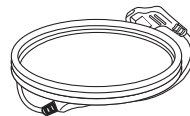
Basic Accessories



Detector



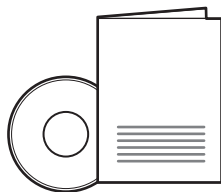
Battery 2 EA



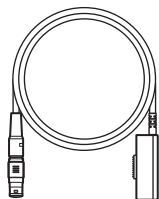
AC Power Cord for the AC Power Adapter



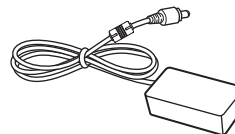
Inspection Report



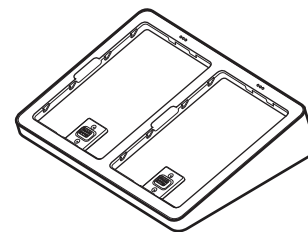
Owner's Manual/Regulatory Manual/Calibration Software



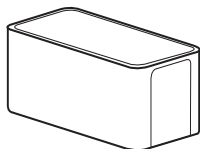
Main Cable



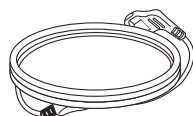
AC Power Adapter for Charger



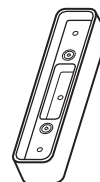
Battery Charger



System controller

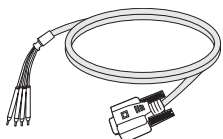


AC Power Cord for the System controller

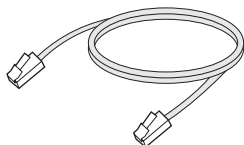


Main Cable Cradle

Optional Accessories



Trigger Cable



LAN Cable

- Some models may not include optional accessories.

CAUTION

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

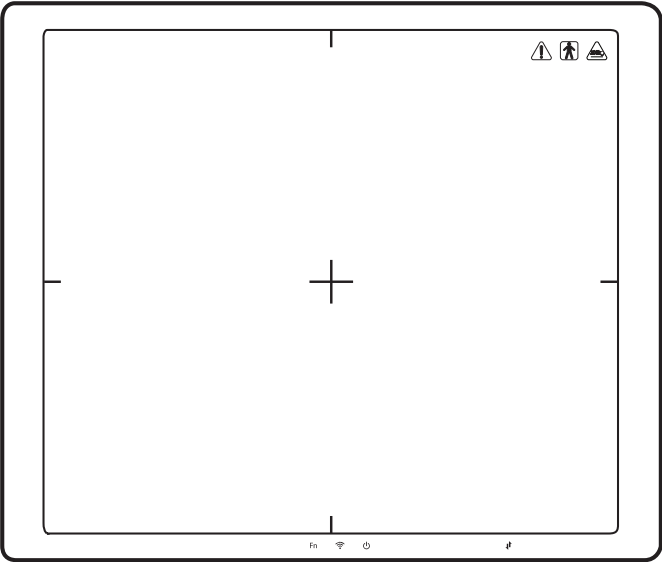
Component	Standard
LAN Cable	More than CAT5E Standard
Power Cord	US – Approved Medical grade regulation Others – Approved country safety regulation

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

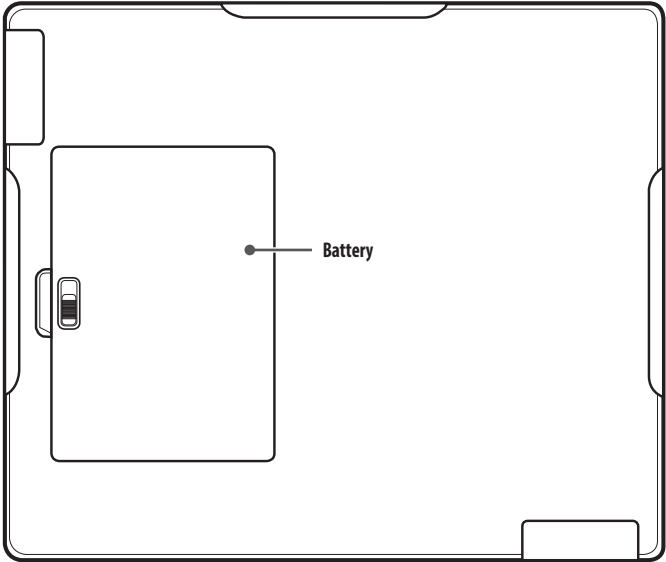
NAMES AND FUNCTIONS OF COMPONENTS

Detector

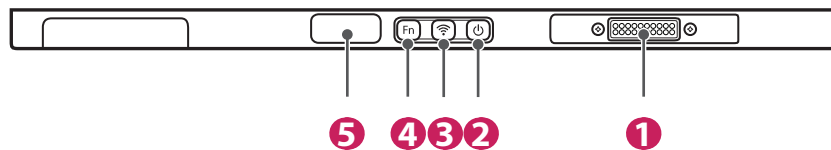
Front



Back



Side



1	Connection to Main Cable
2	 • Power LED Indicator • Power button
3	 • Wired/Wireless LED Indicator • Wired/Wireless Connection Button
4	Fn • Function Switch LED Indicator • Function Switch Button
5	OLED Indicator

Button Information

Button	Description
 (Power button)	Press the Power button to turn the power on or off. – On: Press and hold for 1 sec or longer – Off: Press and hold for 1 sec or longer
 (Wired/Wireless Connection button)	Press this button for at least one second to switch between the following connection modes, in respective order: Ethernet/Station/AP mode.
Fn (Function Switch button)	Press this button for at least one second to switch between the following menus, in respective order: Check connection mode, video acquisition, image auto save. The menu is shown on the OLED indicator. – Press and hold the Fn button for at least three seconds to change the on/off settings for each function.

NOTE

- Press and hold the  and **Fn** buttons at the same time for at least ten seconds to restore to factory settings.

LED Indicator

LED	Description	
 (Power LED Indicator)	Displays the power and battery status of the detector.	
	Off	Power off
	White	Power on
	Orange	The battery level is greater than 10 % and less than 30 %.
	Orange(blinking)	The battery level is less than 10 %.
 (Wired/Wireless LED Indicator)	Displays the connection mode status of the detector.	
	Green	Ethernet connected
	Green(blinking)	Ethernet disconnected
	White	Wireless(Station/AP) connected
	White(blinking)	Wireless(Station/AP) disconnected
F _n (LED Indicator for Function Switch)	Briefly lights up in green when the Function Switch button is used to change the on/off settings.	

NOTE

- If the LED indicators show the following behaviour, a system error may have occurred. Please contact the manufacturer.
 -  (White(blinking)) +  (Green(blinking)) + F_n (Green(blinking))

OLED Indicator

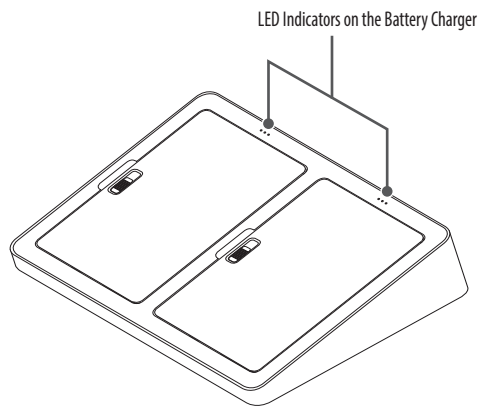
The OLED indicator displays the information below.

Connection Mode			Information
Ethernet	Station	AP	
999.999.999.999  Wired	999.999.999.999  STA SSID	999.999.999.999  AP AP SSID	Wired/STA/AP – Check Connection Mode (Ethernet/Station/AP).
Dynamic  On	Dynamic  On	Dynamic  On	Dynamic On/Off – Video Acquisition
Auto save  On (10/200)	Auto save  On (10/200)	Auto save  On (10/200)	Auto save On/Off (Up to 200 images) – Image Auto save

! NOTE

- The information displayed on the OLED indicator will vary depending on the connection mode (Ethernet/Station/AP).
- If left idle for ten seconds after pressing the Fn button, the OLED indicator turns off. When the OLED indicator is turned on again, the starting screen is displayed.

Battery and Battery Charger



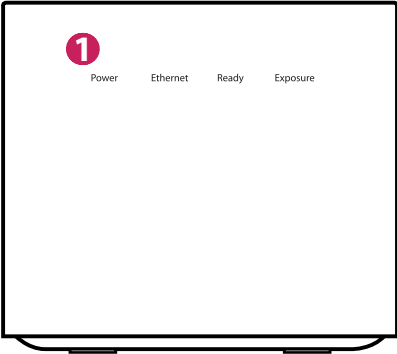
! NOTE

- Battery: Lithium ion polymer battery (charging time - Typ. 3 hours)
- Battery Charger: 2-port cradle type
- The remaining battery level and status for each battery can be checked through the LED indicators on the battery charger.
- If the LED indicator does not turn on when charging the battery, it may be a connection error. Please reinstall the battery.

