Wireless Digital Flat Panel Detector

Mars1717X

User Manual



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Before operating, please read this user manual and pay attention to all safety precautions.

Please ensure that this user manual is properly maintained so that it can be accessed at any time (reserve).

Please use it correctly based on full understanding of the content.

About FCC

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

(1) This device must not cause harmful interference;

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

Attention must be paid to the fact that changes or modifications not expressly approved by the party responsible for compliance can void the user's authority to operate the equipment.

Note: This product 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 product 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 product 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 to 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

Congratulations on your purchase of the Flat Panel Detector (hereinafter referred to as Mars1717X) which is manufactured by iRay Technology Company Ltd. (Hereinafter referred to as iRay).

Please take time to read through this user guide in order to utilize the product effectively. We hope you enjoy the experience with iRay Mars1717X.

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

To Customers

Congratulations on your purchase of the Fixed Digital Flat Panel (hereinafter referred to as Mars1717X) which is manufactured by iRay Technology Co.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 Mars1717X(configuration: Mars1717X).

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

Notes on usage and management of the equipment

- 1. Read all of the instructions in the user guide before your operation. Give particular attention to all safety precautions.
- 2. Only a physician or a legally certified operator should use this product.
- 3. 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.
- 5. Use only the dedicated cables. Do not use any cables other than those supplied with this product.
- 6. 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, loss, 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.
- 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.

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Symbols and Conventions

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

	Identify the conditions under which improper use of the product may cause death or serious personal injury.
	Identify conditions under which improper use of the product may cause minor personal injury.
CAUTION	Identify conditions under which improper use of the product may cause property damage.
Prohibited	Indicate a prohibited operation.
0	Indicate an action that must be performed
Important	Indicate important operations and restrictions.
(1) Information	Indicate operations for reference and complementary information.

Labels and markings on the equipment

Symbol	Description
\triangle	Caution: please refer to the instructions in the user manual.
30 M (670)	Indicates that the equipment has passed CE testing and the CE
CE	Notified Body number follows it.
SN	Serial number of the product.
	Name and address of the manufacturer.
20XX-XX-XX	Expiring date of this product.
EC REP	Name and address of iRay authorized representative in the European region.
Ĩ	Consultation of the user guide for general information.
X	This product is not to be disposed of with your residential or commercial waste.
	Safety Signs:
1	Please refer to the user guide for safety instructions.
Ŕ	В Туре.
ISONg	Load limit.

Ŷ	Handled with care.
30°C-	Operational temperature limits.
	Storage temperature limits.
Ĩ	Fragile
淤	Keep away from sunlight
Ť	Keep dry
(A)	Humidity limits.
<u>†</u> †	Keep the equipment up right.
	Do not roll the transportation package.
	Stacking limit number.
IP56	IP56 for detector
Rx only	Detector symbol : device is for prescription use only

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1. General Description

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	Do not use or store the equipment near flammable chemicals such as alcohol, thinner, benzene, etc.
of use	If chemicals are spilled or evaporate, it may result in fire or electric
Topo and the first first first	shock through contact with electric parts inside the equipment. Also,
\otimes	some disinfectants are flammable. Be sure to take care when using
Prohibited	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.
\otimes	Do not handle the equipment with wet hands.
Prohibited	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.

Doing so may result in fire or electric shock. To avoid the risk of electric shock, this equipment muonly be connected to power supply with protective earth.	
OperationTo avoid the risk of electric shock, this equipment muProhibitedonly be connected to power supply with protective earth.	
	st
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	I
or serious injury.	
Be sure to hold the plug or connector to disconnect t cord.	ıe
If you pull the cord, the core wire may be damaged, resulting in fi	е
or electric shock.	
WARNING	
Handling Never disassemble or modify the equipment. No	
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	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 Control Box, 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.
0	NEVER use alcohol, ether and other flammable cleaning agent for safety. NEVER use methanol, benzene, acid and base because they will erode the equipment.
\otimes	DON'T dip the equipment into the liquid.
Prohibited	Please make sure that the equipment's surface & plugs are dry before turning ON.
	Otherwise, it may result in fire or electric shock.
0	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.
	<load limit=""></load>
	Uniform load: 300kg over the whole area of the surface
	Local load: 150kg on an area 4cm diameter

	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
0	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.
	13.m 13.m 13.m

Power supply	Always connect the three-core power cord plug to a grounded AC power outlet.
0	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.
U	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.
U	The Internal Image sensor may be damaged if
	* *
	something hits against it or it is dropped.
	Do not place excessive weight on the equipment.
	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
	Keep the same load (same pressure) on the detector when acquiring the image. Or the image will be incorrect.
	Keep the same load (same pressure) on the detector when acquiring the image. Or the image will be incorrect.
	Keep the same load (same pressure) on the detector when acquiring the image. Or the image will be incorrect.

Do not operate close to fire, do not use in high temperatures
Do not invert positive and negative poles
Do not contact with metal in case of a short circuit
Do not insert sharp objects into the battery
Do not hit the battery
Do not stand on the battery
Do not use the battery for purposes other than those stipulated in the rules
Do not dispose of the battery or change its internal structure
Do not submerge the battery in water; please keep it dry in storage and do not contact with water while in use
Please charge the battery with the charger provided by Manufacturer
Do not mix the battery with ones not provided by Manufacturer
Do not charge the battery with a broken charger.
Charge the battery regularly to avoid over-discharge failure.
Do not use the battery when it is severe ballooning.

1.2. Notes for Use

When using the product, take the following precautions. Otherwise, problems may occur and the

product may not function correctly.

Before exposure

- Be sure to check the connection of all the parts are set properly & check the detector is kept in insulated cover that operator or patient can't touch the detector directly before powered up.
- Be sure to check the product daily and confirm it work properly.
- Sudden heating of the room in cold areas will cause condensation on the product. In this case, wait until the condensation evaporates before performing an exposure. If it is used when condensation is formed, problems may occur in the quality of captured images. When an air-conditioner is used, be sure to raise/lower the temperature gradually to prevent condensation.

- The product should be warmed up for 15 minutes before exposure or updating the gain map and defect map.
- Make sure wave form of the energy going to the X ray tube is square not pulse.
- Be cautious with circumstance that someone has radio isotope recently injected into them, it may cause panel transmit image without x ray.
- Once powered off, please wait at least 60s before power on again

During exposure

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

After Usage

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

2.

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2. General Description

Mars1717X (configuration: Mars1717X, hereinafter referred as Mars1717X) is a cassette-size wireless X-ray flat panel detector based on amorphous silicon thin-film transistor technologies. It is developed to provide the good quality of radiographic image, which contains an active matrix of 4267×4267 with 100µm pixel pitch. The scintillator of Mars1717X is Csl(Caesium lodide) which is direct deposit. Since Mars1717X supports multiple trigger modes, it can satisfy both of the general DR system and retrofit DR system.

2.1. Scope

This manual contains information about iRay Mars1717X product. 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. Principle

Detectors contain a layer of scintillator material, which converts the x-rays into light. Directly behind the scintillator layer is an amorphous silicon pixel array contains a photodiode which generates an electrical signal in proportion to the light produced by the portion of scintillator layer in front of the pixel. The signals from the photodiodes are amplified and encoded by additional electronics positioned behind the sensor array in order to produce an accurate and sensitive digital representation of the x-ray image.

2.3. Model

<u>Mars 1717 X</u>

 Image: Image:

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

Product Type: Charger - Combo------Battery charger

2.4.Characteristics

- Wireless static flat panel detector
- 17 inch ×17 inch
- Removable handle
- AED
- 802.11 a/b/g/n/ac
- 16-bit AD

2.5. Intended Use

Mars1717X is indicated for digital imaging solutions designed to provide general radiographic diagnosis for human anatomy including both adult and pediatric patients. It is intended to replace film/screen systems in all general-purpose diagnostic procedures. The device is not intended for

mammography or dental applications.

According to the Mars1717X intended use and the result of risk management, identifying and describing the essential performance as the following:

To get image of dark field, the Mars17X shall be not influenced to the imaging acquisition.

To keep the data transmission function, the Mars1717X shall be not influenced to the data and signal transmission

2.6. ESSENTIAL PERFORMANCE

According to the Mars1717X series intended use and the result of risk management, image acquisition and data transmission are defined as essential performance.

