



**GENORAY. Co., Ltd**

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Please have full knowledge of the guidebook before installation.  
Inquire of Genoray Co.,Ltd. about occurring problems with installation or errors.

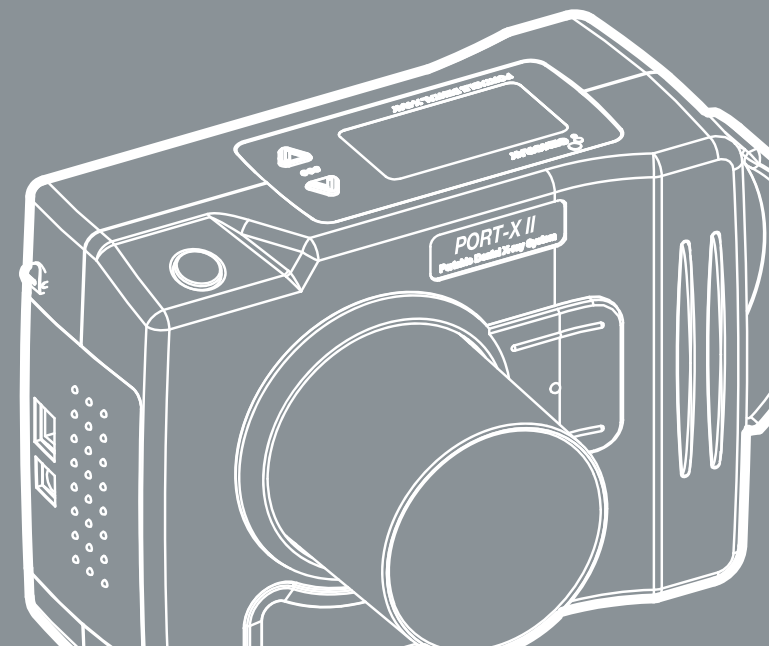
[http:// www.genoray.com](http://www.genoray.com)



The FDA is responsible for protecting the public health  
by assuring the safety, efficacy, and security of human



# User Manual



## **PORT-X II** PORTABLE DENTAL X-RAY SYSTEM

Please have full knowledge of the guidebook before installation.  
Inquire of Genoray Co.,Ltd. about occurring problems with installation or errors.

This product is Portable Dental X-ray System.  
Please handle with care for safety. Hard shock or too much pressure could make  
damage and danger to this product, so be careful.



ENGLISH

Remarks

Cleaning

- Please consider what follows before choosing a detergent.
- To clean plastic surfaces it is enough to clean water and soap. If other detergents are used (ex : with a high alcohol rate, corrosive lotions, abrasives and solvents) the material can break.
  - Brush with a humid cloth and with a soft cleaner to clean aluminum. then brush with a dry wool cloth.
  - For chromed surfaces, brush exclusively with dry wool cloth and do not use any detergent.
  - Never use high alcohol rate products, corrosive detergents, abrasives and solvents to clean the other surfaces on the unit.  
For cleaning operations, follow the precaution below.
  - Turn the unit off and disconnect the power supply cable.
  - Make sure that no liquid enters the unit, thus to prevent from short circuits and corrosions of the electrical and electronic components.

Disinfecting

For the unit disinfecting, it's advisable to use a common liquid solution with aldehydical base or based on amphotical surface active agents (ex : Tego103 Korsolin) Substitutive disinfectives releasing chlorine or based on phenols must be avoided as they can cause the material stuff weakening. The same restrictions are valid for non diluted solutions with a high alcohol rate.

Do not use disinfecting spays : these can pass through the unit damaging its safety. (Possible damages to electrical and electromechanical components, formation of inflammable gaseous mixes and steam solutions)

In case of use of disinfecting products that create explosive aerated mixtures, make sure that gasses have been scattered, before any X-ray emission.

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Range and terms for warranty

Genoray guarantee this products without any expense for the mal-function or disorders occurred under standard transportation and operation within 1 year from installation.

Defect on its appearance is our of the range of warranty.

