

MSLGX13 Portable X-ray SourceProduct User Manual



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Before operating, read the product instruction and pay attention to all safety precautions. Please be sure to keep this product instruction for future reference (reserve it for future use). Please use this manual correctly based on fully understand the content.

User must read

MSL is committed to producing world-class products of value while also providing high quality customer service. Please read this user manual carefully to make more effective use of the product.

MSL will not be liable for any abnormal phenomena, equipment failure and personal injury caused by the violation of the warnings and operating requirements in the instruction, and does not promise any warranty.

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

Contact information:

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Address: 1st, 4th, 5th, No 85th, 87th, 89th, Baiyun Road,

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<https://www.watermed.com>

Disclaimer

1. MSL shall not be liable for any injury or death caused to the buyer or any third party by force majeure such as fire, earthquake or misuse of the product.

2. MSL shall not be liable for any loss or death or injury caused by unauthorized modification of the product or not in strict accordance with the product instruction.

3. MSL shall not be liable for any loss or death or injury caused by the use of products other than our products.

Copyright

The copyright of this manual belongs to Medsinglong Global Group Co.,Ltd.

Environmental protection



This symbol is used to indicate that the product should not be disposed of as domestic or commercial waste.

Recycling equipment

Please do not dispose of this product as domestic or commercial waste.

This type of waste can have negative effects on health and the environment if improperly handled. Some countries or regions, such as the European Union, have established systematic recycling mechanisms. Please contact your local government to find out how to dispose of this type of waste.

If there is no relevant guidance, please contact our customer service.

Environmental protection period



In mainland China, this value means the period (in years) during which the toxic substances or elements contained in the electronic information products will not be leaked or mutated under normal use conditions, and users will not cause serious pollution to the environment or serious damage to human life and property when using the products.

The value is based on the normal use conditions of the product specified in the product instruction.

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1 Safety information

1.1 Overview

This equipment belongs to radioactive equipment. Operators should strictly follow the instructions, except for medical photography, not for other purposes. Any improper operation of the equipment will result in damage to the equipment. The user must comply with local laws and legally valid regulations to ensure that the operator has received adequate training.

1.2 Matters needing attention



Before operating, read the product user manual pay attention to all safety precautions.



This equipment is diagnostic equipment, only doctors or legally qualified operators can use this product.



The equipment must be stored and operated in a specified environment and maintained by professional maintenance personnel in a safe and operable condition.



The product shall not be altered without the manufacturer's authorization.



This equipment can not be used in combustible gas, corrosive gas and explosive environment.



The equipment should pay attention to prevent liquid or conductive substances into the equipment to avoid short circuit.



Non-authorized personnel are forbidden to disassemble the equipment.





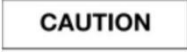


If there is any electrical or mechanical fault, the equipment should not be used until it has been removed.





When using the knob, do not exert too much force, and the direction of rotation of locking and loosening can not be mistaken.

1.3 Safety symbols and markers

The Safety symbols and markers in the table apply throughout the product instruction.











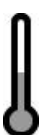



	Improper use of the product may result in death or serious injury.
	Improper use of the product may cause minor personal injury.
	Improper use of the product may result in property damage.
	Prohibit operation
	An action that must be performed

	Important operations and restrictions. Be sure to read this information in case of property damage and malfunction.
	Provides reference and supplementary information. You are advised to read this information.







1.4 Label and identifier

The label and identifier of our equipment are as follows:



Identifier on the label:

	Serial Number
	Name and address of manufacturer.
	This symbol is used to indicate the date of manufacture + country of origin (CN) in the format YYYY-MM
	This symbol is used to indicate consultation of the user guide for general information
	Bluetooth
	AC voltage
	Dangerous voltage
	Warning: ionizing radiation.
	Safety warning label
	Hand crushing hazard. This symbol indicates that serious injury to the hand may occur.
	Operating temperature. The component must be within a minimum and maximum temperature range in order to operate. Damage to equipment may occur if equipment is used at temperatures outside of the specified range.
	Follow Instruction for use
	The power on
	The power cut off

Transportation safety precautions identifier:





	Packaging graphic mark used to indicate fragility.
	This symbol is used to indicate rain and damp.
	The packaging graphic symbol is used to indicate holding the device upward.
	This symbol is used to indicate the limit of stack layers.
	This symbol is used to indicate Humidity limitation.
	This symbol is used to indicate Atmospheric pressure limitation.