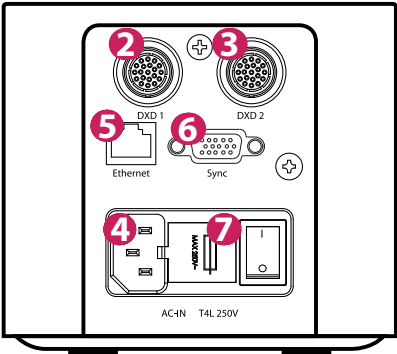
LED Indicators on the Battery Charger				
Remaining Battery Levels	0 ~ 30 %	30 ~ 70 %	70 ~ 99 %	100 %
Battery Status	On charging			Completion of charging

System controller

Front



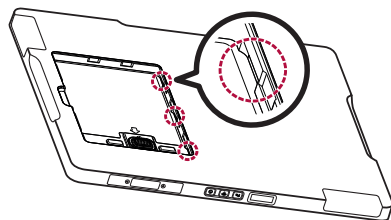
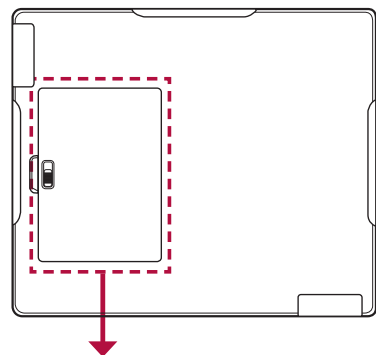
Back



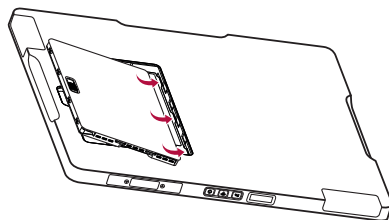
Number	LED Indicator	LED Colour	Description
1	Power	Green	Power normal operation
		Off	Power off (AC power cord no connection or Power error)
	Ethernet	Green	Ethernet normal operation
		Green(blinking)	On data communication
		Off	Ethernet disconnected
	Ready	Green	Ready signal from X-ray Generator is active
		Off	Ready signal from X-ray Generator is inactive
		Orange(blinking)	Power error
	Exposure	Orange	Exposure signal from X-ray Generator is active
		Off	Exposure signal from X-ray Generator is inactive
		Orange(blinking)	Power error

Number	Port	Description
2	DXD 1	Connects the System controller to the Detector A. This connector supplies power (24 V $\pm$ 2.1 A) to the Detector and transmits the X-ray generator's sync signal and Ethernet image data.
3	DXD 2	Connects the System controller to the Detector B. This connector supplies power (24 V $\pm$ 2.1 A) to the Detector and transmits the X-ray generator's sync signal and Ethernet image data. The System controller supports connection up to two detectors. One is for a bucky stand and the other is for a table bed. Hospital X-ray examination rooms are typically equipped with both bucky stand and table type detectors. This makes it more convenient and efficient to use the detectors.
4	AC-IN	Connects the AC power cord.
5	Ethernet	An Ethernet port to transmit images/commands between the Detector and a PC.
6	Sync	Synchronizes the Detector and X-ray generator.
7	Fuse	System controller power fuses are 4 A, 250 V to Type T fuse. Power rating: T4L 250 V

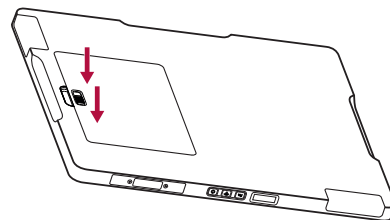
ASSEMBLING BATTERY



1 Check the direction of the holes located inside the detector.

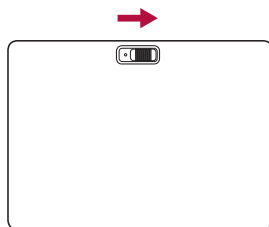
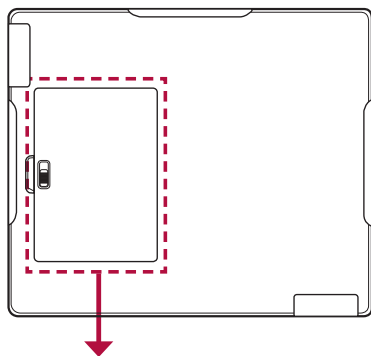


2 Align the battery, and slide it into the holes inside the detector.

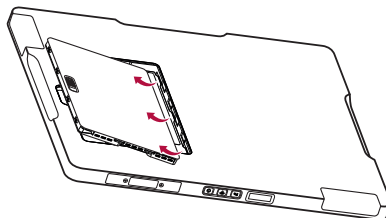


3 Press the other side to assemble the battery.

REMOVING BATTERY



1 Slide the battery lock button in the direction shown in the figure.



2 Remove the battery by lifting it in the direction shown in the figure.

Battery Hot-Swap

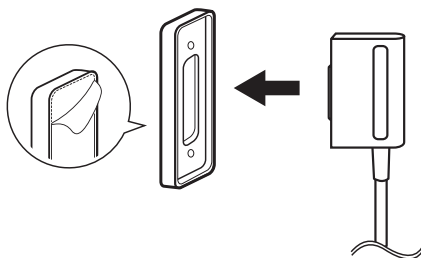
The detector is equipped with a hot-swappable battery. Hot-Swap is activated for one minute after the battery is removed from the detector.

NOTE

- The detector will turn off if charged battery is not inserted on time.
- Data collection and calibration functions are not available during a Hot-Swap.

HOW TO USE MAIN CABLE HOLDER

- 1 Clean the wall before attaching the holder to it.
- 2 Attach the main cable holder using adhesive tape on the back.
- 3 Store the main cable of the detector in the holder.



! NOTE

- The strength of the adhesive may be weakened depending on the environment. Avoid attaching the holder too high on the wall.
- Ensure that the holder is firmly fixed on the wall.
- Avoid storing anything other than the main cable.

SPECIFICATION AND DIMENSION OF EACH PART

Specifications are subject to change without notice.

The symbol ~ means alternating current, and the symbol — means direct current.

Specifications

Detector

Item	Specifications
Model	10HQ701G
Sensor Type	a-Si TFT
Scintillator Type	CsI:TI
Total Pixel Matrix	2048 x 1792 pixels
Total Pixel Area	286.72 mm x 250.88 mm
Pixel Pitch	140 μm
Effective Pixel Matrix	2008 x 1752 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. 8.5 Sec (Wireless)
Image Transmission	Typ. 1.5 Sec (Wired) Typ. 2 Sec (Wireless)
Image Save	Stores up to 200 images
Semi-dynamic mode	5fps @ 140 μm (full FOV)
Energy Range	40 kVp ~ 150 kVp
MTF	Typ. 84 % @ 0.5 lp/mm
DQE	Typ. 66 % @ 0.1 lp/mm

Item	Specifications
Size (Width x Height x Depth) (mm)	333 x 282 x 15.6
Weight (kg)	Typ. 1.9
Window Materials	Carbon Fibre
Trigger Mode	Manual Mode Auto Mode (Auto Exposure Detection)
Power Consumption	Typ. 24 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: 2 x 2
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 (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.

⚠ CAUTION

- Always use the detector in places that meet the following environmental requirements.

Item	Min	Max	Unit
Temperature (Storage)	-20	60	°C
Temperature (Operation)	10	35	°C
Humidity (Storage)	0	90	%, Non-condensing, Relative Humidity
Humidity (Operation)	0	80	
Pressure (Storage)	50	106	kPa
Pressure (Operation)	70	106	kPa

GRID

Item	Recommended Specifications
SID	100 cm / 130 cm / 150 cm / 180 cm
Size	282 x 332 mm
Ratio	10:1
Frequency	215 Line / Inch
Inter Spacer	AL

Battery

Item	Specifications
Model	LBS7222E
Size (Width x Height x Depth) (mm)	112.2 x 158 x 8.4
Weight (kg)	Typ. 0.2
Output Nominal voltage	Typ. 7.7 V $\overline{\text{---}}$
Operating Temperature	10 °C - 35 °C
Charging Time	When charged using the detector, Typ. 4 hours When two batteries are charged using the charger, Typ. 3 hours
Capacity	Typ. 4725 mAh, Min. 4300 mAh
Battery Performance	Typ. 7.5 hours (90-second shooting cycle, battery fully charged)

! NOTE

- The capacity of the battery pack decreases as the usage period increases.
 - The longer the period of use, the higher the possibility that the detector's operating time has become shorter.
 - The battery pack can be replaced at the end of its life. To obtain a replacement, please contact the manufacturer.

