

VeRay Portable Dental X-ray User Manual

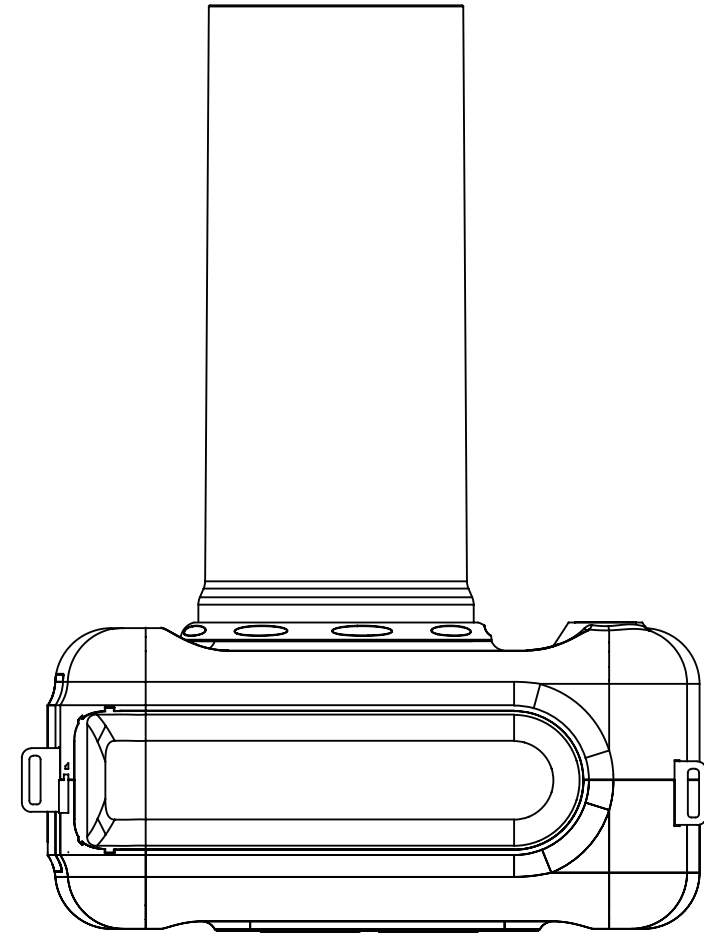


Figure 1-1 VeRay Panoragram

Contraindication: Do not use it on people with cardiac pacemakers or pregnant women. Use it carefully on children.

Main feature: the product is a high frequency dental X-ray equipment, rated tube voltage is 60kV DC, rate tube current is 2 mA, the inverter X-ray control method is adopted, for chemical film and digital sensor diagnostics to obtain high quality dental images, the power supply of

Introduction

Dear customer,
Thank you for selecting our product!
In order to use the product correctly, please read the users' manual carefully before using the equipment.
The equipment is only for qualified professional technicians and trained or qualified professionals (such as a dentist) in the hospital or clinic to use.
The equipment belongs to the radioactive equipment, the operator should operate the equipment according to the users' manual, the equipment shall not be used for other purposes except for medical radiograph.

The following identifiers are used on the equipment, their meanings are as follows:

Symbol	Description	Symbol	Description
	AC		DC
	Caution		Dangerous warning for ionizing radiation
	Follow the operating instruction		Do not discard the electronic equipment casually, according to the regulations, the equipment should be disposed according to the local legal requirements, after the useful life.
	Type B application section		X-ray emit or imminent emit
	Standby		Dangerous Voltage
	Manufacturer		Authorized representative in the European Community
	Class II equipment		Medical device
	Date of manufacture		

Chapter 1 Overview

1.1 Product Basic Information

Product Name: Portable Dental X-ray
Working principle: The high voltage generator provides high voltage to both ends of the X-ray tube filament and metal target in the internal X-ray source assembly, a large number of electrons are generated on the cathode filament of the X-ray tube and move at a high speed in the vacuum tube, impact the metal target to generate the X-ray. The X-ray penetrate the different tissue densities of the body, such as teeth and muscles after pass through the X-ray window and beam tube, the X-ray which carry image information through body tissue, are passed through image receiving devices such as phosphor sheets, film or digital image receivers, to show different densities of human tissue images.
Application Range: used on the teeth to take an X-ray radiograph, with an intraoral image receiver, images are obtained for the clinical diagnosis.
Intended users: Dentist
Intended patient population: Adults and pediatrics
Structural composition: the product consists of the host (including the X-ray tube, controller and rechargeable battery), beam limiting tube, power adapter, stand and exposure switch.
Product model: VeRay

the X-ray VeRay is 24V DC, powered by a rechargeable battery pack.

