



Pluto0005X Image Sensor

User Manual



Preface

Dear users:

Thank you for using Tootoo MediTech Co., Ltd. (Hereinafter referred to as 'MediTech') image sensor and trust us on the product, we are deeply honored by your choice, and will provide our best to ensure your satisfaction with Pluto0005X image sensor.

Pluto0005X image sensor is performed in equipped the software (VetImage software is designed for animal clinical use), which is designed to take full advantage of the sensor performance. To get the optimal image and higher processing quality, the use of Pluto0005X image sensor and VetImage software in combination is necessary.

To ensure your safety and efficient use of image sensor, please follow this user manual carefully. MediTech will not be held responsible for any failure or accidental damage caused by improper operation against the instructions in the manual.

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Modification and update of this manual, as well as the right of final explanation are belong to MediTech.



Contents

Chapter 1 Product Description	1
1.1 Image Sensor Appearance	1
1.2 Image Sensor Description	2
1.3 Intended Use	2
Chapter 2 Safety Instruction	3
2.1 Safety Classification	3
2.2 Symbols Description	3
2.3 Warning and Precaution	4
2.3.1 Precaution	4
2.3.2 WARNING	5
2.4 Work Environment	5
2.4.1 Operating Conditions	5
2.4.2 Transportation and Storage Environment	6
Chapter 3 Specification	7
3.1 Image Sensor Specifications	7
3.2 Computer Configuration Requirements	7
3.3 Exposure Requirement of X-ray Generator	8
Chapter 4 Software Installation Instruction	10
4.1 Driver Installation	10
4.2 Software Installation	10
4.3 Registry & Activation	12
4.4 Calibration File Installation	13
Chapter 5 Software Operation	16
5.1 User Interface	16
5.2 Create a New Case	16
5.3 Search for a case	17
5.4 Image Acquisition	18
5.5 Image Editing	21
Chapter 6 Image Sensor Operation Guidelines	23
6.1 Working Sketch Map	23
6.2 Image Sensor Operation Guidelines	23
Chapter 7 Cleaning and Disinfection	26
Chapter 8 Maintenance	27
8.1 Periodic Maintenance	27
8.2 Damaged or Nonfunctional Image Sensor	27
Chapter 9 Troubleshooting	28
Chapter 10 Warranty	30
Chapter 11 Product Components	31

Chapter 1 Product Description

The sensor consists of sensor head, control box, connection cable and image management software.

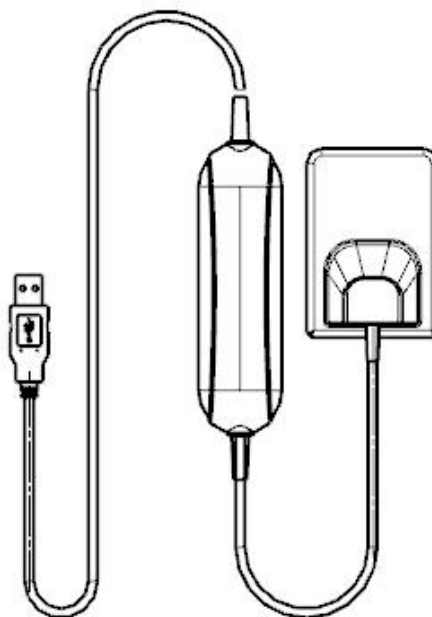
Additionally equipped with the sensor head holder and control box holder, for the user to place the product.

NOTE: Different product model is with different design and components, please refer to '1.1 Image Sensor Diagram'.

Image Sensor applies to collect x-ray photons for photoelectric conversion, digital data collection / conversion / transmission. Digital data is sent to computer via USB cable. The sensor is powered by the USB hub, instead of batteries or a charging system, but need to work with software.

The computer and other external devices (like monitor, printer, etc.) that work with this product are equipped by the user own self. For the suggested computer configuration, please refer to "3.2 Computer Configuration Requirements".

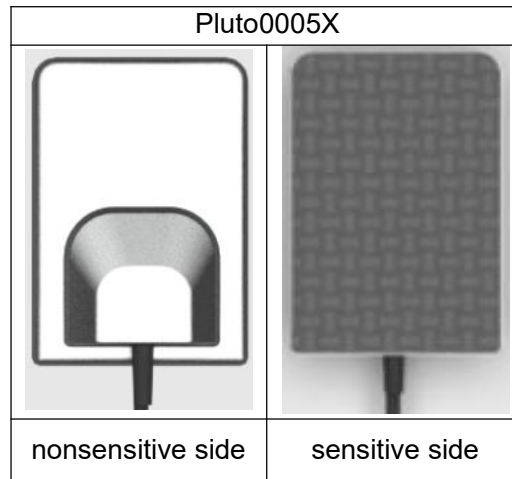
1.1 Image Sensor Appearance





1.2 Image Sensor Description

Image Sensor is applied to collect x-ray photons for photoelectric conversion, digital data collection/conversion/transmission. (Image sensor head design is as below image)



1.3 Intended Use

This product is intended to convert x-ray photons emitted from X-ray generator into digital image, which is for viewing/saving/transferring.



Chapter 2 Safety Instruction

This chapter provides important safety information for image sensor use.

2.1 Safety Classification

Degree of Protection Against Electric Shock: BF
Mode of Operation: Continuous operation
Grade of Water Proof: IPX7(only applicable for the sensor head part)
Power Supply (through USB port): DC5V±0.5V
Input Power: 1W
Non AP equipment. Non APG equipment
No application for protection against defibrillation discharge effect
Non-permanent installation equipment

2.2 Symbols Description

Symbol	Description
	Caution(refer to accompanying documentation)
	Refer to user manual
	Type BF applied part
SN	Manufacture's serial number
	Fragile Contents of the transport package are fragile Therefore it shall be handle with care



	THIS WAY UP Indicates correct upright position of the transport package
	KEEP AWAY FROM RAIN Transport package shall be kept away from rain
	Antiroll
	Max and Min temperature
	Manufacturer Name and address of the manufacturer