Environment sign:

	Environmental protection period, more than 10 years will pollute the environment.
	When the end user intends to discard the product, the product must not be disposed of at will, but must be sent to the appropriate facility for recycling and recycling.

1.5 Warning

Observe the following safety precautions and use the equipment properly to avoid personal injury and equipment damage.

	Do not use or store near flammable chemicals such as alcohol, diluents, benzene, etc. If chemicals are sprayed or vaporized on the equipment, they may cause fire or electric shock through contact with live parts of the equipment. In addition, some disinfectants are also flammable, so be sure to be careful when using them.
	Do not connect with other equipment specified. Otherwise, a fire or electric shock may occur.
	Do not use power sources other than those indicated on the nameplate to supply power to the equipment. Otherwise, a fire or electric shock may occur.
	Do not use wet hands to carry the equipment. Otherwise, an electric shock may occur, which can result in death or serious injury.

	<p>Do not place heavy objects such as medical devices on the cables.</p> <p>Do not pull, bend, bind, or step on the cable to prevent damage to the sheath.</p> <p>Otherwise, the cables may be damaged, resulting in fire or electric shock.</p>
	<p>To avoid electric shock, the equipment can only be powered by a power supply device with protective grounding.</p> <p>Otherwise, a fire or electric shock may occur.</p>
	<p>Ensure that the power is off before connecting or disconnecting cables between devices.</p> <p>Otherwise, it can result in electric shock, which can result in death or serious injury.</p>
	<p>Do not disassemble or modify the equipment. Any changes to the equipment are not allowed.</p> <p>Otherwise, it may result in a fire or electric shock. In addition, touching an integrated component may cause electric shock, which can result in death or serious injury.</p>
	<p>Do not hit or knock the equipment and parts.</p> <p>The equipment may be damaged if it is subjected to strong turbulence. If the equipment is not repaired in time, it will result in fire or electric shock.</p>
	<p>Immediately turn off the power box and disconnect the power cord and contact our sales representative or local dealers if any of the following occurs:</p> <p>When there is smoke, accompanied by odor or abnormal sound.</p>
	<p>Before cleaning, power off the equipment and unplug the power cable. Before powering on the equipment, ensure that the equipment surface and plug are dry.</p> <p>Otherwise, a fire or electric shock may occur.</p>
	<p>Remove the plug from the ac socket and clean it regularly. Use a dry cloth to remove dust and dirt from the socket and surrounding area.</p> <p>If the power cord is plugged in for too long in a dusty, dark, damp environment, the dust around the socket will absorb moisture, which may cause insulation failure and cause a fire.</p>
	<p>For safety purposes, ensure that all power supplies are turned off before performing routine checks according to the product instruction.</p> <p>Otherwise, an electric shock may occur.</p>
	<p>Do not spray liquids or chemicals on the equipment. Do not allow the device to come into contact with the animal's blood or other body fluids.</p> <p>Otherwise, it could cause a fire or get an electric shock.</p>
	<p>Means of monitoring, evaluation and control</p> <p>Please refer to the "Product installation and connection" section of this manual for the status indication of the product. Do not use the product if the status is not correctly indicated.</p>

1.6 Environmental Requirements

Transportation and storage environment (With the packing)

Temperature : $-15^{\circ}\text{C} \sim +55^{\circ}\text{C}$

Humidity: $10\% \sim 90\%$ (No Condensation)

Air pressure: $50\text{kPa} \sim 106\text{ kPa}$

The equipment should be placed in a cool, dry, moisture-proof, ventilated, non-corrosive gas place, do not put in the open wind and rain.

The work environment:

Temperature: $+10^{\circ}\text{C} \sim +40^{\circ}\text{C}$

Humidity: $30\% \sim 75\%\text{RH}$

Air pressure: $70\text{kPa} \sim 106\text{ kPa}$

1.7 Safety regulatory information

1.7.1 Company information

Registrant: Medsinglong Global Group Co.,Ltd.

Address: 1st, 4th, 5th, No 85th, 87th, 89th, Baiyun Road,

Manufacturer: Medsinglong Global Group Co.,Ltd.

Address: 1st, 4th, 5th, No 85th, 87th, 89th, Baiyun Road,

Production address: 1st Floor Area 1, 2nd Floor Area 1, Building A, No. 2 Caohejing Road, Haining Economic Development Zone, Haichang Street, Haining City, Jiaxing City, Zhejiang Province, China

After-sales service provider: Medsinglong Global Group Co.,Ltd.

