Mars1717V User's Manual

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To Customers

Congratulations on your purchase of the Mars1717V Wireless Digital Flat Panel (hereinafter referred to as Mars1717V) which is manufactured by iRay Technology (Shanghai) Ltd. (hereinafter referred to as iRay).

At iRay, we strive to not only make the world-class products that deliver the best value possible to our customers but also offer the highest quality of service and customer care. Please take time to read through this user guide in order to utilize the product effectively. We hope you enjoy the experience with iRay Mars1717V.

If you have any questions or suggestions, please feel free to contact us.

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About FCC

FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference;

(2) This device must accept any interference received, including interference that may cause undesired operation.

Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.
- FCC requires this product to be used indoors for the frequency range 5.15 to 5.25 GHz to reduce the potential for harmful interference to co-channel Mobile Satellite systems.

Federal Communication Commission (FCC) Radiation Exposure Statement.

This EUT is compliance with SAR for general population/uncontrolled exposure limits in ANSI/IEEE C95.1-1999 and had been tested in accordance with the measurement methods and procedures specified in OET Bulletin 65 Supplement C. This equipment should be installed and operated contact with the radiator & your body.

Notes on usage and management of the equipment

- Read all of the instructions in the user guide before your operation. Give particular attention to all safety precautions.
- Only a physician or a legally certified operator should use this product.
- The equipment should be maintained in a safe and operable condition by maintenance personnel.
- Use only computers and image display monitors complying with IEC 60601-1 or IEC 60950-1. For details, consult our sales representative or local iRay dealer.
- Use only the dedicated cables. Do not use any cables other than those supplied with this product.
- Request your sales representative or local iRay dealer to install this product

Caring for your environment

This symbol indicates that this product is not to be disposed of with your residential or commercial waste.

Recycling iRay Equipment

Please do not dispose of this product with your residential or commercial waste. Improper handling of this type of waste could have a negative impact on health and on the environment. Some countries or regions, such as the European Union, have set up systems to collect and recycle electrical or electronic waste items. Contact your local authorities for information about practices established in your region. If collection systems are not available, call iRay Customer Service for assistance.

Disclaimer

1. iRay shall not be liable to the purchaser of this product or third parties for any damage, losse, or injury incurred by purchaser or third parties as a result of fire, earthquake, any accident, misuse or abuse of this product.

2. iRay shall not be liable to any damage, loss, or injury arising from unauthorized modifications, repairs, or alterations to this product or failure to strictly comply with iRay's operating and maintenance instructions.

3. iRay shall not be liable for any damage or loss arising from the use of any options or consumable products other than those dedicated as Original iRay Products by iRay Technology.

4. It is the responsibilities of the user/attending physicians for maintaining the privacy of image data and providing medical care services. iRay shall not be responsible for the legality of image processing , reading and storage nor it shall be responsible for loss of image data for any reason.

5. Information regarding specification, compositions, and appearance of this product is subject to change without prior notice.

Copyright

Trademarks

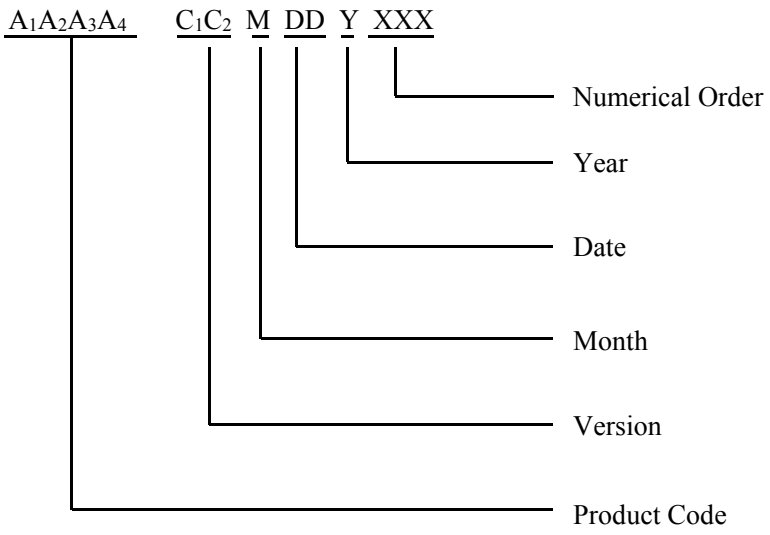
Symbols and Conventions

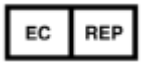
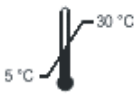
The following symbols and conventions are used throughout the user guide.

	This symbol is used to identify conditions under which improper use of the product may cause death or serious personal injury.
	This notice is used to identify conditions under which improper use of the product may cause minor personal injury.
	This notice is used to identify conditions under which improper use of the product may cause property damage.
	This is used to indicate a prohibited operation.
	This is used to indicate an action that must be performed.
	This is used to indicate important operations and restrictions.
	This is used to indicate operations for reference and complementary information.

Labels and markings on the equipment

The contents of the labels and markings on iRay Mars1717V product are indicated below:

	Caution: please refer to the instructions in the user manual.
	This symbol is used to indicate that the equipment has passed CE testing and it is followed by the CE number.
	This symbol is used to identify the manufactuer's series number which is after, below or adjacent to the symbol. The series number of iRay products is usually made of thirteen digits as shown below: 

	This symbol is used to indicate the name and address of the manufacturer.
	This symbol is used to indicate the name and address of iRay authorized representative in the European region.
	This symbol is used to indicate consultation of the user guide for general information.
	Safety Signs: please refer to the user guide for safety instructions
	Safety Signs：Dangerous Voltage
	Stand-by
	Handled with care
	FPD is allowed to withstand 100 kg on the surface
	This symbol is used to indicate the operational temperature limits.

	This symbol is used to indicate the storage temperature limits.
	non-ionizing radiation
FCC	Federal Communications Commission certificate
	Package symbol, fragile.
	Package symbol, keep away from sunlight
	Package symbol, keep dry
	Package symbol, this symbol is used to indicate the humidity limits.
	Package symbol, keep the equipment up right
	Package symbol, do not roll the transportation package.
	Package symbol, this symbol is used to indicate stacking limit number.

Contents

1 Safety Information

1.1 Safety precautions

Follow these safeguards and properly use the equipment to prevent injury and damage to any equipment/data.

WARNING
Installation and environment of use      • **Do not use or store the equipment near flammable chemicals such as alcohol, thinner, benzene, etc.** If chemicals are spilled or evaporate, it may result in fire or electric shock through contact with electric parts inside the equipment. Also, some disinfectants are flammable. Be sure to take care when using them.    • **Do not connect the equipment with anything other than specified.** Doing so may result in fire or electric shock. • **All the patients with active implantable medical devices should be kept away from the equipment.**
Power supply      • **Do not operate the equipment using any type of power supply other than the one indicated on the rating label.** Otherwise, it may result in fire or electric shock. • **Do not handle the equipment with wet hands.** You may experience electric shock that could result in death or serious injury. • **Do not place heavy object such as medical equipment on cables and cords. Do not pull, bend, bundle, or step on them to prevent their sheath from being damaged, and do not alter them neither.** Doing so may damage the cords which could result in fire or electric shock. • **Do not supply power to more than one piece of equipment using the same AC outlet.** Doing so may result in fire or electric shock. • **Do not turn ON the system power when condensation has formed on the equipment.** Doing so may result in fire or electric shock.

- **Do not connect a multiple portable socket-outlet or extension cord to the system.**

  Doing so may result in fire or electric shock.

- **To avoid the risk of electric shock, this equipment must only be connected to power supply with protective earth.**

  Not doing so may result in fire or electric shock.

- **Securely plug the power cord into the AC outlet.**

  If contact failure occurs, or if metal objects come into contact with the exposed metal prongs of the plug, fire or electric shock may result.

- **Be sure to turn OFF the power to each piece of equipment before connecting or disconnecting the cords.**

  Otherwise, you may get an electric shock that could result in death or serious injury.

- **Be sure to hold the plug or connector to disconnect the cord.**

  If you pull the cord, the core wire may be damaged, resulting in fire or electric shock.

WARNING

Handling

- **Never disassemble or modify the equipment. No modification of this equipment is allowed. Parts of the Mars1717V that are not serviced or maintained while in use with the patient**

  Doing so may result in fire or electric shock. Also, since the equipment incorporates parts that may cause electric shock as well as other hazardous parts, touching them may cause death or serious injury.

- **Do not place anything on top of the equipment.**

  The object may fall and cause an injury. Also, if metal objects such as needles or clips fall into the equipment, or if liquid is spilled, it may result in fire or electric shock.

- **Do not hit or drop the equipment.**

  The equipment may be damaged if it receives a strong jolt, which may result in fire or electric shock if the equipment is used without being repaired.

- **Do not put the equipment and pointed objects together.**

  The equipment may be damaged. If so, the equipment should be used in bucky.

- **Have the patient take a fixed posture and do not let the patient touch parts unnecessarily.**

  If the patient touches connectors or switches, it may result in electric shock or malfunction of the equipment.

When a problem occurs

- **Should any of the following occurs, immediately unplug the power cord of adaptor or battery, and contact your sales representative or local iRay dealer:**

  When there is smoke, an odd smell or abnormal sound.

  When liquid has been spilled into the equipment or a metal object has entered through an opening.

  When the equipment has been dropped and damaged.

Maintenance and inspection

- **Please turn OFF the power of the equipment and unplug the power cord of adaptor before cleaning.**
- **NEVER use alcohol, ether and other flammable cleaning agent for safety. NEVER use methanol, benzene, acid and base because they will erode the equipment.**
- **DON'T dip the equipment into the liquid.**
- **Please make sure that the equipment's surface & plugs are dry before turning ON.**

  Otherwise, it may result in fire or electric shock.

- **Clean the plug of the power cord periodically by unplugging it from the AC outlet and removing dust or dirt from the plug, its periphery and AC outlet with a dry cloth.**

  If the cord is kept plugged in for a long time in a dusty, humid or sooty place, dust around the plug will attract moisture; this could cause insulation failure that may result in a fire.

- **For safety reasons, be sure to turn OFF the power to each piece of equipment when performing inspections indicated in this manual.**

  Otherwise, electric shocks may occur.

CAUTION

Installation and environment of use

- **Do not install the equipment in any of the locations listed below. Doing so may result in failure, malfunction, equipment falling, fire or injury.**

Close to facilities where water is used

Where it will be exposed to direct sunlight

Close to the air outlet of an air-conditioner or ventilation equipment

Close to heat source such as a heater

Where the power supply is unstable

In a dusty environment

In a saline or sulfurous environment

Where temperature or humidity is high

Where there is freezing or condensation

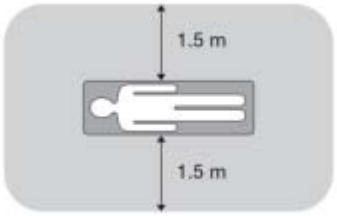
In areas prone to vibration

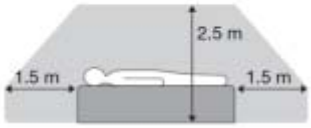
On an incline or in an unstable area

- **Take care that cables do not become tangled during use. Also, be careful not to get your feet caught by cable.**

Otherwise, it may cause a malfunction of the equipment or injury of the user due to tripping over the cable.

- **Non-medical equipment such as the battery charger, access point and IR data communication unit cannot be used in patient's vicinity.**





Power supply

- **Always connect the three-core power cord plug to a grounded AC power outlet.**
- **To make it easy to disconnect the plug at any time, avoid putting any obstacles near the outlet. Otherwise, it may not be possible to disconnect the plug in an emergency.**
- **Be sure to ground the equipment to an indoor grounded connector. Also, be sure to connect all the grounds for the system to a common ground.**
- **Do not use any power source other than the one provided with this equipment.**

Otherwise, fire or electric shock may be caused due to leakage.

Handling

- **Do not spill liquid or chemicals onto the equipment. In case the patient is injured, it is not allowed to contact with blood or other body fluids.**

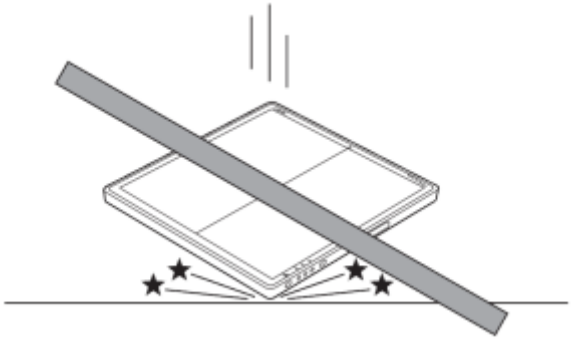
  Doing so may result in fire or electric shock.

  In such a situation, protect the equipment with a disposable cover as necessary.
- **Turn OFF the power and pull out the plug to each piece of equipment for safety when not used.**

CAUTION

Handling

- **Handle the equipment carefully.**
- **Do not submerge the equipment in water.**
- **The internal image sensor may be damaged if something hits against it or it is dropped. If the equipment is dropped, the drop sensor inside will turn red and the equipment will not be warranted by iRay.**



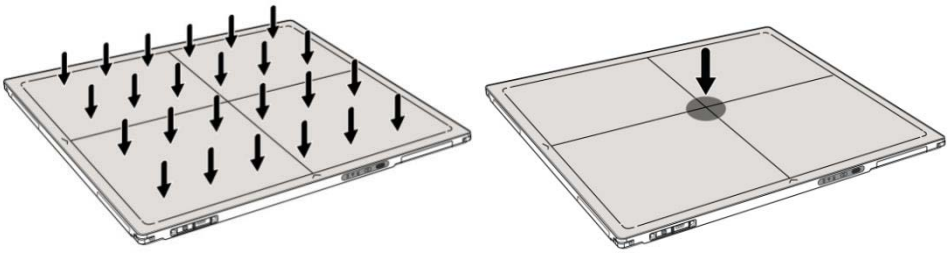
- **Do not place excessive weight on the equipment.**

  Otherwise, the internal image sensor may be damaged and image may be incorrect.

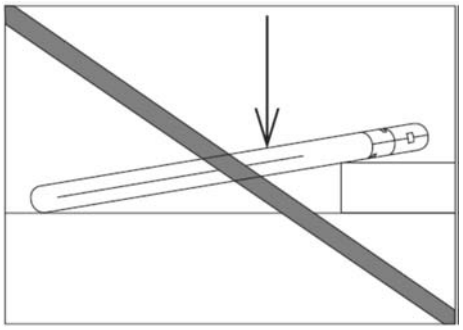
<Load Limit>

Uniform load：100 kg over the whole area of the detector surface.

Local load：100 kg on an area 4 cm diameter.



- **Be sure to use the equipment on a flat surface so it will not bend. Otherwise, the internal image sensor may be damaged. Be sure to securely hold the detector while using it in upright positions. Otherwise, the detector may fall over, resulting in injury to the user or patient, or may flip over, resulting in damage to the inner device.**



Keep the same load (same pressure) on the detector when acquiring the image. Or the image will be incorrect.

CAUTION

⚠ CAUTION

- Do not close to fire, do not use in high temperature
- Do not invert positve and negative pole
- Do not contact with metal in case of short circuit
- Do not insert sharp objects into battery
- Do not beat battery
- Do not stand on battery

- Do not use battery out of rules
- Do not dispose battery or change internal structure
- Do not submerge battery in water, please keep dry in storage and do not contact with water in use
- Please charge battery with charger following IEC60601-1 & IEC62133 Standards provide by us
- Do not mix battery with ones not provided by our company
- Do not charge battery with broken charger.

1.2 Notes for Using

When using the equipment, take the following precautions. Otherwise, problems may occur and the equipment may not function correctly.