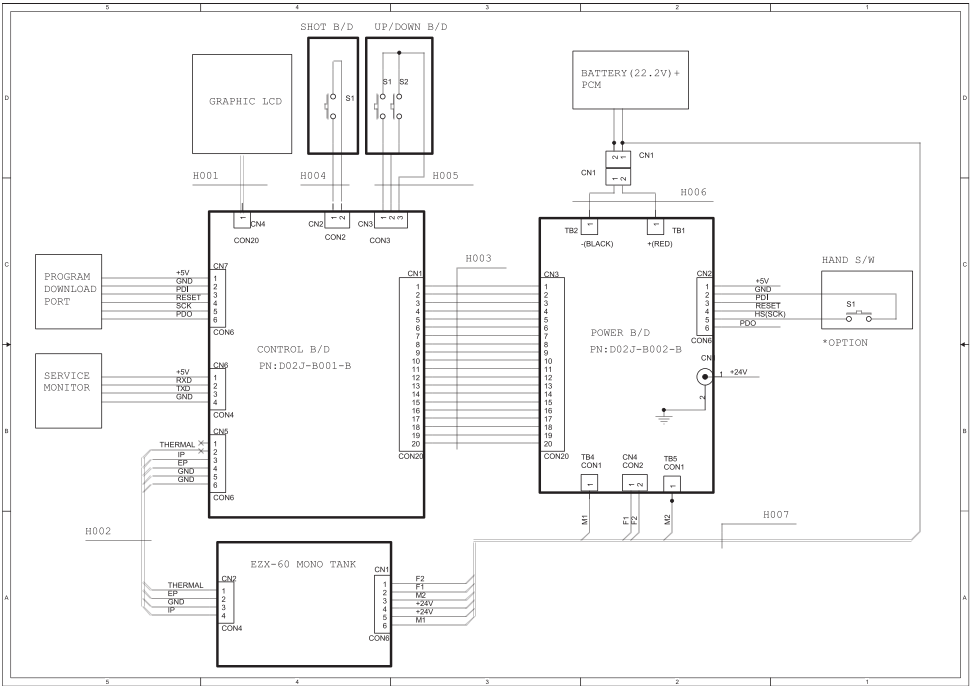
Requirements on After service call

When the malfunction or disorder appeared, stop operating and check again the related article of this “User’s Guidebook. Before your calling, please put off this equipment and check for the Model Name, serial No and purchasing date. Genoray Co., Ltd. is not responsible for indirect harm. Genoray Co., Ltd. cannot warrant for defect or harm after warranty period.

GENORAY CO., LTD.



Block Diagram for User



Shooting Time Setting

Condition	Part		Shooting Time (sec)	
			Adult	Child
Chemical Film	Upper	Incisor	0.6	0.55
		Canine	0.7	0.65
		Molar	0.8	0.75
	Lower	Incisor	0.5	0.45
		Canine	0.6	0.55
		Molar	0.7	0.65
Digital Sensor	Upper	Incisor	0.12	0.1
		Canine	0.13	0.11
		Molar	0.15	0.13
	Lower	Incisor	0.1	0.08
		Canine	0.12	0.1
		Molar	0.14	0.12

※ These figures are measured under OIS shooting condition.



**Inquiry for the product and A/S**

- Manufacturer : GENORAY Co., Ltd. TEL) +82-31-737-8020
- Distributor :



**Notice**

- This equipment can be modified without notice in order to upgrade its performance and increase safety.

General Introduction and Safety

This manual provides guidelines for the safety use and operation of the system.

The operator should be trained in the use of equipment of this type and should refer to this manual in conjunction with that training.

It is the responsibility of the owner to ensure that the system is operated only by properly trained, qualified personnel have obtained credentials from local, state, and federal authorities where required.

Potential hazards exist in the use of medical electronic devices and X-ray systems.

All users and operators must understand the safety and emergency procedures, and the operating instructions given in this manual.

## Introduction of equipment

This equipment generates and controls X-Ray in order to acquire images for tooth and jaw.

It generates X-Ray from high voltage electricity into the X-Ray tube, which penetrates tooth and jaw, and makes X-Ray Images on receptor (Chemical Film or Digital Sensor).

It is composed of main unit, high capacity rechargeable battery, recharging unit and necklace.

It is designed as like a camera in order to use it utmost comfortable way and adopted beam limiting device in order to remove inefficient X-Ray.

High capacity enables it wireless, which make it to store and move very easily.

Only qualified person has the right to use this equipment.

## Error Code

If there's any error happens on this equipment, it shows the following error code in order to clarify the problem.