Getting dark image proves that essential performance does not influence intended use. Method for getting dark image in detail refers to section "installation" and "operation".

The product support DICOM3.0.

2.7. Application Specification

Suitable patient

It is suitable for providing digital X-ray imaging for DR system to provide general radiographic diagnosis for human anatomy including both adult and pediatric patients, but not intended for mammography or dental applications. The remaining notes depend on the DR system.

PATIENT population:

Age: Adult and pediatric patients Weight: not relevant Health: not relevant Nationality: multiple Gender: except for pregnant women

Pediatric Use: Guidance & Considerations

Special care should be exercised when imaging patients outside the typical adult size range, especially smaller pediatric patients whose size does not overlap the adult size range (e.g.less than 50 kg (110 lb) in weight and 150 cm (59 in) in height, measurements which approximately correspond to that of an average 12 year old.

The following ranges of pediatric subpopulations are to be used as a guide for manufacturers in developing medical devices:

Pediatric Subgroup	Approximate Age Range
Newborn (Neonate)	From birth to 1 month of age
Infant	Greater than 1 month to 2 years of age
Child	Greater than 2 to 12 years of age
Adolescent	Greater than 12 through 21 years of age

Exposure to ionizing radiation is of particular concern in pediatric patients because:

1) for certain organs and tumor types, younger patients are more radiosensitive than adults (the cancer risk per unit dose of ionizing radiation is higher for younger patients);

2) use of equipment and exposure settings designed for adults of average size can result in excessive and unnecessary radiation exposure of smaller patients;

3) younger patients have a longer expected lifetime putting them at higher risk of cancer from the effects of radiation exposure.

To help reduce the risk of excessive radiation exposure, you should follow the ALARA (As Low As

Reasonably Achievable) principle and seek to reduce radiation dose to only the amount necessary to

obtain images that are adequate clinically.

Additional guidance and recommendation are provided by the Alliance for Radiation Safety in Pediatric Imaging (Image Gently Alliance) *https://www.imagegently.org/*

Table 1 : Techniques for Typical Body Parts

Body Parts	Patient Size	kVp	mAs	SID	Grid
	Very Low Birth Weight (Less than 1.5Kg)	55	1	1m	No
Abdomen	Low Birth Weight (Between 1.5 and 2.5Kg)	55	1.6	1m	No
ΑΡ/ΡΑ	Newborn (Age is less than 1 month and Weight above than 2.5Kg)	70	1.6	1m	No

Body Parts Patient Size		kVp	mAs	SID	Grid
	Infant (Age is between 1 month and 2 years)	73	2	1m	No
	Child (Age is between 2 years and 12 years)	75	7.1	1m	Yes
Abdomen	Preadolescent (Age is between 12 years and 13 years)	75	14	1m	Yes
ΑΡ/ΡΑ	Adolescent (Age is between 13 years and 21 years)	75	20	1m	Yes
	Adult Small	75	18	1m	Yes
	Adult Medium	80	22	1m	Yes
	Adult Large	85	32	1m	Yes
	Very Low Birth Weight	50	1	1m	No
	Low Birth Weight	55	1	1m	No
	Newborn	65	1	1m	No
	Infant	70	1.6	1m	No
	Child	70	1.6	1m	No
Chest PA/AP	Preadolescent	90	2	1m	Yes
	Adolescent	90	2	1m	Yes
	Adult Small	110	1.8	1.8m	Yes
	Adult Medium	110	2.8	1.8m	Yes
	Adult Large	120	4	1.8m	Yes
Extremities	Very Low Birth Weight	50	1	1m	no

2. General Description

AP/PA	Low Birth Weight	55	1	1m	no
	Newborn	57	1	1m	no
	Infant	57	1.2	1m	no
	Child 58 1.2 1m		no		
	Preadolescent 62 1.6 1m		no		
	Adolescent	Adolescent 62 2 1m		no	
		Regarding adult			
		details techniques of			
	Adult Small	Extremities, please refer		no	
		to the table "Techniques			
		for Ac	lult Extrim	nities"	

Table 2: Techniques for Adult Extrimities

Adult Extemities List	kVp	mAs	SID	Grid
Ankle - AP	58	4	1m	no

Adult Extemities List	kVp	mAs	SID	Grid
Ankle – Lateral	58	4	1m	no
Femur – AP	70	16	1m	yes
Femur – Lateral	70	10	1m	yes
Hand - AP	53	1.8	1m	no
Hand – Lateral	53	1.8	1m	no
Humerus - AP	75	7.1	1m	yes
Humerus – Lateral	70	3.2	1m	yes
Knee - AP	65	10	1m	yes
Knee – Lateral	65	10	1m	yes
Wrist - PA	55	1.8	1m	no
Wrist – Lateral	55	1.8	1m	no

Intended OPERATOR:

All of use, maintenance and operation steps should be carried out by the operator who has accepted the professional training offered by the company's customer service staff.

2.8. The relative position between patient and detector

Because of the crosstalk effect of Amorphous silicon flat-panel detector, Pay attention to the relative position of patient and detector, the recommended position as shown below, Otherwise, the image is prone to abnormal light lines.



2.9. Product Components

The product is configured with the components below

Item	Quantity
Mars1717X Detector	1pcs
Adapter	1pcs
Battery pack	2pcs
Gigabit Ethernet cable	1pcs
AC power cable	1pcs

DC power cable	1pcs
Battery charger	1pcs
CD ROM	1pcs

2.10. Environment

	Temperature	Temperature Variation	Humidity	Atmospheric Pressure	Atmospheric Pressure Variation
Operating	10~35℃	<1k/min	5%~90% RH	700~1060hPa	<10kp/min (1kp=1.0197E-5Pa)
Transport &Storage (without battery)	-20~55℃	<1k/min	5%~95% RH	600~1060hPa	<10kp/min (1kp=1.0197E-5Pa)

2.11. Components Dsecription

2.11.1. Detector





2.11.2. Button and Indicator



NO.	ltem	Description
A	DC Input Interface	24V DC input
В	Multi-Function	Multi-Function Button
С	Status Indicator	Detector Status indicator
D	Mode Indicator	Detector WIFI mode indicator
E	Link Indicator	Detector Link indicator
F	Power Indicator	Detector Power indicator
G	Power Button	Power button

2.11.3. Image Dirction



Locate the logo at the top right corner, then the acquired image is mirrored on vertical direction.

2.12. Product Specification

2.12.1. Detector



Item	Specification
Model	Mars1717X
Image Sensor	a-Si (Amorphous Silicon) TFT
Scintillator	Csl
Pixel Size	100um
Fill Factor	60%

267×4267
26.7mm×426.7mm
/in 4.3 lp/mm
VIFI
-5s
S
lax 20W @No battery charging
60mmx460mmx15mm @typ.
/lax 3.4kg(with battery)
Vireless : IEEE802.11 a/b/g/n/ac
.412~2.472GHz, 5.18~5.22GHz; 5.745~5.85GHz
3dBm (Typ.) @802.11a 6dBm (Typ.) @802.11b 4dBm (Typ.) @802.11g 3dBm (Typ.) @802.11n HT20 1dBm (Typ.) @802.11n HT40 6dBm@2.4GHz 3dBm@5.8GHz
02.11b: CCK, DQPSK, DBPSK 02.11a/g/n: 64QAM, 16QAM, QPSK, BPSK 02.11ac: 256QAM, 64QAM, 16QAM, QPSK, BPSK
.4GHz≤40MHz .19GHz≤40MHz .8GHz≤40MHz
0-150kV
256
0-180cm

2.12.2. Battery





Item	Specifications
Model	Battery-KX
Rated Capacity	Min. 4700mAh, Typ. 4900mAh @ Discharge 0.2C
Nominal Voltage	11.55V
Charge Voltage	13.2V
Discharged End Voltage	9V
Charging Method	CC-CV
Operating Temperature	Charge 0°C - +60°C, Discharge - 10°C - +60°C
	1 month-20°C-+50°C
Storage Temperature	3 month -20℃-+45℃
	6 month -20℃-+35℃
Relative Humidity	5%~95%
Dimension (L \times W \times H)	210 x 105 x 8 mm
Weight	0.285kg



NO.	ltem	Description
A	Battery Label	/
В	Battery Interface	7-pin battery connector
С	Guide Block	/
D	Touch Display	Show battery level after touching

2.12.3. Battery Charger



Item	Specifications
Model	Charger-Combo
Simultaneous Charging	1 battery pack
Full charging time	≤3 hours
Rated power supply	90V~264V(AC)
Dimension ($L \times W \times H$)	240.4 x 184.4 x 41.5 mm
Weight	0.55 kg

The battery charger indicator definition:



Item	Name	Description
A	Power Indicator	/
В	Charging Indicator	/
С	Charge Full Indicator	/

X Indicator	Lighting Status	Operating Status
All off		No power input
A indicator on		 AC Power input Multiple batteries inserted
A indicator on B and C alternately blink 2 times		Battery insertion self-test
A and B indicator on		Battery Charging
A and C indicator on		Battery capacity full, charging stops
A indicator on B and C alternately blinking		Battery charging abnormal

Two or more battery charging at the same time is prohibited, if inserted at the same time, the charger will automatically stop working.