Before exposure

- Be sure to check the equipment daily and confirm that it works properly.
- Be sure there be a battery installing on the Mars1717V to avoid the power off suddenly.
- Sudden heating of the room in cold areas will cause condensation to form on the equipment. In this case, wait until the condensation evaporates before performing an exposure. If the equipment is used while condensation is formed on it, problems may occur in the quality of captured images. When an air-conditioner is used, be sure to raise/lower the temperature gradually so that a difference of temperature in the room and equipment does not occur, to prevent condensation.
- The detector should warm up for 15 minutes before exposure or updating the gain map or defect map.

During exposure

- Do not move the power or Ethernet Cables during exposure, or it may cause image noise or artifacts, even incorrect images.
- Do not use the devices near the equipment generating a strong magnetic field. Otherwise, it may cause image noise, artifacts or even incorrect images.

Disinfection and Cleaning

- After every examination, wipe the patient contact surfaces of the detector using disinfectants such as ethanol, to prevent the risk of infection. For details on how to sterilize, consult a specialist.
- Do not spray the detector directly with disinfectants or detergents.
- Wipe it with a cloth slightly damped with a neutral detergent. Do not use solvents such as alcohol, thinner, benzene, acid and base. Doing so may damage the surface of the equipment.
- It's recommended to use a waterproof non-woven cover as the isolated layer between detector and

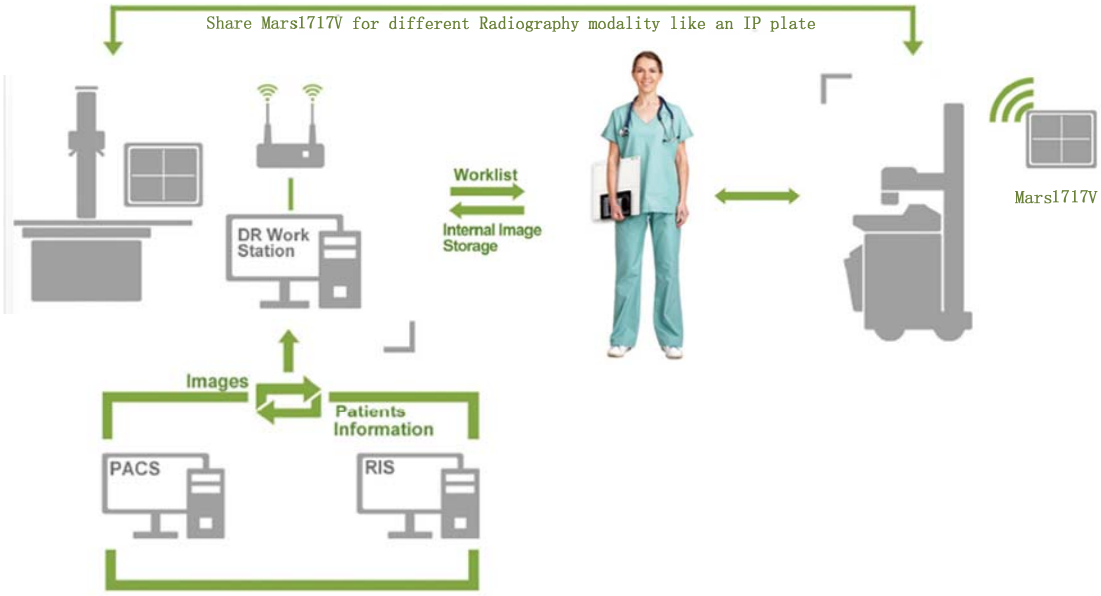
the blooding patient.

2 General Description

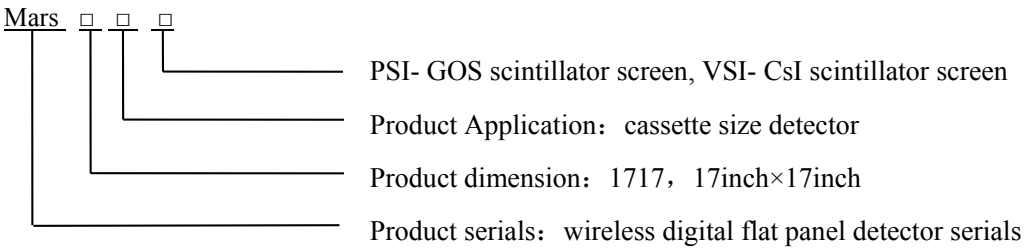
Mars1717V is a cassette-size wireless X-ray flat panel detector based on amorphous silicon thin-film transistor technologies. It is developed to provide the highest quality of radiographic image, which contains an active matrix of 3072×3072 with 139um pixel pitch. Detectors' scitinator has two options which are Standard GOS(Gadolinium Sulfoxylate) and CsI(CaesiumIodide). However the most great improvement is Mars1717V supports wireless communication between detectors and PC. Mars1717V's power supply includes battery. Mars1717V can be used as a real portable panel.

2.1 Scope

This manual contains information about the iRay Mars1717V. All operators must read and understand this manual before using equipment. All information in this manual, including the illustrations, is based on equipment prototype. If configuration of your equipment does not have any of these items, information about these items in the manual does not apply to your equipment.



2.2 Model



Product Type: Battery-KV---------Rechargeable lithium battery

Product Type: Charger-KV--------Battery charger

2.3 Characteristic

- Wireless static Flat Panel Detector used for general radiography.
- 17 × 17 inch
- Sync-Shot exposure trigger
- GOS or CsI scintillation screen.
- Easy to change the cable and upgrade firmware.
- Battery recycling

2.4 Intended use

This equipment provides digital X-ray imaging for diagnosis of disease, injury, or any applicable health problem. The image is obtained as the result of X-ray passing through the human body and detected by the equipment. This device is intended to be used in the holder or bucky which is well insulated to panel. The holder or the bucky is well grounded. This panel is not intended for directly contacting with patient

iRay will provide equipment and software support for integration of system. The length of both Ethernet Cable and DC Power Cable cannot exceed 3.5 m. or the impedance of protective earth connections may exceed the safety threshold.

This panel is not intended for mammography or dental applications，and prohibited for pregnant women and children.

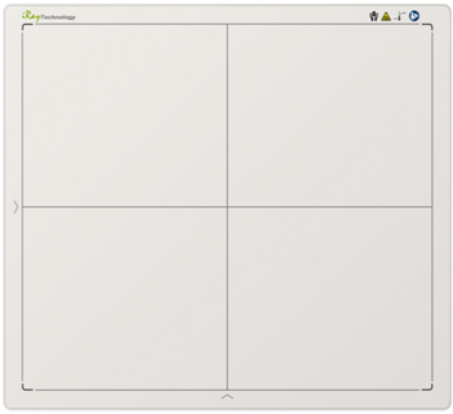
According to the Mars1717V intended use and the result of risk management, identifying and describing the essential performance as the following:

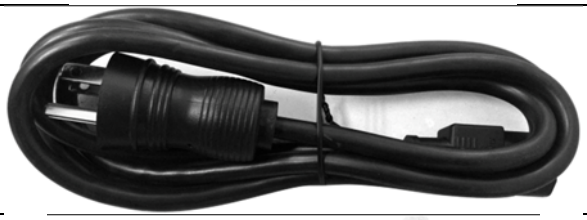
a) To get imaging of dark field, the Mars1717V shall be not influenced to the imaging acquisition

b) To keep the data transmission function, the Mars1717V shall be not influenced to the data and signal transmission

2.5 Standard Product Components

Mars1717V comes with power supply both 24V DC and battery package. Once powered on, it would build a connection with PC through Ethernet cable or Wireless connection.

Item		Description
Mars1717V Detector		1 pcs Main Unit
Medical Adapter for • Detector and • Battery Charger		2 pcs DC 24V
Battery Pack		2 pcs Battery-KV

Ethernet Cable		1 pcs 3.5 m
Gigabit Ethernet Cable		1 pcs 3 m
AC Power Cable		2 pcs
DC Power cable		1 pcs 3.5 m
Battery Charger		1 pcs

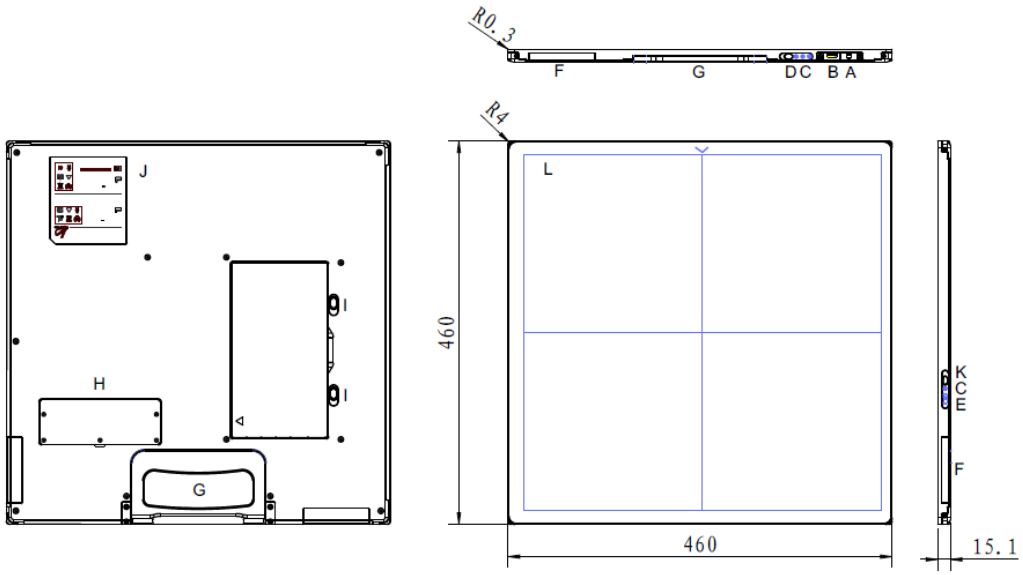
CD-Rom		1 pcs Gain correction data Defect correction map SDK Manual

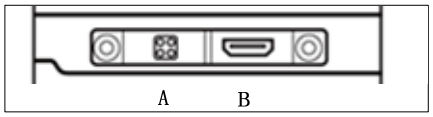
2.6 Optional Product Component

	Item	Description
Wireless AP Device		1 pcs
Infrared Device		1 pcs

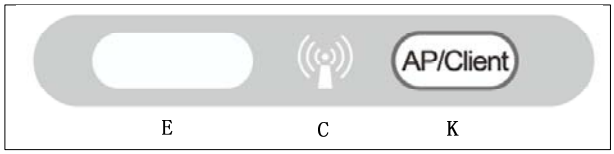
2.7 Components Description

2.7.1.1 Detector

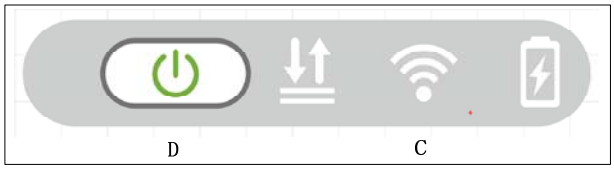




External Signals Input



Control Panel

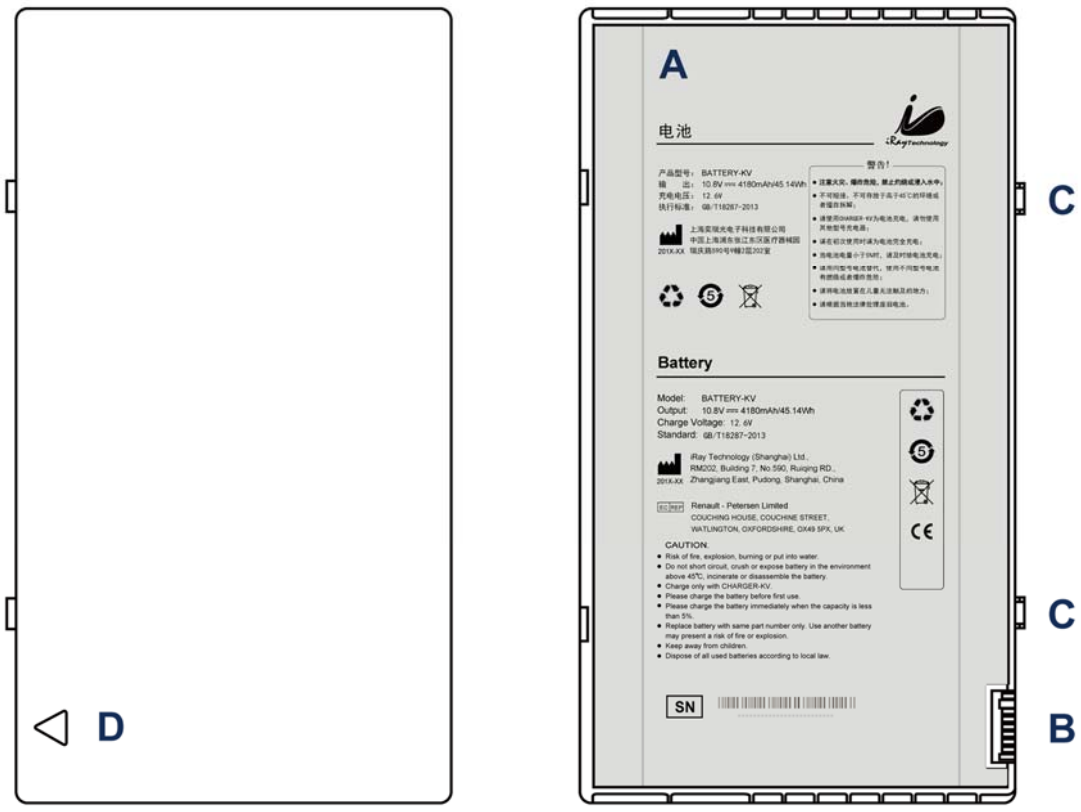


Control Panel

Item	Name	Description
A	DC Input Interface	24V DC input
B	Ethernet Interface	Gigabit Ethernet Wire
C	Detector Indicator	Detector indicator of control panel
D	Power Button	Power button of control panel

E	Infrared Window	Infrared device window
F	Antenna	Antenna
G	Handle	For the panel carried
H	Maintenance Cover	For service engineer to maintenance
I	Battery Lock	The lock button for detaching battery
J	Detector Label	Product information.
K	Switch	AP/Client Mode Switch
L	Carbon Film	Panel Carbon Film, have biocompatibility

2.7.1.2 **Battery**



Item	Name	Description
A	Battery Label	/
B	Battery Interface	8 Pin Battery connector
C	The location pin	/
D	Indicator	Installation direction indicator

2.7.1.3 **Battery Charger**

Item	Name	Description
A	Battery Interface	8 Pin Battery connector
B	Capacity Indicator	The indicator definition is as follow
C	Power Indicator	The indicator definition is as follow
D	Hand Pull Position	/
E	The limit ball plug	/
F	DC Jack	24V DC input

Power indicator definition:

Power Indicator	Lighting Status	Operating Status
OFF		No external DC adaptor input
GREEN ON		External DC adaptor input

The battery charging capacity indicator definition:

X Group Indicator	Lighting Status	Operating Status
I, II and III grid OFF		No battery Insert

I grid blinking II and III grid OFF		Battery Insert with capacity ≤30%，charging
II grid blinking I and III grid OFF		Battery Insert with capacity >30% and ≤60%，charging
III grid blinking I and II grid OFF		Battery Insert with capacity >60% and ≤95%，charging
I and II grid OFF III grid ON		Battery Insert with capacity >95% and charging, when capacity = 100%, charging can stop automatically

2.7.1.4 **Power Supply**

Mars1717V supports both DC Power and Battery package input.

2.7.1.5 **Infrared Device**

Mars1717V does not include Infrared Device. Users can select by themselves, however some basic requirements should be followed.