2.3 Warning and Precaution

2.3.1 Precaution

- Check whether the image sensor surface is with visible physical damage before each usage, the surface should be smooth, without any crack or damage. Otherwise, please contact our after-sales team once any damage occurred.
- As with other electronic equipment, image sensor is susceptible to electrostatic discharge (ESD), particularly when the device is used in or around carpeted areas or low humidity environments. During cable re-plugged, when image sensor contacts are exposed, it is especially important to protect the device from potential ESD damage. Touching a metal surface prior to re-plugging the cable will reduce the risk of damaging image sensor components by accidental static discharge. The use of anti-static floor mats or floor treatments will also help eliminate static build-up in your office.
- When the image sensor is in use, do not touch exposed connectors on non-medical electrical equipment (like computer externals) and the object under test at the same time. If the object under test is capable of conducting electrical current and against the appropriate safety practices, that may cause a shock hazard to the object.
- The image sensor has been determined to be in accordance with international safety standards and is deemed suitable for use within 5ft (1.5m) away from the object under test. To comply with these standards, do not operate non-standard equipment within the test area. Within the test area, the presence of approved medical grade equipment and Listed/Approved/GB9706.1(IEC60601-1), YY0505(IEC60601-1-2) certified computer equipment is acceptable. Outside the test area, the presence of



approved non-medical grade equipment and Listed/ Approved/GB4943(IEC60950) certified computer equipment is acceptable. The person in charge of connecting this product to the host computer shall ensure its compliance. To keep optimal performance, ensure that all software programs residing on the workstation are virus-free and have been adequately tested so they will not impact imaging applications after installation.

- Portable and mobile radio frequency communication equipment probably impact on medical electrical equipment.

2.3.2 WARNING

- Non-following the user manual probably endanger the safety of object under test. Manufacture bear no compensation liability for any damage caused by improper operation.
- As a precision electronic product, avoid falling on the floor, pulling and long-time disinfectant soaking.
- The image sensor must be used by a trained personnel in accordance with the user manual carefully.
- Cover a disposable hygienic sheath before each usage to avoid cross infection and allergy (apply to animal clinical).
- Do not bite on sensor to avoid damage to the disposable hygienic sheath and the image sensor.
- Stop using once the product is malfunction, contact our company or authorized dealer immediately.
- Do not move or knock the device while in working state.
- This product is not used for treatment, all images are for users' reference only.
- Only professional vet/technician/trained staff are authorized to operate this product.
- Only the manufacturer is authorized to make repairs and maintain.
- Use with caution in epilepsy/psychosis animals.
- Do not work with or approach toward other equipment. If it must to work with or approach toward other equipment, please observe and verify that it can work normally under the existing configuration.
- The use of unspecified accessories/transducers/cables may result in an increase in the x-ray emission or a reduction in the disturbance immunity of this product.

2.4 Work Environment

2.4.1 Operating Conditions

Environment Temperature	10℃~40℃
Relative Humidity	0%~80%



Air Pressure

86kPa~106kPa

2.4.2 Transportation and Storage Environment

Environment Temperature

-25℃~60℃

Relative Humidity

10%~93%

Air pressure

80kPa~106kPa



Chapter 3 Specification

3.1 Image Sensor Specifications

Model	Pluto0005X
Chip Type	APS CMOS
Pixel Size	18.5μm
Dimension (mm)	53.8 x 77.1 x 6.5
Active Area (mm)	46.7 x 67.3
Active Pixel Array (pixels)	2524 x 3640
Voltage (through USB connection)	5.0 V±0.5V
Electricity Current (though USB connection)	≤500mA
Power	≤1W
Digitization	12/14bit
Imaging Time	5~6 s
Spatial Resolution	GOS: ≥10 lp/mm Csl: ≥14 lp/mm
Theoretical Resolution	27 lp/mm
Signal Output	USB 2.0

3.2 Computer Configuration Requirements



Note: Suggested minimum configuration for the computer, it's equipped by the user own self.

Table of Minimum Computer Configuration Requirements

Items	Minimum Requirements
Processor	Intel 1.5GHz chip or above
Memory	Above 4G



Hard disk	Above 40G (1GB for software installation, 40GB for software operation)
Video card	32M or above
Display	Resolution 1024 × 768 (15") or above 32-bit color mode
Interface	At least 2 available USB2.0 / USB3.0 ports (if desktop computer used, 2 available USB ports must be had at the back of host)
Operating System	Windows XP/Win7/Win10 (32bit&64bit)
Backup Medium	Removable device (the database should be copied frequently to avoid information lost by accident, some cases like PC Disk is corrupt/full/attacked by virus, etc.)

**Caution:**

- The computer and other external devices (like monitor, printer, etc.) should comply with the requirements of GB4943 (or IEC60950), and be certified by 3C (or CE) as well.
- The computer and other external devices (like monitor, printer, etc.) are equipped by the user own self.
- The requirement form above is the suggested minimum configuration for the computer, and the product performance might be affected if those above are not reached.
- Prohibit the use of computer non-comply with GB4943(or IEC60950), like some kind of unauthorized assembly computer may incur potential safety hazards.
- Prohibit the use of computer unapproved with 3C (or CE).

3.3 Exposure Requirement of X-ray Generator



Note: X-ray generator is equipped by the user own self.

As with conventional radiological equipment, exposure time depends on the performance of generator, the shape and property of the object under test.

The recommended exposure time of x-ray generator for reference under the value of 70kV/7mA showed in below table, and reset a special value according to your practical experience to make the radiograph more clear.



Recommended exposure times (take animal dental as an example):

Tooth Position	Recommended exposure values (Unit: s)
Upper incisor/canine	0.18
Upper premolar	0.24
Upper molar	0.35~0.45
Lower incisor/canine	0.12
Lower premolar	0.18
Lower molar	0.25

**Caution:**

- The X-ray generator tube voltage range should be 60~70kV.
- The X-ray generator is with DC power supply, if it with AC power supply, please increase the exposure time by 10~30%.



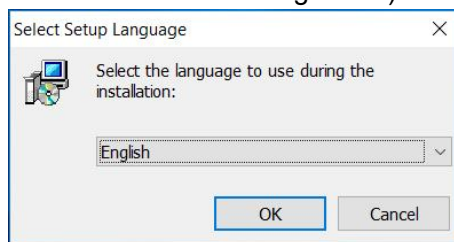
Chapter 4 Software Installation Instruction

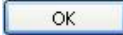
4.1 Driver Installation

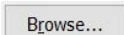
We provide a USB flash disk or a CD together with the sensor in package. Please open the driver installation folder, double click the driver icon  VetImage_3.32.01(2025020601).exe to complete the installation by following install-shield wizard. (The Driver name might change with update version, please refer to the actual using name)