Battery Charger

Item	Specifications
Model	LG Battery Charger
Size (Width x Height x Depth) (mm)	268.4 x 54.9 x 186.9
Weight (kg)	Typ. 0.52 (excluding the battery)
Input	19 V $\overline{\text{---}}$ 3.42 A
Output Nominal voltage	8.7 V $\overline{\text{---}}$

Battery Charger Adapter

Item	Specifications
Model	DA-65J19
Manufacturer	Asian Power Devices Inc. (APD)
Size (Width x Height x Depth) (mm)	134.0 x 59.8 x 31
Weight (kg)	Typ. 0.34
Input	AC 100-240 V ~ 50-60 Hz, 1.5-0.7 A
Output	19 V $\overline{\text{---}}$ 3.42 A
Classification by protection type against Electric Shock	Class I equipment
Cable Length (m)	1.5

System controller

Item	Specifications
Model	LG Control Box
Size (Width x Height x Depth) (mm)	125.0 x 109.8 x 255.0
Weight (kg)	Typ. 1.3
Input	AC 100-240 V ~ 50/60 Hz, 1.4-0.7 A
Output	DXD 1 24 V $\overline{\text{---}}$ 2.1 A, Trigger Signal, Ethernet Data from the detector A.
	DXD 2 24 V $\overline{\text{---}}$ 2.1 A, Trigger Signal, Ethernet Data from the detector B.
	Ethernet An Ethernet port to transmit images/commands between the detector and a PC.
	Sync Synchronizes the detector and X-ray generator.

Cables

Item	Length	Qty
Main Cable	7 m	1
LAN Cable (Optional)	10 m	1
Power Cord (110 V or 220 V)	1.5 m	2
Trigger Cable (Optional)	15 m	1

ENVIRONMENTAL REQUIREMENT

PC System Requirements

PC Specifications	
CPU	Intel i5
RAM	8 GB
Disk capacity	500 GB or more recommended
Network Card	Dual Ethernet 100/1000 Mbps
OS	Windows 7/8.1/10 (64 bit)
Monitor	Min Resolution 1920 x 1080
AP	Cisco models recommended (e.g. Linksys EA9200)

INSTALLING CALIBRATION SOFTWARE

How to Install

Launch the installation file of Calibration Software. After the installation file is launched, follow the instructions displayed on the screen to complete the installation.

How to Uninstall

To remove Calibration Software from your PC, read and follow the steps below:

Uninstall in the Control Panel

- 1 Click and launch Control Panel in your Start menu.
- 2 Select Programs and Features in Control Panel.
- 3 Select [LG DXD Calibration] from the list of the installed programs.
- 4 Select the [Delete] button when the screen for installation and uninstallation of the program appears.
- 5 Follow the on-screen prompts for proceeding uninstallation and click the [Next] button to complete uninstallation.

Uninstall using the Installation File

Launch the installation file of Calibration Software and follow the instructions on the screen for uninstallation to complete the operation.

NOTE

- To uninstall the program using the installation file, make sure to run the installation file of the same version as the software installed in the PC.

CONNECTION TYPE

Connection of X-ray Generator - Detector

Select the trigger mode according to the image acquisition method.

- Auto mode: The detector automatically detects and acquires X-ray images.
- Manual mode: The detector recognizes the X-ray generator signals and acquires images.

Connection of Detector - PC

The status of the connection between the detector and a PC

- Wired Mode: The wired connection between the detector and a PC through the System controller
- Wireless (STA) mode: The wireless connection between the detector and a PC through a wireless AP
- Wireless (AP) mode: Wireless connection between the detector and a PC through the Soft AP function

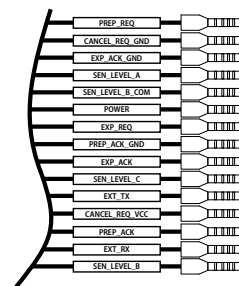
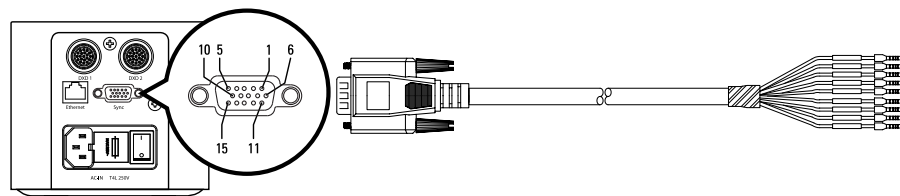
Network Connection Mode

Select the network connection mode using  (Wired/Wireless Connection button).

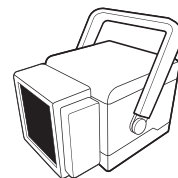
- Press  (Wired/Wireless Connection button) for at least one second to switch between the following connection modes, in respective order: Ethernet/Station/AP mode.

Trigger Cable

The trigger cable is connected to the System controller and X-ray Generator. It can only be used in manual mode, and not in automatic mode.



Pin Label



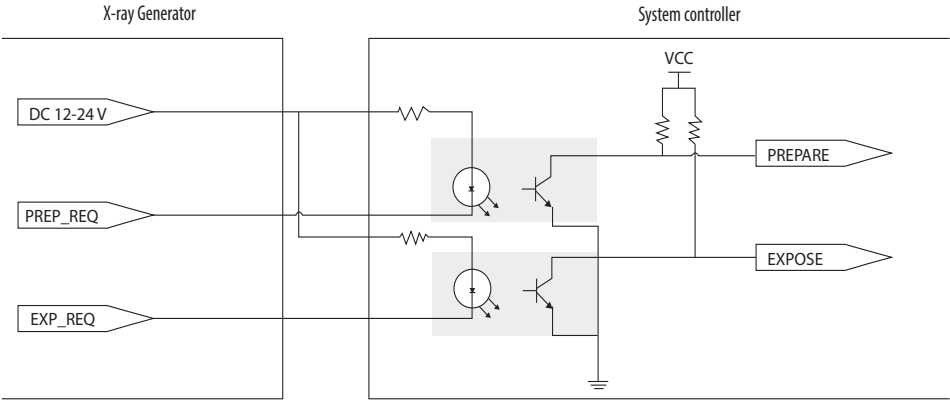
X-ray Generator

Number	Pin Label	Description
1	PREP_REQ	Prepare the signal from the X-ray generator to the System controller.
2	CANCEL_REQ_GND	Cancel REQ ground.
3	EXP_ACK_GND	Signal ground
4	SEN_LEVEL_A	READY
5	SEN_LEVEL_B_COM	READY
6	POWER	Power: X-ray generator supply voltage (DC 12 V to 24 V)
7	EXP_REQ	Expose the signal from the X-ray generator to the System controller.
8	PREP_ACK_GND	Prepare ground check.
9	EXP_ACK	Expose the acknowledgement signal from the System controller to the X-ray generator.
10	SEN_LEVEL_C	READY
11	EXT_TX	READY
12	CANCEL_REQ_VCC	Cancel VCC request.
13	PREP_ACK	Prepare a confirmation signal from the System controller to the X-ray generator.
14	EXT_RX	READY
15	SEN_LEVEL_B	READY

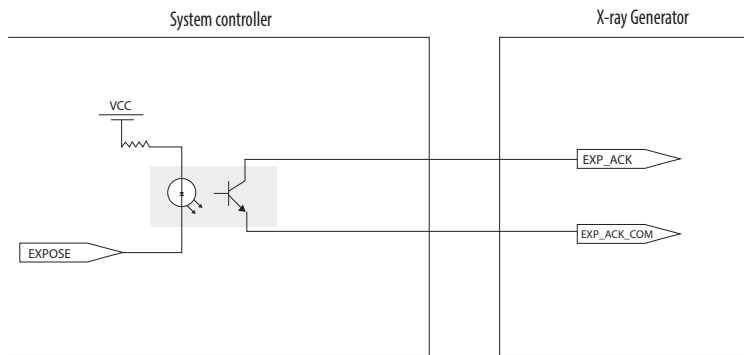
! NOTE

- Connection of trigger cable and X-ray generator is to be performed by qualified personnel. The description of each pin is in the common language for this industry.