3.

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3. Basic Operation

3.1. Preparation

3.1.1. Attach Battery Pack

The product can be powered by both a battery pack and DC power. Once the battery pack is inserted or DC power is connected, detectors will be turned on immediately. If neither battery nor DC power is connected, panel will power off. Please see below for battery installation.



3.1.2. Adapter

Detector supports an external adapter powered, It gets CB certificate No. SG PSB-MD-00005 and NRTL certificate No. U8V 093768 0016. The ports defined as bellow:
No.	Definition	Voltage Range
P1	DC Power Negative	0~0.5V
P2	DC Power Positive	23~25V
P3	DC Power Positive	23~25V
P4	DC Power Negative	0~0.5V

In order to meet the safety and function requirements of the detector, standard components are recommended.



3.2. Routine Operation

3.2.1. Starting Up

On the control panel, users can press the power button to turn on.



After booting up, users can check the indicator of the detector.

Power Indicator Lighting Status		Status		
		Battery Capacity	DC Input	Description
OFF		N/A	N/A	Detector is off
Green ON	Ð	N/A	YES	Detector is on
Orange Blinking		≥7% & <15%	NO	Detector is on
Green Blinking		≥95%	YES	Detector is off
Green&Orange Blinking		≥15% & <95%	YES	Detector is off

Power indicator:

Link indicator:

Link Indicator	Lighting Status	Description
OFF	<u></u>	Detector is turned off Wireless connection is not ready
Blue ON	?	AP connection is ready Client WIFI connection is build
Blue Blinking	??	Client WIFI connection is not built
Green ON	?	Wired connection is enabled (Service Mode)

Mode indicator:

Mode Indicator	Lighting Status	Description
ON	8	Client connection is built
ON	X	AP mode is enabled
OFF	X	Detector is off Client connection is not built

Mode Indicator	Lighting Status	Description
OFF	Θ	Detector is off
Green ON	0	Exposure is allowed
Orange ON	0	Error

Status indicator:

3.3. Battery Charger Installation

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

4.

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4. Software Setup

4.1. System requirement

iDetector is developed and deployed on Windows Operation System, it can be run on Windows XP/Windows 7/Windows 8/Windows 10, OS should install latest service pack. And requires computer memory 4 GB minimum. The firewall should be shut down to avoid commuication issue.

4.2. Environment setup

Setup files and download url are included in SDK directory: Tools\env_setup

1. Please install Microsoft .NET Framework 4.5(Windows XP only can install V4.0). Download from Microsoft web site, please.

2. Visual C++ redistributed package need to be installed: vcredist_x86_2013(or vcredist_x64_vs2013).

3. For Windows XP, full path should be used in file "bind.txt".

The wifi information should be configured for first use with wired connection. The configuration can be changed when needed.

4.3. Wireless Connection

The default IP address (IPv4) of the detector is 192.168.8.8, the PC address (IPv4) should be configured as 192.168.8.xxx, which should be the same as the value of parameter "Cfg_HostIP"in file "*\work_dir\Mars1717X\config.ini"

4.3.1. AP Mode





Waiting FPD status be "Ready"		
	None August 129 Network Callying Lond No.	ALMANS/72 1117.0 Mars17178
	Parameter (Server, WA (Server)	
	Const + at 100176 (RA10888	We prove the knowlear Calling Linesitth officing
	INDo (mass/777s	New photos algo: 12 1,204/Braffly: IE
	Nay 12345878	Meet
	security will weat what was	Read With Datus
	Insparsy 100,744,3500 1	Winter Street
	Gurry Weighting (N -	ALC OF DESIGN
	CountyFade (1)	
	Band Wit, Band (#120 C	
	Disease Will Dist 199	
	Read Distances (Junity) None Demonstra Landing	Same Associated
	and the second states of the s	a second the second sec
	and the second s	a suma name

4.3.2. Client Mode

Add: add the information of the access point, such as SSID and password.

Select: Select th	e Access Point that needs to be connec	cted to).	

Open local wireless signal	In section of the sec
list	In tractional and the second
	// mars1717c
	🖾 manale
	Mars1717x
	17. ASUS
	- Contraried Inte
	And a second bird and a second
	A 10 10 10 10 10 10 10 10 10 10 10 10 10
	MLAN 2519ELC H-224-0

4.3.3. Configuration of external wireless card

Select SSID which	- mars1717x
belongs to detectors;	No 22
Input password and log	输入网络安全的旧
into system	32345678
	T-# 800
Open wireless card	Carl Winners Network Matter
configuration	General
	Connection
	IPvid Connectivity: Net Internet access
	SDDv MaRS141/V_AP
	Daratiery 03:22:47 Speed: 54.0 Miga
	Spral Quality:
	Details
	Activity
	Butter 3,455,720 14,074,379
	spine around the star day
	Struetes State Degrise
	Que
open IPV4 setting	Internet Protocol Version 4 (TCP/IPv4) Properties
	General
	You can get IP settings assigned automatically if your network supports
	for the appropriate IP settings.
	🗇 gittein an IP address automatically
	Use the following IP address: 103 tag g 198
	Sybret mak: 255 - 255 - 0
	Default gateway:
	Clipter DHI server widows adunationly.
	@ Use the following DRG server addresses:
	Preferred DNG servers
	Atemate Dici serven
	Valdate settings upon exit. Advanced
	Contract Contract
IP setting as follows	IP address: 192.168.8.188
IP address:	Subnet mask: 255.255.255.0
IP address: 192.168.8.188	Subnet mask: 255.255.255.0

255.255.255.0		
Open SDK and choose product start connection	Termina Annual State Statement Long Termina	- 0 x Martinizar al de si Anatza
	Basel Basel Basel Basel Basel Basel	

4.4. Software UI

SDK supply iDetector as tool softwore:

32-bits iDetector.exe: Tools\iDetector\w32

64-bits iDetector.exe: Tools\iDetector\x64

Double click iDetector.exe to run the software. For different software version, the UI maybe has little difference.

For this manual, the example is based on SDK_*_xxxx. This UI is almost the same for different versions of iDetector.

Tab	Function description
Home	Connect FPD and view the connect state
Acquire	Acquire image, select correction mode, save image and process image
SDK	config.ini setting, log level setting
Detector	Configurate parameters for detector.
Calibrate	Generate calibration files and manage the calibration files
Local File	Open and view local images.

4.4.1. HomePage

The main function in this page is to connect detector.

Detector								- 0
Acquire .	SDK Determe Ca	albrare Local Pile					2020	/05/22.16.37;3
								4.1.0.7
	Name	in	Product Type		6um			
	Marshitt?3_1		Mars14179	Red				
	MaryLTIDE L		AMARKETTER.	- Block			Const(t)	
	100001117778F_1		VPRUTT17349	and a second				
	Malenderer 1		Were the Br				and the owner where the	
	Shee 37178 1		Name 17178	and a			Add	
	Margirity 1		Mars17174	Read.		- 8		
	MenTTING 1		Mars171762	Red		- L	Bernove (
	Marsh71701.3		Marthini	and a		10		
	March4179.1		Marshill?v	Reid				
	Marc1417v2.1		March417V2	Bird			Byrichiau	
	Mashittir 1		Marshill TV8	Maria				
	MarsT4173tht 1		Mars14170M	Bind				
	1990 1990 1990 1990 1990 1990 1990 1990							

Item	Function description
Name	Display the name of detector
SN	Display the SN of detector
Product Type	Display the type of detector
State	Display the connection state (Bind, Unknown, Ready etc.)

