midmark

VetPro® DC Animal Health Dental X-ray System

User Manual

00-02-1601
Revision L01
October 2019

CE

Table of Contents

Introduction

Indications for Use

The VetPro® DC Animal Health Dental X-ray System is to be used by veterinarian and other qualified professionals as an extraoral source of X-rays in Dental radiography.

Contraindications

None known

Warnings and Precautions

The instructions contained in this manual must be read and followed when operating the VetPro system. The local Midmark dealer can assist in placing the system in operation.

Radiation Safety

- Allow only qualified and authorized personnel, observing all laws and regulations concerning radiation protection, to operate this equipment.
- The operator must remain at all times a safe distance from the focal spot and the X-ray beam.
- Utilize all of the equipment's radiation safety features.
- To protect both the patient and the operator from X-ray radiation, employ all available radiation protection devices, accessories, and procedures.

Electrical Safety

⚠WARNING	To avoid electric shock, connect this equipment only to supply mains with protective earth.

- Because the design of the VetPro DC power supply circuit may momentarily draw high current, do not use this device with wall outlets having GFCIs (Ground Fault Circuit Interrupters). Outlets with GFCI are designed to trip when they sense a small amount of current passing from the line to earth ground. Outlets with GFCI can compromise the operation of the intraoral X-ray device and the GFCI circuit itself.
- Allow only qualified and authorized service personnel to remove equipment covers.
- All maintenance requiring the removal of protective covers must be performed by service personnel only when patients are not present.
- Replace sensors only when a patient is not in contact with the machine or the operator.

⚠CAUTION	Do not touch the USB connector on the articulated arm.

- This equipment must be used only in rooms or areas complying with all applicable laws and recommendations concerning electrical safety in rooms used for medical purposes, e.g., IEC[1], NEC[2], or VDE[3] standards concerning provisions of an additional protective earth (ground) terminal for power supply connection.
- Before cleaning or disinfecting, disconnect the equipment from the main electrical supply.
- The system is ordinary type medical equipment without protection against ingress of liquids. To protect against short-circuit and corrosion, do not allow water or any other liquid to leak inside the equipment.

[1] International Electrotechnical Commission
[2] National Electrical Code
[3] Verband Deutscher Elektrotechniker (Association of German Electrical Engineers)

Explosion Safety

This equipment must not be used in the presence of flammable or potentially explosive gases or vapors, which could ignite, causing personal injury and/or damage to the equipment. If such disinfectants are used, the vapor must be allowed to disperse before using the equipment.

Safe Installation and Operation

The equipment must be installed and operated only in accordance with the safety procedures and operating instructions in this manual and in the Installation Guide and only for the purposes and applications for which it was designed. Modifications or additions to the equipment may be made only by Midmark Corporation or by third parties expressly authorized by Midmark Corporation. Such changes must comply with the rules and legal requirements of the authority having jurisdiction. It is the responsibility of the owner to ensure that existing legal regulations regarding installation of the equipment with respect to the building are observed.

X-Ray Protection

Do not operate the device in the significant zone of occupancy. The operator of an intraoral dental X-ray device must remain 2 meters (6.6 feet) away from the focal spot and out of the path of the X-ray beam.

The VetPro DC Dental X-ray System provides a high degree of protection from unnecessary X-ray radiation. However, no practical design can provide complete protection from radiation or completely prevent operators from exposing themselves or others to unnecessary radiation.

Device Disposal

To ensure compliant and safe disposal of waste electrical and electronic equipment, contact the Midmark dealer or local regulatory or public health authorities.

Product Description

The VetPro DC Animal Health Dental X-ray System is a high-frequency intra-oral X-ray machine. It consists of the components shown in Figure 1: the Control Unit, the Tubehead, the Articulating Arm, the Horizontal Arm, the Cone, and the Remote Control option.

Control Unit

The Control Unit provides for the input power connection and control of the Tubehead and Operator Panel. It provides automatic line voltage compensation, kVp control, and exposure time control. The Control Unit consists of the mounting base and Operator Panel.