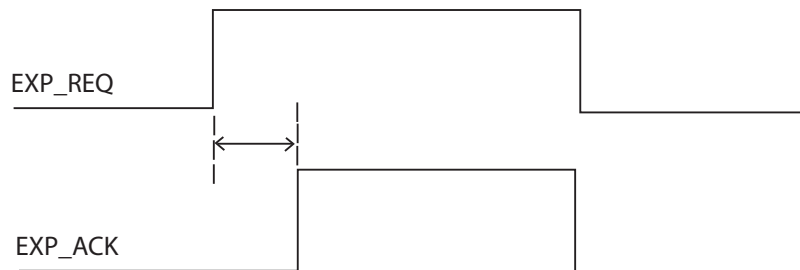
Block diagram of Trigger Cable connection



<Connection of X-ray Generator - System controller>



<Assembly Diagram>



<Timing Chart>

Connecting Detector to PC (Wired Mode)

A: Detector

B: Main Cable

C: System controller

D: LAN Cable

E: PC

F: Object

G: X-ray Switch

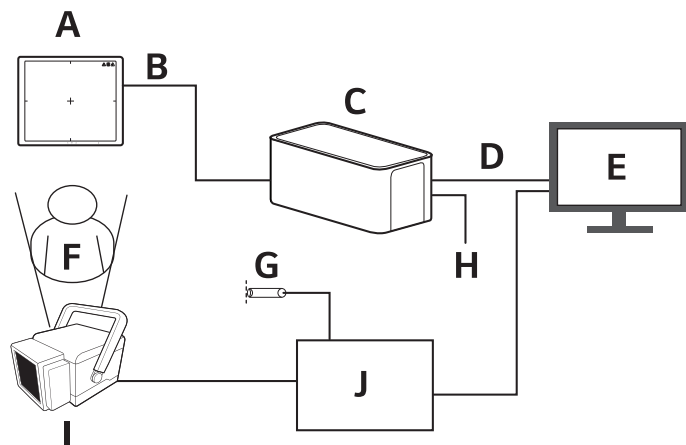
H: Power Cord (AC 100-240 V~)

I: X-ray Generator

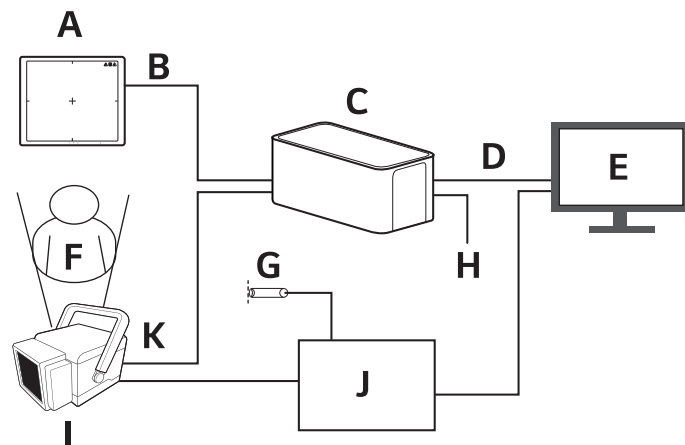
J: X-ray Generator Interface

K: Trigger Cable

Auto Mode

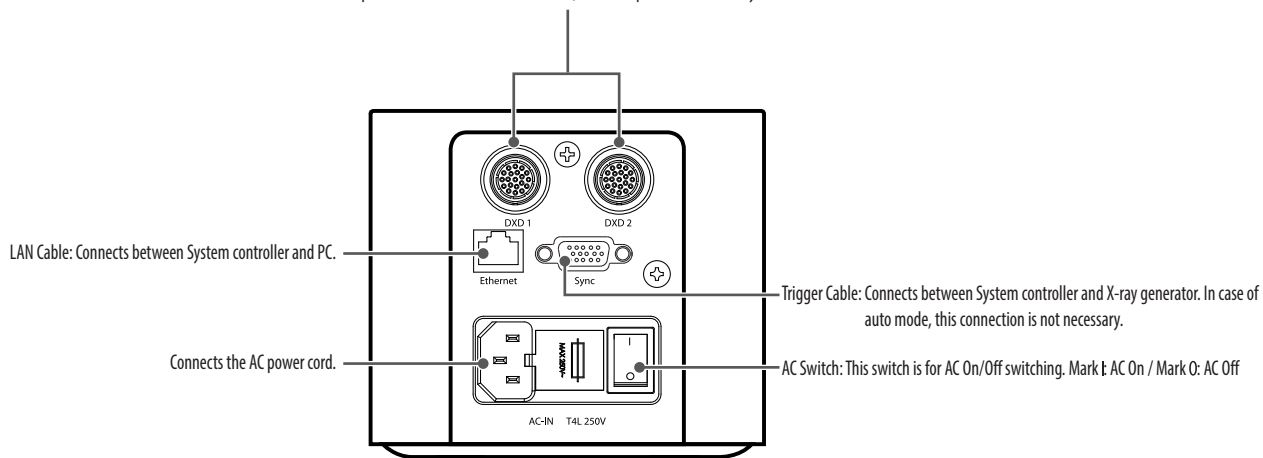


Manual Mode



Main Cable: Connects the System controller to the detector.

Up to two detectors can be connected, and both ports can be used by one detector.

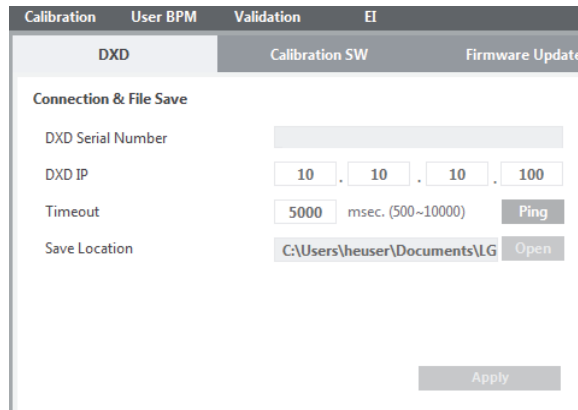


Connect - Wired Connection

Use the LAN cable to connect a PC to the System controller and connect the detector to the System controller with the main cable. After connecting the cables, proceed to set up the PC as shown below.

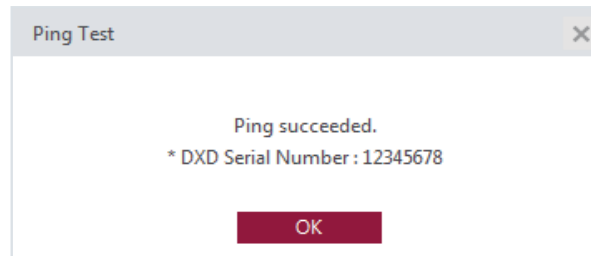
- 1 Launch the [Network and Sharing Center] and click [Change adapter settings].
 - Control Panel > Network and Internet > Network and Sharing Center > Change adapter settings
- 2 Go to [Properties] in Local Area Connection.
- 3 Select [Internet Protocol Version 4 (TCP/IPv4)] and then click [Properties] to set the IP address as follows:
 - IP address: 10.10.10.2 ~ 10.10.10.254 (set an IP address other than 10.10.10.99, 10.10.10.100)
 - [Subnet Mask]: 255.255.255.0
 - [Default Gateway]: 10.10.10.1
 - Do not set up DNS.

- 4 Launch Calibration Software, go to  (Settings) > [DXD] > [Connection & File Save] and enter the detector's IP (10.10.10.100). Click the [Ping] button to check the connection.



Calibration	User BPM	Validation	EI
DXD		Calibration SW	Firmware Update
Connection & File Save			
DXD Serial Number			
DXD IP	10	10	100
Timeout	5000	msec. (500~10000)	Ping
Save Location	C:\Users\heuser\Documents\LG		Open
Apply			

- Press the [Ping] button. If connected successfully, the following pop-up will appear:



Connecting Detector to PC (Wireless Mode)

A: Detector

B: AP

C: LAN Cable

D: PC

E: Object

F: X-ray Switch

G: X-ray Generator

H: X-ray Generator Interface

I: Main Cable

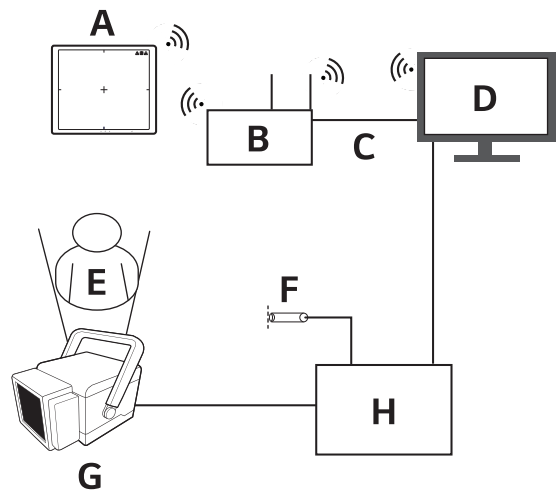
J: System controller

K: Power Cord (AC 100-240 V~)