Address: 1st, 4th, 5th, No 85th, 87th, 89th, Baiyun Road,

Phone: +86-020-84899760

1.7.2 Notice

If the user/patient becomes aware of any serious incident related to the device, they should report it to the competent authorities and manufacturers of the user and/or the member state in which the patient is located.

1.8 Radiation and magnetic field



Radiation may occur when the equipment is used. Operators must comply with the requirements of relevant laws and regulations.



The operator must comply with the safety exposure requirements and operating guidelines, otherwise the device may be dangerous to the operator.

1.9 Noise

The noise generated by the machine in no-load operation should be no more than 65dB (A) (excluding the non-continuous and non-periodic noise within 3s).

1.10 Production date and service life

Production date and service life refer to the equipment nameplate or label.

1.11 FCC information

The host

FCC ID: XXXXXXXXXX

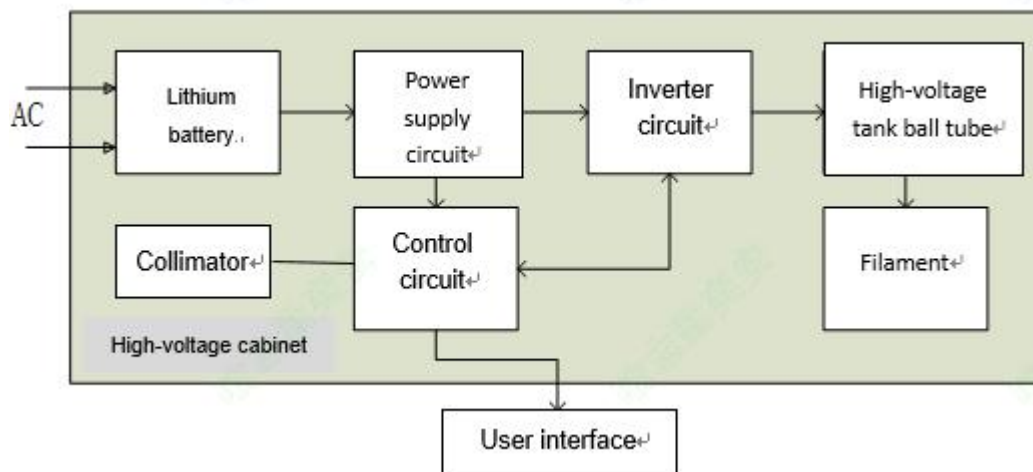
The remote control

FCC ID: XXXXXXXXXXXX

2 Product overview

2.1 The component of product

Portable X-ray source directly provides rays for radiographic operation, which is composed of the following parts: lithium battery, power supply circuit, inverter circuit, high-voltage tank ball tube, filament circuit, control circuit, high-voltage cabinet body, user interface and collimator. The structure is shown in the figure below.



2.2 Intended Use

The MSLGX13 is Portable X-ray Source, intended for use by a qualified/trained veterinary on animal for the purpose of acquiring X-ray images of the desired parts of animal's anatomy.



Especially large animals may not be able to get x-rays through effectively to obtain images

2.3 Working conditions

Power supply voltage and phase number: 100-240V AC, network voltage fluctuation should not exceed $\pm 10\%$ of the nominal value;

Power supply frequency: 50 / 60 Hz;

Power resistance: should be no more than 1 Ω ;

Power capacity: 1kVA.



This equipment is not allowed to be connected to temporary small capacity power generation equipment, nor is it allowed to be used in parallel with other load equipment (such as welding machine, cabinet air conditioner, etc.) in the same circuit.





3 Structural composition and working principle

3.1 Structural composition



1. Hand switch
2. Hand Switch interface
3. Communication interface
4. Power port
5. The control panel
6. Collimator field light button
7. Field control knob switch
8. The handle

3.1.1 Attachment


Name		Description
Power adapter		Connect the MSLGX13 to the mains
Communication Wired		Connect the MSLGX13 to the computer
Hand Switch Wired		Connect the operator to the MSLGX13 and Control MSLGX13 exposure
Hand Switch Wireless		Connect the operator to the MSLGX13 and Remote control MSLGX13 exposure



3.1.2 Exposure handbrake: The handbrake is composed of the preparatory and the exposure buttons



1. Prepare

2. Expose

Position	Description
Off 	Both the prepare and the expose are not working.
Prepare	Prepare is the next position on the Hand-switch. When pressed partially,



	<p>it brings the rotor up to speed and heats the filament. Prepare also checks the system interlocks and verifies the system is ready to make an exposure, and the READY green light will light up. If you release the button, it returns to Off.</p>
<p>Expose</p> 	<p>The Expose position is when the button on the Hand-switch is fully depressed. This produces X-rays that are recorded. Release the Prep/Expose button after the exposure is completed.</p> <p>The system beeps as X-rays are produced. And the yellow X-ray light lights up.</p>

3.1.3 Wireless exposure handbrake

The wireless exposure handbrake has only one gear for exposure.