2.8 Product Specification

2.8.1 Detector

2.8.1.1 **Basic**

Item	Specification
Model	Mars1717V-PSI (GOS) Mars1717V-VSI (CsI)
Image Sensor	a-Si (Amorphous Silicon) TFT
Pixel Size	139 μm
Effective Array	3072 x 3072
Effective Area (H x V)	427 x 427 mm
Fill Factor	60%
Greyscales	14bit
Spatial Resolution	2.8 Lp/mm (Standard GOS)

	3.1Lp/mm (CsI)
Image Acquisition Time (Wired)	Preview Acquisition Time : 6 sec Processed Acquisition Time : 10 sec. (including Preview Time)
Image Acquisition Time (Wireless) Both AP mode and Client mode	Preview Acquisition Time : 9 sec. Processed Acquisition Time : 16 sec. (including Preview Time)
Cycle Time	Min. 13s @Wired;Min.16s @Wireless
Power Consumption	Max. 16W
Dimension (L × W × H)	460 x 460 x 15.2 mm
Weight (with one battery)	Mars1717V-PSI: 4.3 kg without battery, 4.6 kg with battery Mars1717V-VSI: 4.5 kg without battery, 4.8 kg with battery
Image Transfer	Wired : Gigabit Ethernet(1000BASE-T) Wireless : IEEE802.11a/b/g/n
Data Transmission Rate (Wireless)	802.11b : Max. 11Mbps 802.11a/g : Max. 54Mbps 802.11n : Max. 300Mbps (MIMO 2x2)
X-ray Energy	40kV to 150kV

2.8.1.2 **MTF**

The MTF with GOS should meet the following table

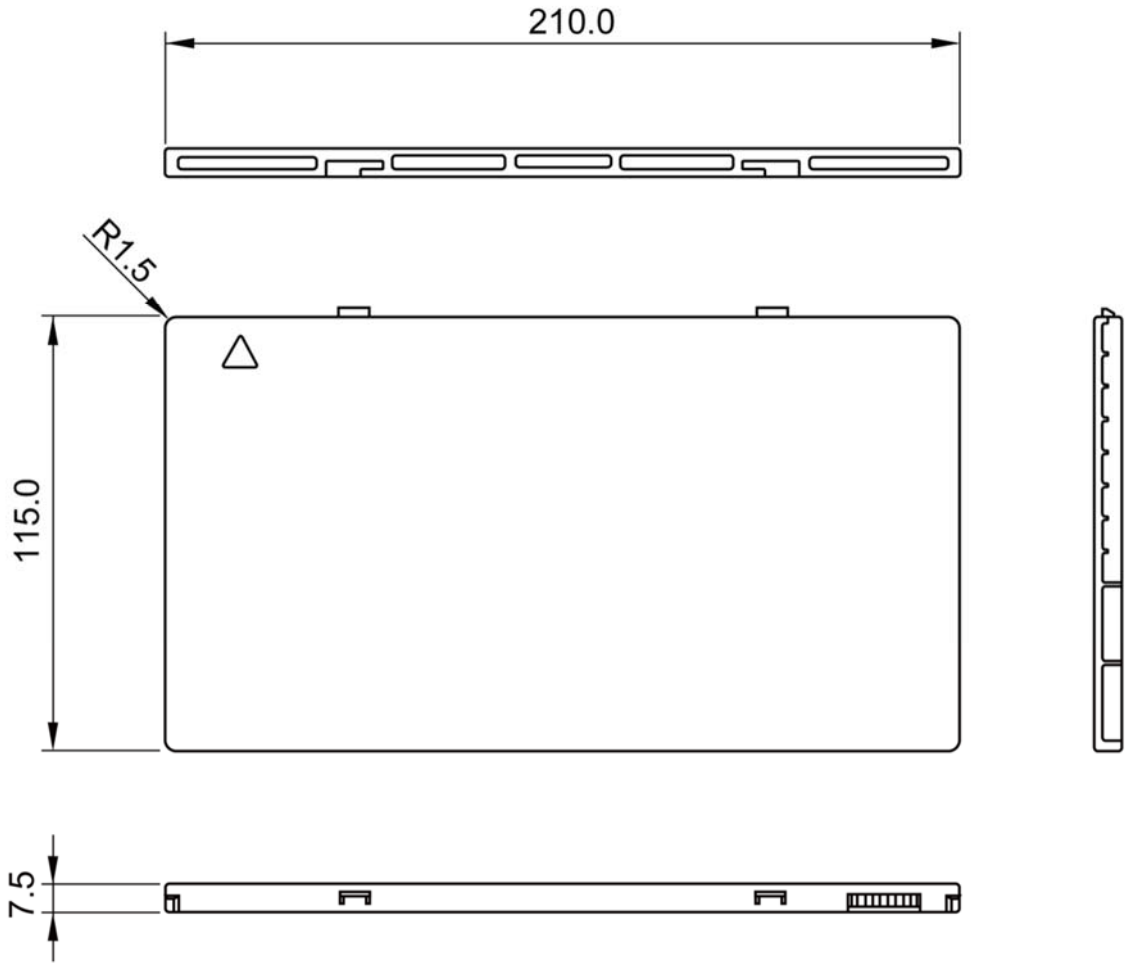
Spatial frequency (lp/mm)	MTF (GOS)	MTF(CsI)
1.0	0.39	0.60
2.0	0.12	0.31
3.0	0.04	0.15

2.8.1.3 **DQE**

The DQE with GOS should meet the following table

Spatial frequency (lp/mm)@RQA5	DQE (GOS)@3.2uGy	DQE (CsI)@2.5uGy
0	0.30	0.52
1.0	0.15	0.39
2.0	0.05	0.24
3.0	0.01	0.16

2.8.2 Battery



Item	Specifications
Model	Battery-KV
Rated Capacity	Min. 3950mAh, Typ. 4180mAh @ Discharge 0.2C
Nominal Voltage	10.8V
Charge Voltage	12.6±0.05V
Discharged End Voltage	8.25V
Charging Method	CC-CV
Operating Temperature	Charge 0℃-+45℃, Discharge -20℃-+60℃
Storage Temperature	1 month -20℃-+45℃ 3 month 0℃-+30℃ 6 month 5℃-+20℃
Relative Humidity	65±20%
Dimension (L × W × H)	210 x 115 x 7.5 mm
Weight	0.29 kg

2.8.3 Battery Charger

Item	Specifications
Model	Charger-KV
Simultaneous Charging	2 battery packs
Full charging time	2 hours
Rated power supply	24V(DC)
Dimension (L × W × H)	300 x 263 x 42 mm
Weight	1.26 kg

2.8.4 Power supply

Mars1717V supports both DC Power and Battery package input.

Item	Specifications
DC Power	**24V(DC), 0.8A**
Battery Package	10.8V(DC),1.78A

2.8.5 Infrared Device (Optional)

Mars1717V does not include Infrared Device. Users can select by themselves, however some basic requirements should be followed.

Item	Specifications
IRDA Protocol	Compliant with IrDA V1.0 and V1.1
USB	Compliant with USB V2.0 and V1.1
Data Rate	Max. 4Mbps

2.8.6 AP Router (Optional)

Mars1717V do not include AP Router. Users can select AP Router as they wish, however specification below is a requirements.

Item	Specifications
Wireless Standard	IEEE 802.11 a/b/g/n
Frequency Range	2.412 ~ 2.4835 GHz and 5.15 ~ 5.85 GHz
Wireless Data Rate	802.11b : Max. 11Mbps 802.11a/g : Max. 54Mbps 802.11n : Max. 300Mbps (MIMO 2x2)
Wired Data Rate	Max. 1Gbps

2.8.7 Wireless Communication

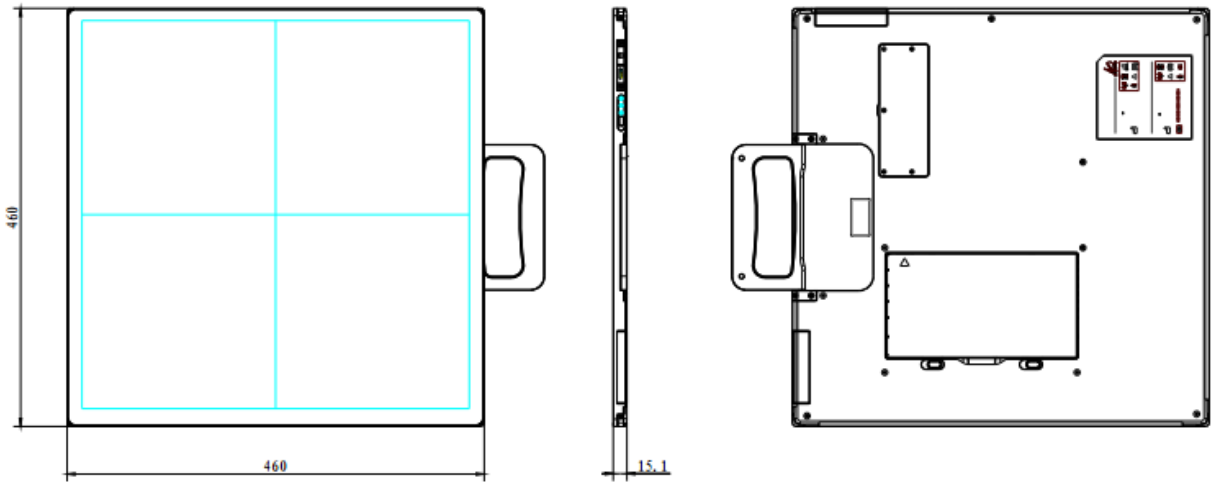
Item	Description
Wireless Standard	IEEE802.1a/b/g/n
Frequency Range	2.4G: 2.412 ~ 2.4835 GHz 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe

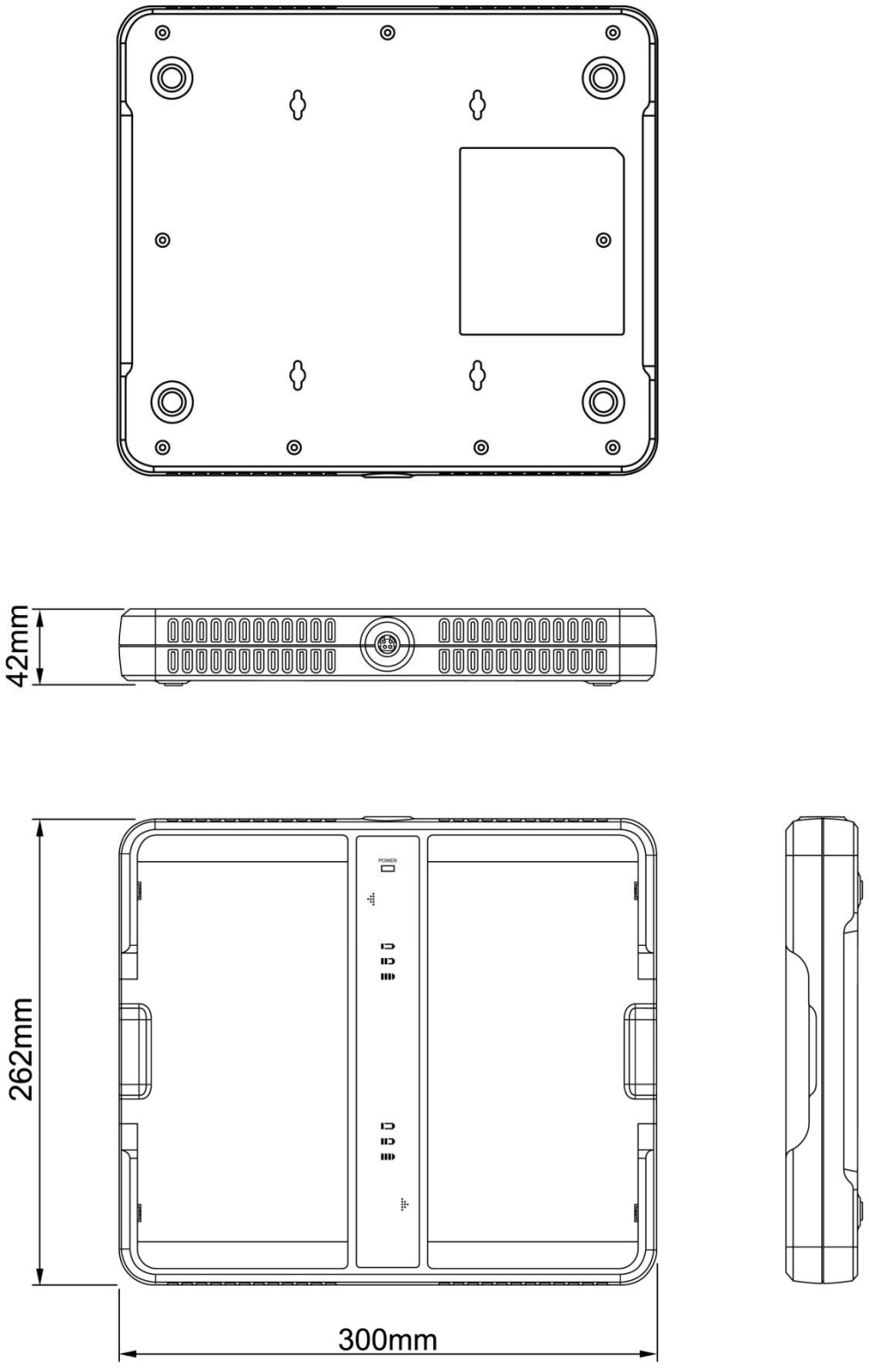
	14: (Ch. 1-14) – Japan 5G: 5.15 ~ 5.85 GHz 12: United States 19: Europe 8: Japan
Data Transmission Rate	802.11b : Max. 11Mbps 802.11a/g : Max. 54Mbps 802.11n : Max. 300Mbps (MIMO 2x2)
Modulation	802.11b: CCK, DQPSK, DBPSK 802.11a/g: 64 QAM, 16 QAM, QPSK, BPSK 802.11n: 64 QAM, 16 QAM, QPSK, BPSK
Transmission Power	Max.17dBm
Security	WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit
Antenna	2 Dual Band internal antenna

2.8.8 Recommended Applicance Condition

Item	Description
Operating System	Windows XP/7 32/64bit
CPU	Intel Core i73.6G
Memory	4G DDR3
Hard Disk	160 G
LAN Card	Intel Pro EXP9301CT PRO Gigabit Network Adapter with PCIe interface

2.8.9 Mechanical Outlines




42mm
262mm
300mm

2.8.10 Use Environment

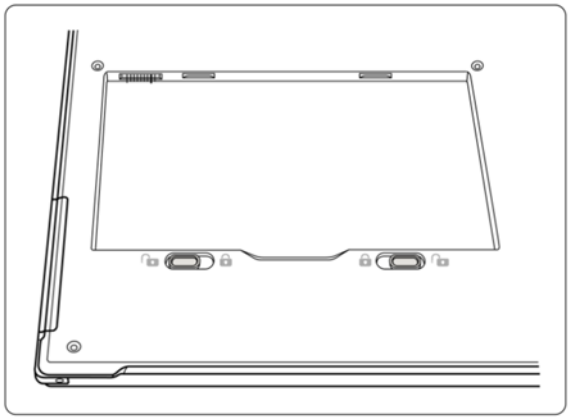
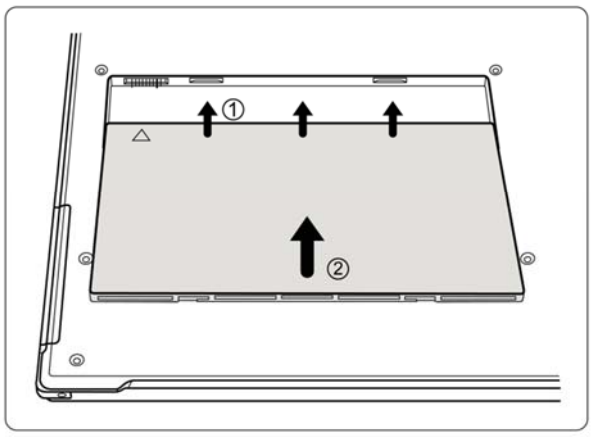
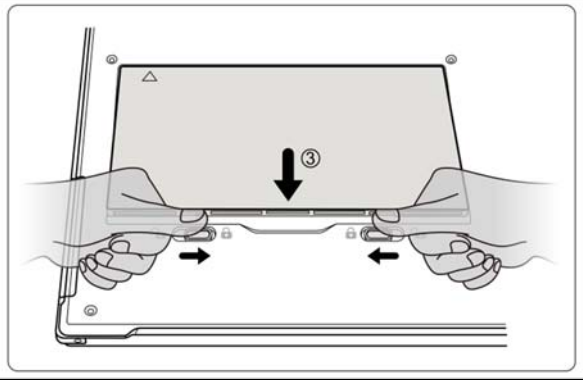
	Temperature	Temperature change	Humidity	AtmosphericPressure	Pressure Change
Operating	5~30℃	<1k/min	45~85% RH	700~1000hPa10~70% RH	<10kp/min (1kp=1.0197E-5Pa)
Storage	-20~60℃	<1k/min	45~85%RH	700~1000hPa10~70% RH	<10kp/min (1kp=1.0197E-5Pa)
The Mars1717V serial detectors shall operate at an altitude specified not more than 3000m.					