Tubehead

The Tubehead contains the X-ray tube, high voltage circuit, and a round Cone. The tubehead is shipped already assembled to the Articulated Arm.

⚠WARNING	Do not block the small hole in the plastic handle that covers the back of the tubehead. It provides an air vent to allow the tubehead oil to expand and contract as the unit is operated.

Articulating Arm

The Articulating Arm provides the articulation support for the Tubehead and the reach and coverage of the Tubehead to the patient. It allows smooth movement for precise positioning and does not drift or vibrate when left in position.

Horizontal Arm

The Horizontal Arm helps provide the necessary reach for the VetPro DC. It pivots smoothly around a shaft inserted in the top of the Control Unit and contains an access cover to connect the cable from the Horizontal Arm to the Control Unit. It is available in four lengths, providing reaches of 56, 66, 76 and 82 inches.

Modular Beam Limiting Device [BLD]

The Cone establishes the distance from the X-ray tube to the patient's skin. It provides positioning assistance and collimates the X-ray beam to within a defined circle at its end. The VetPro DC is shipped with the standard 20 cm (8-inch) Cone attached to the Tubehead. An optional 30 cm (12-inch) Cone is available[4].

Remote Control

The remote control switch is used to make exposures in addition to or replacing the use of the exposure button.

Mobile Unit

An optional device, the mobile unit supports preprogrammed technique selections and X-ray acquisition. See Appendix A of the VetPro Installation and Service Manual for the installation instructions of the mobile unit.

Installation and Service

Allow only Midmark-approved personnel to install or service VetPro DC equipment. Contact Midmark for assistance in locating an approved dealer. Contact information is on the back cover.

[4] See *Using the 30 cm Cone* on page 17 for ordering information.

EMC Statement

Information regarding potential EMC interference and advice for avoidance

⚠WARNING

- Mobile RF communications equipment can affect the performance of medical electrical equipment. (The VetPro DC Dental X-ray System is not considered life-supporting equipment.) Midmark advises against using the VetPro system adjacent to other devices. If it must be used near other devices, carefully adjust their configuration to ensure that electromagnetic interference (EMI) does not degrade performance. Test both devices for normal operation.
- Use of accessories, transducers, or cables other than those provided by or specified by Midmark can result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment. This can result in improper operation.
- Use portable RF communications equipment (including peripherals such as antenna cables and external antennas, including cables specified by Midmark) no closer than 30 cm (12 in.) to any part of the VetPro system. Otherwise, performance of the equipment may be degraded.