Button	Function description
Connect	Click this button to connect the selected detector.
Close	Click this button to disconnect the selected detector.
Add	Add work directory
Remove	Remove work directory
Syncbox	Open Syncbox configuration window(Optional device)

4.4.2. Acquire Page

This page is used to acquire image under different work mode, and user can select correction options too. When acquire image finished there will be a preview image shown on the screen (if the correction option is selected, otherwise only the raw images will be shown). The propertities of image is displayed on the left of image window. And on the right of image window there is a list to show thumbnail of images. User can select it and double click to see for detail. User can rotate, reverse or mirror image. User can get the value of AVG and SNR by ROI tool. The acquired images can be save as raw, tiff or dicom formats. Both raw and tiff formats support single frame and continuous frames save.

Detector								-		×
Hume Algo	SDK	Detector	Calibrate	toxial File			2020	105/22 Ma	17:08	1.7
Operation Operation Other Othe	V Intege From WW1 65 WU1 22 Post 0 Post 0 Value 0 Width 42 Height 42 F75 0. Frames 0 S	perties 5525 1767 267 187 189 9 8 9 8 9			27				mege Lin	t
BAC HALFFREED	10012345621	State 200	Teol: Inn	on Nessages 1	64013 Task succe	eed Connect			- 🗖	0%

Status bar shows detector's serial number, the current task and state of detector, and feedback information of command. Status bar is also can be seen in other pages, and they are all the same.

ltem	Description
SN	SN number of current connected detectors
State	Detectors state , eg busy, ready
Task	the current task of detector
Message	feedback information of command,eg succeed,failed

Functions in this Page.

Corre	ction Menu	Description				
Offset	HWPostOffset	Do hardware PostOffset correction for image if checked				
Gain	HWGain	Do hardware Gain correction for image if selected				
Defect	HWDefect	Do hardware defect correction for image if checked				
Acqu	irie Button	Description				
Prep		Clear. Prepare to integrate.				
SingleAcq		Acquire once				
PrepAcq		Clear and acquire				
Acquire		Seriers acquire images				
Save		Save the current image, the format is raw and tiff				
ActiveSenso	r	Active sensor				
DeactiveSensor		Deactive sensor				
PowerOff		Shutdown detector				
Stitchingflow	V	Image stitching flow				
Image Pro	perties& Image	Description				
Р	rocess					
WW		window width				
WL		window level				
PosX		X coordinates of the current cursor at the point				
PosY		Y coordinates of the current cursor at the point				
Value		Value of the current cursor at the point				
Width		Image width				
Height		Image height				
FPS		Frame rate				
Frames		Display the frame count				

C	Rotate the image clockwise, 90 degrees every time.
2	Rotate the image anticlockwise, 90 degrees every time.
Mirror	Open or close mirror
ROI	ROI tool, to view the image of the AVG, SV, SNR and other parameters with right click. Press "ctrl" key, can create several ROI area.
WW/WL	Auto adjust WW/WL based on selected area by right button of mouse.
Image List	Show thumbnails

When the image is displayed on the screen, maybe the user want to see details by dragging or zoom in/out the image, for convenience, these are some shortcuts.

- 1. Click the left mouse button: movie playback function operation area display.
- 2. Double-click the left mouse button: the image display in center and with maximum size;
- Double-click the right mouse button: restore the window level and width for WL:32767/WW:65535;
- 4. Drag the left mouse button to drag the image display;
- Lateral-drag the right mouse button to adjust the window width, and vertical-drag the right mouse button to adjust the window level;
- 6. F3 Key: Quickly locate the image window width and window level.
- 7. F4 Key: Adjust window width and window level automatically.

4.4.3. SDK Pgae

C) Kleter	ebàr:								- 0 3
Hore	Acquire	626	Detector	Calibrate	tacal file				2020/05/22 17:26:21 Mars17178_1
www.bir.i	Protocol 8 <i>d</i> i	tion	4						SetLogiavel
WaxADv I	ProdNo		33						LogLevel_Debut - Sa
WeikDir I	NC:		HIGHT	M78812345	971 H	012345678912245671		Set	
Detector	DLL		\$45W						
Currentle	an DLL		Controlle	(fail)					
Calibratio	- 011		CHIERW						
logine	6		Indiave	Debug					
Use Servi	ce Process		OH		1	le.	-1	Set	
Heat IP			102.166	8.194	1	12.166.6.198		Ger.	
History	0		28000		3	6000		Set	
Remote U	P		103.188	8.8	1				
Remute P	Port.		27988						
COM For	e i i i		0		10		10	let	
Peers Co	mment Sibirg	i.	1.				1	Set	
			-				- 10		

SDK page is used to set parameters in config.ini and log level.

Different log level will show different details. It is recommended to set the log level as Debug

4.4.4. Detector Page

In this page, there are Parameters, Sensor and Images tab.

• Parameters

- 1. Enter Detector page, the tab of Paramters is activity by default. There are 5 regions in this page.
- 2. Parameter name region: lists the paramters.
- 3. Parameter read region: read the parameters, the values of the parameters are displayed in this area by Read.
- 4. Parameter write region: write parameter. Entered value of the corresponding parameter in this area can be write to detector.
- 5. Operation region: functional operation buttons area.
- 6. Status bar region: status bar for detector state and information of reading or writing parameters, etc.

Hume Acquire	SDK.	Detector	Calibrate La	scal File	2020/05/22 17:29:97 Mart17770_1
Parameters Semar	witi in	utiges			
Product No		53			Reset Detecture
Gerial No		1001234	5678912345671		fleat
Main Venion		1121			othing.
Main MB Cpu Version	č.	255,255	255.295		
Read Version		0.0.0.0			VITTLE RAM
Miss Version		7.10.0.1	B)		
Arm Vanion		2.2.0.58			Upgsalle Firmula
Gernel Version		120.5.8		1	L .
Inigger Mode		Trippert	Aude_Sult	TriggerMode_Soft +	
Let Delay Time (m)		1200		1200	
Acquire Delay Time (r	-	200		100	
Exp Window Time (m	0	10000		10000	
In MAC		OFFAR	F6F89	000FEAFF6FED	
and Monte		TITLE STORE			
SN: 1002149478112	141671	Itate	Table No. Table	Metager, 164015 Tell Succeed Convert	- 673

Configuration parameters description as below:

Name	Description	Configurable
Product No.	Type of detector product	Ν
Serial No.	Serial number of the detector	Ν
Main Version	Firmware version number of the FPGA	Ν
Read Version	N/A	Ν
MCU Version	Firmware version number of the MCU	Ν
Arm Version	Version number of the ARM App	Ν
Kernel Version	Version number of ARM Kernel	Ν
Trigger Mode	Tirgger mode of the detector	Y
Set Delay Time(ms)	Exposure window for AED mode which use a fixed window	Y
Acquire Delay Time(ms)	Exposure window for getting image which use a dynamic window	Y
Exp Window Time(ms)	Max exposure window for command trigger which use a dynamic window	Y
Src MAC	Detector MAC	Y

Button function description:

Function Button	Description
Reset Detector	Reset Detector
Read	Read parameters
Write	Write parameters
Write RAM	Write parameters into RAM(will lost changes after reset)
Upgrade Firmware	Upgrade firmware
L	Upload detector log to the specified directory

• Sensor

The mainly function in this page is to probe the temperature and humidity of the detector. Click "Read" button to get the value of the temperature or humidity.

Detector									-		- 2
Hume Acquire IOK Demana Calibrate Local File					2020/05/22 17:10- Mart/1773						
Parameters Service	WHI I IN	eges (
Despecificité		1.0	ter.								
handday		14									
Satteng		14	und .								