Error No.	Class of Error	Counterplan
<b>Error 1</b>	OCP_ERR ( OCP(over-current-proction) error ) Detail : HFG DRIVER controller is turned aside	Check the temperature (10°C to 35°C) Ask Genoray
<b>Error 2</b>	EP_OVR_ERR ( EP(kV) over error ) Detail : KV FEEDBACK volume of X-RAY output is input 10% higher	Ask Genoray
<b>Error 3</b>	EP_LOW_ERR ( EP(kV) low error ) Detail : KV FEEDBACK volume of X-RAY output is input 10% lower	Check the temperature (10°C to 35°C) Ask Genoray
<b>Error 4</b>	IP_OVR_ERR ( IP(mA) over error ) Detail : mA FEEDBACK volume of X-RAY output is input 10% higher	Ask Genoray
<b>Error 5</b>	IP_LOW_ERR ( IP(mA) low error ) Detail : mA FEEDBACK volume of X-RAY output is input 10% lower	
<b>Error 6</b>	mAs_ERR ( mAs error ) Detail : mAS is measured under 10%	
<b>Error 7</b>	OVR_HEAT_ERR ( over-heat error ) Detail : Inner temperature of TANK is higher than 45 degrees	Stop using machine for 2 hours and shoot again for checking. If same message occurs after checking, Ask Genoray.
<b>Error 8</b>	SHOT_SW_ERR ( SHOT switch error occurred ) HAND S/W OR SHOT S/W is still pressed after X-RAY irradiation	Release HAND S/W or SHOT S/W after shooting Ask Genoray
<b>Error 9</b>	EPIP_LVL_OVR_ERR ( EP/IP level over error ) HAND S/W OR SHOT S/W is still pressed after X-RAY irradiation	Ask Genoray

※ These figures are measured under OIS shooting condition.



### Notice

- When the error happens, the error No. appears,  
"call service" message flickers every second and buzzer rings 3 times.

## Operation Time

The remaining extent of battery is shown on right-upper side on LCD. If the battery is not sufficient, you cannot acquire the best image.

Keep the battery charged enough. When the remaining extent of battery is lower than the minimum, the electricity is automatically shut off in order to protect any damage for the equipment.

The recharging time (from empty to full) is about 3.5 hours.



### Warning

- When you use ordinary recharging unit, the battery can be damaged.  
You should use its own recharge unit supplied by Genoray.



### Warning

- This battery is exclusive for ZEN-PX2.  
You cannot use any other battery for this equipment. When life span of battery is finished, you should change it with the same battery supplied by Genoray.

### ■ Periodic Check.

- We recommend to check this equipment annually. Only qualified people can check this equipment.

### ■ Maintenance and Cleaning.

- Before sweeping this equipment, put the power off first and sweep it with smooth towel.

## Compliance

The owner/operator is responsible for verifying continued compliance exposure rates, leakage radiation, alignment of the useful beam, and the calibration of kVp and mAs. Annual verification by a qualified service technician may be required by federal law. Compliance with applicable statutory and regulatory requirements is the responsibility of the owner/operator. Consult local, state, and/or federal agencies regarding specific requirements and regulations applicable to the use of this type of medical electronic equipment.

## Safety

### ■ Classification

- CLASS I EQUIPMENT and Internally Powered Equipment.
- TYPE B APPLIED PART
- Ordinary Equipment (IPX0)
- EQUIPMENT not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.
- Continuous Operation

### ■ This equipment complied with the following standards

- |               |                |
|---------------|----------------|
| • EN60601-1   | • EN60601-2-7  |
| • EN60601-1-2 | • EN60601-2-28 |
| • EN60601-1-3 | • EN60601-2-32 |

# Preface

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## ■ Electrical Safety



### Warning


- Electrical circuits inside the equipment use voltages which are capable of causing serious injury or death from electric shock.  
To avoid this hazard, operators should never remove any of the cabinet covers.

Observe the following safety procedures to avoid electric shock or serious injury to operators and patients and to avoid system malfunction.

- Under no circumstance should the safety interlocks in the system be bypassed, jumped, or otherwise disabled.
- Under no circumstance should the system or assembly covers be removed by anyone other than a GENORAY CO., LTD. Trained service representative.
- Do not place food or beverage containers on any part of the equipment.  
They can tip over and introduce conductive substances into the electrical circuitry.

# Operating and Maintenance Procedure

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- About 5 seconds of waiting time is required for next shooting.  
When  “waiting” signal appears in LCD, you cannot shoot it.

If you don't push “shooting” button until the end of adjusted exposure time,  
“Not Enough” message appears on left-upper side of LCD.  
Then you will get bad image for the lack of X-Ray.



### Notice

- In order to reduce motion artefacts, we recommend to use ZEN-PX2 together with the tripod.



### Notice

- The most important thing for the X-ray is the distance from the source to skin.  
In order to get the best image from the equipment, please shoot the X-ray, contacting the cone to skin.  
Because ZEN-PX2 supplies the suitable distance with its cone. (60 mm at SID 200 mm)

- Battery recharging and operating time.

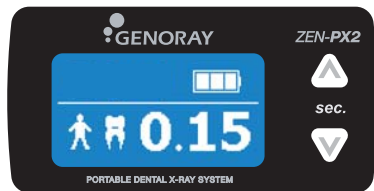
## Specification of Battery

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This adopted Lithium-Polymer battery which is very safe.