3 Installation

3.1 Detector Installation

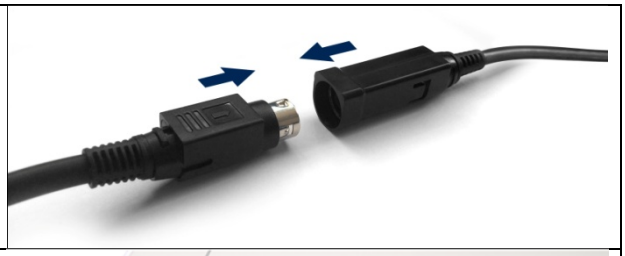
3.1.1.1 Attach Battery Pack

Mars1717V can be powered on by both battery package and DC power. Once battery package is inserted or DC power is on, Detectors would be activated immediately. If none of battery and DC power is on, Mars1717V would power off. Please see below for battery installation.

Make sure that the connectors on the battery package are pointed to the cave in battery compartment.	
Slide battery package into battery compartment （Make sure battery capacity overpass 10%）.	
Slide the battery lock lever.	

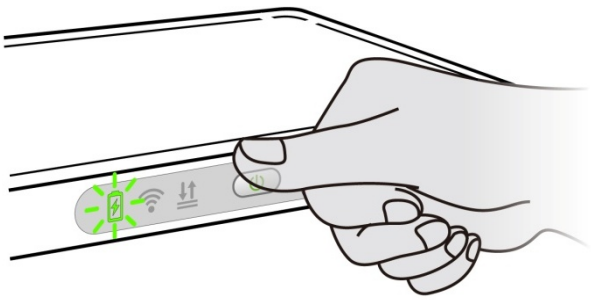
3.1.1.2 Attach DC Power

Please see below for DC power installation.

Connect one end of DC Power Cable to the Medical Adapter	
As figure is power interface and Ethernet interface	
Connect another end of DC Power Cable to the DC input of the detector. If user want to use wired Ethernet, connect the Ethernet cable to Ethernet interface.	

3.1.1.3 **Booting Up**

On the control panel, user can press power button to power on/off.

If detector is powered off, users can press the button for 4 seconds to power on the detector when battery is inserted and battery capacitor is not less than 10%, or direct current power is connected. If detector is powered on, users can press the button for 4 seconds to shut down the detector. On the other hand, it can also be used as reset internal control IC when button is active for 8s.	

After booting up the detector, use can check the status LED indicator of detector.

Power Indicator	Lighting Status	Operating Status		
		Operating	Battery Capacity	DC Input
OFF		Power OFF	/	/
Orange ON		Power ON	≤10%	NO
Green ON		Power ON	• Battery Capacity >10%, NO DC Input • No Battery with DC Input	
Orange Fast Blinking		Power OFF	≤10%	YES
Orange Slow Blinking		Power ON	≤10%	YES
Green Fast Blinking		Power OFF	>10%	YES
Green Slow Blinking		Power ON	>10%	YES
OFF after Green ON with 1 sec.		Power OFF	>10%	NO
OFF after Orange ON with 1 sec.		Power OFF	≤10%	NO

Link indicator is as table:

Link Indicator	Lighting Status	Description
OFF		• Panel shut down • wired connection broken and wireless connection not ready
Blue blinking		• Client mode, wireless connection is ready for connection, but not connected
Blue ON		• Client mode, wireless connection is built

		• AP mode, wireless AP is ready for connecting
Green ON		• Wired Connection is built
Green blinking		• Panel Initialization • Infrared configuration

Status indicator is as table:

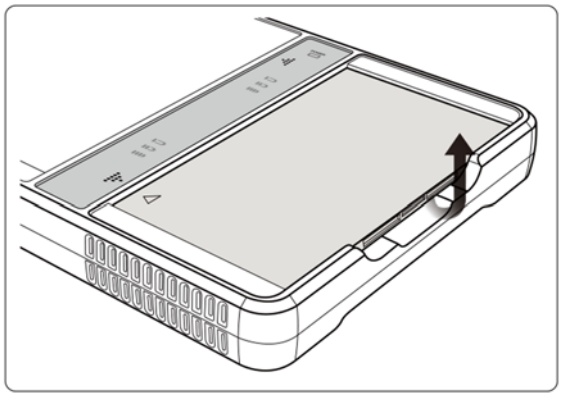
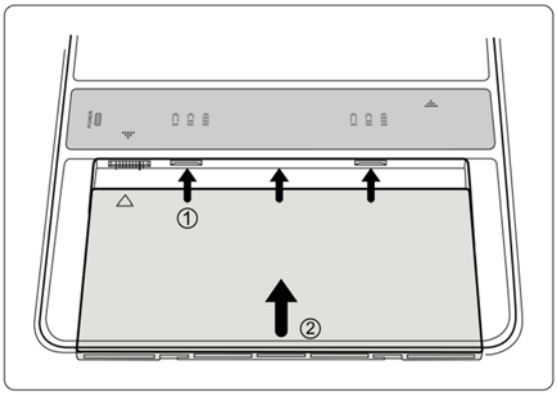
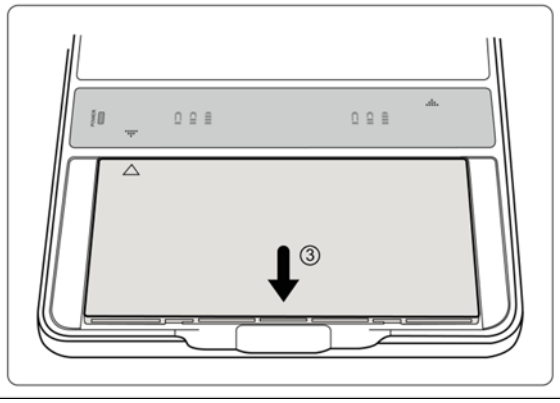
Status Indicator	Lighting Status	Description
OFF		• Panel shut down • Panel is idle
Green ON		• Data Transmission
Orange blinking		• Fatal Error
Orange ON		• Panel Initialization

AP/Client indicator is as table:

AP/Client Indicator	Lighting Status	Description
OFF		1. Network connection error; 2. Network connection is wired connection;
Green ON		Wireless connection ok, connection mode is AP
Blue ON		Wireless connection ok, connection mode is Client

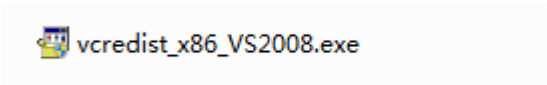
3.2 Battery Chargering Installation

Operating	Figure

Unload Battery from battery charger.	
Insert battery into battery charger. Note align the interface position as figure.	
Press the battery to the bottom of battery compartment.	

3.3 Software Installation

In the case of IDemo doesn't work, please install following VC redistribute package.

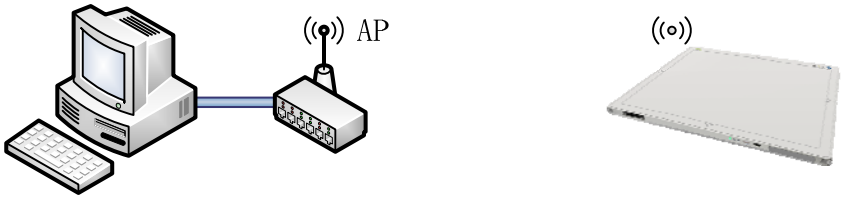


3.4 Panel Infrastructure

Mars1717V supports three connection modes as follows:

1) Wired connection mode

2) Wireless Client Mode



3) Wireless AP Mode

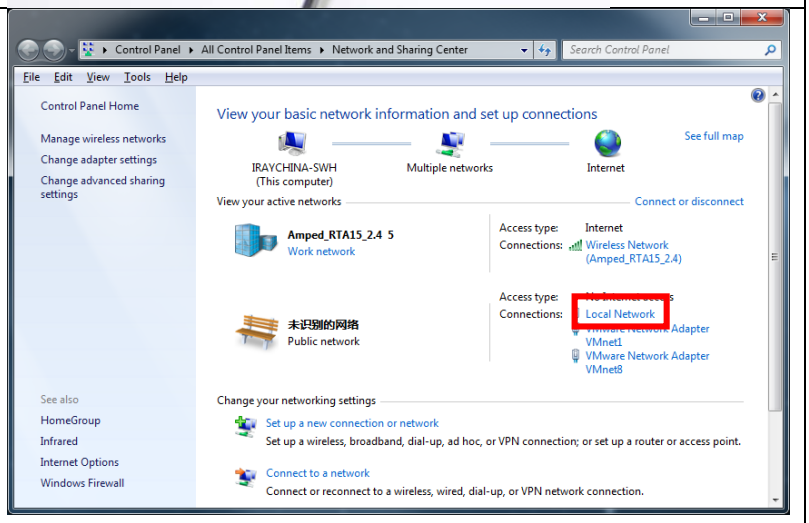
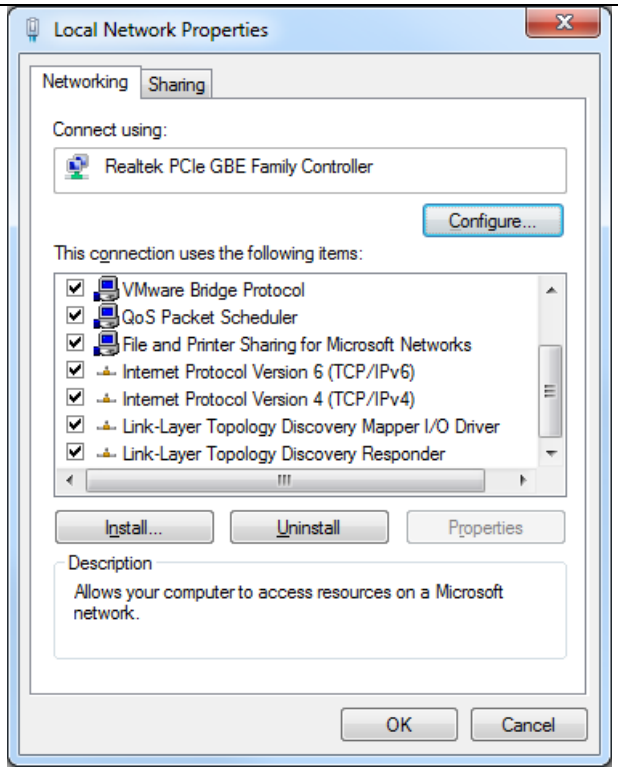
To build connection between workstation and Panel, User should follow steps below.

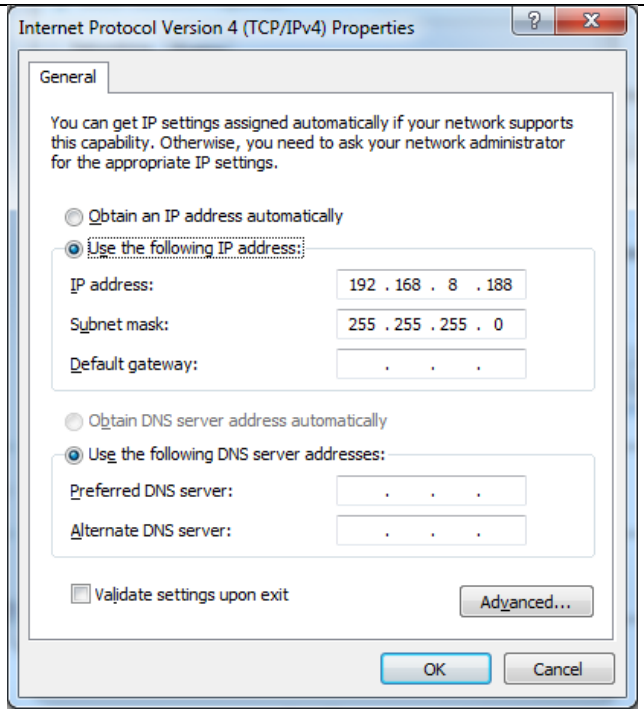
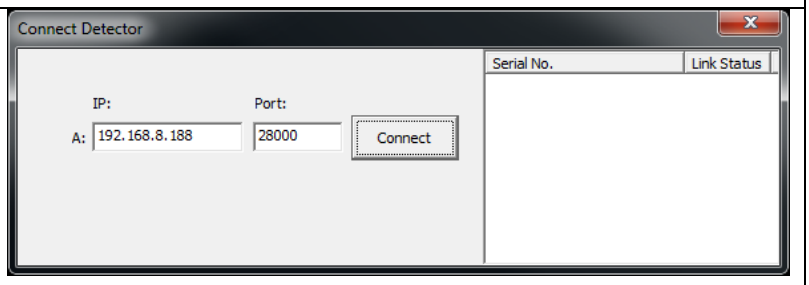
3.4.1.1 **Wired Mode**

To complete Wired connection configuration, users have to finish actions listed below.