Sensor type	Explanation
Temperature	Read detector temperature
Humidity	Read detector humidity
Battery	Read the capacity of the battery

• Wifi

Area Area	ite MDR. Determe Call	under Lund File	302	0/05/22 17:40:36 Mare17170_1
Add Add Dat Dat Dat Sisci	Marce WA Integer	3AN IPI 192198.88	Wit Manus Irfis Interdition Cakine Detection Bacut 0 LineClashiny 8 LineClashiny 9 Tellower 9 Meet With Instan Windows Network ISO SegretLand	
Paul Network	North Write Material Config	No. Test. Message: 17.33	Stan Aven MD	
Detector une Aus	ine ADE Delater Cal	Local Tile	ador	- 0 WPV22 17.00.4 Mastrica
Detector une Aus contenti la tele COllec Mail Security County County County County County	And Book and An Call Market States Call Market Mill Integer 4 4 AP Market States Call Mill Integ States Mill Country, Chi Call Mill States (MC28 Mill States	Local Tile	With Dather tells Anterface Calify Lineadon Experimentally 0 Experimentally 0 Experimentally 0 Experimentally 0 Experimentally 0 Talface 0 New With Datase With Datase	- D

User can config the wireless connect parameters on this tab.

• Images

You can Query and upload Images from detector to Workstation.

Hume Acquire \$25K Parameters Service WE Image: Control of the service Outry Imaget: Upload instructions Upload instructions Index Imaget: 1200094037 Image: Control of the service 1 1200094037 Image: Control of the service 1 1200094037 Image: Control of the service 2 1500094037 Image: Control of the service 3 1500094037 Image: Control of the service 4 1500094037 Image: Control of the service 6 1500094037 Image: Control of the service 8 1500091454 Image: Control of the service 9 1500091761 Image: Control of the service 10 1500091761 Image: Control of the service 13 1500091761 Image: Control of the service 14 1500091763 Image: Control of the service	Celiborter Caliborter La ages Centre Colonal CenterTone Delay 2020-05-07 15:07:75 1016 2020-05-07 15:07:56 1016 2020-05-07 15:07:56 1016 2020-05-07 15:07:56 1016 2020-05-07 15:07:56 1016	Scal File	2020/05/22 17.49:10 Main1717X_1
Farameters Sensor W/E Sra Ourry Imaget: Uphoed Imaget: Uphoed Imaget: Uphoed Imaget: Index Imaget: 1300054037 3 2 1300054037 3 2 1300064037 3 3 1300064037 3 4 130006412 3 5 130006412 3 6 130006412 3 7 130008412 3 8 130008412 3 9 130008412 3 9 130008412 3 9 130008414 3 9 130008414 3 9 130008414 3 10 156001761 3 11 156001761 3 12 156001764 3 13 156001764 3 14 1560001764 3	ages CreateTime DefayT 2020-05-07 15:07:17 1200 2020-05-07 15:07:58 1018 2020-05-07 15:11:05 1018 2020-05-07 15:11:05 1018 2020-05-07 18:01:58 700	Tree ImageAtti Status ? Du00000001 Biy0000000 Du0000000 Du0000000 Du0000000 Du0000000	
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17 1568800590 3	2020/05-07 22-29/01 1017	0x0000006	
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18 15aaayoeaz 1	where he is the later where the set of the set	5-0000000	

4.4.5. Calibrate Page

Offset, Gain, Defect calibrate files can be generated and managed in this page.



Click "Start Generate Templates" to enter generating templates page.

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sate Officet	Subset Activity Offset Gain Defect Lag	
wate Gain	Default evable valid valid valid advent	
natur Defect		Import to Working
		Download to FPD
		Reset Status
		Call Switch Subset
	Type Index Activity Description	
		Upload to Workdin
		Upload to Workde Read Status
		Upliced to Workdie Read Status Active

SubTab	Description
Mode&Files	Manage template files
Create Offset	Create Offset template
Create Gain	Create Gain template
Create Defect	Create Defect template

Mode&Files page	Description
Import to Workdir	Copy template file into current calibration directory.
Download to FPD	Select one item first. Then click this button to download selected template file(s) into detector.
UpLoad to Workdir	Select one item in Fpd template file control and select one item in Subset settings control. Click this button to upload selected template from detector into specified calibration directory.
Upload Lag	Upload Lag into SDK current directory
Active	Select one item in list. Click this button to activate selected template for hardware correction.

Wireless Digital Flat Panel Detector Mars1717X

UpdateHWPreOffset	Force detector update Offset template
ReadStatus	Get the current state of template for hardware correction,
	enable/disable

• Generate Gain Template File

If the relative position between tube and detector changed or KV value changed, it suggest to create gain template file.

1. Enter Create Gain page

Click "Start" button to start process, the offset type should be selected, then start to get the images.



 Click PREP button, then exposure after Acquire button enable. After receving the PREP request, the detector needs some time to be ready, the decounting bar will apear when the exposure window is opened. After exposure user can click Acquire button to acquire the X-Ray image.



The gain template generation process needs 5 images total, the UI gives the recommended KV and target value, user can use different ones if needed.

After accepting the current image, the "Stage" will turn to 2/5, 3/5 and so on.

The current value box will show different colors, the definitons are as below:

Yellow: The current value is higher or lower than the expected one, user decides if acceptable. For example, the expected value is 20000, and user needs 40000 as the gain piont, the yellow warning can be ignored, and the value can be accepted still.

Green: The value is good.

Red: The value is un-acceptable.

3. After getting 5 images, user can generate the Gain template by "Generate" button, and the process can be exited from at anytime by using "Cancel" button.

If "Download to FPD after generation" is checked, then the download UI will appear after finishing generating. User can refer to the part of "Generate Defect Template File"

Municipalities	
Control Annual Control Control of	Canad as ofter type Hilling/Har Carles generation
Course Dorford	Singer AS Suggested UK 2000 Frankford Uklas Carrent Value

4. When the generating process is finished, the UI will give the message of successful.

• Generate Defect Template File

The process of generate defect map is quite similar with the one of gain map.

1. On the "Create Defect" page, user can start the generating process by "Start" button.

And the process can be quit by "Cancel".

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				Assess	
				LoadVie	
			Links of the second belows		

- 2. There are 8 images that need to be acquired, the UI gives the recommend KV and expected image value, user should refer with them.
- 3. If the option "Download to FPD after generation" is checked, the download UI will appear after finishing generating the defect map which will takes a little time.

The field of "Index in FPD" means that the detector can store several correction maps and choose one set to active as user wants.

The "Download files" part show the directory of the generated map stored on the workstation.



- After choosing the stored index of FPD, the download process can be started by the "Download" button, user should wait the process until it is finished.
- 5. The correction map also can be managed at anytime on the page of "Mode&Files".

Choose the item of "Default" in the Subset settings part and click "Download to FPD" to finish downloading the maps into the detector.

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ina Gala Shah	Subort Aldring Office Sam Onlink Log Terlinith models advance unlid salls? advance	Agentic Mobile Destination (The Agent Mobile
	Find template file	Upload to Monkels
		And Sets Setse systems/setse

• Upload the correction files

1. The correction maps can be uploaded to the workstation too.

Choose the gain or defect in the "Fpd template files" and the "Default" directory in the "Subset settings", then click the "Upload to workdir".

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2. When the upload process is finished, the UI will give the message.

The correction maps should be enabled before using hardware correction, read status first, then choose the gain or defect, enable the map by clicking "Active" button.

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4.4.6. Local Page

In this page user can open the image files saved in local, the file formate can be dcm, raw, tiff, dft. When the software is disconnected to detector, the file still can be opened.

Click "Load File", there will be an open file wizard. Select file and click open or double click the file. The tiff file will be opened directly. For the raw file or dft file there will be a dialog to select image size. Select correct size to open image files. If the file is not correct user will get an error message.

The pixel matrix is defined as below:

Active area : 4267*4267

What needs to be notice is only the active area pixels will be displayed when use load file funtion, the value of dummy pixels and empty channels will be filled by 65535.

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Horse	Acquire	sbe:	Detector	Californie	Local Pile	2020/05/22 17:56:21
Deerstin	n. bruge Pr	operties				
Sned FA	WWW WL PosR PosR Volue WSddh Heighth D Minny ROI	015335 32767 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				

This page provides ROI tool, which can see the AVG, SNR, and other properties of the choosen image area by right mouse button.