However, if the battery is not recharged periodically(minimum once in two months),  
it's capacity could be dropped or out of order.



If the image is not satisfactory because the dose of X-Ray is excessive or deficient, adjust the exposure time pushing the button right side of LCD.



■ **Memorize the exposure time on each button.**

Then the last exposure time for each button is memorized automatically.  
You can set 12 direct exposure time according to your patient.

■ **Shooting**

- Set the exposure time.
- Sight the cone for the area you want to get the image
- Push “shooting” button
-  Ready” signal is flickering for 2 seconds on LCD.
- When X-Ray generates  “shooting” signal appears on LCD, yellow LED turns on and buzzer rings..
- Push “shooting” button until the end of “shooting” period.
- When “ shooting” is finished, Buzzer rings off and Yellow LED turns off.



**Warning**

- This system is not waterproof. Water, soap, or other liquids, if allowed to drip into the equipment, can cause electrical short circuits leading to electric shock and fire hazards. If liquids should accidentally spill into the system electronics, DO NOT connect the power cord to a supply connection or turn the system on until the liquids have dried or evaporated completely.

■ **Electrical Fire**

The owner should develop an emergency procedure for the area in which the system is used that includes the following safety measures:

- Turn the system off and unplug the main power cable from the outlet.
- Evacuate everyone from the area.
- Call for help.
- Use only a fire extinguisher of a type approved for electrical fire.



**Warning**

- The use of the wrong type of fire extinguisher presents electrical shock and burn hazards. To avoid these hazards, a fire extinguisher which has been approved by the appropriate local, state, and federal codes must be available in the room where the equipment is being used.



## ■ Electromagnetic Compatibility Statement

This equipment generates, used and can related radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other devices in the vicinity. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to other device, 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 measure:

- Reorient or relocate the receiving device.
- Increase the separation between the equipment.
- Connect the equipment into an outlet on a circuit different from that to which the other device(s) are connected. Consult the manufacturer or field service technician for help.

## Operating Procedure

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### ■ Power on.

Push “Power on” button for 0.3 second, then electricity turns on this equipment. While booting time, “Wait” signal is on and off and warm up for about 10 seconds if the equipment is normal condition.



#### Notice

- When the signal shows “Fail” on memory check.

The memorized exposure time on each button is initialized.



#### Notice

- Battery storage is less than required extent.

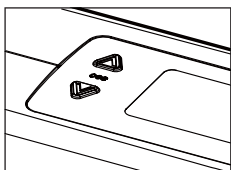
When the battery Storage is less than the minimum dose, the power is put off automatically. You should recharge it with recharge unit supplied by Genoray.

### ■ Adjustment of exposure time

This equipment adopt APR(Anatomic Programmed Radiography) mode for the convenience of operator. APR mode is programmed by the following procedure. While booting time, “Wait” signal is on and off and warm up for about 10 seconds if the equipment is normal condition.

- First, push adult or child button. (You can check it on LCD)
- Then, push one button during 6 buttons for Upper/lower, molar/canine/incisor button. (You can check it on LCD)

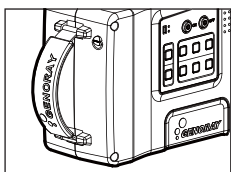
## Exposure Time Setting



### ■ Exposure time-set button

Use this button in order to set the exposure time.  
It is composed of 56 steps.

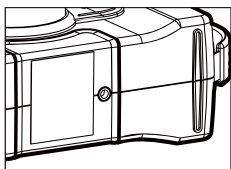
▲ is for increase, ▼ is for decrease exposure time



### ■ Grip tie

Use it when shooting or moving.

The length can be adjusted for the operator  
and is very smooth and comfortable.



### ■ Mount for tripod

It connects to Tripod.