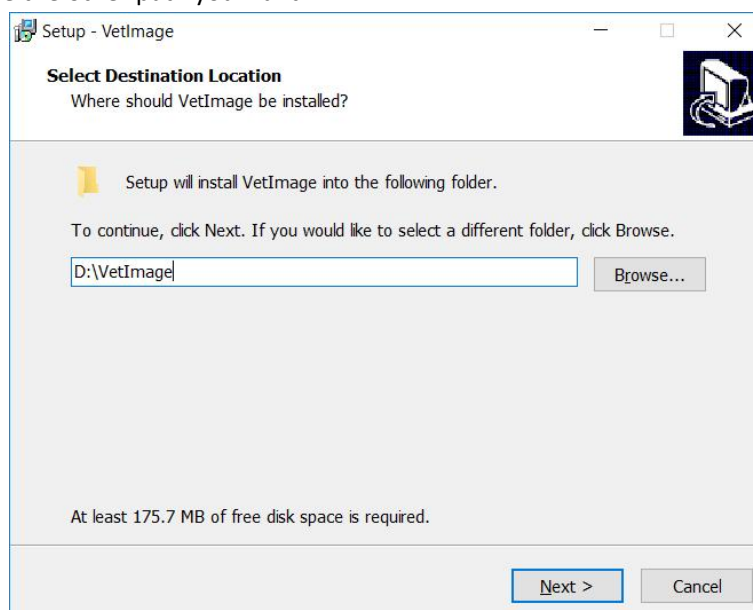
4.2 Software Installation

1. Please open software installation folder saved on USB flash disk, double click the software icon  VetImage_3.32.01(2025020601).exe to launch the installer. (The Software name might change with update version, please refer to the actual using name)



Chose the language you'd like, click  button.

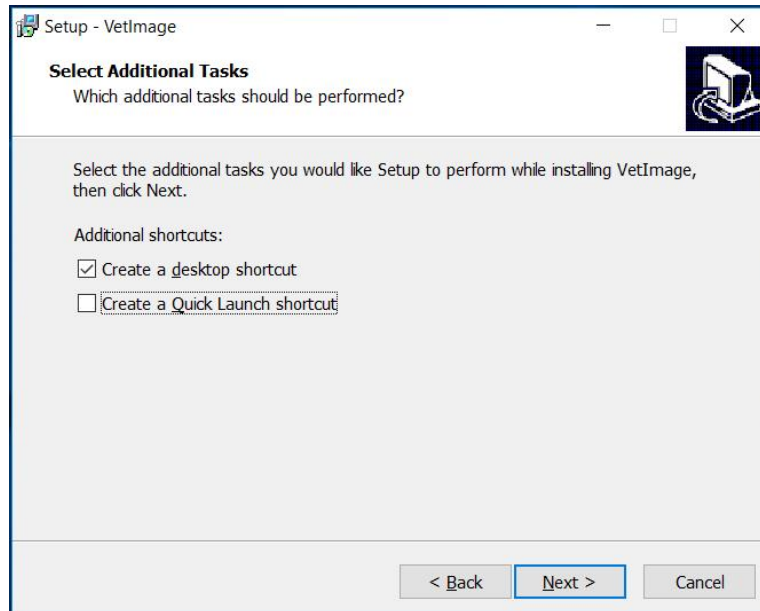
2. Software installation path: the default path is on D drive 'D:\VetImage', or click the  button to choose the other path you want.





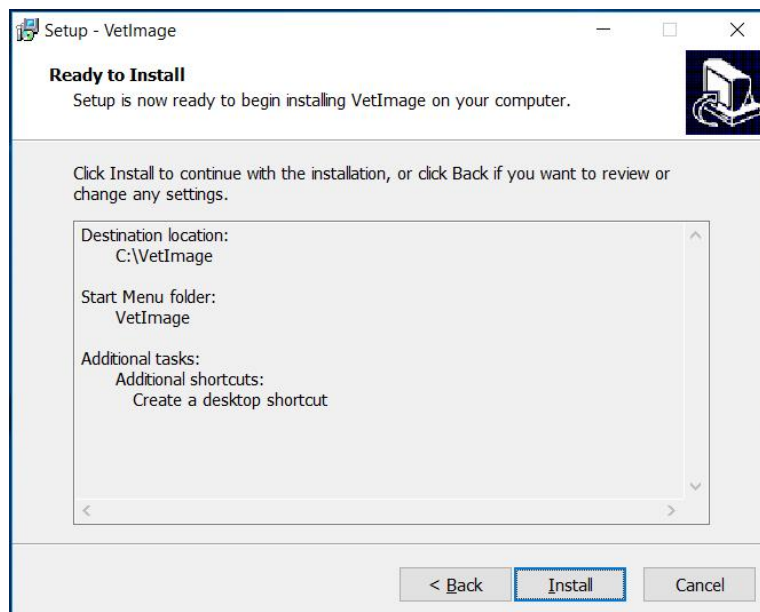
Click **Next >**

3. Chose the below two options as needed.



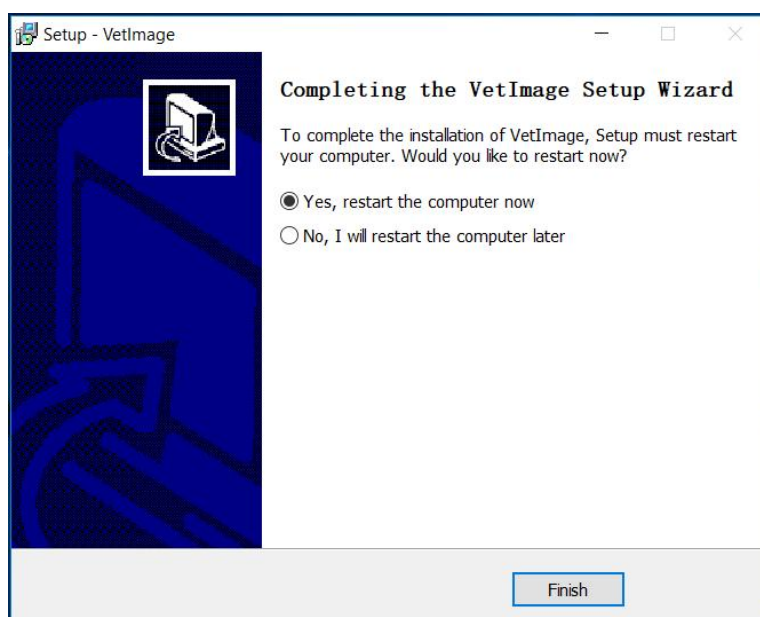
Click **Next >**

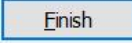
4.