This page provides WW/WL tool as Acquire page . Click this button to auto adjust WW/WL based on selected area by right button of mouse.

Image			
Properties&	Description		
Image Process			
WW	window width		
WL	window level		
PosX	X coordinates of the current cursor at the point		
PosY	Y coordinates of the current cursor at the point		
Value	Value of the current cursor at the point		
Width	Image width		
Height	Image height		
C	Rotate the image clockwise, 90 degrees every time.		

9	Rotate the image anticlockwise, 90 degrees every time.
Mirror	Open or close mirror
ROI	ROI tool, to view the image of the AVG, SV, SNR and other parameters. Press "ctrl" key, can create several ROI area.
WW/WL	Auto adjust WW/WL based on selected area by right button of mouse.

4.5. List of the HAZARDOUS SITUATIONS resulting from a failure of the IT-NETWORK

- a) The operating system is not compatibility;
- b) Change or update the software failed;
- c) The compatibility of the interface;
- d) The data transfer protocol error;
- e) The inconsistent of interface or format leads to data distortion;
- f) The data output failed;

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5.

Operation Instructions for Image Acquisition

Mars1717X provides SDK for users to integrate detector into their DR system. Additionally, it also provides an application for demonstration, i.e. IDetector. User can use IDetector to control detector without DR system.

4.6. Steps for acquiring image

• Make sure the hardware is connected correctly and then power on.

Once powered off, please wait at least 60s before power on again

- Wait until initialization is complete
- Connect the software
- choose the synchronization mode
- Generate HWPreOffset, Gain and Defect template after the detector reaches thermal equilibrium
- Acquire images in the selected mode

To Acquire X-ray image is the main operation of Mars1717X. Most importantly, detector should build synchronization with X-ray generator. Mars1717X has one synchronization modes to acquire X-ray image, which is Software Mode.

4.7. Software Mode

4.7.1. 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 iDetector and SDK. FPD is the Flat Panel Detector and HVG is the High Voltage Generator. In this mode, Workstation does not have to control X-ray generator. Users would decide when to shoot X-ray.



4.7.2. Work Flow(PrepAcq)

Select HWPostOffset、HWGain、HWDefect. If user need the raw image, please de-select all these correction options.

Also, the software correction is supported.



- 1. Send Cmd"PrepAcq" on UI "Acquire" page.
- 2. After receiving the Cmd_PrepAcq, it will start the prepare process, and send back the acknowlage of "Prohibit" and "Enable", the "XWIN" will be started.
- 3. The XWIN is configured by parameter "Clear Acq Delay Time" on "SDK" page, the unit is "ms".
- 4. User needs to make sure the X-Ray ends within the XWIN.
- 5. The detector will send the images after the XWIN closed.
- 6. The preview image will be always sent, which is 4x4 averaging, the raw X-Ray image will be sent if the HW correction is disabled with the raw offset image follows, otherwise, the X-Ray image will not be sent and only the corrected image will be transferred.

4.7.3. Work Flow(Prep+Acq)



1. Send Cmd"Prep" on UI "Acquire" page.

- 2. After receiving the Cmd_Prep, it will start the prepare process, and send back the acknowlage of "Prohibit" and "Enable", the "XWIN" will be started.
- 3. The max XWIN is configured by parameter "Exp Window Time" on "Detector" page "Parameter" tab, the unit is "ms".
- 4. User starts the X-Ray.
- 5. Send "SingleAcq" on UI "Acquire" page after the X-Ray is end.
- 6. The preview image will be always sent, which is 4x4 averaging, the raw X-Ray image will be sent if the HW correction is disabled with the raw offset image follows, otherwise, the X-Ray image will not be sent and only the corrected image will be transferred.

4.8. AED Mode





- The detector is in low power state, user needs to send Cmd "Prep" to make the detector exit to idle state which indicated by the acknowledge to Cmd "Prep".
- 2. When the detector is in idle state, user can start the X-Ray any time.
- 3. When the X-Ray starts, the detector will sense the X-Ray automaticlly, the XWIN is configured by parameter "Set Delay Time" on "Detector" page "Parameter" tab, the unit is "ms", user needs to make sure that the XWIN is larger than the X-Ray time.
- 4. After the XWIN is end, then the detector will start the acquisition flow.
- 5. The preview image will be always sent, which is 4x4 averaging, the raw X-Ray image will be sent if the HW correction is disabled with the raw offset image follows, otherwise, the X-Ray image will not be sent and only the corrected image will be transferred.



4.8.2. Freesync Mode

- 1. For Freesync mode, there is no low power state.
- 2. When the detector is Idle, user can start the exposure flow any time.
- 3. When the X-Ray starts, the detector will sense the X-Ray automaticlly, the XWIN is configured by parameter "Set Delay Time" on "Detector" page "Parameter" tab, the unit is "ms", user needs to make sure that the XWIN is larger than the X-Ray time.
- 4. After the XWIN is end, then the detector will start the acquisition flow.
- 5. The preview image will be always sent, which is 4x4 averaging, the raw X-Ray image will be sent if the HW correction is disabled with the raw offset image follows, otherwise, the X-Ray image will not be sent and only the corrected image will be transferred.

4.9. After use

- 1. Disconnect the software
- 2. Power off
- 3. Keep it clean
- 4. Store under specified conditions

4.10. Correction and Calibration Template Generation

The correction and calibration should be performed after installation and it is recommended to perform the new correction and calibration after any major change on the system settings and hardware configuration. On the other hand, it is also recommended to do the correction and calibration in each 6 months.

4.10.1. HW pre-offset Template Generation



4.10.2. Gain Calibration Template Generation

If the relative position between tube and detector changed or KV value changed, it suggest to create gain template file.

Enter Create Gain page	Contract Contract Contract	- 8.4
Click "Start" button to start	Topo Shall	Loss a departmente
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		Ingenited value
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		Toront Made
		- Annual - C
		-



Select Mode&Files tab. Click Read Status button to check whether just downloaded gain template is enable. If not, please click Active button to enable.	R mate law Installer Controller		ing and a second
		Nel magda Ta Tarr Alex Alexi Sumation Tarr I Alexi Tarr	Early Hit Is Street To Make Hit Street In And Street Article Article

4.10.3. Defect Correction Template Generation




Select Mode&Files tab. Click Read Status button to check whether just downloaded gain template is enable. If not, please click Active button to enable.	A Land for A statistics Control (And Control (And Control (And)	n Yangan Kalan antag Salam antag (Man Jan Jahn Jag Salam antag ant Jahn Jag	Santa Salah Santa Sila
		Ballengen fo Seine den Akon Deorgen Seine 2 Akon Seine	Tana At in an and a stand a st

4.11. Local Image Check

"OPEN" provides two features for image check and uploading. Local Image Check, Panel Image Upload. Local Image Check defines function to check image saved in Workstation. Panel Image Upload defines function to upload images stored in panel.



This page provides ROI tool, which can see the AVG, SNR, and other properties of the choosen image area by right mouse button.

This page provides WW/WL tool as Acquire page . Click this button to auto adjust WW/WL based on selected area by right button of mouse.

Image Properties& Image Process	Description	
WW	window width	
WL	window level	
PosX	X coordinates of the current cursor at the point	
PosY	Y coordinates of the current cursor at the point	
Value	Value of the current cursor at the point	
Width	Image width	
Height	Image height	
C	Rotate the image clockwise, 90 degrees every time.	
5	Rotate the image anticlockwise, 90 degrees every time.	
Mirror	Open or close mirror	
ROI	ROI tool, to view the image of the AVG, SV, SNR and other parameters. Press "ctrl" key, can create several ROI area.	
WW/WL	Auto adjust WW/WL based on selected area by right button of mouse.	

4.12. Firmware Upgrade

Panel supports upgrading firmware with IDetector, also allows the use of the Web way to upgrade the firmware, if a user needs to upgrade the firmware, please complete the following steps.

On "Detector" Page, "Parameter" Tab, user can upgrade firmware by entrance button "Upgrade Firmware".