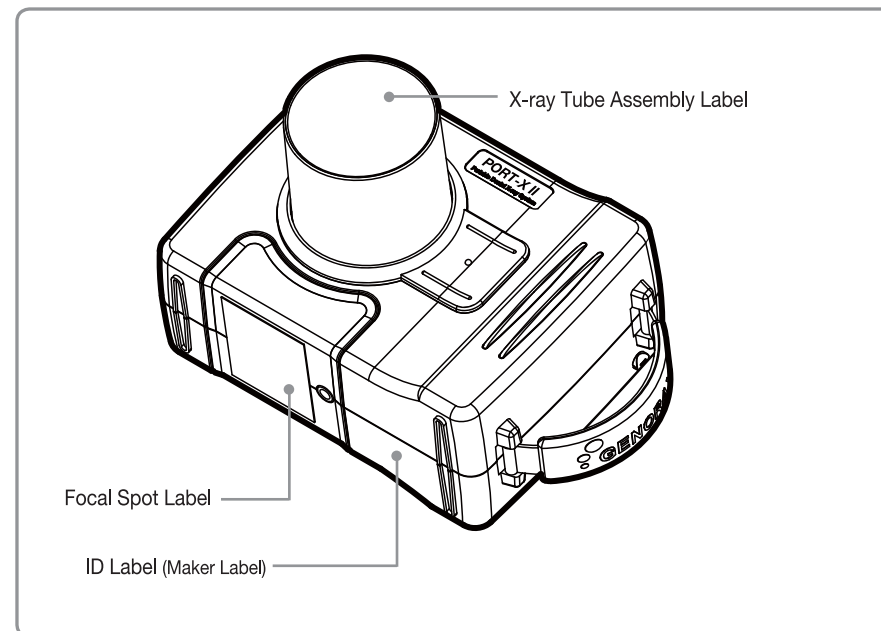
Only the tripod supplied by Genoray or  
permits more than 3 Kg can be connected.



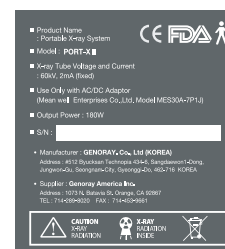
### Warning

- X-RAY SWITCH should be pushed until shooting is finished.

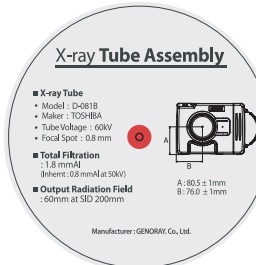
## Labels



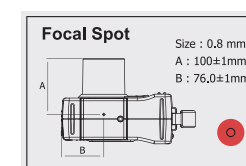
ID Label (Maker Label)



X-ray Tube Assembly Label



Focal Spot Label



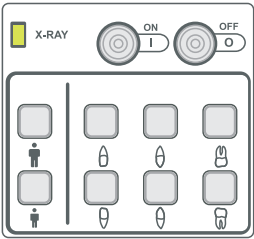
■ AC/DC Adapter for recharging.

- Model Name : MES30A-7P1J1
- Maker: Mean Well Enterprises Co.,Ltd.
- Rated power Input: 90~264Vac / 0.8~0.4A
- Rated output: 28Vdc / 1.07A



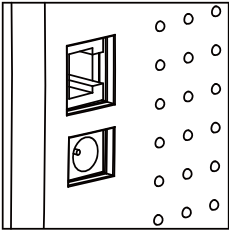
**Warning**

- Recharge with the recharge unit supplied be Genoray Co., Ltd., and use it only for this equipment.  
Unless, it may occur malfunction or disorder.



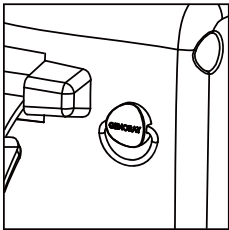
④ Direct key for each shooting condition

It controls On/Off for the equipment.  
It remember the last shooting condition  
for each button.

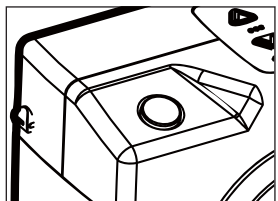


⑤ Connector for recharge It connects to recharge unit.

⑥ Connector for hand switch It connects to hand switch.



⑦ Ring for necklace It hooks necklace.



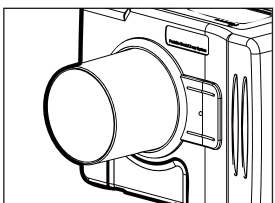
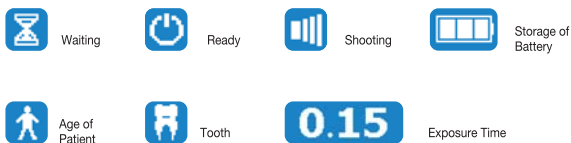
## ❶ X-ray shooting button

Use this in order to generate X-Ray.  
When this button is pushed, x-ray generates as for the setting exposure time.



## ❷ Indication of LCD State

Use this in order to generate X-Ray.  
When this button is pushed, x-ray generates as for the setting exposure time.