Chapter 2 Product Description

2.1 Technical specification

2.1.1 Product technical specification

Serial number	Name	Parameter value
1	Power Adapter	Input Voltage
		Uniphase AC 100 ~ 240V, ±10%
		Supply Frequency
		50/60Hz, ±1Hz
2	Output Power	286W
3	Charge voltage	DC 25.2V
4	Charge current	1.0A
5	Nominal value of the focal point	0.8mm
6	Anode angle	19°
7	Available maximum tube voltage at 2mA	60kV
8	Maximum output electric power	0.12kW
9	Maximum loading factor combination	60kV、2mA、2s
10	Repeatability of radiation output	No more than 0.5
11	Tube voltage (The deviation is within the range of ±10%)	60kV
12	Tube current (The deviation is within the range of ±20%)	2mA
13	Running mode	Discontinuous operation, maximum excitation (open) time: minimum excitation (close) time = 1: 30
14	Total filtration of X-ray tube assembly	> 2.5mm Al
15	Intrinsic filtration of X-ray tube assembly	0.75mm Al
16	Additional filtration	1.00mm Al
17	Half-value layer	≥ 1.5mm Al (60kV)
18	Leakage radiation	≤ 0.25mGy/h (60kV、2mA、2s)
19	Adjustment range of the loading time	0.01 ~ 2.00s, adjustable
20	Distance of the Focal point to skin (The deviation is within 0~5%)	205mm±5mm (long) 116mm±5mm (short)
21	X-ray field size at the end of beam limiting tube	round, Φ 57mm±3mm
22	Nominal electric power	0.12kW (60kV、2mA、0.1s)
23	Available maximum tube current at 60kV	2mA
24	Inverter frequency of the High voltage generator	70kHz

2.1.2 Product basic safety features

- Safety category: Class II or internal power supply class, do not use when charging.
- Classified by electric shock protection type: Type B application section.
- Classified by the degree of protection against fluid intake: Common equipment.
- Classified by the manufacturer's recommended disinfection and sterilization methods: As required by the manufacturer to carry out.
- Classified by the degree of safety for use with flammable anesthetic gases mixed with air or with oxygen or nitrous oxide: Non AP/APG type.
- Classified by operation mode: Discontinuous operation, Maximum excitation (open) time: Minimum excitation (close) time = 1: 30.
- The product has no application part with protection against defibrillation discharge effect.
- Whether the equipment has a signal output or input part: No.
- The product is a common equipment.
- Permanent or non-permanent installation equipment: Non-permanent installation equipment.
- Radiation type: Ionizing radiation.
- Radiation property: X ray.
- Radiation distribution: The X-ray radiates from the positive direction of 6cm circle in the window of the limited beam barrel when used.

2.1.3 X-ray tube technical specification

Serial number	Name	Parameter value
1	The X-ray tube model	XD10D-0.5 / 70
2	Nominal value of the focal point	0.8mm
3	Target material	Tungsten
4	Maximum working tube voltage	70kV

5	Anode angle of the X-ray tube	19°
6	Intrinsic filtration	0.75 mm Al
7	Filament current	2.0 A
8	Filament voltage	2.85 ± 0.5 V

The emission characteristics of X-ray tubes are shown in Figure 2-1.