1. Prepare & Expose

Position	Description
<p>Off</p> 	<p>The system is not in a working state.</p>
<p>Prepare & Expose</p> 	<p>Long press the wireless gear, the system will first enter the preparatory state, after the preparation is finished, the system will be exposed, the release of the gear after exposure. During the preparation process, the green light of the system will be on, and when exposed, the yellow light of the system will be on, and the system will emit a beep.</p>

3.1.4 X-ray generator



Working interface

No	Buttons' name	Description
1	X-ray preparation indicator	Press the first gear of the exposure handbrake, the X-ray enters the preparation state, the light is on, the color is green, and the light is off after the preparation is completed.
2	X-ray exposure indicator	Press the second gear of the exposure manual brake. When the X-ray starts, the exposure indicator light is on and the color is yellow. After the exposure, the light is off.
3	System error indicator	When the X-ray generator system reports an error, the light is on and the color is red.
4	Electric quantity display indicator	Display current electric quantity
5	kV display	Displays the kV value three number
6	mAs display	Displays the mAs value three number
7	SID distance display	Displays the SID value with three number
8	kV value adjustment button	 KV increase  KV decrease
9	mAs value adjustment button	 mAs increase  mAs decrease
10	Warning message	Notice
11	Quick parameter settings	M1 ~ M5 are quick parameter setting buttons, STORE is store
12	Power switch button	Press and power on, and press again to power off

3.2 Principle of the system

The high voltage generator provides high voltage to both ends of the X-ray tube filament and the metal target, and a large number of electrons generated on the cathode filament of the X-ray tube move at high speed in the vacuum tube and hit the metal target, thus generating X-rays.

In pet hospital when using X-ray photography, X-ray generator emit x-rays through the body a different part of the bone and muscle groups such as density, through animal tissue contains images of X ray through the screen, film or digital video receiver device such as a image receiving and shows that the density of different tissue images, used for clinical diagnosis.

4 Performance Introduction

4.1 Portable X-ray source

Model	MSLGX13
Power	1.6kW
The anode type	Fixed anode
Target material	Tungsten
KV range	40 to 90 kV
KV precision	$\leq \pm 8\%$
mAs range	0.1mAs to 32mAs
mAs precision	$\leq \pm (10\% + 0.2\text{mAs})$
Nominal focus size	0.8mm
The anode target Angle	20°
Maximum anode heat capacity	9.8KHU
Maximum anode heat dissipation rate	210W
Minimum ray field size	No greater than 5cm*5cm (SID: 100cm)
Maximum ray field size	Not less than 43.5cm*43.5cm (SID: 100cm)
Ray field error	No greater than 1% of the SID (SID: 100cm)
Total filtration	2.5mm Al
Dimensions (Length × Width × Height)/ Weight	313mm×237mm×187mm/ 8.5kg



Wireless remote control

Model	YK500-1(433)
Working voltage	DC12V
Working frequency	433MHZ
Working current	34mA
Output power	16dBm (40mW)
Transmission rate	<10Kbps
Modulation method	ASK (Amplitude modulation)
Appearance of size	85*36.8*16mm
Number of buttons	1
Switch button location	As shown in the figure

Collimator

model	Crux 701i
Control mode	Manual control
Attenuation equivalent	1.3mmAl
Maximum X-ray field range @SID=100cm	Max: 43X43
X-ray field deviation @SID=100cm	≤1% of SID
Maximum leakage radiation	<1mGyh
Power supply	24V AC/DC(±10%), Max.4A
Weight (kg)	1±0.2kg

Hand switch

Model	F29-9A
Current	3A
Voltage	250V
Operating temperature range	Heat resistant level 3
Wire diameter	4.6mm-4.8mm
Three core	Red, white first gear; Red, green second gear

4.2 Technical data

4.2.1 Power

Maximum output power:

The loading factor combination of the maximum output power of the X-ray source with the nominal power of 1.6kW in the photographic mode is 50 kV and 32 mA.

Nominal power:

When the nominal power is 1.6kW, the corresponding loading factor combination is 50 kV and 3.2 mAs (32 mA, 100ms).