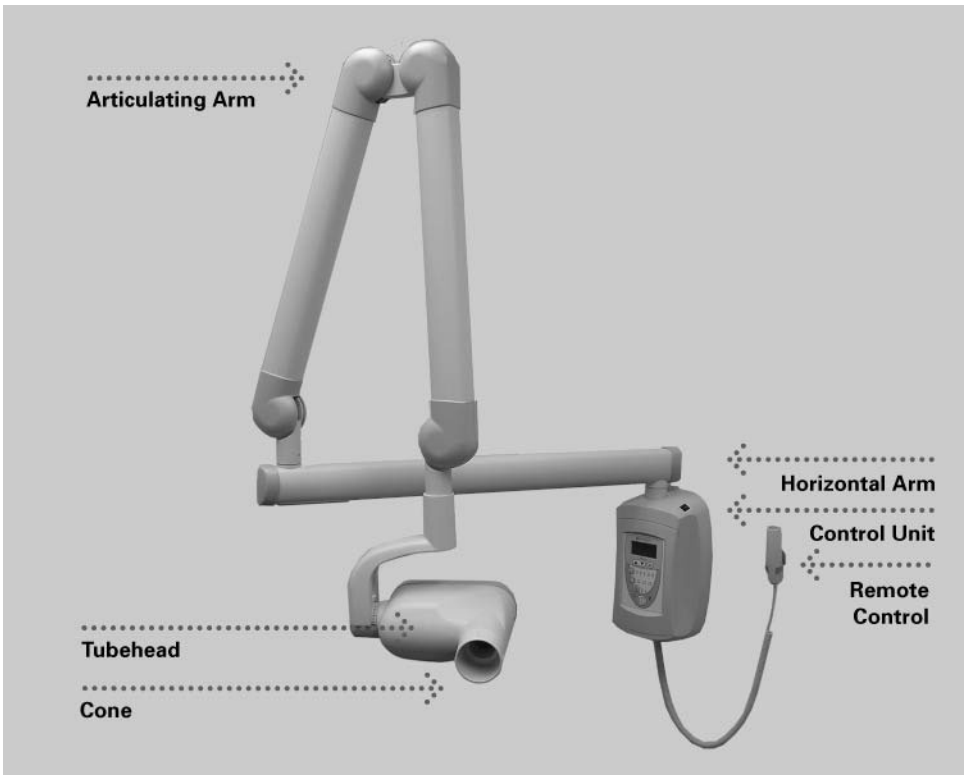


Figure 1 Component Diagram

⚠CAUTION Do not hang lead aprons on the horizontal extension arm.

Compliance with Applicable Standards

Radiation Protection	The certified components of the VetPro DC Animal Health Dental X-ray System comply with Radiation Performance Standards 21 CFR, Subchapter J, at the time of manufacture. The certified components of the VetPro DC Animal Health Dental X-ray System comply with IEC 60601-1-3 Radiation protection/X-ray equipment.
UL 2601-1 File Number: E181750	Classified by Underwriters Laboratories Inc. with respect to electrical shock, fire and mechanical hazards only in accordance with UL 2601-1, and CAN/CSA C22.2 NO, 601.1-M90, and to the following particular standards, IEC60601-2-7, IEC60601-2-28.
EMI/EMC	IEC60601-1-2

Certified Components

Component	Reference Number
Tubehead	30-A1027
Control Unit. VetPro DC	30-A0019
Control Unit. VetPro DC Mobile	30-A0018
Modular BLD, 20 cm Lg., 70 mm Cone, Gray	30-A2195
Modular BLD, 20 cm Lg., 60 mm Cone, White	30-A2196
Modular BLD, 20 cm Lg., 60 mm Cone, Gray	30-A2228
Modular BLD, Base, Gray	30-A2205
Modular BLD, Spacer, Gray	30-A2206
Modular BLD, Spacer, White	30-A2208

Note: longer cones and cones with rectangular apertures are available.
Contact Midmark Customer Service (see back cover).

EC Declaration of Conformity

Name and Description of Product

VetPro DC

System	Reach	Control	Arm
P7018V-P	82”[208 cm]	30-A0019	30-A2164
P7017V-P	76”[208 cm]	30-A0019	30-A2071
P7016V-P	66”[208 cm]	30-A0019	30-A2073
P7015V-P	56”[208 cm]	30-A0019	30-A2074
P7017VM	Mobile	30-A0018	

VetPro Complete

System	Reach	Control	Arm
DCV8-G2A/(S1, S2 or SB)	82”[208 cm]		30-A2213
DCV7-G2A/(S1, S2 or SB)	76”[208 cm]		30-A2212
DCV6-G2A/(S1, S2 or SB)	66”[208 cm]		30-A2211
DCV5-G2A/(S1, S2 or SB)	56”[208 cm]		30-A2210
DCV5-G2A/(S1, S2, S1/L or S2/L)	Mobile		

Reference Numbers to which Conformity is Declared

The following regulatory documents apply:
UL 2601-1
IEC 60601-1-2
IEC 60601-1-3
IEC 60601-2-7
IEC 60601-2-28
IEC 60601-2-32

Contact

Technical Support
imagingtechsupport@midmark.com

Authorized Representatives

North America

Midmark Corporation
1001 Asbury Dr.
Buffalo Grove, Illinois 60089 U.S.A.
Phone: 800-MIDMARK
Fax: 847-415-9801