Click **Install**

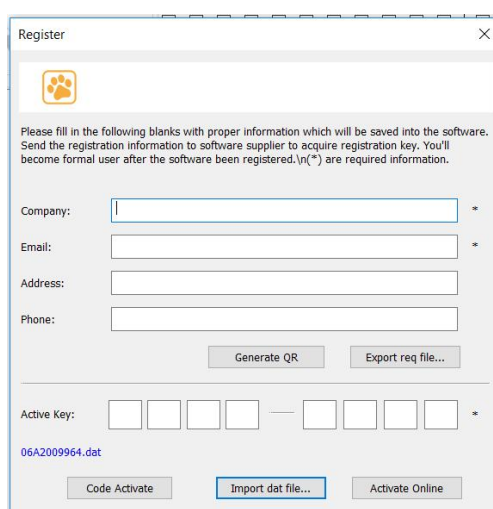
5.



Click  button to complete the software installation.

4.3 Registry & Activation

All copyright, trademark, patent, trade secret and other intellectual property rights of the software are protected by the P.R.China laws and rules, as well as the corresponding international treaties. It's restricted to use as any other form without permission, otherwise he will be investigated for legal responsibility according to law. To protect your legitimate rights and interests, please activate the software as required.





After 30 days since the date of software installed, the trial version will be locked, and ask for an activation code, the registration window will be showed automatically for your side to proceed with registry (Please activate your software in advance to avoid software stop working).

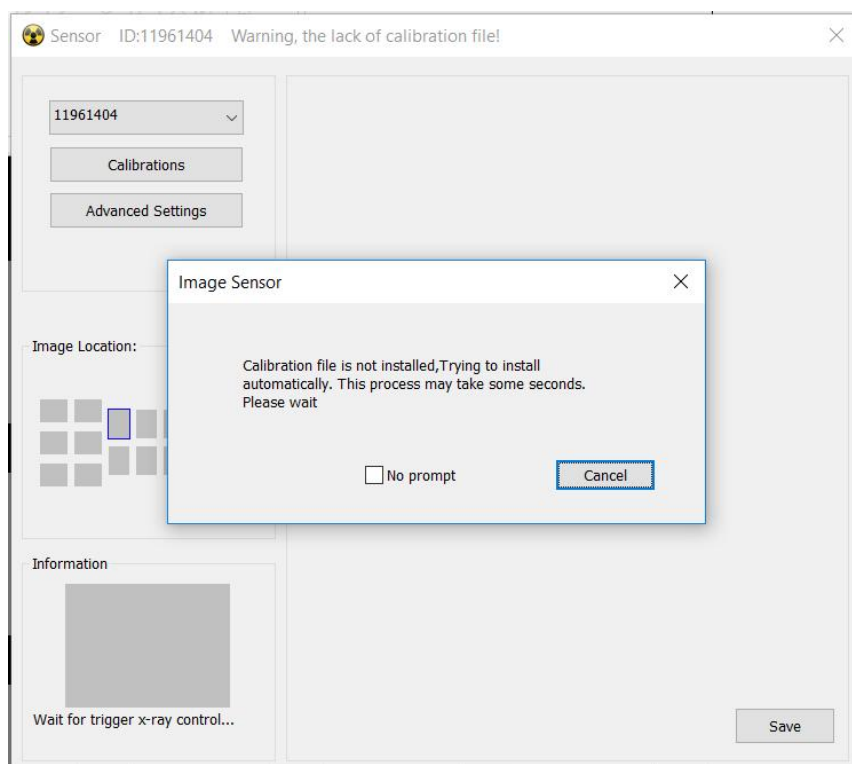
If the registration window disappears, please follow the below steps:

- (1) Run the software, click **Help(H)** button in menu bar, and select **Register(R)**;
- (2) Fill in the blank of the user information: Company/Email/Address/Phone, in which the Company and Email information is required;
- (3) Click **Export req file...** button after the user information is be finished, save it on your computer desktop, a file suffixed with '.req' will be generated, then send this request file to your local distributor or our company;
- (4) We will reply you an activation file suffixed with '.act', to active your software by import this file into registration windows directly (No need to open this file);
- (5) Click **Import act file..** button to import the activation file you received;
- (6) Message of successful registration will be prompted in the software;

4.4 Calibration File Installation

On-line Automatic Installation

If the calibration file hasn't been installed yet, a prompt box will pop up showing the calibration file is being installed automatically at the first time of bring up the shooting window in software. This procedure is trying to connect to network to search its calibration file and install the file automatically.

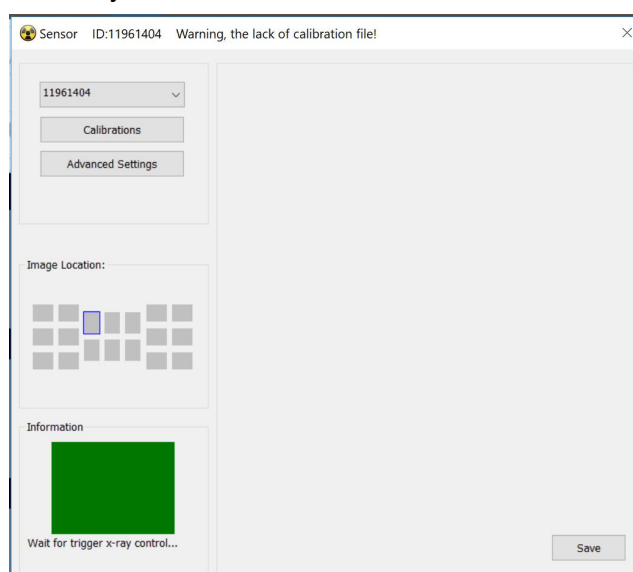


The prompt box will be closed automatically after successful installation, the warning message in title bar also will remove automatically.

Reminder: On how to bring up the shooting windows, please refer to Chapter 5 'Software Operation'