4.2.2 Loading factors and controls

4.2.2.1 X ray tube voltage

40 kV ~ 90 kV, continuously adjustable, step length of 1 kV;

The voltage deviation of the X-ray tube should $\leq \pm 8\%$.

4.2.2.2 Current time product

Current time product shall meet the following requirements:

Adjustment range: 0.1 mAs to 32 mAs; The current time product can be adjusted by means of R'20 number system.

mAs									
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
1.1	1.2	1.4	1.6	1.8	2	2.2	2.5	2.8	3.2
3.6	4	4.5	5	5.6	6.3	7.1	8	9	10
11	12.5	14	16	18	20	22	25	28	32

MSLGX13 adjustable parameter range table

kV	Max. mAs
40~48	32
49~60	28
61~66	25
67~75	22
76~85	20
86~90	18

kV	Max. mA
40~50	32
51~57	28
58~64	25
65~69	22
70~80	20
81~88	18
89~90	16

4.2.3 RF-EMC standards

ETSI EN 300 328 v2.2.0(2017-11)

Wideband transmission systems;Data transmission equipment operating in the 2.4GHZ ISM band

and using wide band modulation techniques; Harmonised Standard for access to radio spectrum

ETSI EN 300 200-1 V3.1.1(2017-02)

Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 1: Technical characteristics and methods of measurement (V3.1.1)

ETSI EN 300 200-2 V3.1.1(2018-06)

Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonised Standard for access to radio spectrum for non specific radio equipment (V3.1.1)

ETSI EN 301 489-1 V2.2.3(2019-11)

ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 1: Common technical requirements - Harmonised Standard for ElectroMagnetic Compatibility

ETSI EN 301 489-3 V1.5.1 (2012-07)

ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 1: Common technical requirements - Harmonised Standard for ElectroMagnetic Compatibility

ETSI EN 301 489-17 V2.1.1(2009-05)

ElectroMagnetic Compatibility and radio spectrum Matters(ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems

BS EN 62479:2010

Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10mhz to 300GHZ)

RSS 247

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

FCC part 15B

FCC 15C.231 ID

4.2.4 Statement of Conformance

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

For a Class B digital device the text mentioned in section 15.105(b) shall be mentioned in the user manual:

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

and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna,
- Increase the separation between the equipment and the receiver,
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected,
- Consult the dealer or an experienced radio/TV technician for help.

A warning shall be mentioned that no modification shall be made by the user that can be of influence on the EMC behaviour of the device without permission of the manufacturer.

4.2.5 RF Description

4.2.8.1 RF wireless technology specification

bluetooth	
The bluetooth type	BT3.0 SPP + BT4.2 BLE Dual-Mode Bluetooth
Wireless technology form	GFSK Modulation
The RF frequency	2.4 GHz ISM band
Maximum output power	0 dBm
The wireless remote control	
The wireless remote control type	Single Modular
The wireless remote control form	ASK/OOK Modulation
The RF frequency	433.92-433.92 MHz

4.2.8.2. A description of how the design of the device's wireless function(s) assures timely, reliable, accurate, and secure data and wireless information transfer.

(1) Bluetooth

Bluetooth uses SPP protocol to connect to the computer, and the matching code needs to be entered for verification during connection. After one device is connected, other devices will not be verified. Bluetooth data is transmitted between two devices in the form of serial data, and fixed baud rate, data bit, stop bit and parity bit are set to ensure data.

The following instructions and verification formats are used for communication between equipment and computer:

<Command><Data><ETX><Checksum>

Command - ASCII alphanumeric command

Data - ASCII numeric as defined in command.

ETX - ASCII end of transmission delimiter (03H)

Checksum - Binary 1 byte summation of all Command, Data and ETX bytes.

The effective distance of Bluetooth without shielding is 10m, beyond which communication control cannot be carried out.

the maximum baud rate for SPP connection of bluetooth module can reach 115200bytes/s, and 19200 bytes/s is used in practice

The device software will request data again after detecting data errors.

(2) The wireless remote control

Wireless remote control matching uses 1527 code, which contains millions of matching codes. When sending and receiving devices are paired, they need to enter the configuration background

and enable pairing to be matched. Unpaired devices cannot be controlled.

The wireless remote control needs to keep pressing during exposure, and will stop exposure after communication interruption.

4.2.8.3 Security of wireless signals and data

(1) The effective use range of wireless is within the visual range, beyond the physical range can not be controlled through wireless.