## ❸ Beam Limiting Device

Block inside with lead and attach aluminium filter, prevent inefficient x-ray to flow out

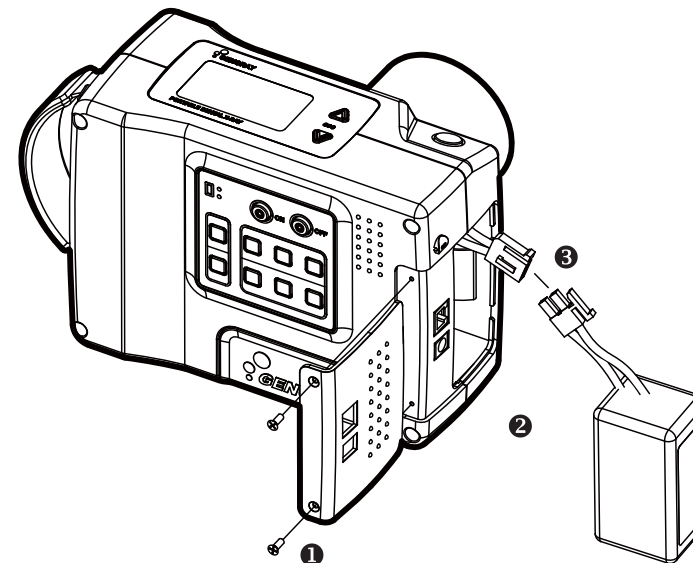
## ■ Battery



### Warning

- Use the battery supplied by Genoray Co., Ltd., only.  
The operator is responsible for any malfunction from usage with another battery.

### • Battery changing



- ❶ Unfasten bolts(2pcs) from the battery cover.
- ❷ Take out the battery from main body.
- ❸ Disconnect the battery connector and change the battery.

### • How to dispose

The battery which is end of life does away with general waste.

■ Radiation Safety



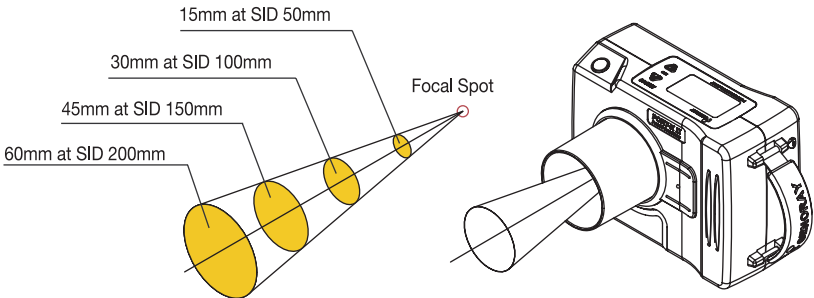
**Warning**

- This X-Ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed.

The X-Ray tube assembly produces ionizing radiation when energized. Never operate this device without X-Ray shielding in place.

It is imperative that the owner designates areas suitable for safe operation and service of the system and the operator ensure that it is used only in these designated areas.

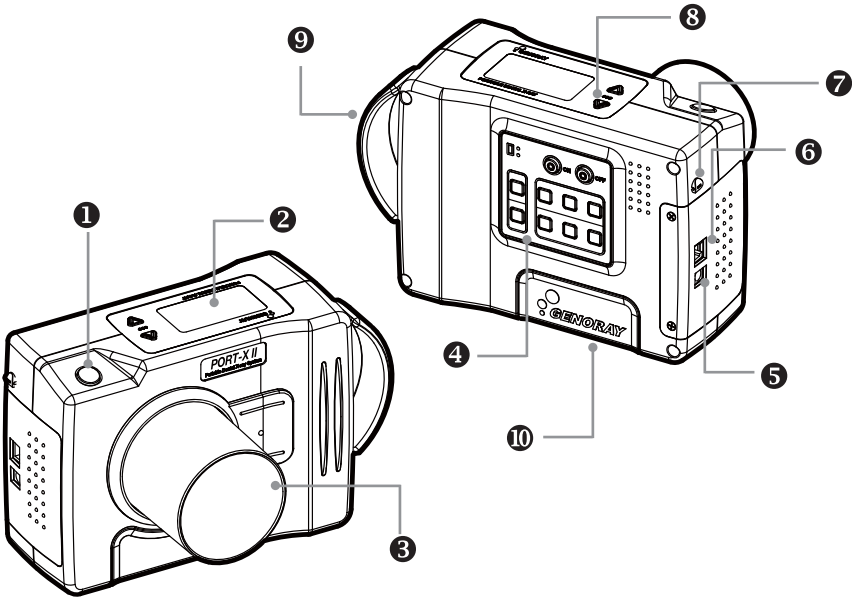
It is the responsibility of the owner to ensure that all personnel wear protective clothing and radiation monitoring devices while using this system.