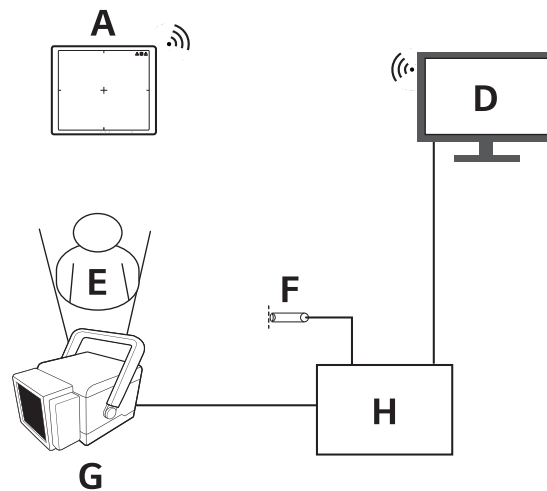
L: Trigger Cable

Auto Mode

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



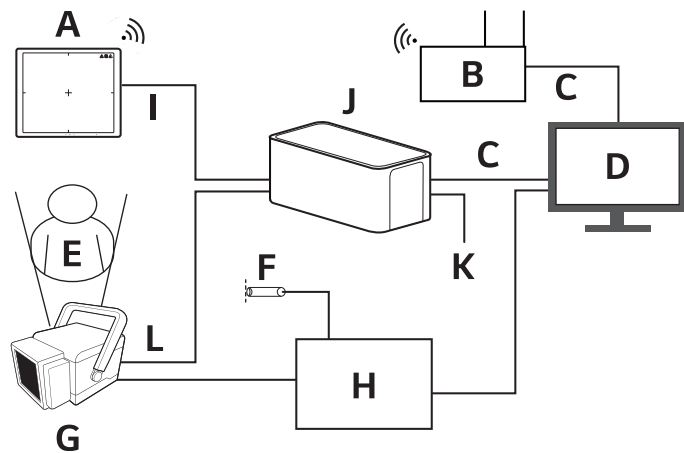
2. AP mode (for the use of detector internal AP)



! NOTE

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

Manual Mode



Making connections-Wireless connection

- 1 The wireless factory default settings are as follows:
 - 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 Settings" for details.
- 3 Press  (Wired/Wireless Connection button) for at least one second to switch between the following connection modes, in respective order: Ethernet/Station/AP mode.
- 4 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.
 - If the ping test fails despite the wireless connection being complete, please enter the IP address as follows:
 1. Launch the [Network and Sharing Center] and click [Change adapter settings].
 - Control Panel > Network and Internet > Network and Sharing Center > Change adapter settings
 - Select a network adapter.
 2. Go to [Properties] in Local Area Connection.
 3. Select [Internet Protocol Version 4 (TCP/IPv4)] and then click [Properties] to set the IP address as follows:
 - IP address: 10.10.10.2 ~ 10.10.10.254 (set an IP address other than 10.10.10.99, 10.10.10.100)
 - [Subnet Mask]: 255.255.255.0
 - [Default Gateway]: 10.10.10.1
 - Do not set up DNS.

! NOTE

- Refer to the wireless access point setup guide.
 - "Wireless Access Point Setup Guide (Model: Cisco Linksys EA9200)"



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.

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



SOFTWARE MANUAL

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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 months 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 [EI].

Settings

⚙️ (Settings) include [DXD] settings, [Calibration SW] settings and [Firmware Update].

- [DXD]: Configures the settings required to obtain calibration images and detector settings.
- [Calibration SW]: Configures the settings required for to Calibration Software algorithms.
- [Firmware Update]: Checks the firmware version of the detector or performs the firmware update. You can update firmware by this menu.

The screenshot shows the 'LG DXD Calibration' application window with the 'About' tab selected. The window has a dark gray title bar and a light gray background. The 'About' tab is highlighted in the top navigation bar. The main content area is divided into several sections:

- Connection & File Save:** Contains fields for 'DXD Serial Number', 'DXD IP' (10.10.10.100), 'Timeout' (5000 msec), and 'Save Location' (D:\). There are 'Ping' and 'Open' buttons.
- 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). There is a 'Register' button.
- Detector Parameters:** Contains settings for 'Trigger Mode' (Auto/Manual), 'Sensitivity' (15), 'Window Time' (5.00 msec), 'Frame Width' (2500), and 'Frame Height' (3052). There is a 'Reset' button with a warning icon.
- Power Options:** Contains 'Auto Sleep' and 'Auto Power-Off' settings, both set to 'Off'.

At the bottom right, there is an 'Exit' button. The window also has standard Windows window controls (minimize, maximize, close) in the top right corner.

[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.

[User BPM]

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

[Validation]

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

[EI] (Exposure Index)

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

Image Functions

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 "E". The interface includes several panels and a central image area.

- 1**: A yellow circle highlights a point on the central image.
- 2**: A red box highlights the "Navigator" panel, which shows a small thumbnail of the image with a red square indicating the current view area.
- 3**: A red box highlights the "Histogram" panel, which displays a graph of pixel intensity distribution. Below the graph, the "Window" is set to 65536 and the "Level" is set to 32768. A "Reset" button is also present.
- 4**: A red box highlights the top status bar, which shows the coordinates "1536 1536" and the "Pixel Value: 9132".
- 5**: A red box highlights the "BPM Analysis" panel, which contains a table of analysis results.

The "BPM Analysis" panel table:

Item	Count
Rows	0
Columns	0
Class 0	0
Class 1	0
Class 2	0
Class 3~4	0, 0
Class 5~6	0, 0
Class 7~8	0, 0

The right sidebar contains a "History" panel with a table of image acquisition history:

Dark Image(s)	Count: 1	Acquisition
dark_20181001094151.raw	9099	

Below the history panel, there is a "Bright Image(s)" section with a "Count: 0" and an "Acquisition" button. At the bottom of the sidebar, there is a "Calibration" section with a "Calibration" button and a "Count: 0".

The bottom status bar displays the following information: "Image Loaded", "Min=0, Max=65535, Med=9099, Mean=9001.92, Std=476.52, Bad Pixel Count=0", and "(1766,1568) 168=9129 88=35 100.00% 3072x3072".

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.

LG DXD Calibration

CalibrationUser BPMValidationEIFirmware UpdateAbout

DXD

Calibration SW

Firmware Update

About

Connection & File Save

DXD Serial Number

DXD IP

Timeout

Save Location

Apply

Network Options

Current Status: Wired

Change DXD IP

Wireless Setup

Installation Info.

Date Format

Current Date

Register

Detector Parameters

Trigger Mode

Sensitivity

Window Time

Frame Width

Frame Height

! Press 'Reset' to load factory-default Detector

Reset

Save

Cancel

Power Options

Auto Sleep

Auto Power-Off

Save

Cancel

Exit

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].
- If the pop-up message for the [Ping Test] failure appears, check the PC's network settings, connection between the detector and PC, detector status, System controller status, and IP address, and perform 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.

Calibration	User BPM	Validation	EI
DXD	Calibration SW	Firmware Update	
Connection & File Save			
DXD Serial Number			
DXD IP	10	10	100
Timeout	5000	msec. (500~10000)	Ping
Save Location	C:\Users\heuser\Documents\LG		Open
Apply			

[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.

Custom folder	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	Creating a date-time folder (Created when the [Calibration] button is clicked)	[Avgdark.raw]
			[Gain.raw]
			[Offset.raw]
			[BPM.raw]
			El result (the applied date-time folder is created when an El is performed)
			History file
	Log	Image	Log file (connection logs, etc.)
			Bright image
			Dark image
			User BPM image
			Validation image
			El image
			Raw image
	Factory Calibration (Created when there is no folder or file upon the completion of [Apply] or if the file is abnormally small in size)		[Avgdark.raw]
			[Gain.raw]
			[Offset.raw]
			[BPM.raw]

- 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)

Network Options

Current Status: Wired

Change DXD IP

Wireless Setup

! 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.