(2) The connection between high voltage and external wireless devices can only be connected and used after verification.

(3) Wireless connection is one-to-one. When a wireless device is already connected and in use, it will not be connected to other devices. When the device is not in use, it cannot be connected or controlled after shutdown.

4.2.8.4 Wireless coexistence

Wireless remote control matching using 1527 code, containing millions of groups of matching code, in the code successfully sent information in accordance with its code requirements will be received and used, even if multiple use at the same time sent only through the matching code of equipment information will not be received.

Bluetooth works in 2.4~2.48GHz ISM band. In order to avoid Frequency conflict, Bluetooth adopts anti-jamming measures such as Adaptive Frequency Hopping (AFH), LBT (Listen Before Talk) and power control.

4.2.8.5 EMC of the wireless technology

(1) Refer to the TEST REPORT IEC 60601-1-2. The report NO. 220201513SHA-001

(2) Serial port data is transmitted and verified in the following formats:

< Command> < Data> < ETX> < Checksum>

(3) Command - ASCII alphanumeric command

Data - ASCII numeric as defined in command.

ETX - ASCII end of transmission delimiter (03H)

Checksum - Binary 1 byte summation of all Command, Data and ETX bytes.

(4) When receiving data that does not meet the verification, the request is discarded to ensure that each received command is valid and reliable.

(5) The maximum baud rate of bluetooth module SPP connection can reach 115200bytes/s. In practice, 19200 bytes/s is used to ensure that the module performance is enough to meet the device requirements.

If bluetooth cannot be used, system parameters can also be adjusted through the mask of the device to meet temporary use requirements.

4.2.8.6 .Risk-based approach to verification and validation

In the process of Bluetooth data transmission, the workstation software will query the system parameters and status once every second. If there is a delay, it will update the system in the next cycle without affecting the correctness of parameter display. In the exposure process, if the workstation needs to reply to the corresponding delay, it will request again every 500ms. If there is no reply after 5 seconds, a timeout error will be reported to warn.

5 Standard operating mode

5.1 Prepare

1. When using the equipment, please do relevant radiation protection, such as wearing lead apron, protective glasses, etc. This protection needs to consider the operator and other personnel in the same environment.
2. Before operation, check that all connections are correct and stable.

5.2 Operation

1. Put MSLGX13 in place.
2. Adjust the range of the X-ray field to an appropriate size according to the size of the photographed position.
3. Adjust the angle of the X-ray source to the appropriate angle according to the position of the photographed part.
4. Apply appropriate parameter values according to the photographed position to obtain the best radiological image while minimizing the exposure dose.
5. Keep a distance of at least 2 meters from the portable X-ray source. You can use wireless remote controller or hand switch for exposure operation to maintain a safe distance.

5.3 Precautions in operation

Before equipment use

1. To ensure that the equipment can work stably, it is necessary to check the equipment..
2. In cold areas, the sudden heating of the equipment may cause condensation of the equipment. In this case, please give the X-ray source, flat plate detector and computer a period of time to warm up, and then carry out the exposure image acquisition operation after the condensation evaporates to ensure the stable and reliable image quality.
3. Ensure that the MSLGX13 is fixed and relatively still, then position the animal as appropriate.

Equipment in use

1. During exposure, please ensure that the equipment is relatively stationary, otherwise it will cause the appearance of image noise or artifacts, and affect the image effect.
2. When the equipment is in use, it is necessary to keep the ray beam relatively perpendicular to the receiving surface.





When operating the equipment, be careful to avoid mechanical collision or injury to personnel in the examination room due to improper operation.



When moving, ensure that the device components do not collide with any other obstacles around them.

6. Operation



6.1 Startup and shutdown

When press this button  on the control panel, the device starting up, and press  again to power off.


6.2 Photographic operation

After the above actions are completed, exposure and drawing can be carried out. There are two ways of exposure, one is wired hand switch exposure, and the other is wireless remote controller exposure.

1. Wired exposure

When the hand switch is pressed, the indicator light  is in green gear 1 (Refer to section 3.1.2 for schematic diagram of hand switch). Press the second gear of the hand switch. During exposure, the exp indicator light  is yellow, the light goes out and the buzzer rings. The exposure is completed and X-rays are generated.

2. Wireless exposure

Press and hold the wireless exposure button of hand switch (Refer to section 4.4, remote controller diagram), and after 5 seconds, it will automatically enter the prep stage and exposure stage. The indicator light  will go out and the buzzer will sound once. The exposure is completed and X-rays will be generated.