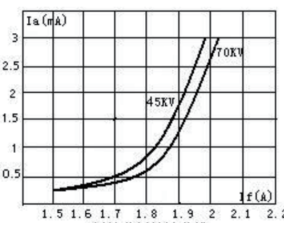


Figure 2-1 Filament emission characteristics of X-ray tube

The X-ray tube load characteristics are shown in Figure 2-2

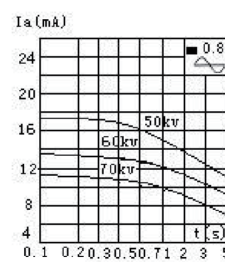


Figure 2-2 Load characteristics curve

The filament characteristics of X-ray tubes are shown in Figure 2-3

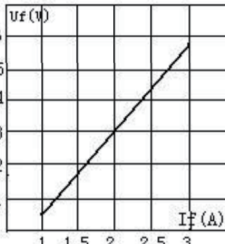


Figure 2-3 Filament characteristics curve

Heating and cooling characteristics of the anode are shown in Figure 2-4.

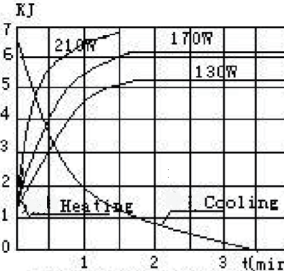


Figure 2-4 Heating and cooling characteristics of the anode

The X-ray tube dimension are shown in Figure 2-5

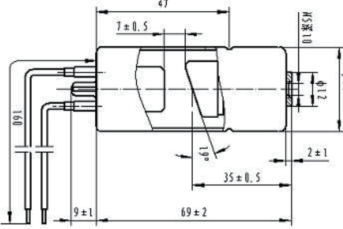


Figure 2-5 Dimension

2.1.4 Product software

Software name: The control software of the dental X-ray system Release version: V1.0.0

2.2 Warnings and cautions

2.2.1 Warnings

- Warning:** To avoid the risk of electric shock, the product must be connected to the power supply network with protective grounding when charging.
- Warning:** The users' manual instructs product operators to operate the product safely. The product should only be used by persons with the necessary radiological knowledge and training, the manufacturer is not responsible for any improper operation, negligence or improper use.
- Warning:** The power supply of the host must be turned off when the exposure is over.
- Warning:** When taken an X-ray radiograph for tooth, the medical staff should always monitor during exposure.
- Warning:** Ionizing radiation.
- Warning:** Do not place the equipment on the position that is difficult to operate the disconnecting device. The equipment uses a flexible wire with a mesh power plug as a breaking device.
- Warning:** Modification of the product is not permitted.

2.2.2 Cautions

- In order to use the product correctly, please read the users' manual carefully before using the equipment.
 - The equipment is only for qualified professional technicians and trained or qualified professionals (such as a dentist) in the hospital or clinic to use.
 - The equipment belongs to the radioactive equipment, the operator should operate the equipment according to the users' manual, the equipment shall not be used for other purposes except for medical radiograph.
 - The equipment should not be used when there is any electrical or mechanical fault.
 - The protective circuit and protective facilities of the equipment shall not be removed when it's powered on.
 - The equipment must not be used in a humid, flammable, or explosive environment.
 - Any modification to the equipment shall be approved by our company or its authorized maintenance personnel.
 - Ensure that there is no risk to the patient or the operator when replace the components of the equipment, if necessary, contact our maintenance personnel.
- Any improper operation of the equipment will cause damage to the equipment, regular inspection and maintenance is also necessary. Our company assumes full responsibility for any loss of life or property caused by the quality of this product, except for those who do not follow the user's requirements and change the system manually or without authorization.

2.2.3 Electric safety

- Ensure the voltage and current meet the power requirements of the product.
- Ensure there is no flammable or explosive gas leakage in the room where the equipment is located.
- Ensure the battery charger is unplugged before cleaning. Cleaning should be carried out when the equipment is powered off, only use non-alcohol sanitizer wipes or cloths dampened with liquid or spray.
- VeRay and the included battery charger is not suitable for any type of disinfection.
- Turn off VeRay after use.