< Radiation Field Area >

**Main Body**

This adopted Litium-Polymer battery which is very safe. Its specification won't be changed after long time of disuse.



■ Explanation

- |                                |                             |
|--------------------------------|-----------------------------|
| ① X-ray Shooting Button        | ⑥ Connector for Hand Switch |
| ② Indicator of LED State       | ⑦ Ring for Necklace         |
| ③ X-ray Beam Limiting Device   | ⑧ Exposure time-set button  |
| ④ Direct key for each shooting | ⑨ Grip tie                  |
| ⑤ Connector for Recharge       | ⑩ Mount for tripod          |

■ Operating Enviroment

- Usable range of temperature ..... 10°C ~ 40°C
- Relative Humidity ..... 30% ~ 75% RH

■ Storing and Transportation Enviroment

- Range of Temperature ..... -40°C ~ 70°C
- Relative Humidity ..... 20% ~ 90%
- Air Pressure ..... 50 – 106kPa

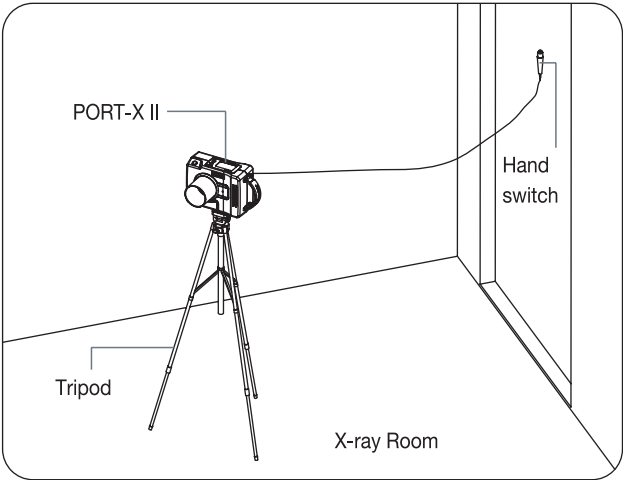
■ Radiation Safety

This X-Ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed.  
The owner should take the maintenance and operation to an authorized people and have the responsibility to inspect this system periodically.

■ Warning and Caution

- Read the user’s guidebook or have a relative traning before operation.
- For this system generates X-Ray, it should be observed by international regulations and regional regulations while operating.
- While this system is used for pregnant people, doctor’s prescription should be observed.
- Stable electrical power should be supplied.

You can use PORT-X II with Tripod & Hand switch.  
It makes that the operator can leave the x-ray room under exposure.



■ Symbols

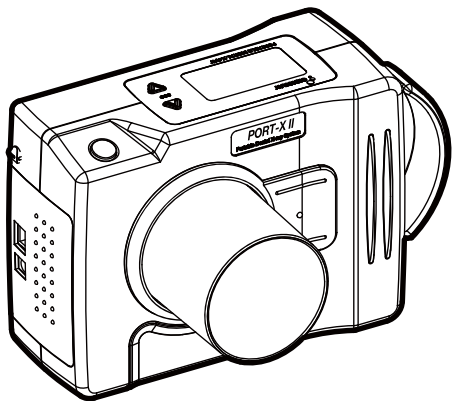
SYMBOL	Description
	Attention, consult accompanying document
	TYPE B APPLIED PART
	X-ray Source Assembly, Emmiting (Emmission or the Imminet Emmission of X-radiation)

Composition

This system is composed of main body and accessories as follows ;

■ Main Unit

X-ray Generator  
Beam Limiting Device  
Battery



■ Accessories

Recharging Unit  
Staying Necklace

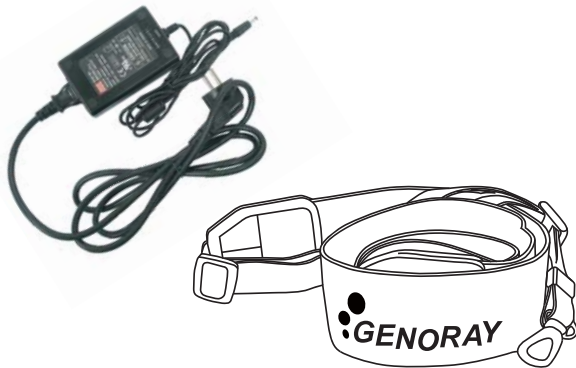


Fig.1 Picture for each part

■ X-Ray Tube Housing

- Max. Heat Storage Capacity : approximate 18.0 kj (25.2 kHU)
- Max. Heat Dissipation Rate : approximate 40W (56 HU/s)