Perameters Sensor Will Images Product No. 53 Serial No. 6002345 Main Version 13333 Main Mill Cpu Version 2552552 Read Version 00000	679912345671 193.255	Mars 1717X_1 Reset Detector Reset Write Write RAM
Forameters Sensor (WII) Images Fonduct No. 50 Herial No. FOLIZING Wain Version 1.7.3.1 Vale MIL Cpu Version 0.00.0.0 Read Version 0.00.0.0	679912345675 193.235	Reset Detector Resid Write Write RAM
Hoduct No. 53 Arial No. 40012345 Aain Varsion 1.3.3.3 Aain Mill Cpu Varsion 2552552 Read Version 0.00.0.0	679912345671 955.255	Reset Delector Resul Write Write
Arrial No. HOLIZING Main Variane 2,333 Aain Mill Cpu Variane 2552352 Jaad Version 2020.0 An Variane 2,350.55	193.235	Resul Write Write RAM
Akin Varsion 1.3.3.1 Akin Mill Cpul Version 2552952 Read Version 0.00.0.0 An Version 2.3555.55	93.235	Writer Writer RANd
Asin Mill Cpu Varsion 255/2552 Jaad Version 0.00.00 As Version 2.550.55	55.255	Write RAM
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238.85		
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Cernel Version 1.20.5.8		4.
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at Delay Time (ms) 1200	113	
icquire Delay Time (mi) 100	1	
sp Window Time (ma) 10000		
INT MAC DOOFEAD	6/88	ALYOPEN

The firmware upgrade package may contain firmware of several units: ARM, FPGA, MCU.

Mars1717X_IMAGE_44_ALL_20XX_XX_XX.ifrm

Word "ALL" indicates the file contains the firmware upgrade file for all units.

Mars1717X_IMAGE_44_ARM_20XX_XX_XX.ifrm

Word "ARM" indicates the file is only for ARM.

Mars1717X_IMAGE_44_FPGA_20XX_XX_XX.ifrm

Word "FPGA" indicates the file is only for FPGA.

Mars1717X_IMAGE_44_MCU_20XX_XX_XX.ifrm

Word "MCU" indicates the file is only for MCU.

User can choose one of these files as required to start the upgrade.

Choose the file that needs to be upgraded, and must check the package info to confirm if it is correct.

Home Acquire	Emmere Upgrade ×	5/26 09:14:04
Parameters Sensor Product No Senial No Main Varsion Main MB Cpu Version	MainFPGA: 1.1.3.1 FPGARead1; 0.0.0.0 MCU: 2.10.0.16 ARM: 2.2.0.36 Cannet: 1.20.3.3	Reset Defector Reset Write Write RAM
Read Version Mos Version Arm Version Kernel Version Trigger Mode Set Delay Time (ms) Acquire Delay Time (Upgrade Parkage OfMars 30Mars17178/Mars17178_2020052100/Mars17178_201 Package Version: 1,20:5.21 Product: Mars17178 Description: ARM: Come 23:0.38, Kennell 1:20:5.21 PEGA main: 1:1.3.2 MCU : 2:100:16 1.DesicsType: AllinOse SourceFile: Mars17178(_IMAGE_44_AUL_2020_05_21.img	Upgrade Firmware 1
Exp Window Time Im Set MAC	Note: Don't break detector power and connection while updating. User: Upgrade	

Note:

- 1. There is a progress bar for indication. Make sure battery is inserted and battery capacity is over 25%
- 2. Please make sure that iDetector shows "Ready". It can also be checked by click "Config" button, there is firmware version.

6.

REG	ULATORY INFORMATION	77
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6.3.	Radio Frequency Compliance Information	
6.4.	Battery Safety Standards	
6.5.	Product Label	

6. Regulatory Information

6.1 Medical Equipment Safety Standards

• Medical equipment classification

Protection type against electrical shock	Class I equipment, using medically approved adaptor supply	
	supply	
Protection degree against electrical shock	В Туре	
Protection degree against water	IP56 (Detector)	
penetration	IP20 (Charger-Combo)	
Mode of operation	Continuous operation	
Flammable anesthetics	Not suitable for use in situation with flammable	
	anesthetic mixture with air, oxygen or nitrous oxide	
	Not suitable for use in oxygen-rich situation	
The detector has two power supply modes (power adaptor and battery pack) and a single way for		
signal transmission (wireless)		

• Safety standards reference

Wireless detector safety standards cover the detector, charger, battery pack and other accessories.

IEC 60601-1:2005+A1:2012	Medical electrical equipment Part 1: General requirements for basic safety and essential performance
EN 60601-1: 2006+A1:2013 +A11:2011+A12:2014	Medical electrical equipment Part 1: General requirements for basic safety and essential performance
CAN/CSA-C22.2No.60601-1:14	Medical electrical equipment – Part 1: General requirements for basic safety and essential performance
ANSI/AAMI ES60601-1:2005+A2 (R2012)+A1	C1:2009/(R)2012 and A2:2010/(R)2012 (Consolidated Text) Medical electrical equipment - Part 1: General requirements for basic safety and essential performance (IEC 60601-1:2005, MOD)
KS C IEC 60601-1:2013;	Medical electrical equipment – Part 1: General requirements for basic safety and essential performance
IEC 60601-1-2:2014	Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance – Collateral standard: Electromagnetic disturbances – Requirements and tests
EN60601-1-2:2015	Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance – Collateral standard: Electromagnetic disturbances – Requirements and tests
CAN/CSA-C22.2 No. 60601-1-2:16	Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance – Collateral standard: Electromagnetic disturbances –

	Requirements and tests
IEC 60601-2-54:2009+A1:2015	Medical electrical equipment Part 2-54: Particular requirements for the basic safety and essential performance of X ray equipment for radiography and radioscopy
EN 60601-2-54:2010+A1:2015	Medical electrical equipment Part 2-54: Particular requirements for the basic safety and essential performance of X ray equipment for radiography and radioscopy
CAN/CSA-C22.2 No. 60601-2- 54:11+GI1(R2016)+A1;	Medical electrical equipment Part 2-54: Particular requirements for the basic safety and essential performance of X ray equipment for radiography and radioscopy
KS C IEC 60601-2-54:2012	Medical electrical equipment Part 2-54: Particular requirements for the basic safety and essential performance of X ray equipment for radiography and radioscopy
IEC 60601-1-6:2010 +A1:2013;	Medical electrical equipment – Part 1-6: General requirements for basic safety and essential performance-Collateral standard: Usibility
EN 60601-1-6:2010+ A1:2015;	Medical electrical equipment – Part 1-6: General requirements for basic safety and essential performance-Collateral standard: Usibility
CAN/CSA-C22.2 No. 60601-1-6:11+A1;	Medical electrical equipment – Part 1-6: General requirements for basic safety and essential performance-Collateral standard: Usibility
KS C IEC 60601-1-6:2011;	Medical electrical equipment – Part 1-6: General requirements for basic safety and essential performance-Collateral standard: Usibility
EN ISO 14971: 2019	Medical device – Application of risk management to medical devices
EN ISO 24971: 2010	Medical devices — Guidance on the application of ISO 14971
ISO 15223-1:2016	Medical devices—Symbols to be used with medical device labels, labeling and information to be supplied—Part 1: General requirements
IEC 62133-2:2017	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems
EN 1041:2008+A1	Information supplied by the manufacturer of medical devices
ISO 10993-1:2018	Biological evaluation of medical devices — Part 1: Evaluation and testing within a risk management process
MDD (93/42/EEC)	Medical Device Directive
EN ISO 13485:2016	Medical devices Quality management systems Requirements for regulatory purposes

6.2 Guidance and Manufacture's Declaration for EMC

6.2.1 EMI Compliance Table

• Emissions

Phenomenon	Compliance	Electromagnetic environment
RF emissions	CISPR 11	Professional healthcare facility environment
	Group 1, Class B	
Harmonic distortion	IEC 61000-3-2	Professional healthcare facility environment
	Class A	
Voltage fluctuations	IEC 61000-3-3	Professional healthcare facility environment
and flicker	Compliance	