Europe

CE Partner 4U
Esdoornlaan 13
3951DB Maarn
The Netherlands
www.cepartner4u.eu

Key to Symbols Used

	Type B: Protection against electric shock (IEC 60601.1-1988)
	Information useful to an operator, not related to safety.
	A hazardous situation which, if not avoided, could result in minor or moderate injury.
	A hazardous situation which, if not avoided, could result in serious injury or death.
	Consult written instructions in User Manual.
	ATTENTION RAYONS-X: OPERATION SEULEMENT PAR DU PERSONNEL AUTORISE. VOIR MANUEL DE L'OPERATEUR.
	WARNING X-RAY THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT AND OPERATOR UNLESS SAFE EXPOSURE FACTORS AND OPERATING INSTRUCTIONS ARE OBSERVED.
	*X-RAY EMISSION*
	Mains HOT WIRE
	Mains NEUTRAL WIRE
	Earth Ground
	Waste Electrical and Electronic Equipment (WEEE). WEEE distributed in the European Economic Area (EEA) must be collected and disposed of separately from other waste, per WEEE Directive 2012/19/EU. Contact the equipment dealer for information on local compliance schemes.

Technical Support

Contact

Midmark Corporation
1001 Asbury Dr.
Buffalo Grove, Illinois 60089 U.S.A.
Phone: 800-MIDMARK
Fax: 847-415-9801
imagingtechsupport@midmark.com

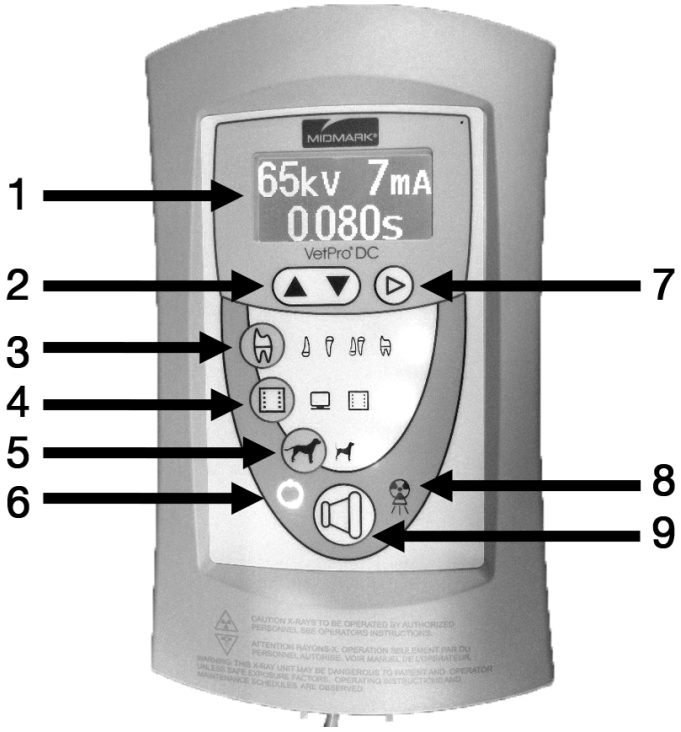
Operating the VetPro DC System

Using the Operator Panel

Power On Settings

When the VetPro DC Animal Health Dental X-ray System is powered on, the Operator Panel selections are those that were in use when the system was last powered off.

Figure 2
VetPro DC
Operator Panel



Icons

1. Large, LED screen displays technique settings. It also displays menu selections when the system is in menu mode.
2. Up and Down arrows are used to change kV, mA and time settings.
3. Tooth Icon: Pressing this button allows the user to select Upper or Lower Canine, Incisors, Premolars and Molars.
4. Receptor Icon: Choices are: Digital, D Speed film, E/F Speed Film. If using phosphor plates, select E/F Speed Film Setting.
5. Patient Size Icon: Press to select Large or Small
6. Ready Indicator: Circle lights up to indicate that the system is ready to produce X-ray.
7. Right Arrow Button: Use this button to move between kV, mA and time selections. This button is also used as an “Enter” key when the system is in menu mode.
8. Radiation Indicator: This symbol lights up when an X-ray is produced.
9. Exposure Button: Pressing this button will produce an X-ray exposure.