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

- Top Bar:** Includes tabs for 'Calibration', 'User BPM', 'Validation', and 'EI'. The 'Calibration' tab is active.
- Sub-Tabs:** Under the 'Calibration' tab, there are sub-tabs for 'DXD', 'Calibration SW', 'Firmware Update', and 'About'. The 'DXD' sub-tab is selected.
- Connection & File Save:**
 - DXD Serial Number: A text input field.
 - DXD IP: A field with four segments, each containing '10'.
 - Timeout: A field with '5000' and 'msec. (3000~10000)', accompanied by a 'Ping' button.
 - Save Location: A field with 'D:\' and an 'Open' button.
 - An 'Apply' button is located at the bottom right of this section.
- Network Options:**
 - Current Status: 'Wired'.
 - Buttons: 'Change DXD IP' and 'Wireless Setup'.
- Installation Info.**
 - Date Format: A dropdown menu showing 'YYYY/MM/DD'.
 - Current Date: '2018/01/19'.
 - A 'Register' button is at the bottom right.
- Detector Parameters:**
 - Trigger Mode: Radio buttons for 'Auto' and 'Manual' (selected).
 - Sensitivity: A field with '15' and '(0~63)'.
 - Window Time: A field with '5' and '00 msec (1~40)'.
 - Frame Width: A field with '2500'.
 - Frame Height: A field with '3052'.
 - A warning message: 'Press 'Reset' to load factory-default Detector'.
 - A 'Reset' button.
 - 'Save' and 'Cancel' buttons at the bottom.
- Power Options:**
 - Auto Sleep: A dropdown menu showing 'Off'.
 - Auto Power-Off: A dropdown menu showing 'Off'.
 - 'Save' and 'Cancel' buttons at the bottom.
- Exit:** A large 'Exit' button at the very bottom center.

- [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.

[Calibration Parameters]

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

LG DXD Calibration

Calibration User BPM Validation EI

DXD Calibration SW Firmware Update About

Calibration Parameters

Target Gain	1	(0.0~255.0)
Gain Margin	0.6	(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)

Image Edit

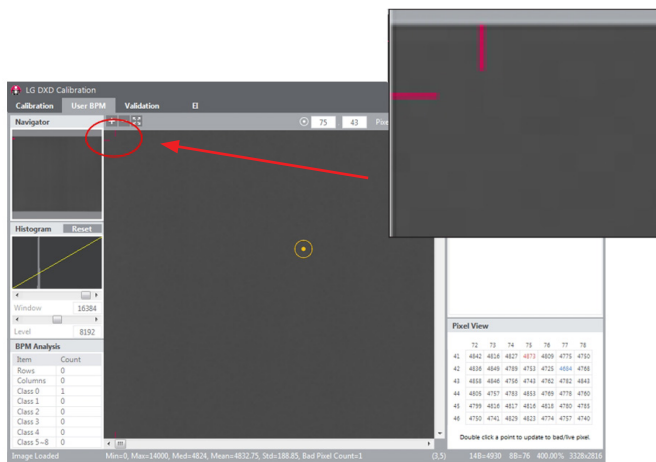
Rotation	0
Flip	None
Invert	☐

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

Save Cancel

Exit

- 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

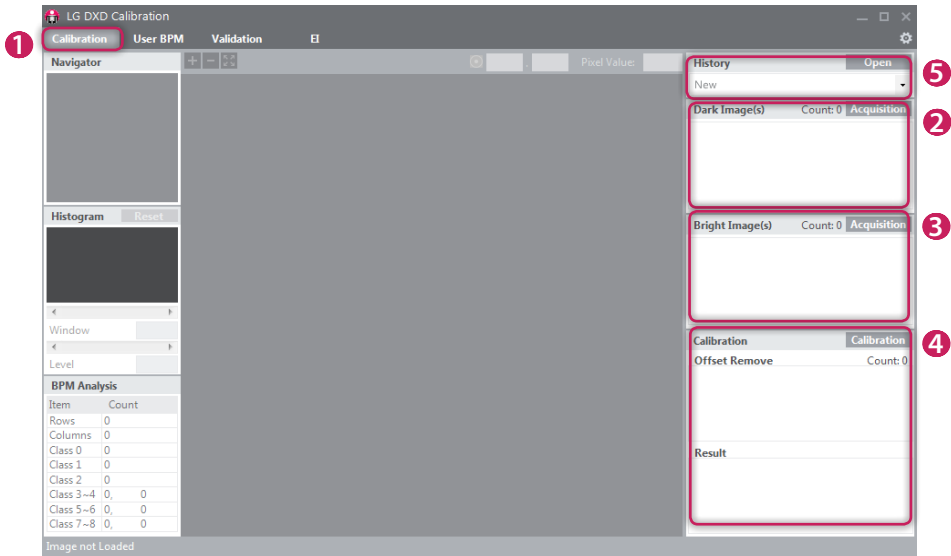
- You must complete the [Apply] process before proceeding with the next step.

[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  (Settings).
 - 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  (Settings).
 - 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.

4 [Calibration]

- [Calibration] is performed in this menu.
 - Dark Image: 4 images (minimum)
 - Bright Image: 3 images (minimum), 10 images (maximum)
- 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.

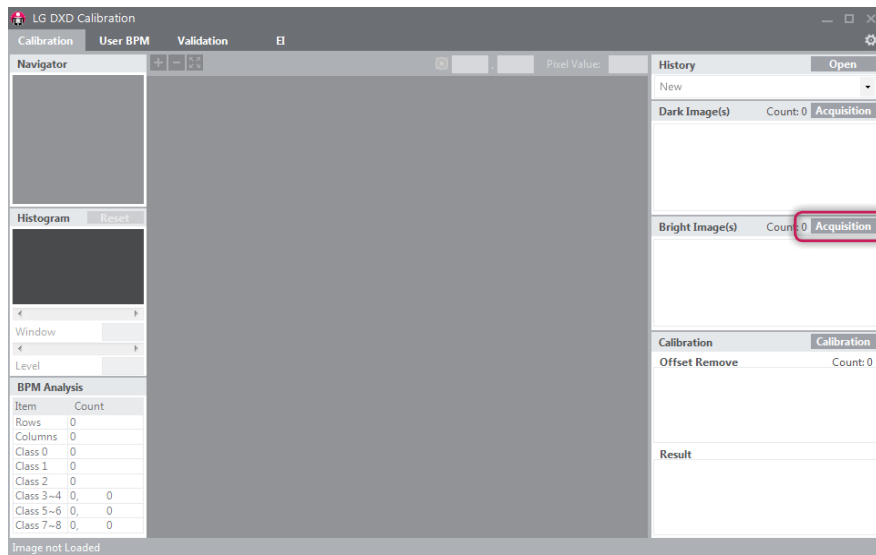
! NOTE

- 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 file, a pop-up message for the error will appear. If the pop-up message for the error appears, check the file size, path, file name, folder access permissions, and then try again.

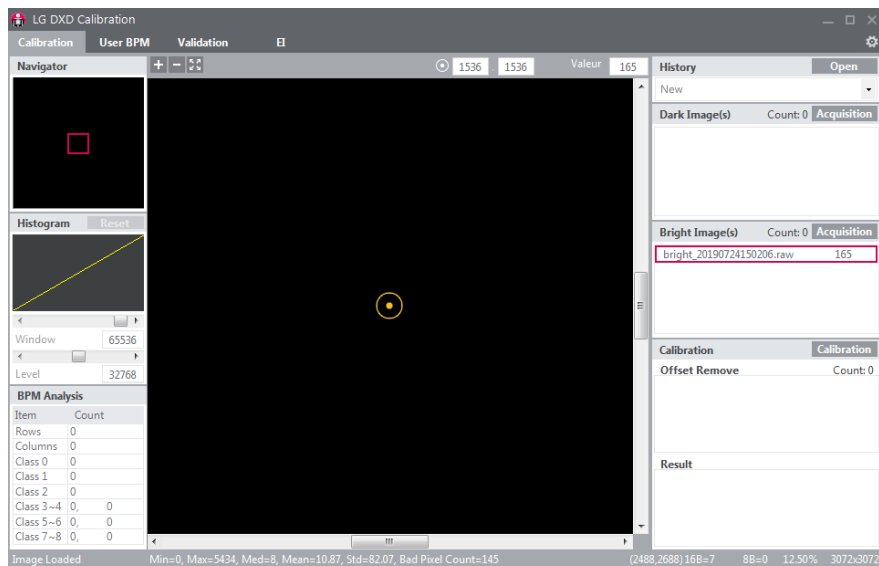
How to acquire Bright image with X-Ray shot. (This procedure is also applied for pediatric patient.)

X-ray Generator connection is explained in this manual.

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



- 2 To implement X-ray shot. Calibration SW will wait for a X-Ray acknowledgement signal from DXD and it will display a 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 paediatric patients is same with other patients.

[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.

The screenshot shows the 'LG DXD Calibration' window with the 'User BPM' tab selected. The interface includes a main image area, a histogram, a BPM analysis table, and a pixel view grid. Red boxes and numbers highlight specific features:

- 1**: Points to the 'User BPM' tab in the top navigation bar.
- 2**: Points to the 'History' button in the right-hand panel.
- 3**: Points to the 'Image(s)' list in the right-hand panel, showing 'BPM_20181001095349.raw'.
- 4**: Points to the 'Pixel View' button in the right-hand panel, which is currently selected.