Battery

- Type ..... Li-Polymer
- Voltage ..... 22.2 VDC
- Capacity ..... 910mAh

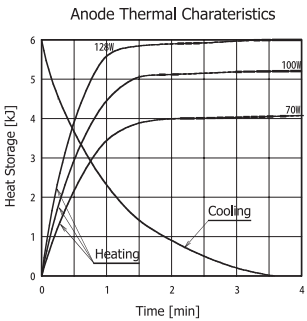
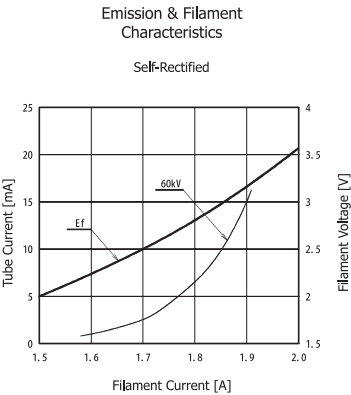
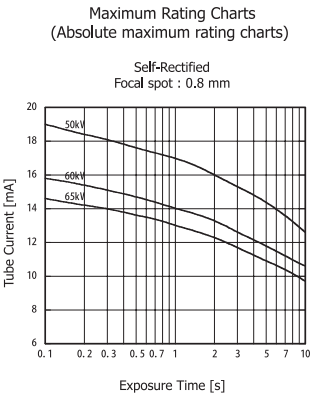
Recharge Unit

- Standard Electricity ..... 90 ~ 264 VAC, 0.8 ~ 1.4 A
- Voltage Output ..... 28 VDC
- Current Output ..... 1.07 A

Dimensions and Weight

- Main Body ..... 197 mm X 147 mm X 145.5 mm (2.35 kg)
- Battery ..... 42 mm X 80 mm X 34 mm (0.25 kg)
- Recharge Unit ..... 100 mm X 65 mm X 35 mm (0.5 kg)

- Cooling Method ..... Oil Cooling
- Maximum Tube Voltage ... 65 kV
- Maximum Inverse Tube Voltage ... 75 kV
- Minimum Tube Voltage ..... 50 kV
- Maximum Tube Current ..... 19 mA (See rating charts)
- Thermal Characteristics
  - Anode Heat Storage Capacity ..... 6.0 kJ (8.5 kHU)
  - Maximum Anode Heat Dissipation Rate .. 128 W (180 HU/s)



<Rating Chart>

Precaution

- The equipment should be used only by personnel possessing relevant qualifications, including adequate training in radiation protection.
- Precaution for storing
  - You must keep away from the place with water vapor, direct sunlight, dust, high humidity, ventilation problem, salty atmosphere and chemical or gas.
  - For normal operation, you must keep away from the place with strong vibration and maintain the following range of temperature and humidity.
- Checking Before Operating
  - Whether the power supply line is suitable with that of the system. Do this before turning power ON.
  - Whether it is completely grounded.
  - Whether all the connectors are in proper position.
  - Check the electricity of battery. If not sufficient, recharge through the recharge unit. If any problem occurred or battery should be changed, consult it with qualified person or manufacturer.  
Don't use other recharge unit in order to prevent malfunction.



Precaution

■ Caution while operating

- Observe carefully on the whole system and the patient.
- When there's problem with the system or the patient, keep the patient in safety, stop operating the system and make relevant disposition.

■ System Malfunction

- In case of malfunction, do not attempt to operate the system until it has been checked out by a qualified service technician.

■ Inspection

- Make inspection for system and part periodically.
- In case it is used after quite a long time of recess, confirm its status from an expert of this equipment or manufacturer.
- Wash periodically with neutral detergent very carefully.
- Don't use erosive detergent or fluid

Other Cautions

Read carefully the following operating manual.

Main Unit

■ X-ray Generator

- (1) Tube Voltage ..... 60 kV
- (2) Tube Current ..... 2 mA

■ X-ray Controller

- (1) Power Output ..... 22 VDC
- (2) Exposure Time ..... 56 steps (0.01 ~ 2.0 sec, manually adjusted)

■ Beam Limiting Device

- (1) Type ..... Round Type
- (2) Output Radiation Field ..... 60 mm at SID 200 mm

■ Tube Assembly

- (1) Value of Loading Factor ..... 60kV x 4mAs

■ X-ray Tube

- (1) Type ..... Stationary Anode
- (2) Focus ..... 0.8 mm
- (3) Target Angle ..... 20 °
- (4) Target Material ..... Tungsten
- (5) Total Filtration ..... 1.8 mmAl  
(Inherent Filtration : 0.8mmAl,  
Additional Filtration : 1.0 mmAl)