2.2.4 X-ray protective safety

- Ensure that precautions are taken against X-ray before each exposure, keep the following in mind:
 - Wear protective clothings, wear protective goggles during the X-ray examination.
 - Irradiation dose should be as low as possible when x-ray examination permits.
 - Human skin should be as far away from X-ray sources as possible, as long as diagnostic requirements are met.
 - The radiation exposure and absorbed radiation dose are inversely proportional to the square of the distance from the radiation source, the farther away you are from the source, the lower the dose you receive. The operator should be 3 meters away from the X-ray tube head.
 - The X-ray Generated by the equipment has certain harm to human body. Besides operating VeRay properly to ensure normal operation, it is more important to pay special attention to the protection of human body against X-ray, so as to minimize the harm of X-ray operators and patients. example, the equipment room should have protective equipment and measures (such as lead plates), and the operator must use protective equipment (such as lead glasses) and wear protective clothing (such as lead caps, lead aprons, and lead gloves). The operator must operate in an occupied area when approaching patients for radiological examination.

Chapter 3 Product operation instruction

3.1 Product overall layout

3.1.1 Product front view



Figure 3-1 Front view

Figure 3-1 functional descriptions:

Serial number	Position	Name	Functional descriptions
1	"1"	Indicator light	"Standby": blue light flash at interval. "Exposure": yellow light on, return to standby after exposure. "Sleep": green light flash at interval. "Product failure": red light on.
2	"2"	Operation panel	See the details below 3.2.
3	"3"	Exposure switch connection port	Open the cover and put the exposure switch into the exposure switch connection port, realizing exposure switch connection.
4	"4"	Adapter connection port	Open the cover and put the adapter charging cable into the adapter connection port, realizing internal battery charging.

3.1.2 Rear view



Figure 3-2 Rear view

Figure 3-2 functional descriptions:

Serial number	Position	Name	Functional descriptions
1	"1"	Hand strap ring	Fix hand strap
2	"2"	Neck strap ring	Fix neck strap
3	"3"	Exposure button	Press the exposure button to activate the X-ray exposure
4	"4"	beam tube	Provide X-ray emission field dimension

3.2 Operation panel description

3.2.1 Operation panel

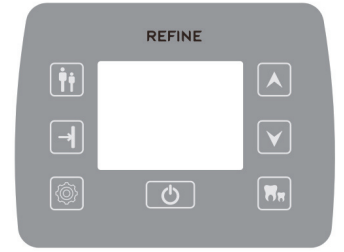


Figure 3-3 Operation panel

Figure 3-3 functional descriptions:

Serial number	Keypad	Name	Functional descriptions
1		Power On/Off button	Turn on or turn off the equipment power supply
2		Patient body type selection button	Select body type large/small
3		Save button	Save exposure time
4		Mode button	Enter the mode selection interface to set the mode
5		Up button	Increase loading time
6		Down button	Decrease loading time
7		Teeth type selection button	Select teeth type

3.2.2 Product operating description

(a) Product power ON/OFF

Power ON: press the power On/Off button , VeRay powers on, the buzzer beeps, the screen lights up, ensure that at least one bar of power is available before starting the equipment.

Power OFF: press the power On/Off button , the buzzer beeps, VeRay powers off. Enter the main interface:

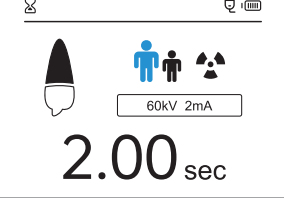


Figure 3-4 Main interface

Figure 3-4 functional descriptions:

Serial number	Keypad	Name	Functional descriptions
1		Tooth	Display the selected tooth type
2		Standby/Pre-exposure/Exposure	Standby state/ Pre-exposure state/ Exposure state
3		Battery capacity	Display the battery capacity state
4		Patient	Display the selected patient type
5	60kV	Exposure tube voltage	Display the fixed exposure tube voltage
6	2mA	Exposure tube current	Display the fixed exposure tube current
7	2.00	Exposure time	Display the set exposure time
8		Charging symbol	Charging state

(b) Body type large/small selection button

Select the type of patient, please press the patient body type selection button , the selection will display the corresponding blue symbol on the screen.

(c) Teeth type selection button

Select the tooth type, please press the teeth type selection button , the selection will display the corresponding tooth type symbol on the screen, as shown in Table 1-1.

Table 1-1

Teeth type							
Description	Upper canine tooth	Lower molar tooth	Upper molar tooth	Wing bite teeth	Lower front tooth	Upper front tooth	Lower canine tooth

(d) Standard exposure time

Preset standard exposure time as shown in Table 1-2.