Exposure Settings

When the system is powered on, the operator panel, Figure 2, displays the exposure settings (kV, mA, and seconds) for the currently selected tooth, image receptor type, and patient size. Use the Tooth Selection, Image Receptor Type, and Patient Size buttons to select other exposure settings.
For a table of the factory-programmed exposure settings, refer to the Default Exposure Settings tables on page 25.

Adjusting Exposure Settings

Preset exposure settings can be adjusted before making an exposure. Use the right arrow to select the exposure setting to adjust. Use the up and down arrows to adjust the value. To save new presets, see the System Configuration Mode section on page 29.

Exposure Button and Ready Indicator

The Exposure button initiates an X-ray exposure. For a complete exposure, the button must be pressed and held until the Radiation Indicator goes off and the audible signal stops. Releasing the Exposure button will immediately terminate the X-ray exposure.

⚠CAUTION	• An incomplete exposure caused by prematurely releasing the exposure button may require the operator to make another radiograph. When the exposure button has been released prematurely, the system will notify the operator momentarily and then return to operating mode. • Device shutdown during an examination can expose a patient to non-diagnostic X-rays. Automatic shutdowns can be caused by overcurrent relays (caused by excess electricity flowing to the tubehead) or thermal cut-out (caused by the tubehead exceeding acceptable temperature specifications).

Interlock

NOTICE	It is the owner's responsibility to provide any visual interlock indicators required by local ordinances.

Ready Indicator

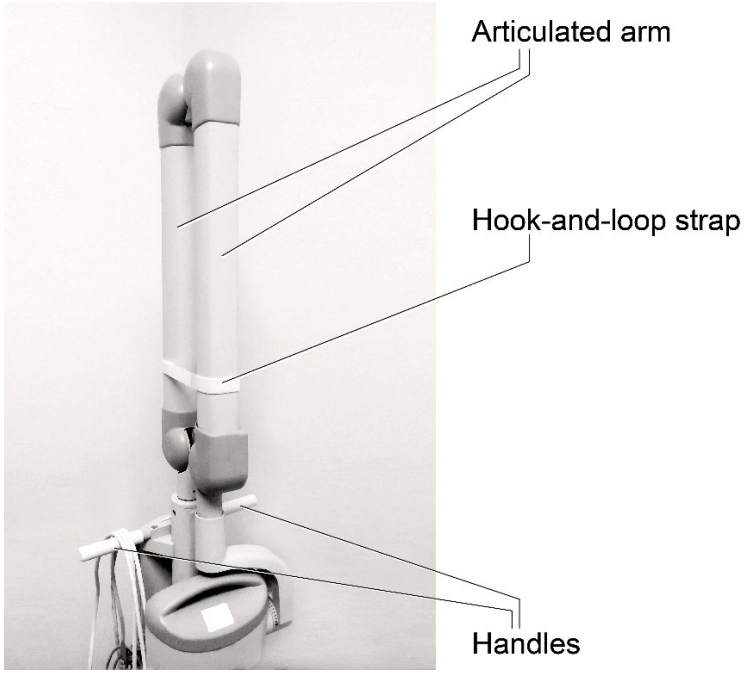
The Ready Indicator illuminates when the system is ready to make an exposure. Immediately after an exposure, the Ready Indicator flashes until the X-ray tube cools down sufficiently to make the next exposure. When the Ready Indicator is flashing, no exposure can be made.