⚠ CAUTION The wireless remote controller and the device match one to one. If the remote controller is damaged or lost, please contact the manufacturer. The distance of the wireless remote controller is 5m.

The loading status of the equipment during use shall be subject to the indicator light on the working interface of the X-ray source. The loading status of the software interface is for the operator's reference.

7 Radiation protection

⚠ WARNING Excessive X-ray radiation causes irreversible damage to human tissues. Therefore, unauthorized or unqualified people are not allowed to operate the equipment or avoid irrelevant personnel from contacting X-rays.

⚠ WARNING Qualified and authorized operators shall be familiar with the recommendations of the International Commission on radiation protection in the annual publication No. 26 of ICRP and relevant national standards before operation.



WARNING During X-ray setting out, operators must wear X-ray protective clothing, protective glasses and other protective equipment.



WARNING In order to reduce the radiation dose of the subject, the appropriate radiation field and X-ray parameters should be selected and adjusted as far as possible.

8 Troubleshooting

In case of failure and equipment readjustment, do not repair or readjust without permission. Be sure to contact the manufacturer or the service agent designated by the manufacturer. If the manufacturer or the service agent designated by the manufacturer repairs and readjusts, the manufacturer shall not be responsible for the resulting faults and personal injuries. The manufacturer shall not be responsible for the failure and damage caused by any combination with the equipment of other unapproved manufacturers.

As a manufacturer, it is not responsible for the safety, reliability and performance of components under the following circumstances:

- Use components in a different way than specified in the operating manual.
- Installation, upgrade, reset, modification or repair by unauthorized personnel.
- When replacing components affecting product safety, original accessories are not used.
- The electrical wiring in the room where the system is placed does not meet the requirements of local regulations.

8.1 Breakdown Maintenance

Troubleshooting includes system performance and system safety inspection. The operator must check the obvious faults of the equipment (see the table below).

Maintenance items	Maintenance contents
Power plug	Discard if damaged
power cord	Discard if damaged
Screw	Check for looseness and falling off
Exposure indicator	Check for proper operation
Appearance	Check for damage and deformation



CAUTION Only authorized and trained operation technicians can judge and solve the fault of the equipment, especially they must understand the possible dangers of wrong operation of the equipment or the handling methods in case of abnormal conditions.

8.2 X-ray safety system

Exposure to X-rays is harmful to human health. During the use of X-ray equipment or radioactive sources, appropriate safety protection measures shall be taken and all regulatory requirements must be met. Therefore, this manual should be read and understood in detail before putting the system into use.

Although the system uses high-performance X-ray protection devices and can provide effective X-ray radiation protection, the system cannot provide all protection, and the system cannot force

operators to take sufficient preventive measures to avoid direct radiation or secondary radiation to themselves or others due to human negligence, ignorance or carelessness.


The operators of this system shall receive appropriate training and take appropriate protective measures to ensure that personnel are not injured. All personnel authorized to use the system should be aware of the risk of excessive exposure to X-ray radiation. The company and its agents and sales representatives shall not be liable for the damage or damage caused by exposure to X-ray radiation when purchasing the system.


A variety of protective materials and devices are available, and users are recommended to use such materials and devices.


Make sure that all necessary radiological protection measures have been taken before radiological examination.

During the radiation examination, the personnel in the examination room must strictly abide by the mandatory rules on radiation protection. Details are as follows:

- a) Where necessary, try to use protective articles to block rays;
- b) Try to use special X-ray protective clothing;
- c) Distance is the best way to protect rays, so keep away from ray sources and photographed targets as far as possible. The greater the distance from the focus to the skin, the less the skin will be affected by radiation;
- d) Avoid walking or standing within the range of radiation exposure;
- e) Try to use the smallest exposure area, and the dispersion of X-ray is related to the size of the subject;
- f) Time protection: all personnel shall stay in the X-ray field as little as possible;
- g) Distance protection: all personnel shall keep away from X-ray sources as far as possible;
- h) Shielding protection: isolate indoor operation, and veterinary use lead gloves, lead clothes, lead glasses, lead hats, etc.

 **CAUTION** While operating or servicing x-ray equipment, always keep a distance not less than two meters from the focal spot and X-ray beam, protect body and do not expose hands, wrists, arms or other parts of the body to the primary beam

 **CAUTION** There should be no one other person in the exam room during x-ray exposure. If another person must enter the room while x-ray exposures are planned or possible, that person must wear a lead apron in accordance with accepted safety practices.