Configuration of Ethernet Card

To begin configuration of Ethernet Card, users should finish 31.1.2

Connect detector to PC with Ethernet Cable	
Open Network configuration	
Open Local network configuration	

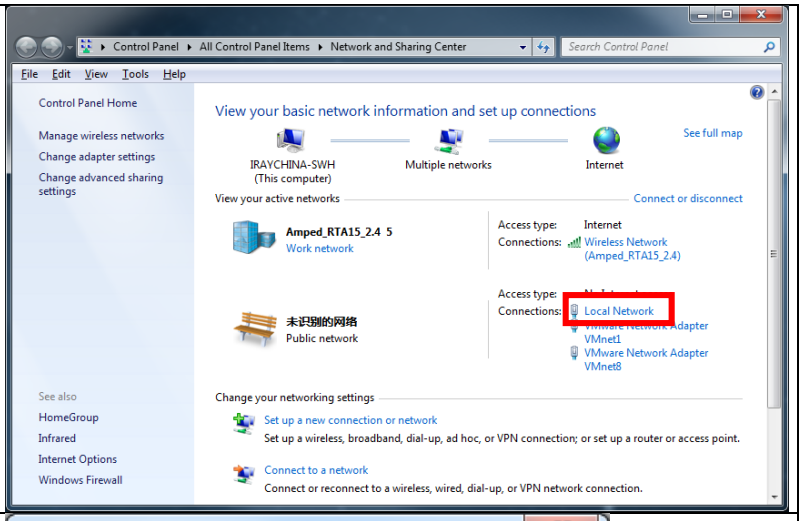
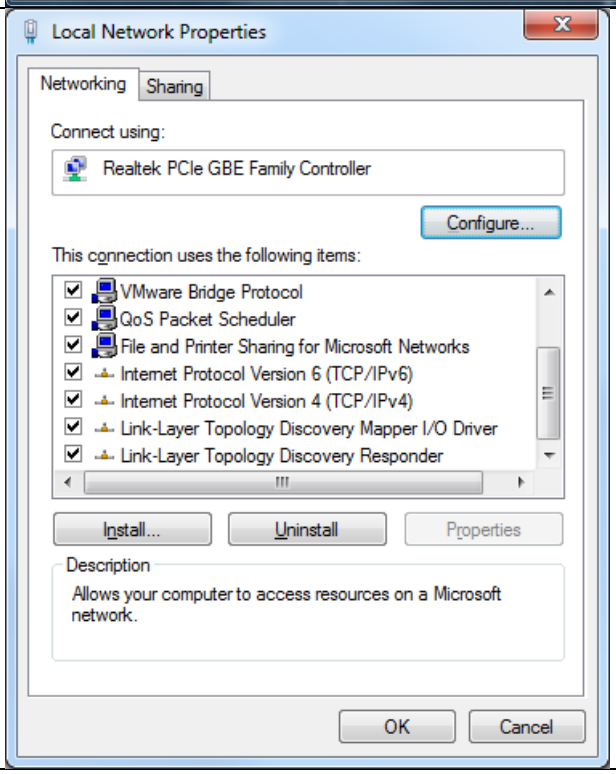
open IPV4 setting	
IP setting Network mask setting	IP address: 192.168.8.188 Subnet mask: 255.255.255.0
Open SDK and start connection	
IP and port setting	IP: 192.168.8.188 Port: 28000

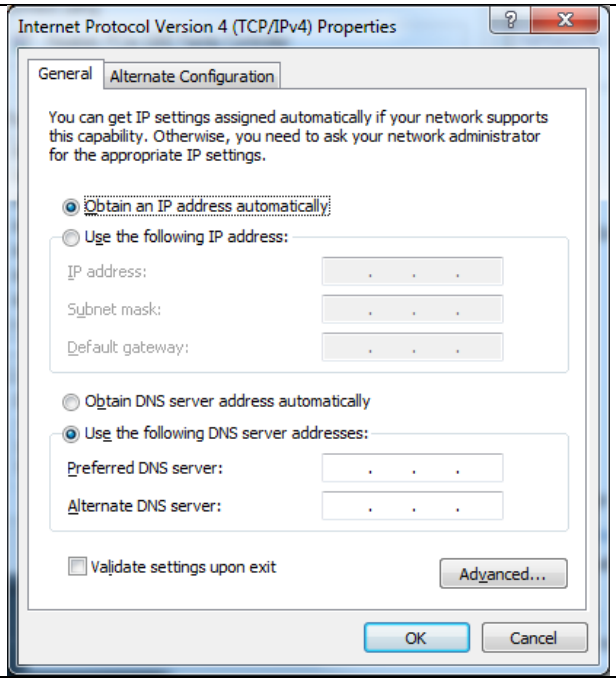
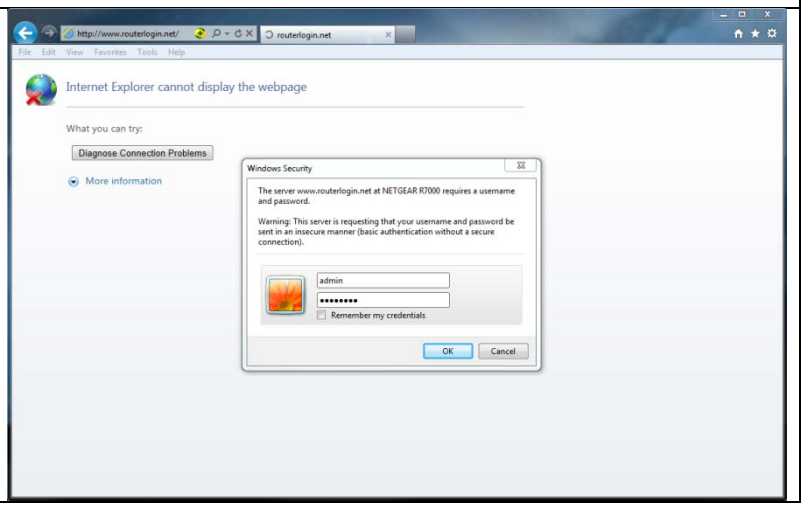
3.4.1.2 **Wireless Client mode**

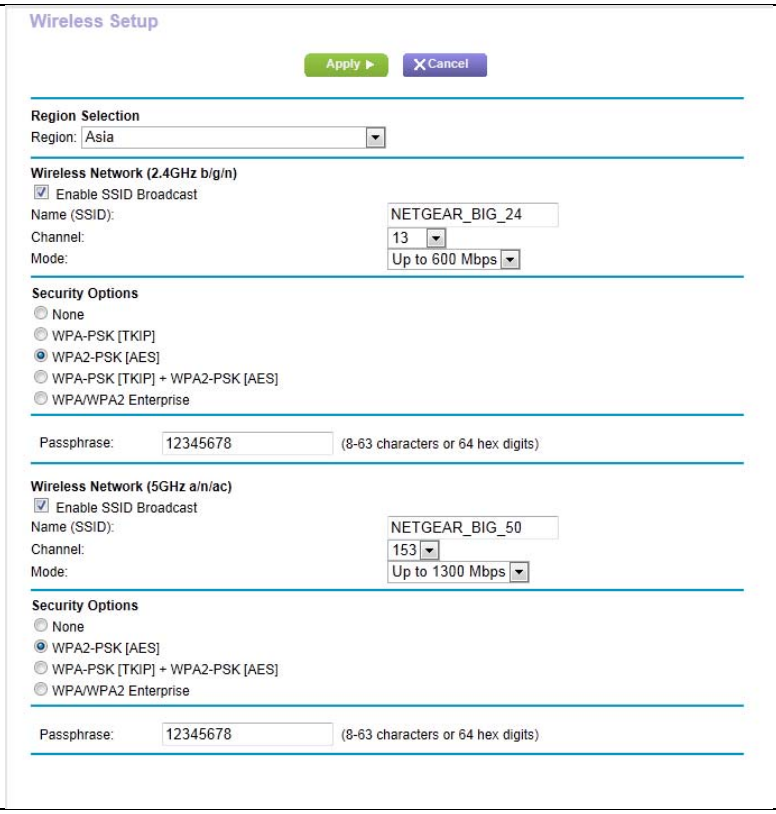
To complete Wireless Client mode configuration, users have to finish actions listed below.

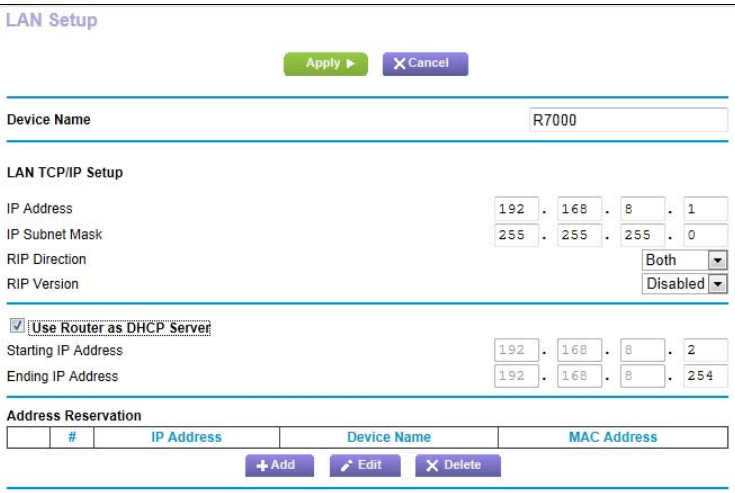
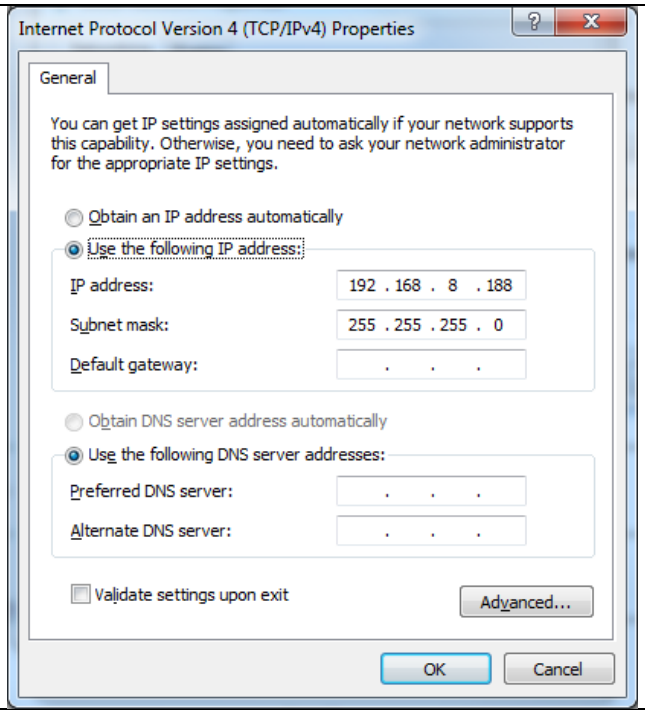
Configuration of External wireless AP

Connect one end of Gigabit Ethernet Cable to PC,Connect another end to LAN port of External wireless AP	/

Open Network configuration	
Open Local network configuration	

open IPV4 setting	
IP setting Network mask setting	Select "Obtain an IP address automatically"
Open browser and type 192.168.1.1 Log into external wireless AP	

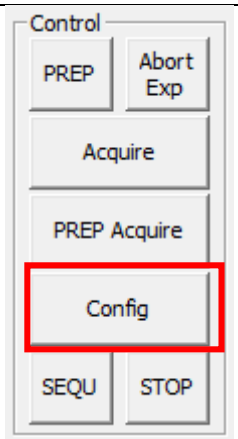
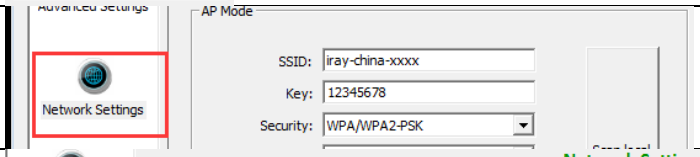
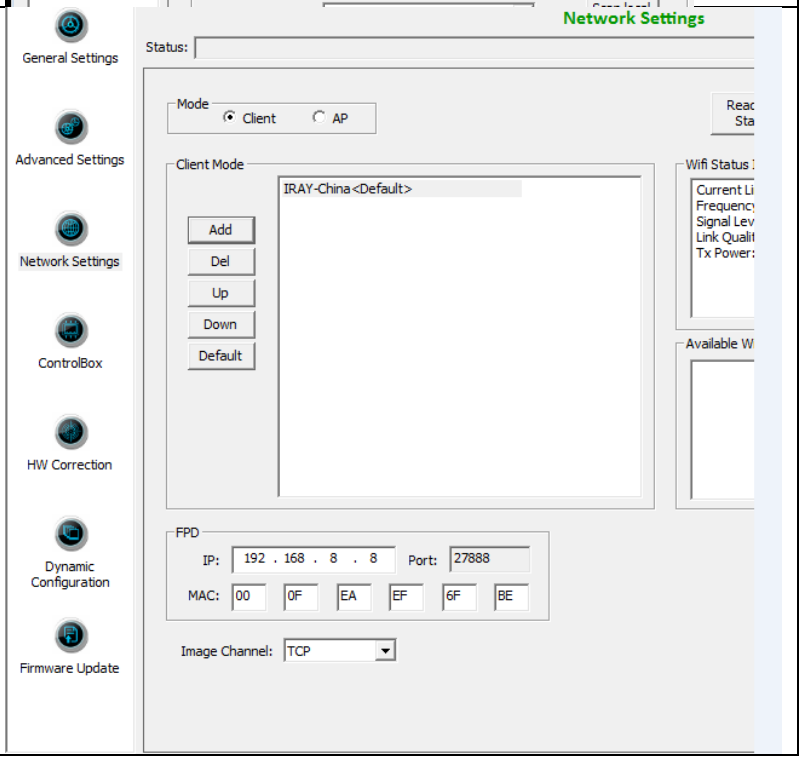
Wireless setup	
Configure 2.4GHz wireless network	SSID: NETGEAR_BIG_24 Security: WPA2-PSK Password: 12345678 Channel: [Please check the current Wi-Fi environment, and choose a relatively clean channel]
Configure 5GHz wireless network	SSID: NETGEAR_BIG_50 Security: WPA2-PSK Password: 12345678 Channel: [Please check the current Wi-Fi environment, and choose a relatively clean channel]

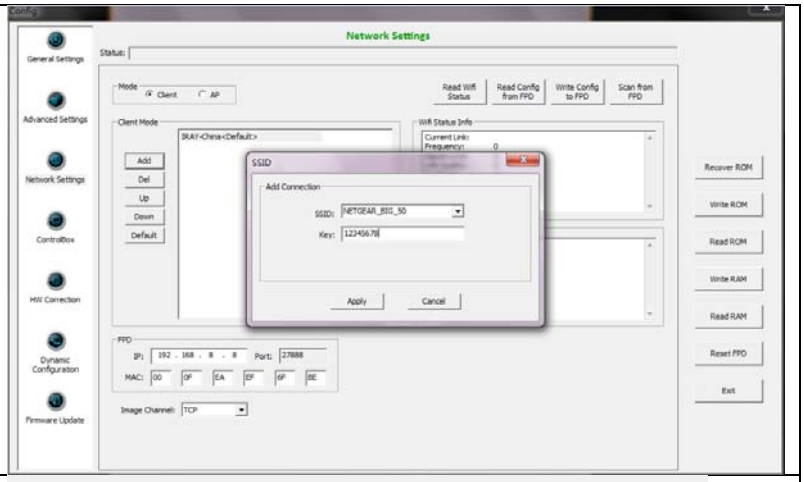
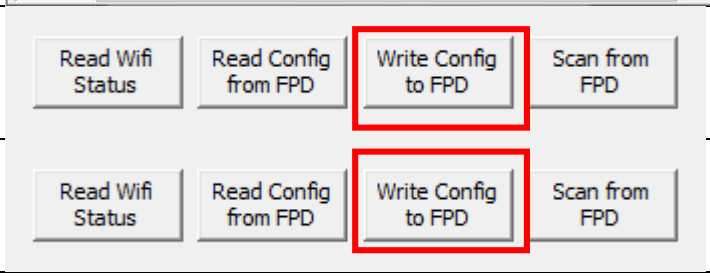
LAN setup	
Configure LAN IP address	IP address: 192.168.8.1 Subnet Mask: 255.255.255.0
External Wireless AP Reboot	Apply above settings and reboot your wireless router.
Recover Local Network IPv4 setting of PC wired Ethernet interface	
IP setting Network mask setting	IP address: 192.168.8.188 Subnet mask: 255.255.255.0

Configuration of detector

Either Wired Cable or Infrared device can be used to configure detector in wireless client mode.

a.To start configuration with wired cable. It is necessary to finish 3.2.2.1, then proceed to the steps below.