Manual Installation

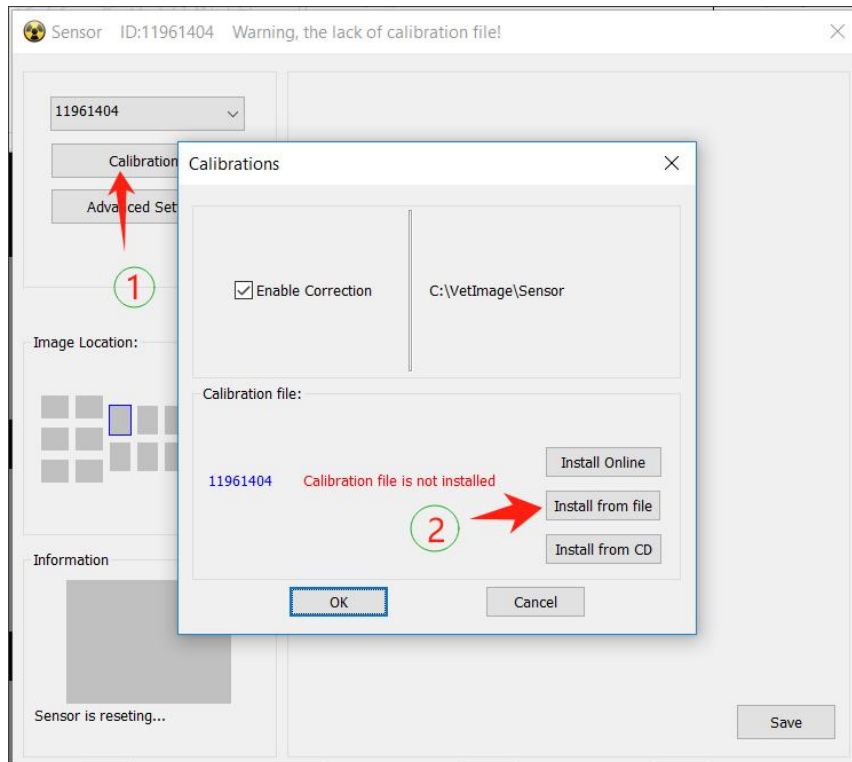
(1) If the on-line automatic installation failed, the prompt box will disappear. Meanwhile, a lo need to be installed manually.



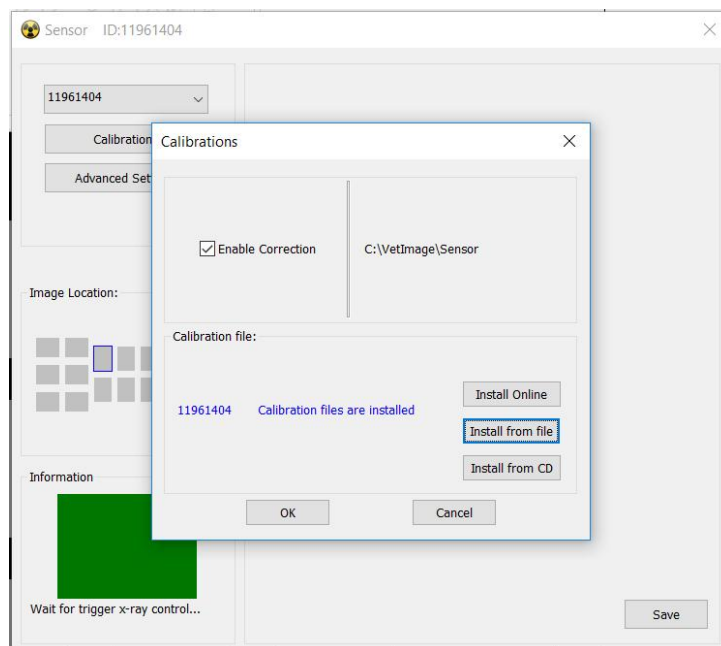
(2) Click 'Calibrations' button to bring up the interface for manual installation. Choose 'Install



from file' option, manually search for its calibration file saved on USB flash disk packed together with the sensor.



(3) The warning message will be removed after calibration file installed successfully.



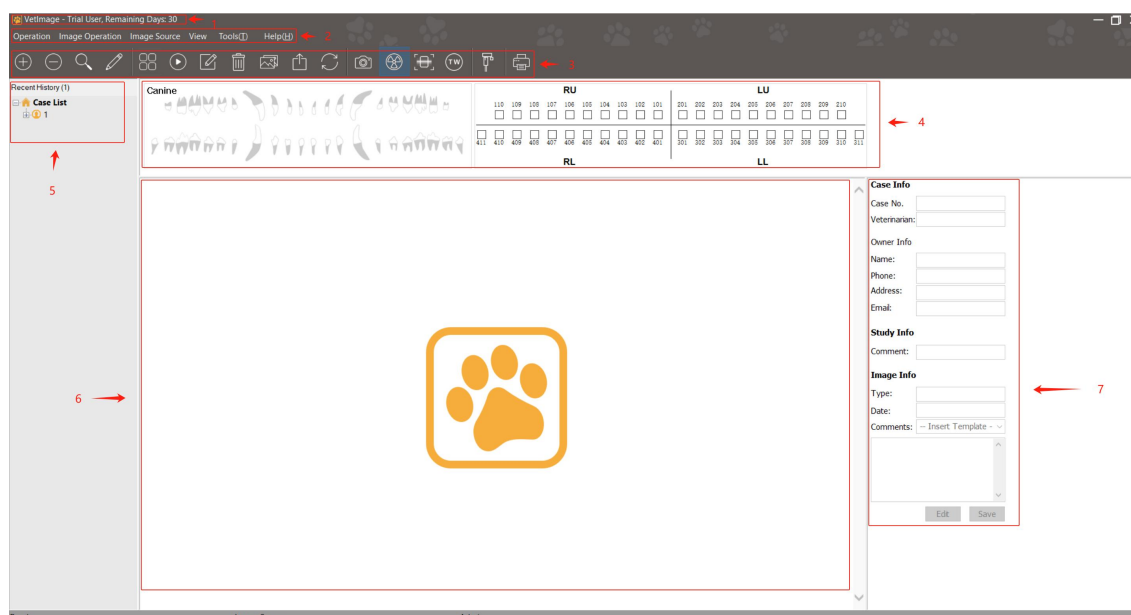
Chapter 5 Software Operation

5.1 User Interface



Double click the icon  to run software, home screen appears.

1.Title Bar	2.Menu Bar
3.Tool Bar	4.Image Location
5.Case list	6.Target Frame
7.Image Information	



5.2 Create a New Case



Create a new case is needed before taking images. Click  button on tool bar to bring up "New Study" interface.