BPM Analysis Table:

Item	Count
Rows	0
Columns	0
Class 0	119
Class 1	18
Class 2	0
Class 3~4	8, 0
Class 5~6	0, 0
Class 7~8	0, 0

Pixel View Grid:

	1502	1503	1504	1505	1506	1507	1508
1520	12	10	9	13	14	13	9
1521	12	13	14	15	14	13	14
1522	12	21	18	12	14	16	16
1523	11	14	14	12	11	13	10
1524	13	10	15	10	14	12	11
1525	9	8	16	15	8	12	12

Double click a point to update to bad/live pixel.
Bad Pixel Map Upload

Image Loaded: Min=0, Max=5434, Med=8, Mean=10.87, Std=82.07, Bad Pixel Count=145
(2488,2688) 168=7 88=0 12.50% 3072x3072

1 Enter into the [User BPM] menu

- Click the [User BPM] menu to enter.
- [User BPM] requires image acquisition before entering the menu since its process includes a visual inspection of the images to which the results of [Calibration] are applied.

2 Check the History file

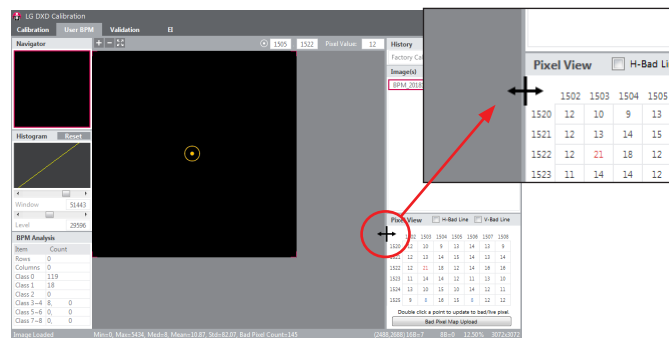
- Check if the History name created from the [Calibration] matches the name shown in the current [History] window.
- Apply the selected History file and carry out the [User BPM] process.

3 Acquire Images

- Click the [Acquisition] button and acquire a Bright Image. The image name will be shown in the [Image(s)] 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 gray 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 Lines 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.

Input vertical bad line range

Range ~

Pixel View ☐ H-Bad Line ☒ V-Bad Line

	1502	1503	1504	1505	1506	1507	1508
1520	12	10	9	13	14	13	9
1521	12	13	14	15	14	13	14
1522	12	21	18	14	14	16	16
1523	11	14	14	12	11	13	10
1524	13	10	15	10	14	12	11
1525	9	8	16	15	8	12	12

Pixel (x 1505, y 1522) has been updated.

Pixel View ☐ H-Bad Line ☐ V-Bad Line

	1502	1503	1504	1505	1506	1507	1508
1520	12	10	9	13	14	13	9
1521	12	13	14	15	14	13	14
1522	12	21	18	14	14	16	16
1523	11	14	14	12	11	13	10
1524	13	10	15	10	14	12	11
1525	9	8	16	15	8	12	12

Pixel (x 1505, y 1522) has been updated.

Bad Pixel Map upload function

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

Bad Pixel Map Upload

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

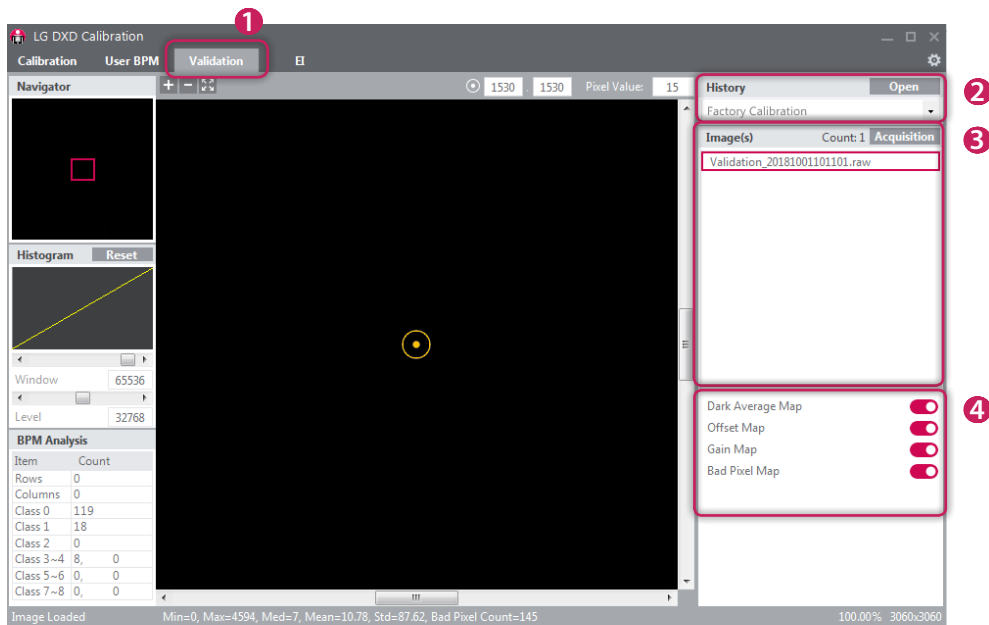
Date	Time	Type	Details
2018-10-01	10:15:53	User BPM	[FILE INFO] avg_dark_size=18874368, offset_size=18874368, gain_size=37748736, bpm_size=18874368
2018-10-01	10:15:53	User BPM	[Warning] Do not click any buttons or tab during upload.
2018-10-01	10:15:56	User BPM	Package file creation success
2018-10-01	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

- After [Calibration] is performed, click the [Validation] menu button to enter the menu.

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

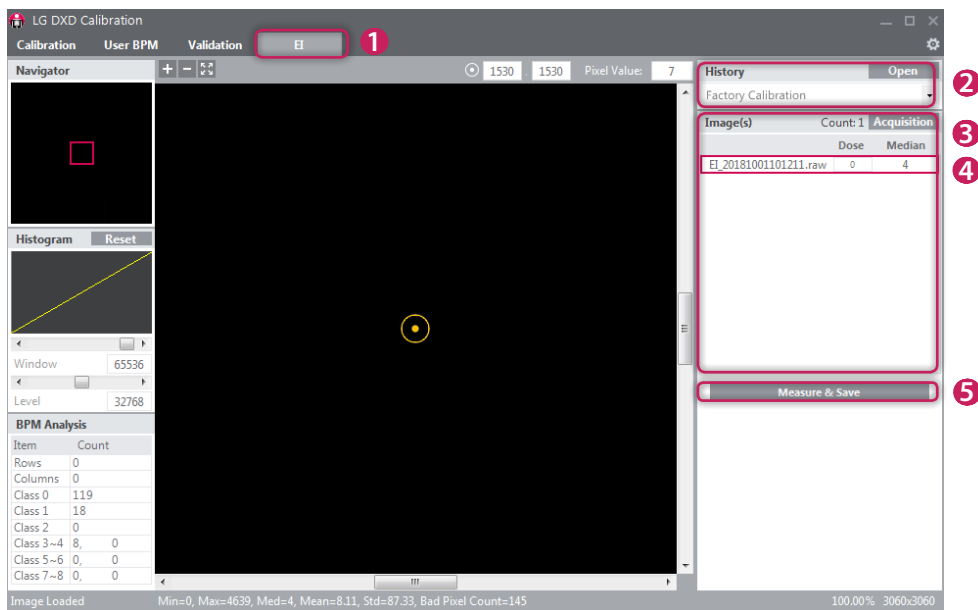
- You can decide whether to apply each of the Calibration results ([Dark Average Map], [Offset Map], [Gain Map], [Bad Pixel Map]) to the image acquired.

: 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)

The output median value based on the input Dose is calculated with a linear expression and in a table before being stored.



1 Enter into the [EI] menu

- After [Calibration] is performed, click the [EI] menu button to enter the menu.

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: μGy)
- 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]

- After acquiring images and entering the Dose value, press the [Measure & Save] button to save the results.
- The EI results file will be stored in the storage path for the calibration results files.
(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.
- At least 3 images are required to store the corresponding results.

Exit

Click the  (Exit) button to close Calibration Software.



CAUTION

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

About

Click the [About] button to view the version information of 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.