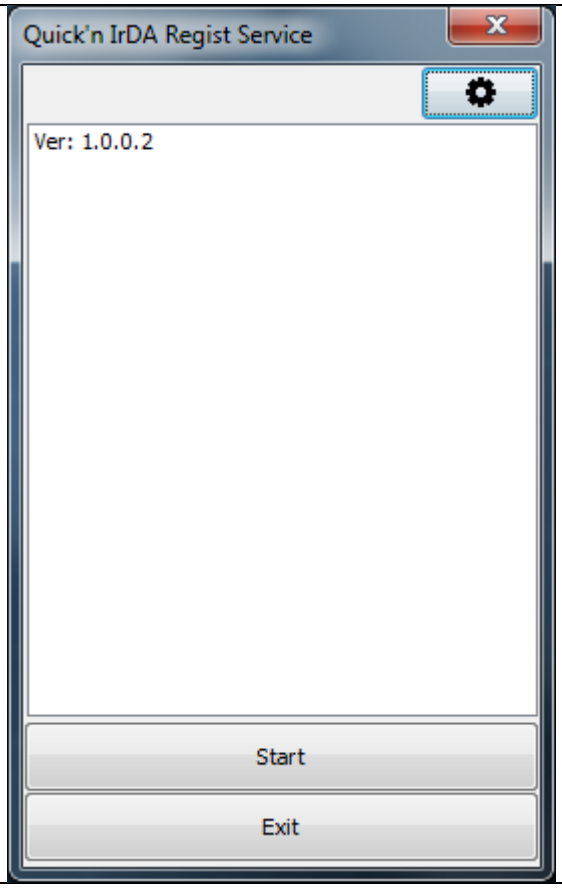
Click "Configure" in IDemo	
Click "Network setting"	
Click "Add"	

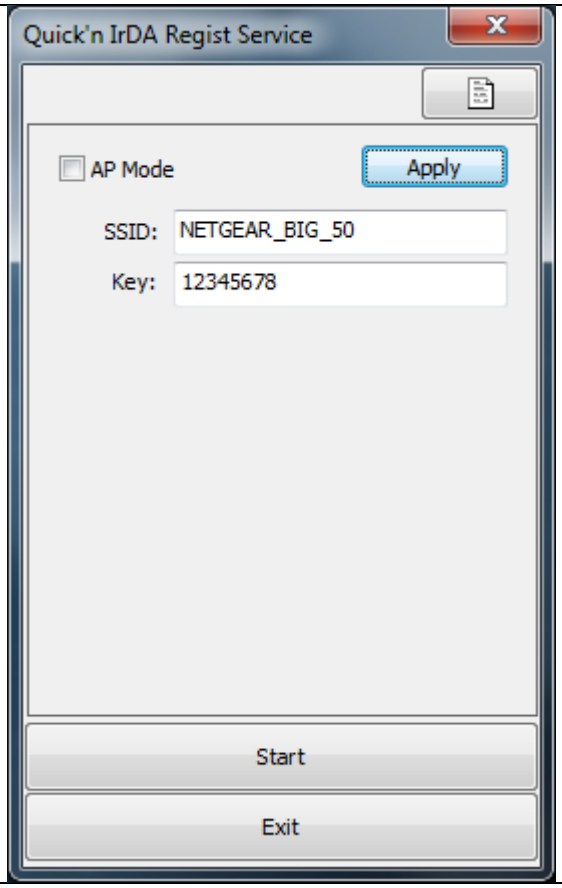
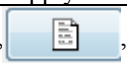
Change SSID and Key, Click "Apply"	
Click "write Config to FPD"	
Do not remove wired cable until "write to FPD" button recovers	

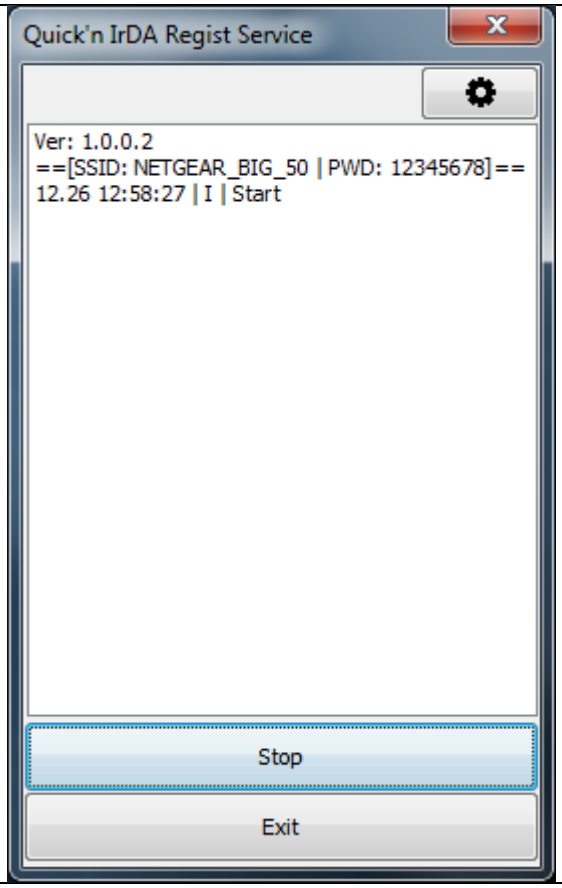
Since we have chosen default SSID and password, it would connect to wireless AP immediately after powered on next time.

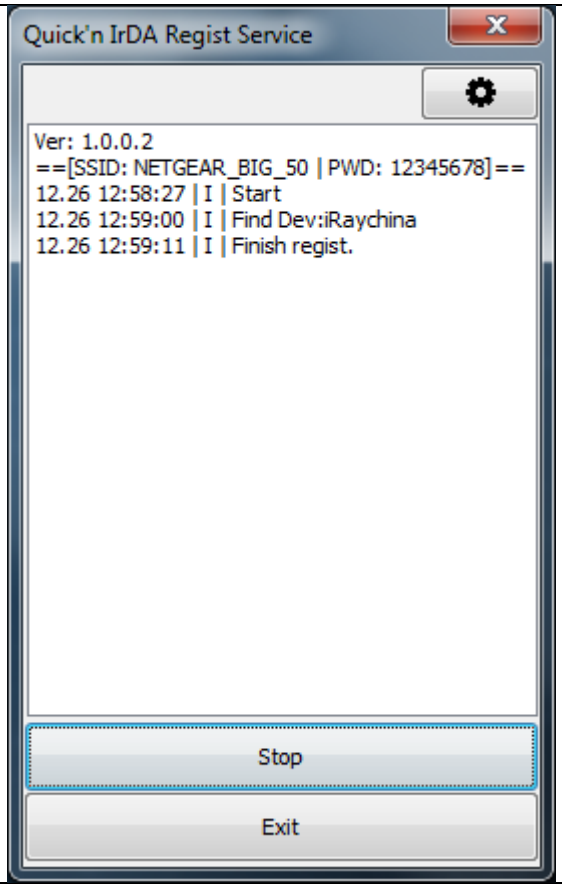
B. To start Infrared configuration. Please see below

Connect Infrared device with Workstation	/

Start IrDARegister.exe	
Click "  " to open wifi setting	/

Change SSID and password,do not select AP mode	
Click "Apply"	/
Click"  "	/

Click"Start"	
Point Infrared device to detector's infrared interface	/

Do not click"Exit" until success	
Disconnect Infrared device from PC	/

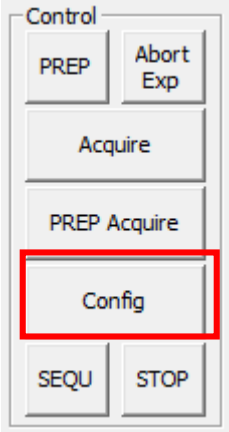
3.4.1.3 **Wireless AP mode**

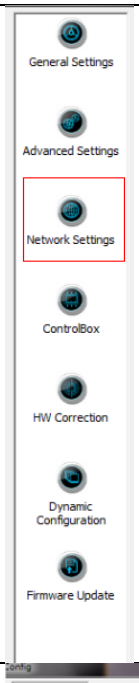
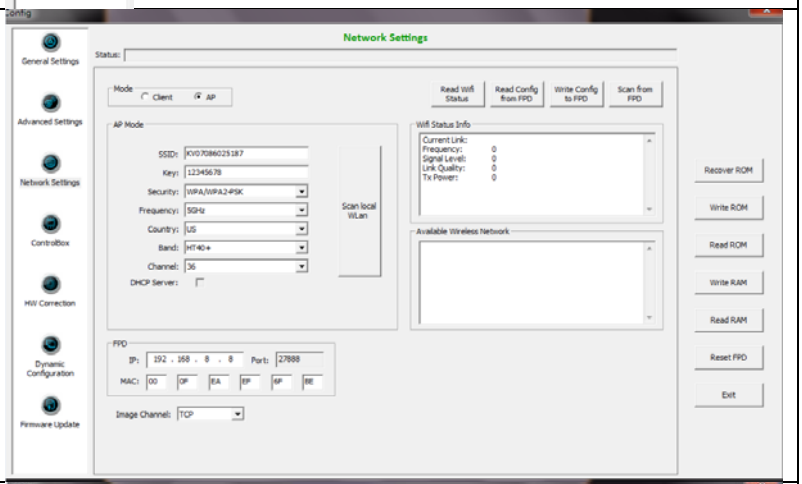
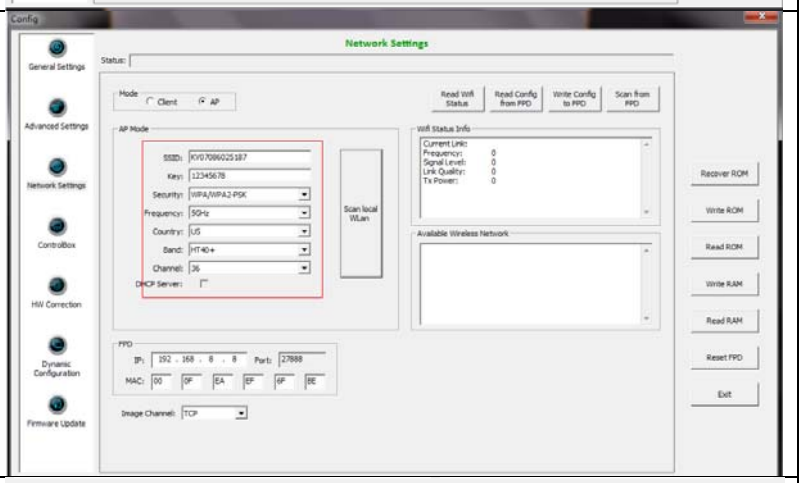
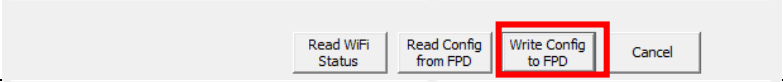
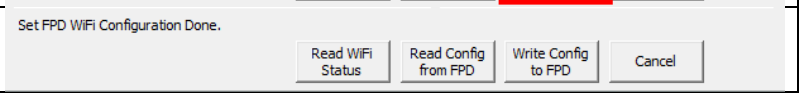
To complete Wired connection configuration, user has to finish actions listed below.

Configuration of detector

Either Wired cable or Infrared device can be used to configure detector wireless AP mode.

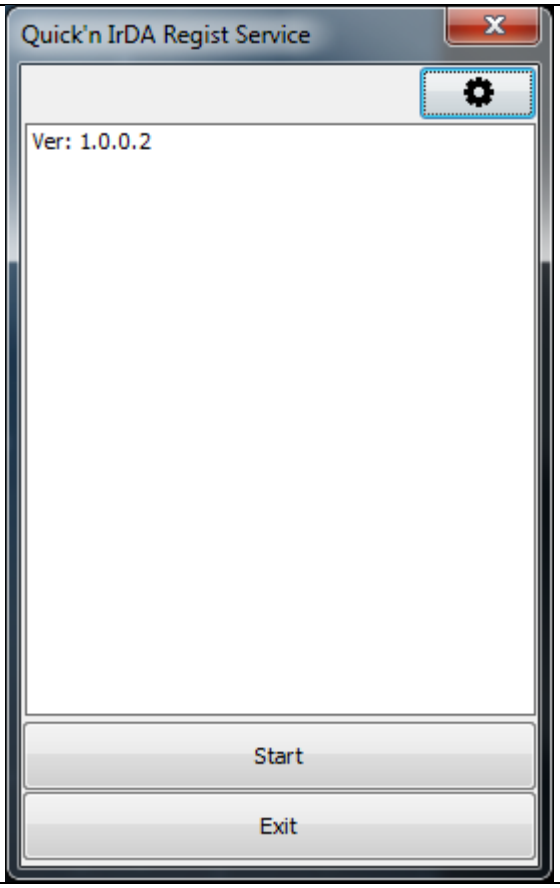
a.To start wired cable configuration, users should finish 3.4.1.1, then proceed to the steps below.

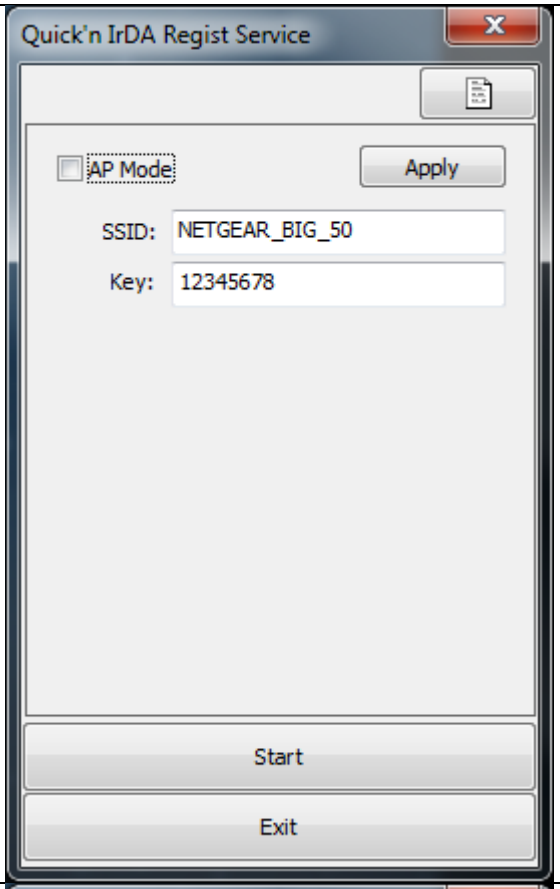
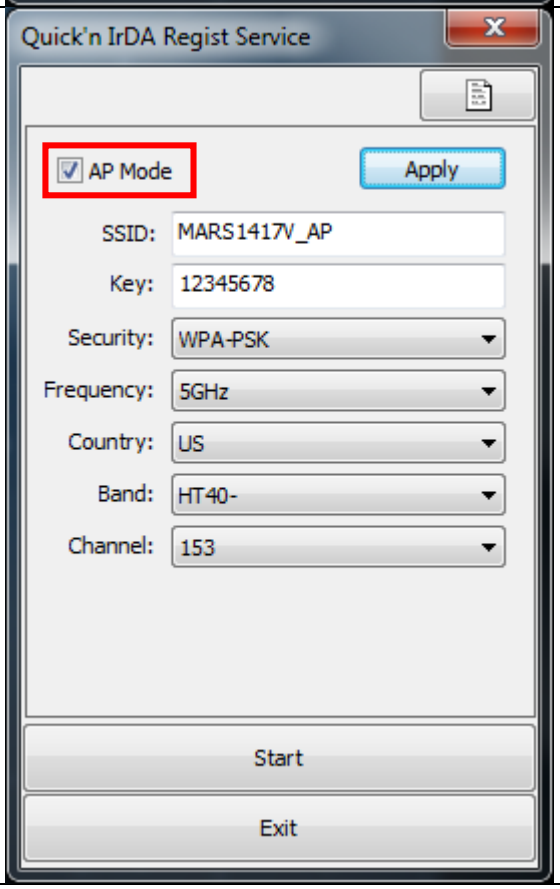
Click "Configure" in IDemo	

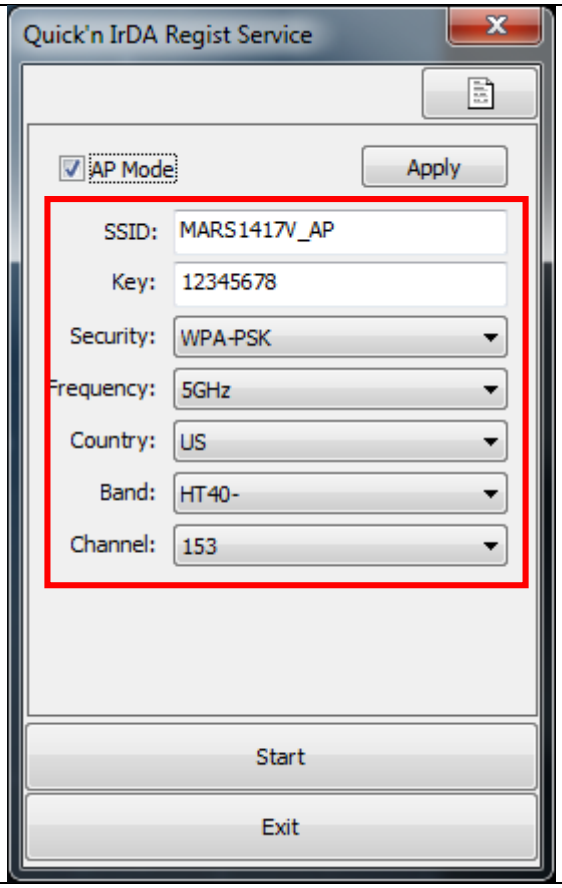
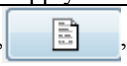
Click "Network setting"	
Select AP mode	
Change SSID and password setting	
Click "write Config to FPD"	
Do not remove wired cable until "write to FPD" button recovers	