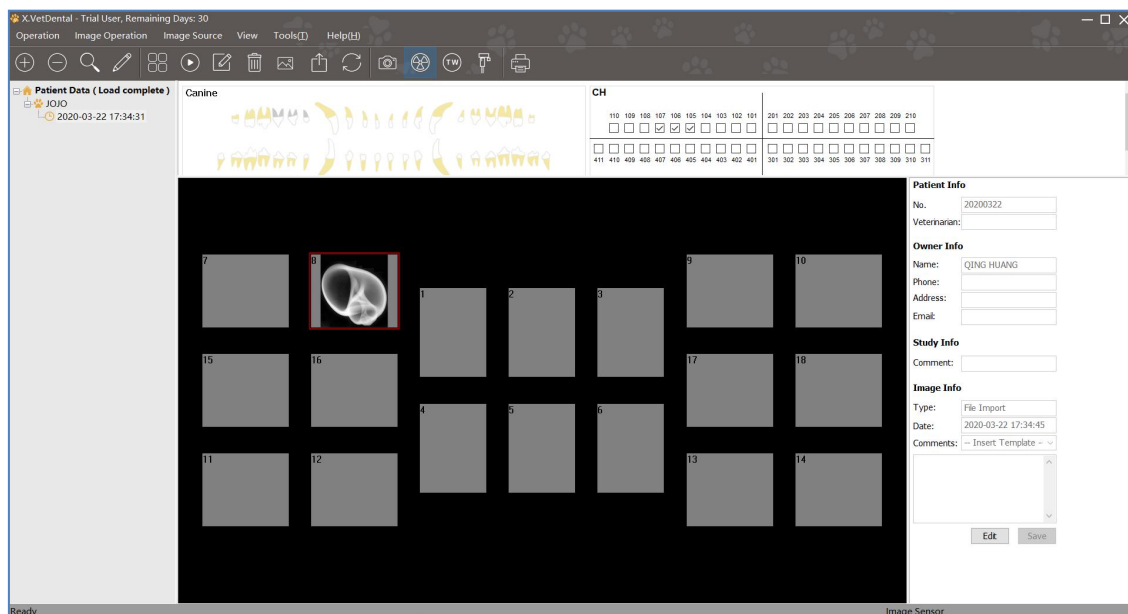
Fill in the information of the object under test (in VetImage software, the owner info also is required to be finished), select Image Display Mode you'd like, also it's available to write study comment in the bottom side blank, then click 'Ok' button to go back to home screen automatically, meanwhile the new case will be displayed in 'Recent History' area with the state of being selected.

5.3 Search for a case

Click  button to bring up 'Searching' window.

VetImage: Search for the case by use its ID/Animal name/Owner name.

Double click the target case, 'Search' window will be closed and go back to home screen automatically, this case will be displayed in 'Recent History' area with the state of being selected.

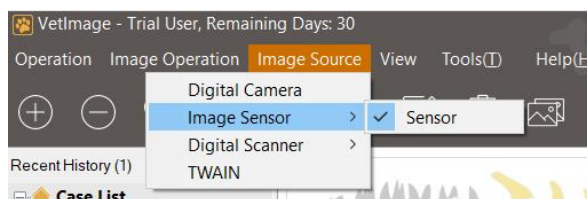


VetImage (The images displayed are the sample, please refer to your actual shooting)

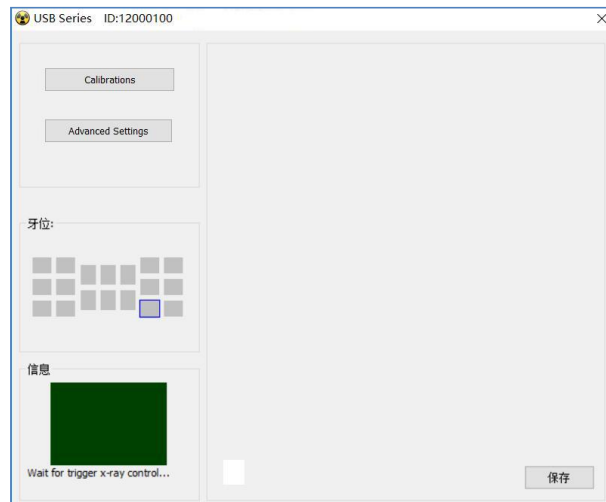
5.4 Image Acquisition

1. Connect the sensor to your computer via USB cable, the power light will be on under normal connection, the working light will flicker after 2 seconds.

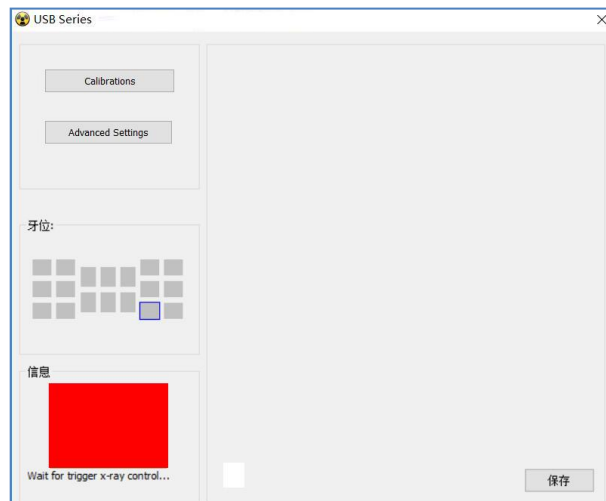
2. Directly click icon  or choose 'Image Source' / 'Image Sensor' / 'USB Series' in drop-down menu by right-click a null frame, to bring up the shooting window. On the second time use, simply double-click a null frame to quickly bring up the shooting window.



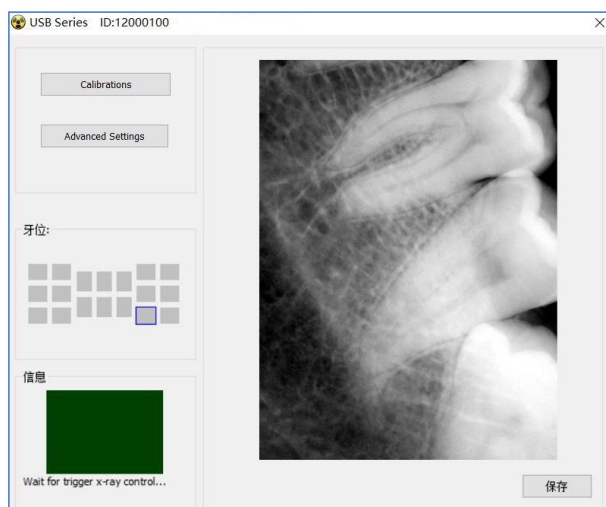
3. Working box with green blinking means the connection is normal and waiting for acquiring x-ray.