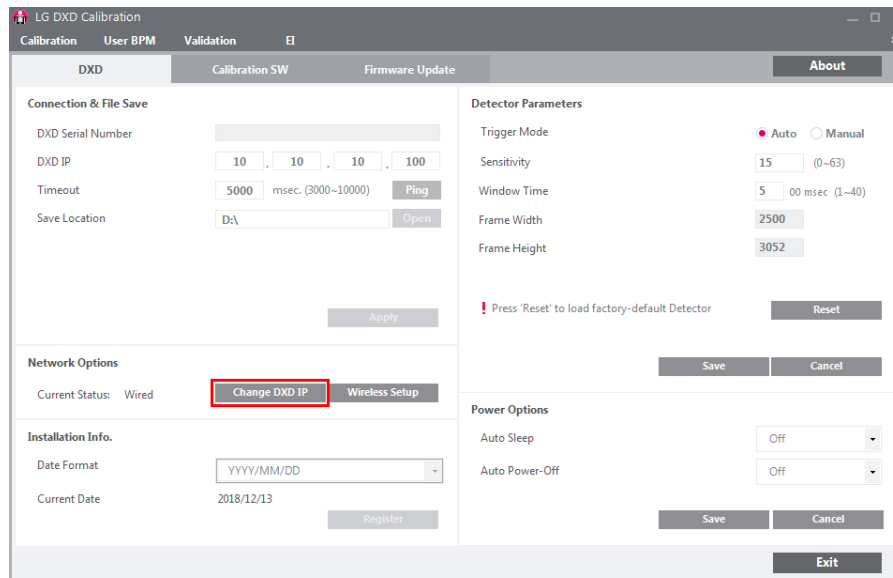
NOTE

- If image acquisition fails, please check the network and detector status and try again.

SERVICE MANUAL

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.
 - 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.

The screenshot shows the 'LG DXD Calibration' application window. The 'Calibration' tab is active, and the 'DXD' sub-tab is selected. The 'Connection & File Save' section contains fields for DXD Serial Number, DXD IP (10.10.10.100), Timeout (5000 msec), and Save Location (D:\). The 'Network Options' section shows the current status as 'Wired', with buttons for 'Change DXD IP' and 'Wireless Setup' (the latter is highlighted with a red box). The 'Installation Info.' section shows the date format as 'YYYY/MM/DD' and the current date as '2018/12/13'. The 'Detector Parameters' section on the right includes settings for Trigger Mode (Auto), Sensitivity (15), Window Time (5.00 msec), Frame Width (2500), and Frame Height (3052). The 'Power Options' section shows 'Auto Sleep' and 'Auto Power-Off' both set to 'Off'. An 'Exit' button is located at the bottom right.

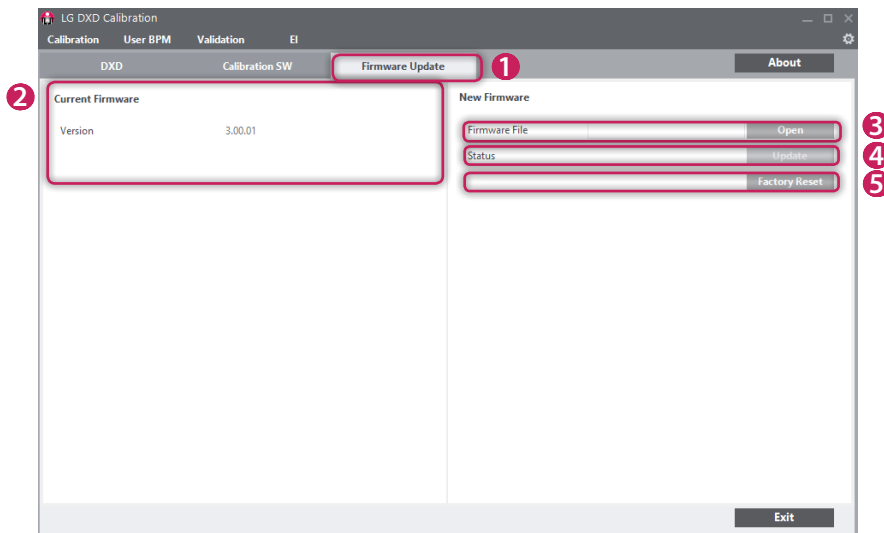
3 If a pop-up appears, enter your [SSID] and [Password], then click [Apply].

 NOTE

- Check the [Wi-Fi (DXD)] 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 compatibility.

Updating Detector Firmware

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



- ❶ Select the [Firmware Update] tab.
- ❷ 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.
- ❸ 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].
- ❹ Update the file.
 - Select the file and click the [Update] button to start updating the firmware.
- ❺ [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.
- If firmware update is failed, all LEDs will blink.

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  (Settings) > [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

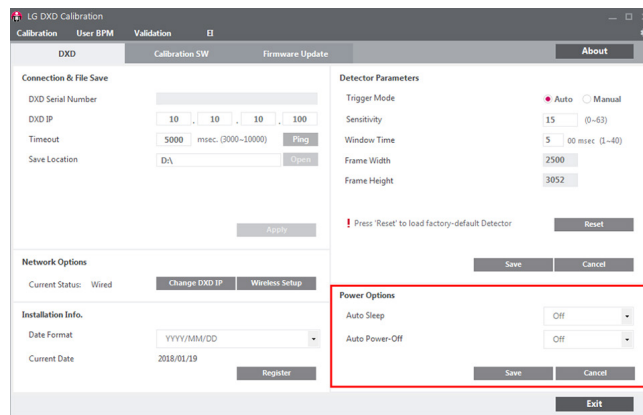
(Some models may not be supported.)

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  (Settings) > [DXD] tabs.
- 3 Select the [Auto Sleep] and [Auto Power-Off] options and select the [Save] button to save the detector's [Power Options].

! NOTE

- Only the above settings will be saved in Calibration Software.
- The detector enters into Standby mode when there is no communication for a set period of time.
- The detector does not enter into Standby mode 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.

This manual is produced for public use and may contain images or contents different from the product you purchased.

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
Sensor ¹⁾	Drop Information	Drop Count
	Position	Indicate DXD Horizontal/Vertical Status
	Temperature	DXD System Temperature
Others	Bright Image Count	No. of image acquisitions with X-ray exposure
	Dark Image Count	No. of image acquisitions without X-ray exposure

1) Sensor information is displayed only on models that support the relevant feature.

Web Monitoring

- 1 Makes the wired/wireless connection between the detector and a PC.
- Please refer to the "Detector and PC".
- 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:

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

- 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 System controller blink in orange	• Check the status of the power cable connection of the System controller. • Check if the System controller 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  (Settings) > [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. - Adjust the X-ray generator's position so that the detector is within the X-ray irradiation range before running a [Calibration]. - Keep the distance at least 120 cm between the detector and the X-ray generator tube. - If the distance cannot be more than 120 cm in Step 2), change the detector settings as follows before proceeding with the [Calibration]. ① Go to  (Settings) > [Calibration SW] and enter a value 0.05-0.1 higher than the existing value for [Gain] and [Save]. ② Go to  (Settings) > [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. - If 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

If you cannot run the Calibration SW because of permission issues, change to Administrator mode and run the software.

TROUBLESHOOTING FIREWALL ISSUES

If the Network 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 Go to [Windows Firewall] > [Advanced Settings] and set the rules as follows:

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

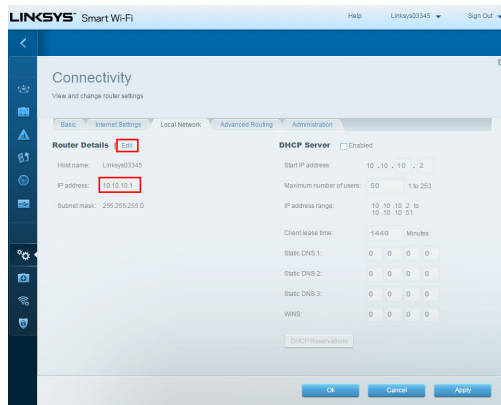
- 3 Check the status and connect the detector again.

WIRELESS AP CONFIGURATION

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 *linksysmartwifi.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.

LINKSYS Smart Wi-Fi

Help Linksys03345 Sign Out

Wireless

View and change router settings

Wireless MAC Filtering Wi-Fi Protected Setup

Smart Connect: ☒ 5 GHz band steering ☐ Off
5 GHz₁ + 5 GHz₂ Individual networks

Network name: LGEDXD 2.4 GHz Network: ON

Password: Password Broadcast SSID: Yes Channel: Auto

Security mode: WPA2 Personal Network mode: Mixed Channel width: Auto

Network name: LGEDXD 5 GHz₁ + 5 GHz₂ Network: ON

Password: Password Broadcast SSID: Yes Channel: Auto

Security mode: WPA2 Personal Network mode: Auto Channel width: Auto

Ok Cancel 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=01t80000003efNkAAI>