 **CAUTION** Please comply with the national regulations on "medical X-ray diagnostic radiation health protection and image quality assurance management", and do a good job in the architectural design, protective facilities and license application of the site and machine room of medical X-ray diagnostic equipment; Ensure the operator's qualification, health and personal dose monitoring.

8.3 Equipment failure

Failures in equipment operation are mostly caused by incorrect operation or sudden changes in power supply voltage make the equipment operate under abnormal conditions. In case of emergency failure of the equipment, please stop using the equipment immediately. Do not use the equipment

until the failure is eliminated. Check and record the fault condition. If it still cannot be solved, notify the nearest service agent or manufacturer, and inform the equipment serial number and detailed fault condition.



Only authorized and trained operation technicians can judge and solve the fault of the equipment, especially they must understand the possible dangers of wrong operation of the equipment or the handling methods in case of abnormal conditions.

9 Maintenance

9.1 General principles

In order to ensure the lasting performance of this equipment, a regular inspection plan must be formulated.

A functional check does not indicate whether the equipment is operating according to specifications. Only regular maintenance can detect potential problems.

9.2 Regular Maintenance

This equipment needs regular maintenance.

If the equipment is worn and used for a long time, the mechanical safety will be reduced. In order to prevent possible injury to operators, always check whether the mechanical parts are loose and whether the braking device is reliable.

Special personnel shall be responsible for the equipment and establish management archives.

Operators shall be well trained and able to complete routine inspection.

Special personnel must be assigned to cut off the power supply after operation and after work.

9.2.1 Maintenance period of equipment

Period of time	Inspection content
Daily inspection	Check whether the display and indicator lights are normal.
Weekly inspection	Check the X-ray source assembly for oil leakage. Check whether there is abnormal sound when the X-ray source assembly is exposed.

9.3 After-sales service

Please contact the company's after-sales service department or product dealer:

Contact: +86-020-84899760.

After the completion of after-sales service, if necessary, provide related installation and maintenance reports according to local regulations.

9.4 Maintenance

9.4.1 As long as the maintenance is carried out on time according to the instructions, the product

failure rate can be minimized, but sometimes the product still has failures. If the product fails and cannot be eliminated, please contact the company's after-sales service department or product dealer, and provide the following information according to the nameplate of the product:

Product name and model

Product ID

Product fault description (as detailed as possible)

9.4.2 This product needs to clean and disinfect the flat panel detector. Please refer to the flat panel detector manual for specific cleaning and disinfection methods.

If the product fuse is damaged, you need to replace the fuse. Replace the fuse as follows:

A. Unscrew the fuse cover

B. Replace the fuse specifications and models specified in section 2.6 of the instruction manual

C. Tighten the fuse cover

9.5 Support of maintenance parts

The parts that affect the performance of the product (the part required to maintain the operation of the product) will be reserved for 5 years after the termination of production, so as to prepare materials for maintenance.

10 Transportation and storage

10.1 Transportation

Ensure that the equipment is firmly and reliably fixed in the packing box before transportation;
Load the packing box into the transport vehicle with a forklift or crane and fix the packing box firmly;

Ensure that the transport vehicle runs smoothly during transportation;

When unloading, use a forklift or crane to unload each packing box from the transport vehicle and place it on the finger positioning ground near the machine room.

Be careful:

1) Keep the package intact when disassembling to reduce damage, The unloaded packages shall be kept as standby supplies;

2) If the removed equipment cannot be installed immediately, it shall be packed and kept; Place neatly and pay attention to moisture;

3) Before unpacking, if there are relevant data instructions outside the packing box, you should read them first. If you also need to refer to them during installation, please put the data close to the operation position for easy reading at any time.

10.2 Storage

In the packaging state, the equipment must be able to be stored for no more than 240 hours under the environmental conditions not exceeding the following range

(1) Ambient temperature: - 15 °C ~ +55 °C;

(2) Relative humidity: 10% ~ 90% (no condensation);

(3) Atmospheric pressure: 50kPa ~ 106 kPa.

11 Disposal after scrapping

On the premise of correct use, the service life of the equipment is 10 years. After the X-ray tube is damaged, it can be sent to our company for replacement. When the equipment is damaged and difficult to repair after 10 years of correct use, and the safety performance cannot be guaranteed, the equipment shall be scrapped. After the equipment is scrapped, the transformer oil in its X-ray source assembly shall be recycled by a special industrial waste oil acquisition station; The rest shall be handled according to the waste disposal procedure of the pet hospital.