Red color means an abnormal connection

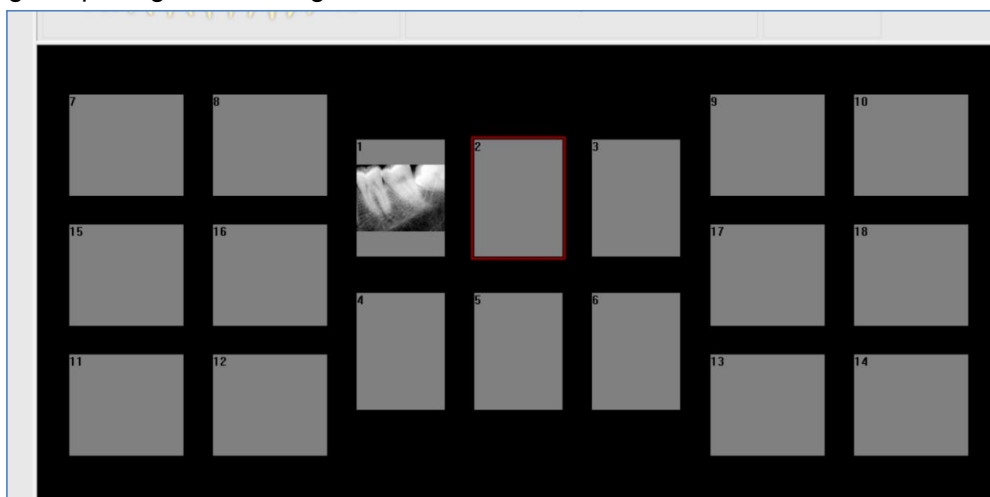


4. Set the required x-ray parameters (exposure time, etc.) for the x-ray generator
5. Cover the sensor head with a disposable hygienic sheath, bring the x-ray generator tube head close to the object under test and focus on the target area. After x-ray emission, the green color convert to yellow, image signal is being transmitted.
6. After transmission completed, the acquired image will appear on the right side of shooting window.



7. No need to click 'Save' button, close the shooting window directly after finished exposure, the image will be loaded into corresponding image frame automatically.

When multiple images acquired at one time, just click to choose its corresponding frame firstly from image display, then take continuously shooting without the need of closing/re-opening the shooting window.



CAUTION:

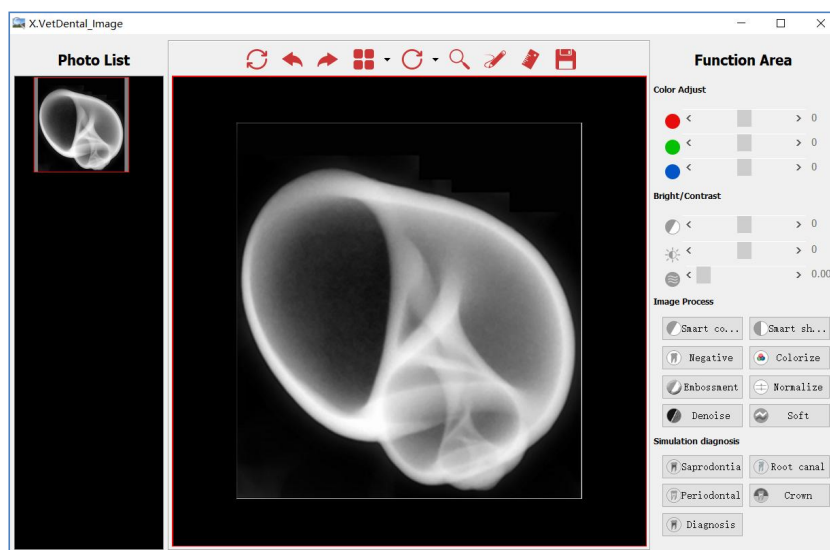
- Face the sensor sensitive side to x-ray generator tube while take shooting.
- Disconnect the sensor from compute when not in use to prevent LED lights from over heat.
- Cover the sensor head with a disposable hygienic sheath prior to be put into animal's mouth. Use a new disposable sheath for each usage.
- Disposable hygienic sheath should comply with GB/T16886 bio-compatibility requirements: with no cytotoxicity/no delayed-type hypersensitivity/no

irritation/no endothelial reaction.

- Disposing of the used disposable hygienic sheath should be executed by medical and health facilities according to Regulation on the Administration of Medical Treatment Wastes.

5.5 Image Editing

Double-click an image required to edit, or directly click  button on tool bar, to bring up the edit window.



【VetImage_Image】

Image Editing function is divided into three parts:

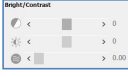
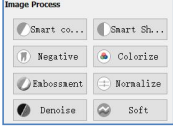
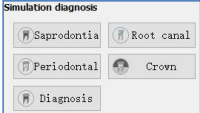
1. Photo List: All original images that you want to edit are listed here.
2. Tool bar

-  Reload: Click to bring back original image
-  Undo: Click to withdraw the previous operation
-  Redo: Click to repeat previous operation
-  Partition: Click to choose the display mode you'd like, left-click an image you want to edit from Photo List, hold it on, and drag into partition window for comparison.
-  Relocation: Click to rotate image.



-  Magnifier: Click to zoom up part of the image.
-  Draw: Click to mark the image.
-  Scale: Click to do measurement
-  Save: Click to save the edited image

3. Function Area

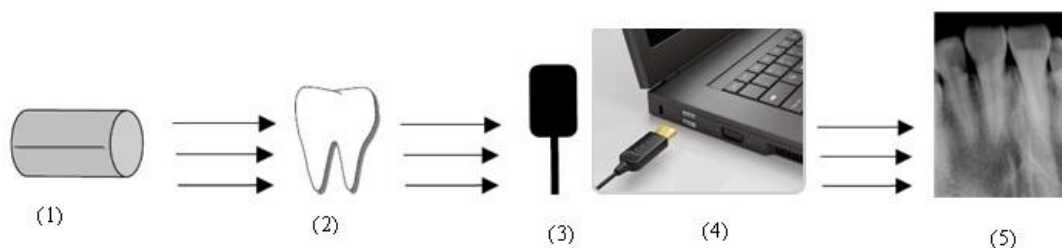
-  Color Adjust: Swipe left/right as needed to adjust the color.
-  Bright/Contrast: Swipe left/right as needed to adjust the brightness contrast
-  Image Process: Smart Contrast/Smart Sharpen/Negative/Colorize/Embossment/Normalize/Denoise/Soft.
-  Simulation Diagnosis: Saprodontia/Root Canal/Periodontal/Crown/ Diagnosis



Note: All the function buttons just change image characteristics, instead of image itself. The user should make a diagnosis according to the actual conditions.