6.2.2 EMS Compliance Table

Enclosure Port

Phenomenon	Basic EMC standard	Immunity test levels
		Professional healthcare facility environment
Electrostatic	IEC 61000-4-2	±8 kV contact
Discharge		$\pm 2kV$, $\pm 4kV$, $\pm 8kV$, $\pm 15kV$ air
Radiated RF EM field	IEC 61000-4-3	3V/m
		80MHz-2.7GHz
		80% AM at 1kHz
Near fields from RF wireless communications equipment	IEC 61000-4-3	Refer to table "Near fields from RF wireless communications equipment"
Rated power frequency magnetic fields	IEC 61000-4-8	30A/m 50Hz or 60Hz

• Near fields from RF wireless communications equipment

Test frequency	Band	Immunity test levels
(MHz)	(MHz)	Professional healthcare facility environment
385	380-390	Pulse modulation 18Hz, 27V/m
450	430-470	FM, ±5kHz deviation, 1kHz sine, 28V/m
710	704-787	Pulse modulation 217Hz, 9V/m
745		

700		
780		
810	800-960	Pulse modulation 18Hz, 28V/m
870		
930		
1720	1700-1990	Pulse modulation 217Hz, 28V/m
1845		
1970		
2450	2400-2570	Pulse modulation 217Hz, 28V/m
5240	5100-5800	Pulse modulation 217Hz, 9V/m
5500		
5785		

Input a.c. power port

Phenomenon	Basic FMC standard	Immunity test levels
		Professional healthcare facility environment
Electrical fast	IEC 61000-4-4	±2 kV
transients/burst		100kHz repetition frequency
Surges	IEC 61000-4-5	+0.5 kV +1 kV
Line-to-line		
Surges	IEC 61000-4-5	±0.5 kV, ±1 kV, ±2 kV
Line-to-ground		,,,
Conducted disturbances induced by RF fields	IEC 61000-4-6	3V, 0.15MHz-80MHz
		6V in ISM bands between 0.15MHz and 80MHz
		80%AM at 1kHz
Voltage dips	IEC 61000-4-11	0% UT; 0.5 cycle
		At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°
		0% UT; 1 cycle
		and
		70% UT; 25/30 cycles
		Single phase: at 0°
Voltage interruptions	IEC 61000-4-11	0% UT; 250/300 cycles

Recommended separation distances between portable or mobile RF communication device and detector:

Portable RF communications equipment, including antennas, can effect medical electrical equipment. The warning should include a use distance such as "be used no closer than 30 cm (12

inches) to any part of the [ME EQUIPMENT or ME SYSTEM], including cables specified by the manufacturer".

Cable	Recommended length	Shielded/Unshielded	Number	Cable classification
AC power cable	1.8m	Unshielded	1 piece	AC power
DC power cable	3m	Shielded	1 piece	DC power
Ethernet cable	3.5m	Shielded	1 piece	Signal

• Cable provided for EMC

• Electromagnetic Compatibility (EMC)

Mars1717X requires special precautions regarding EMC and needs to be installed only by iRay or authorized personnel and put into service according to EMC information provided in the user manual. Mars1717X in use may be susceptible to electromagnetic interference from portable and mobile RF communications such as mobile (cellular) telephones. Electromagnetic interference may result in incorrect operation of the system and create a potentially unsafe situation.

Mars1717X conforms to this EN60601-1-2:2015 standard for both immunity and emissions.

Nevertheless, special precautions need to be observed:

The use of accessories, transmitters and cables other than those specified by this User Manual, with the exception of accessories and cables sold by iRay of Mars1717X as replacement parts for inner components, may result in increased emission or decreased immunity.

6.3 Radio Frequency Compliance Information

Country	Item
U.S.A.	KDB 865664 D01
	47 CFR part 15, subpart B
	47 CFR part 15, subpart C 15.247
	47 CFR part 15, subpart C 15.407
	47 CFR §2.1091
	KDB447498 D01 General Exposure Guidance v06
European Union	ETSTEN 300 328 V2.2.2
	ETST EN 301 893 V2.1.1
	ETST EN 300 440 V2.1.1
	ETSTEN 301 489-1 V2.2.3
	ETSTEN 301 489-3 V2.1.1
	ETSTEN 301 489-17 V3.2.4
	EN 55032:2015+A11:2020

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EN 55035:2017+A11:2020
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 50566:2017
EN 62209-2:2010+A1:2019
IEC 62479:2010

6.3.1 FCC Compliance

Contains module's FCC ID: 2ACHK-01070189

• The panel has been tested to comply with limits for a Class B digital device, pursuant to part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Operation is subject to the following two conditions.

The panel may not cause harmful interference.

The panel must accept any interference received, including interference that may cause undesired operation.

 The panel generates, uses, and radiates radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the panel does cause harmful interference to radio or television reception, which can be determined by turning the panel off and on, the user is encouraged to correct the interference by one or more of the following measures.

Reorient or relocate the antenna.

Increase the separation between the panel and receiver.

Connect the panel into an outlet different from the receiver is connected.

Consult the distributor or an experienced radio/TV technician for help.

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

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

UNII I is in door use only

Radio Frequency (RF) Energy

This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the United States.

During SAR testing, this device was set to transmit at its highest certified power level in all tested frequency bands, and placed in positions that simulate RF exposure in usage

against the body with no separation. Although the SAR is determined at the highest certified power level, the actual SAR level of the device while operating can be well below the maximum value.

This is because the device is designed to operate at multiple power levels so as to use only the power required to reach the network. In general, the closer you are to a wireless Base station antenna, the lower the power output.

The exposure standard for wireless devices employing a unit of measurement is known as the Specific Absorption Rate, or SAR. The SAR limit recommended by the ICNIRP used by the general public is 2.0W/kg averaged over ten grams of tissue and, is 1,6W/kg Averaged over one gram of tissue by IEEE Std 1528.

The FCC has granted an Equipment Authorization for this product with all reported SAR Levels evaluated as in compliance with the FCC RF exposure guidelines.

While there may be differences between the SAR levels of various product and at various positions, they all meet the government requirements.

SAR compliance for body-worn operation is based on a separation distance of 0 mm between the unit and the human body. Carry this device at least 0 mm away from your body to ensure RF exposure level compliant or lower to the reported level. To support body-worn operation, choose the belt clips or holsters, which do not contain metallic components, to maintain a separation of 0 mm between this device and your body. RF exposure compliance with any body-worn accessory, which contains metal, was not tested and certified, and using such body-worn accessory should be avoided.

Standards	Description
IEC 62133:2012	Secondary cells and batteries containing alkaline or other non- acid electrolytes
UN38.3	United Nations Recommendations on the Transport of dangerous goods Manual of tests and Criteria ST/SG/AC.10/11/Rev.5/Amend.1&Amend.2

6.4 Battery Safety Standards

6.5 Product Label

Mars1717X Detector Label



Battery Charger Label



Battery Label



7. Trouble Shooting

Please refer to service manual. If the problem persists, turn off the panel and contact iRay service department (*service@iraygroup.com*). We would provide the best service

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8. Service Information

8.1 Service Office Information

Service Office Tel: +86 2150720560 Fax: +86 2150720561 E-mail: service@iRaygroup.com Location: RM202, Building 7, No. 590, Ruiqing RD. , Zhangjiang East, Pudong 201201, Shanghai, P.R. China

8.2 Product Lifetime

The estimated product lifetime is up to 7 years without frequency limit.

8.3 Regular Inspection and Maintenance

In order to ensure the safety of patients and operator, to maintain the performance and reliability of the panel, be sure to perform regular inspection at least once a year. If necessary, clean up the panel, make adjustments or replace consumables such as fuses etc. There may be cases where overhaul is recommended depending on conditions. Contact iRay service office or local iRay dealer for regular inspection or maintenance.

8.4 Repair

If problem cannot be solved, contact your sales representative or local iRay dealer for repairs. Please refer to the label and provide the following information:

Product Name:

Series Number:

Description of Problem: as clearly as possible.

8.5 Replacement Parts Support

Main parts (parts required to maintain the function of the product) of this product will be stocked for 5 years after discontinuance of production for repairing.

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Appendix A Information of Manufactures



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China		
201201		
+86 21-50720560		
WWW.IRAYGROUP.COM		

Appendix B Information of Europe Representative

EC REP	COMPANY:	iRay Europe GmbH
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	ZIP CODE:	/
	TELEPHONE:	+49-7062-977 88 00
	FAX:	+49-7062-976 0571
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