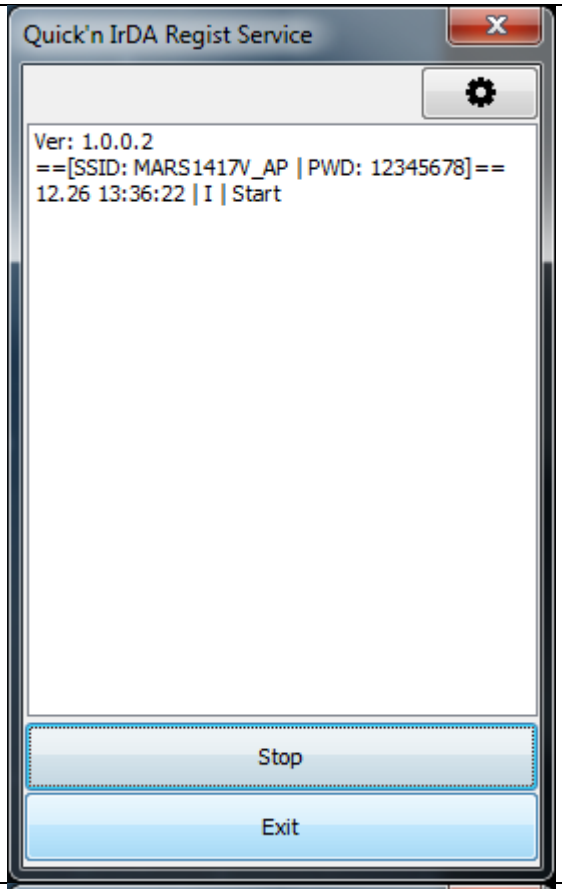
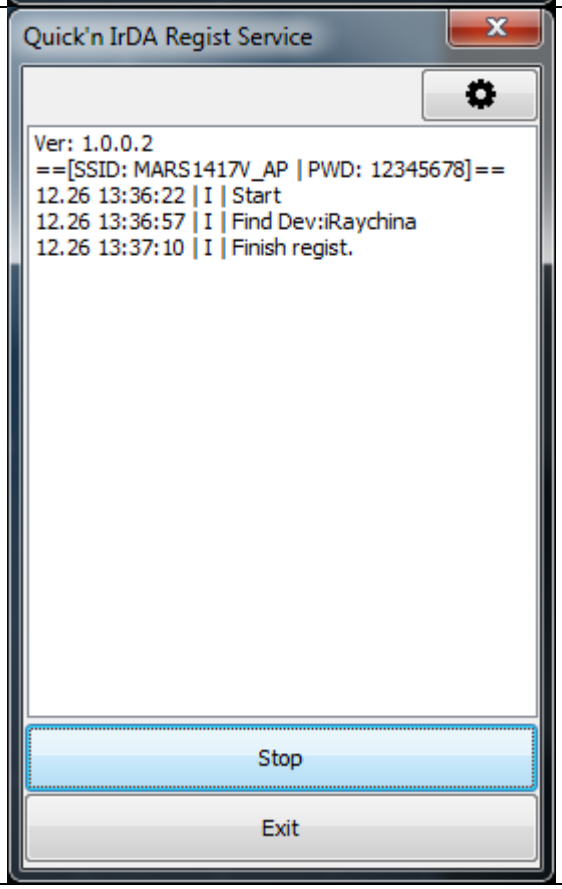
Since we have chosen default SSID and password, it would connect to wireless AP immediately after powered on next time.

b.To start Infrared configuration, please see below

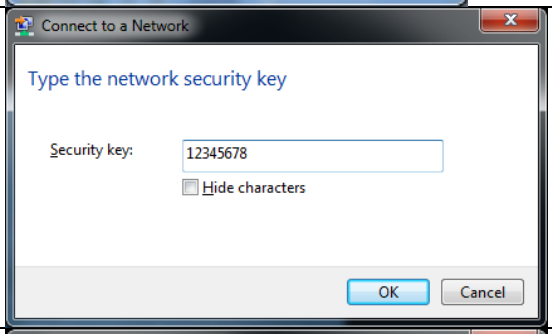
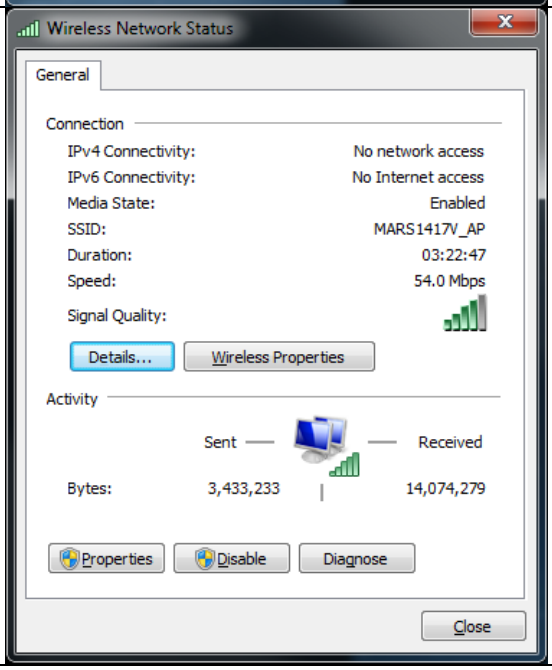
Connect Infrared device with PC	/
Start IrDARegister.exe	

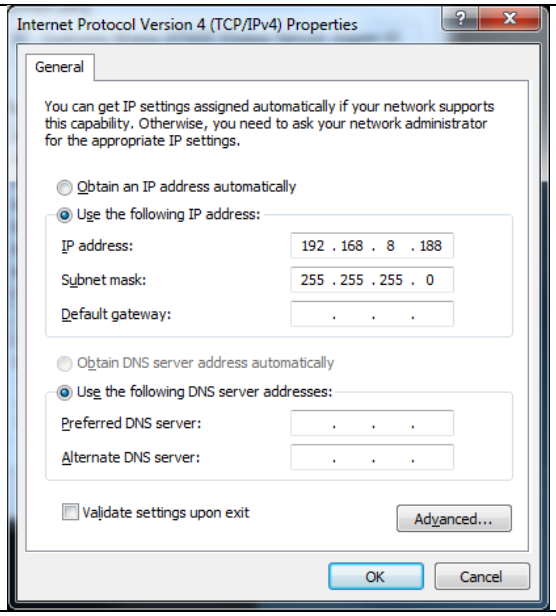
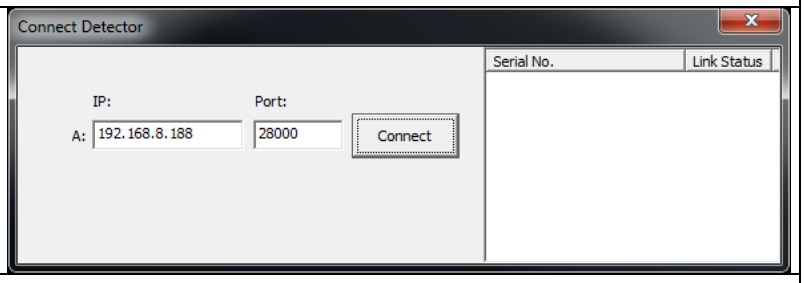
Click "  " to open wifi setting	
Select "AP mode"	

Change SSID and password and other parameter	
Click "Apply"	/
Click"  "	/

Click"Start"		
Do not click"Exit" until success		

Configuration of external wireless card

Open Wireless signal List	
Select SSID which belongs to Detectors, input password and log into system	
Open wireless card configuration	

open IPV4 setting	
IP setting Network mask setting	IP address: 192.168.8.188 Subnet mask: 255.255.255.0
Open SDK and start connection	
IP and port setting	IP: 192.168.8.188 Port: 28000

4 Operation

Mars1717V provides SDK for users to integrate detector into their DR system. Additionally, it also provides an application for demonstration, i.e. Idemo. User can use Idemo to control detector without DR system.

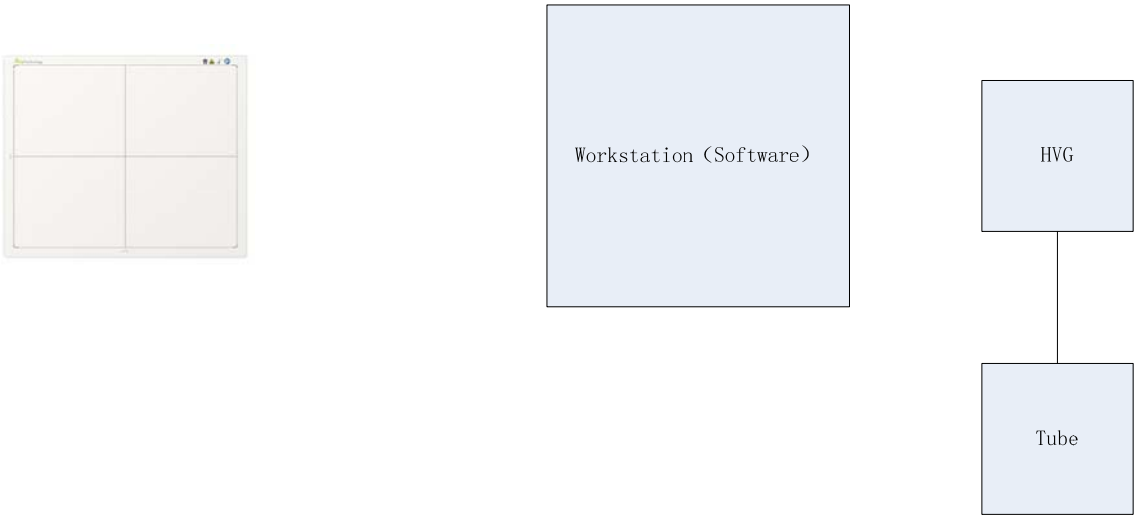
4.1 Main Operation

To Acquire X-ray image is the main operation of Mars1717V. Most importantly, detector should build synchronization with X-ray generator.Mars1717V is born with two ways to acquire X-ray image, that is Software Mode, Inner Mode and Isync Plus Mode.

4.1.1 Software Mode

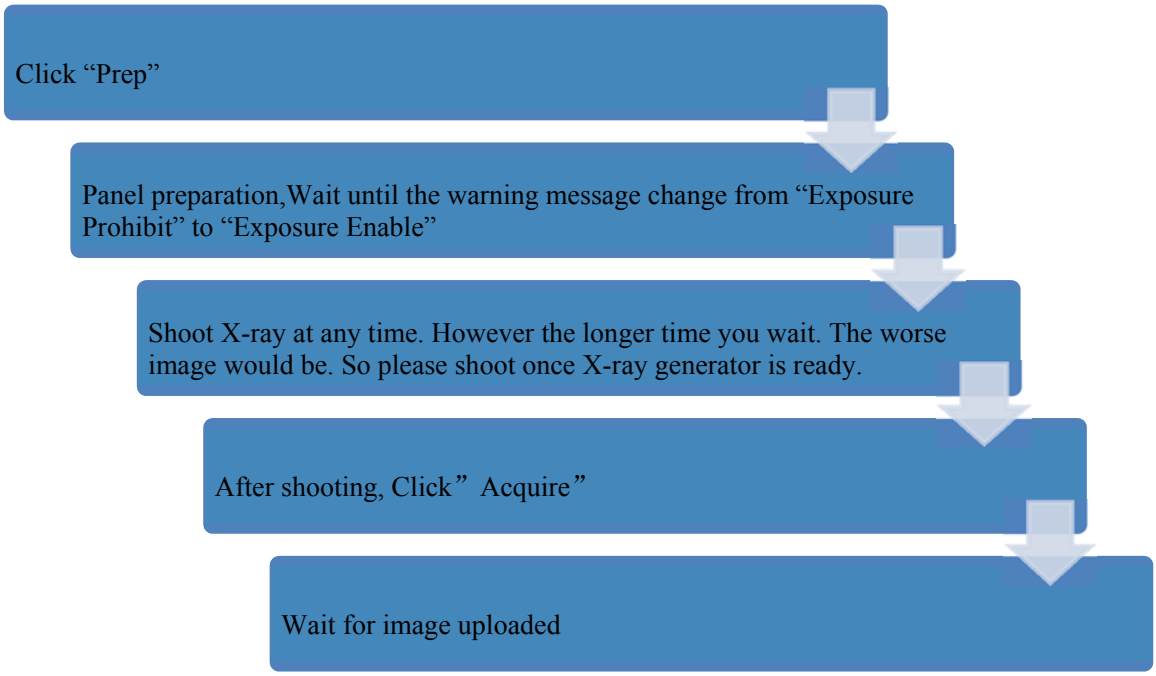
4.1.1.1 Block Diagram

Software mode is the basic way to acquire X-ray image. Please see figure below for general feature



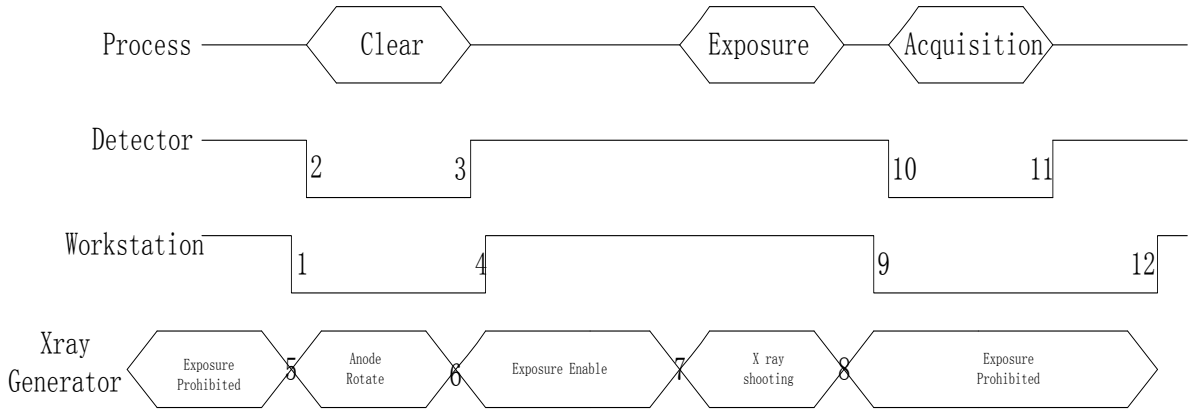
Workstation is a host PC device installed with idemo and SDK. Chapter 3.1 has described how to establish connection between detectors and workstation. In software mode, workstation does not have to control X-ray generator. Users would decide when to shoot X-ray.

4.1.1.2 Work flow



4.1.1.3 Timing Setting

To set a clear scenario for program, see diagram below for details



1. Workstation receives "prep" request, send command "Clear" to panel.

2. Panel receives "clear" from workstation, start detector internal clear cycle. At the same time, detector would tell workstation "Exposure Prohibited".
3. Detector finished "Clear" action and send a message reminding "Exposure Enable"
4. Workstation shows "Exposure Enable" on the iDemo's message bar to tell user shoot X-ray now.
5. User triggers X-ray generator to initialize and do anode rotation to prepare for X-ray shooting.
6. X-ray generator finishes preparation for X-ray shooting and reminds user to shoot.
7. X-ray generator starts releasing X-ray
8. X-ray generator finishes X-ray shooting.
9. Workstation receives "Acquire" request, send command "Data Acquisition" to panel.
10. Panel receives "Data Acquisition" from workstation, start data acquisition operation.
11. Panel completes image acquisition and begins to send data to workstation.
12. Workstation receives all image data from panel.