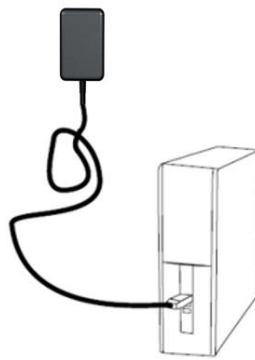
Chapter 6 Image Sensor Operation Guidelines

6.1 Working Sketch Map



1	X-ray generator
2	Animal tooth to be X-rayed/the object under test
3	X-ray collection and conversion (through image sensor)
4	Data transmission (through USB cable)
5	Image acquisition in software

6.2 Image Sensor Operation Guidelines

No	Description	Picture
1	Plug the image sensor into computer	



User Manual

2	Create or search for a case to bring up the shooting window	
3	Cover a disposable sheath on the sensor head	
4	Position the image sensor in animal's mouth just like conventional film, or in/under the object under test, keep the sensitive side close to the target part.	
5	Set required x-ray parameters (exposure time, etc.)	
6	Position the X-ray generator appropriately, then take shooting	
7	Acquire and view the image, please refer to '5.4', '5.5'	



WARNING:

- Connect the sensor into back side of the computer case USB port (about the computer configuration please refer to 3.2 'Computer Configuration Requirements').
- Use a disposable sheath.
- Avoid biting the image sensor and its accessories.
- The recommended exposure conditions for X-ray generator, please refer to 3.3 'Exposure Requirement of X-ray Generator'.



Chapter 7 Cleaning and Disinfection

Do not keep immersing this product in liquids for a long time, please try to avoid disinfecting with any liquids. Cover a disposable hygienic sheath prior to use to achieve the purpose of disinfection (Disposable sheath is not provided in this product package, please purchase with alone). Use soft cloth with a little bit ethanol to do regularly clean on sensor head and control box. Any other disinfectants may cause damage to CMOS sensor and control box, that is regarded as against the usage guideline in intended application. Manufacture bears no responsibility for any damage caused by unauthorized disassembled or improper operation.



WARNING:

- Do not sterilize the image sensor by heating/autoclave.
- Do not put the image sensor in an ultrasonic bath for cleaning or disinfecting.
- Keep the sensor away from spray.
- Remove dirt before clean, wipe the sensor with a soft cloth gently.

Manufacture will not be held responsible for any damage caused by non-following the user manual to proceed with cleaning or disinfection, all risks should be born by the user.



Chapter 8 Maintenance

As with all kinds of electronic equipment, this product requires not only proper operation, but also visual inspection and routine check at regular intervals. These precautions can ensure the product with accurate, safe and high-efficient running.

Before each usage, the operator should check for whether there is any physical damage on sensor or malfunction. Contact our after-sales team for more guidance if happened.

8.1 Periodic Maintenance

Periodic maintenance is performed as needed, but at least once a month, include the below inspection items, which should be executed by the user or a qualified technician.

- The labels are with intact, readable, and adhere well on the surface.
- No damage on sensor cable.
- No damage on the product surface which could incur safely issue.
- The indicator lights and software both are in normal status after installed by following the user manual correctly.

8.2 Damaged or Nonfunctional Image Sensor

Stop using and contact your local distributor immediately once the image sensor occur visible physical damage or abnormal working state.

Do not disassemble sensor housing to take repair without permission.

Please consult the manufacture for more technical information if needed.



Chapter 9 Troubleshooting

The following table shows some solutions for common troubles. If the problem persists, please contact your local distributor or our after-sales team.

9.1 Fault State Information

Fault	Causes and Solutions
Working box color is red instead of green blinking	·Correct image Source option 'Image Sensor/USB Series'. ·Check whether the sensor is well connected to the computer. ·Re-install the sensor Driver. ·Switch to the case back side USB port, make sure USB interface is 2.0 or above. If a laptop is used, please connect to power supply, avoid selecting energy saving mode which may result in USB port voltage unstable.
No images acquired after X-ray emission	·Make sure the shooting windows is launched, normal working state is with green blinking. ·Make sure the X-ray generator faces to the sensor sensitive side. ·Make sure the X-ray generator exposure values are correct. ·Re-install the sensor Driver and switch to the case back side USB port, make sure USB interface is 2.0 or above, and increase the exposure time appropriately.
Unable to opening shooing window	·Close anti-virus program and re-install the software
Remind of calibration file absence	·Please refer to section 4.4 'Calibration File Installation'
Unable to use the software after 30 days trial, remind of registration	·Please refer to section 4.3 'Software Registration'



9.2 Faulty Images

Faulty Images	Causes and Solutions
White lines or ripples on the images	·Lack of calibration file: Please refer to section 4.4 'Calibration File Installation'.
Images are too pale with grainy	·Refer to section 3.3 'Suggested Exposure Time' to reset x-ray exposure values. ·Under the chosen X-ray dose, generator is too far away from the object under test, please position closer. ·Check your monitor brightness/contrast setting, make sure there is no reflects light on the screen. ·Shot of exposure time, please increase exposure time. ·The X-ray generator voltage is too low, check your generator.
Images are too dark	·Excessive of exposure time, please decline exposure time. ·Inspect your generator, decline tube voltage or electric current.
Images are blurred	·The object under test moved at the moment of x-ray exposure. ·X-ray generator work state is unstable. ·Increase the Contrast Pro value under Advanced Setting in shooting window.
Images are too light	·Exposure values (Kv/mA/s) are too low. ·Make sure your X-ray generator is able to generate X-rays, consult with a certified technician to inspect this generator.



CAUTION:

- Try the above solutions if the same failure occurs.
- Please contact our after-sales team for support on the condition of failure persists or even more serious.



Chapter 10 Warranty

We guarantee that the product functions are correct and that there is no failure in raw materials and workmanship within 12 months starting from the release date.

Please contact your local distributor in case of malfunction occurred, by according to the below condition:

We would responsible for free of the maintenance charge against the product's abnormal working state due to quality problem within 12 months start from the date of delivery.

If any of the following situation happened, maintenance charge would be attracted:

- Damage caused by improper operation/maintenance/storage against the instructions in the manual or by user's carelessness.
- Damage caused by unauthorized disassembly.
- Damage caused by irresistible factors.
- The warranty period has expired.

Regarding a reasonable complain about the product failure or delivery, we would provide replacement or maintenance. We reserve the right to take repair, include some kind of natural or special damage, which is only under the compliance with legal provisions to avoid default/ malfeasance / wilful misconduct.

Please contact your local distributor for the maintenance executed by our company in case of malfunction occurred. Please do not disassemble the product without permission, and we will not be held responsible for any damage due to unauthorized disassemble by customer or a third-party.



Chapter 11 Product Components

1	Image Sensor	1 Pc
2	USB flash disk (Image management software and sensor Driver have been downloaded inside)	1 Pc

Tootoo Meditech Co., Ltd.

Address: 2401, 3A, Phase II, Smart Home, Baolong Street,
Longgang District, Shenzhen, Guangdong, China

Technical Support: Please contact our technical engineer directly by scanning the QR below.