If Hardware Pre-offset and Hardware calibration is selected, image is the final image.

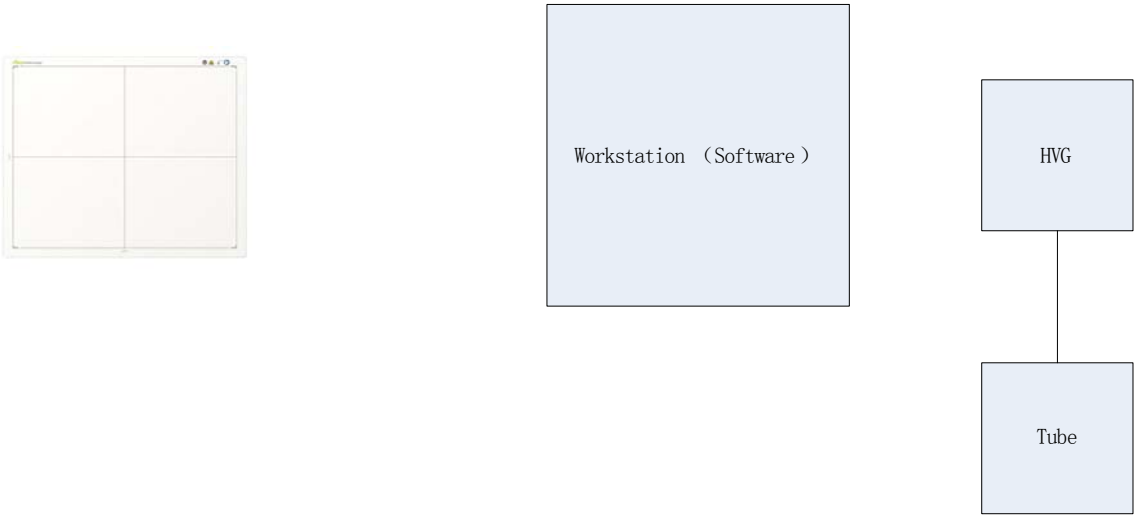
If Software Pre-offset and Software Calibration is selected, image would be the raw image, workstation would finish image processing work and show on screen.

If Hardware Post offset and Hardware calibration is selected, image got would be preview image (2x2 binning). After step12, panel would do another dark image acquisition. With both light image and dark image, panel completes all the correction and calibration process. Finally, panel uploads processed image to workstation.

If Software Post offset and Software calibration is selected, image got would be preview image (No binning). After step12, Workstation sends another "clear Acquire" command to panel, panel finishes a dark image acquisition and uploads dark raw image to workstation. With both light image and dark image, workstation completes all the correction and calibration process. Finally, corrected image shows on screen.

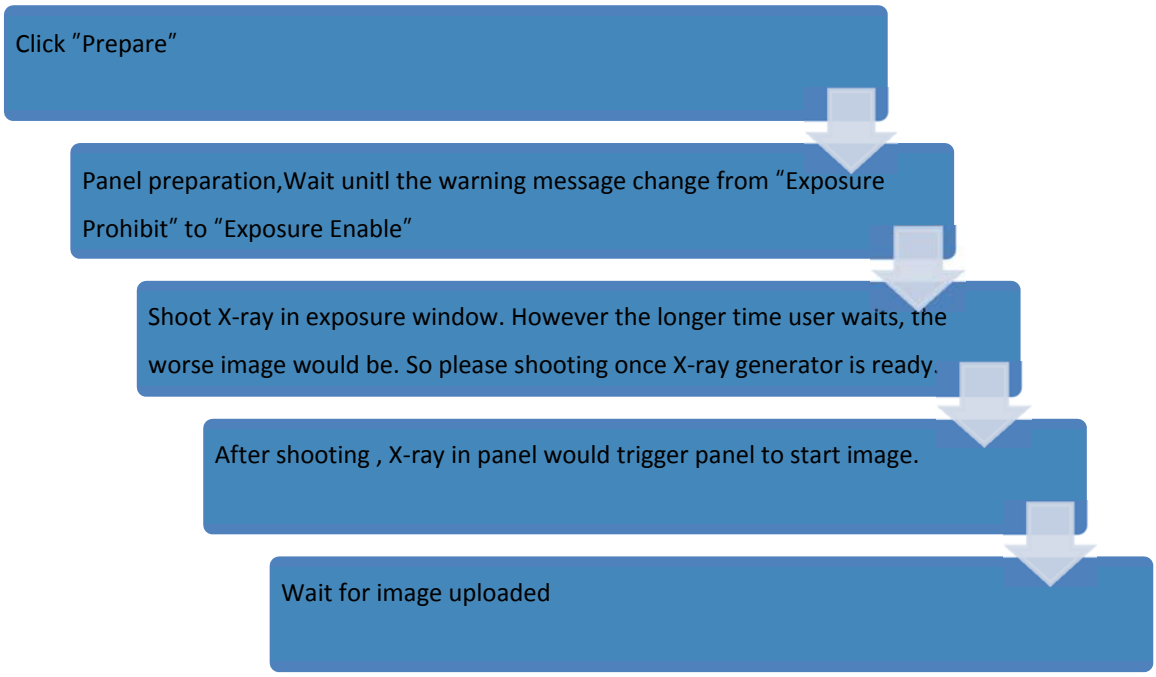
4.1.2 Inner Mode

4.1.2.1 Block Diagram



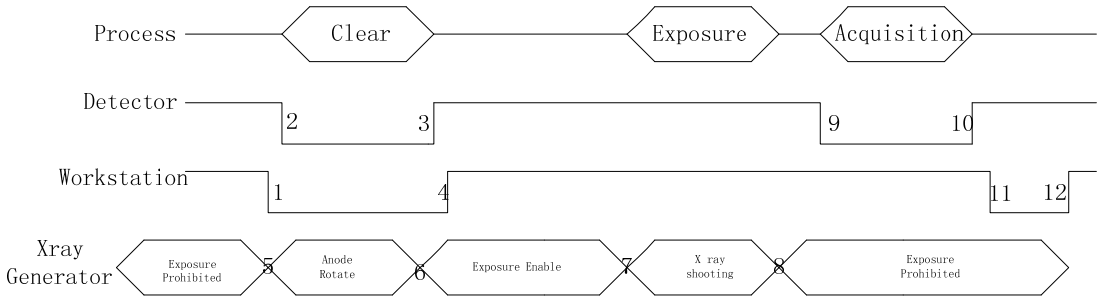
Workstation is a host PC device installed with iDemo and SDK. Chapter 3 has described how to establish connection between panels and workstation. In inner mode, workstation does not control X-ray generator. Users would decide when to shoot X-ray.

4.1.2.2 Work Flow



4.1.2.3 **Timing Setting**

To set a clear scenario for program, see diagram below for details



1. Workstation receives "prep" request and sends "Clear" to panels.

2. Panel receives "clear" from Workstation, start clear operation. Meanwhile, panel would send "Exposure Prohibited" to Workstation.

3. Panel finishes "Clear" operation and send "Exposure Enable" to Workstation.

4. Workstation shows "Exposure Enable" on the iDemo's message bar to tell user shoot X-ray.

5. User triggers X-ray generator to initialize and do anode rotation to prepare for X-ray shooting

6. X-ray generator finishes preparation and reminds users.

7. X-ray generator begins releasing X-ray

8. X-ray generator finishes X-ray shooting.

9. X-ray sensor in panel triggers panel to start image acquisition operation.

10. Panel completes image acquisition and begins to send data to Workstation.

11. Workstation starts receiving image data from panel.

12. Workstation receives all image data from panel.

If Hardware Pre-offset and Hardware calibration is selected, image got is the final image.

If Software Pre-offet and Software Calibration is selected, image got would be raw image, workstation would finish image processing work and show on screen.

If Hardware Post offset and Hardware calibration is selected, image got from detector would be preview image (2x2 binning). After step12, Detector would do another dark image acquisition. With both light image

and dark image, detector completes all the correction process. Finally, detector uploads corrected image and workstation shows on screen.

If Software Post offset and Software calibration is selected, image got from panel would be preview image (No binning). After step12, Workstation sends another "clear Acquire" to panel, panel would do dark image acquisition and uploads dark raw image to workstation. With both light image and dark image, workstation completes all the correction process. Finally, corrected image shows on screen.

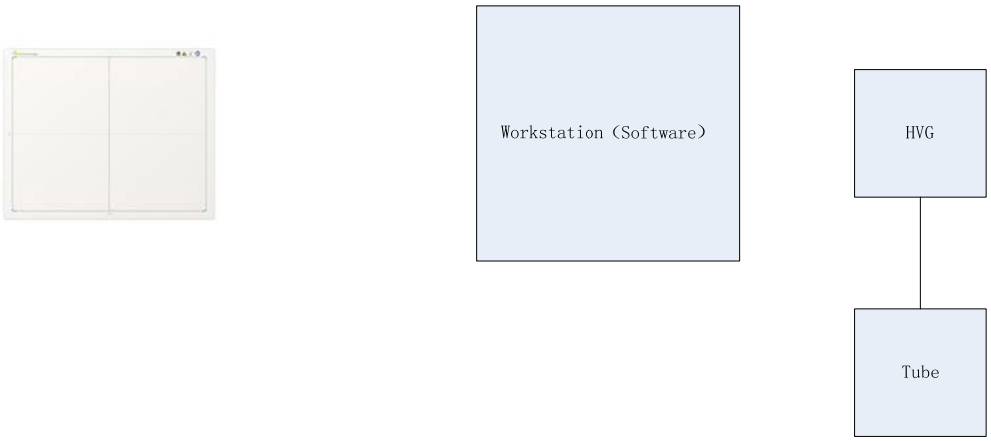
4.1.2.4 **Abnormal Action**

Action1: after Step4, if user wants to cancel this exposure cycle, Idemo provides an "Abort Exp" function to close exposure windows. However, Idemo allows user to click "Abort Exp" until Workstation receives first image.

Action2: after Step4, if user does not shoot X-ray in exposure windows, panel would close exposure windows automatically and send a message to workstation that waiting for X-ray shooting is overtime. Meanwhile, panel would also start image acquisition. After image acquisition, panel sends image to workstation.

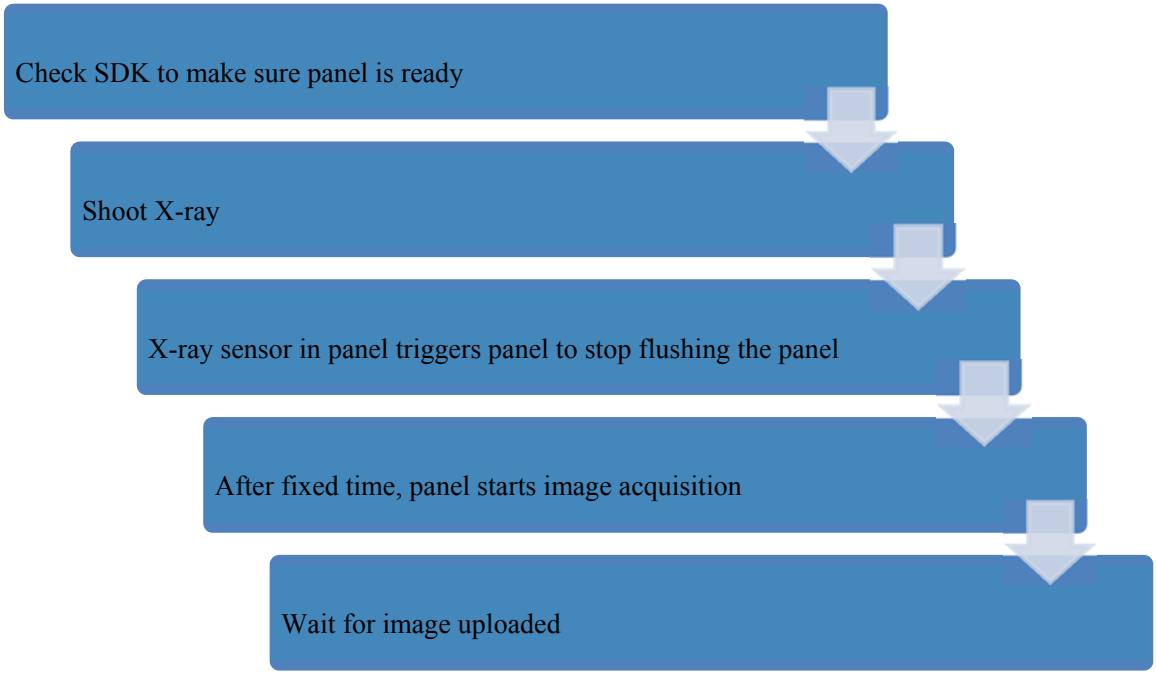
4.1.3 Isync Plus Mode

4.1.3.1 **Block Diagram**

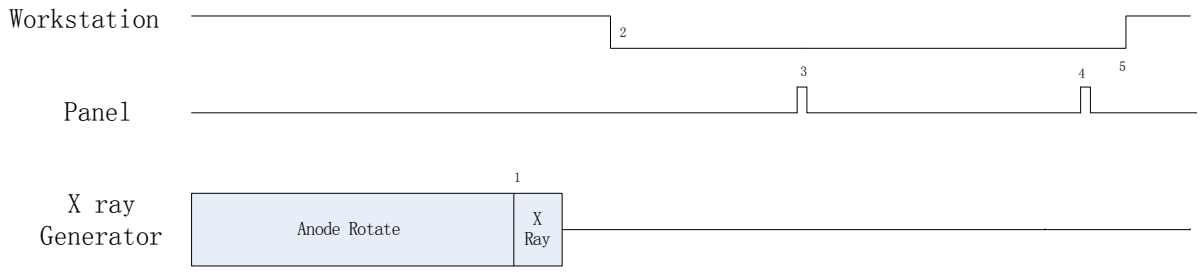


Workstation is a host PC device installed with iDemo and SDK. Chapter 3 has described how to establish connection between panel and Workstation. In Isync Plus mode, User doesn't interact with Workstation. After shooting, images would be shown on screen immediately.

4.1.3.2 Work Flow



4.1.3.3 Timing Setting



1. X-ray generator is ready for X-ray shooting and begins to release X-ray.

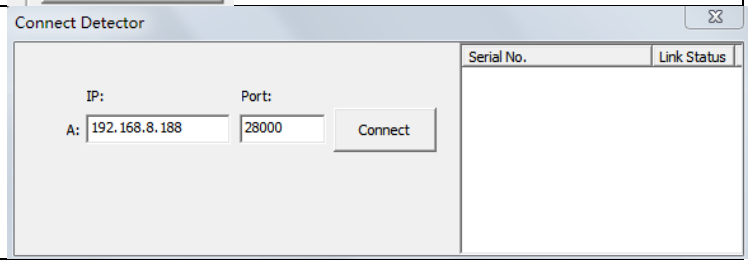
2. Workstation receives "Exposure Prohibited" from Panel.

3. Panel starts uploading Pre-dark image and Light image to Workstation for preview. If hardware offset is selected, panel would do offset first, and then upload preview image (2X2 binning).

4. Panel starts uploading Post-dark image to Workstation. If hardware offset is chosen, panel would do correction and calibration first, then upload processed image to Workstation.

5. Workstation receives "Exposure Enable" from Panel.

4.2 Connection Build

Click "Start"	
Input IP address and port number. The IP address should be the same as the IP address of the network card connected with panel. The port should use the default value of 28000; Click "Connect";	

Note:

1. Once changing connection from different network card, user must re-connect panel with different IP address.

2. Switching between wired and wireless connection does not need any extra operation.