Radiation Indicators

The VetPro DC has a visible and an audible Radiation Indicator. When an exposure is in progress, the Radiation Indicator on the Operator Panel is illuminated and an audible tone is heard. The exposure is complete when the Radiation Indicator is extinguished and the audible tone is no longer heard.

Transporting the Device

To avoid injury and damage to the tubehead when transporting the device to a different location within the user facility, collapse the articulated arm and secure it with the hook and loop strap[5] that was used during shipping. Maneuver the device by grasping the device's two handles. Avoid hitting the tubehead on walls, doorways, etc. and be careful not to damage the cable with the wheels during transport.



[5] Part number 30-S0037

Taking an X-ray

1. Turn the power switch, located at the upper right of the Control Unit, to the “On” position. The Ready Indicator on the front of the Operator Panel will light.
2. Verify that the unit is set for the correct Image Receptor Type. (The icon for the currently selected Image Receptor Type will be illuminated.) To change the Image Receptor type, press the Image Receptor Type button until the correct Image Receptor Type is selected.
3. Verify that the system is set for the appropriate Patient Size. The icon for the currently selected Patient Size is illuminated. To change the Patient Size, press the Patient Size button until the correct Patient Size is selected.
4. Verify that the unit is set for the Tooth to be imaged. The icon for the currently selected Tooth is illuminated. To change the Tooth Selection, press the Tooth Selection button until the correct Tooth is selected.
5. If desired, the preset exposure settings selected in steps 2-4 can be adjusted before making an exposure. (Skip this step when using the default exposure settings.) While exposure settings are being adjusted, the Tooth Selection, Image Receptor Type, and Patient Size buttons will be turned off. Use the right arrow to select the exposure setting to be adjusted. Use the up and down arrows to adjust the value.
6. Position the Tubehead for the patient’s X-ray using standard accepted positioning procedures.

⚠CAUTION	• Do not operate the device in the significant zone of occupancy. The operator must remain at least 2 meters (6.6 feet) away from the focal spot and out of the path of the X-ray beam.

7. Take the X-ray. Press and hold the Exposure button until the audible signal stops and the Radiation Indicator goes off. Releasing the Exposure button or coil-cord hand switch at any time will immediately terminate the exposure.

⚠CAUTION	It is recommended that the operator exit the operatory when using the coil-cord handswitch. To follow established safety practices and comply with regulations, the technique factors must be visible to the operator from the remote location.

8. Return the Tubehead to the storage position.

⚠CAUTION	Do not strike the tubehead on anything when returning it to the storage position.

It may be necessary to increase or decrease the kV, mA, or time from the preset values for one exposure. To do so:

1. Press the Enter button to highlight the value to change.
2. Use the up or down button to increase or decrease the value (no lights on the display will be lit to indicate the preset values).
3. Press the Exposure button.
4. Press any other button (Tooth, Film or Patient Size) to return the display to the preset values.

Using the 30 cm Cone (30-A2200)

The System is factory configured for use with the standard, supplied 20 cm (8 in.) Round Cone[6]. A 30 cm (12 in.) Round Cone[7] is also available.

Using the longer cone will require longer exposure times. For instructions on configuring the system for use with the longer cone, see the System Configuration Mode section on page 29.

[6] Part number 30-A2195
[7] Part number 30-A2200

Recommended Maintenance

Regular Maintenance

In the interest of equipment safety, a regular maintenance program must be established. This maintenance program should consist of annual system function checking. It is the owner's responsibility to arrange for this service and to assure that the personnel performing this are fully qualified to service Midmark Corporation X-ray equipment.

Cleaning and Disinfecting

Employ personal protective equipment to prevent the spread of infections
Clean the outside of the system using a damp towel or non-alcohol based disinfectant.

Cleaning / Disinfecting

⚠CAUTION	• Do not allow liquids to drip into the system electronics. • Do not spray cleaner or disinfectant directly onto the machine. • Protect the system from contamination using barriers available from animal health distributors. • Follow the disinfectant manufacturer's recommendations when using their cleaner or disinfectant.

Cleaning Methods

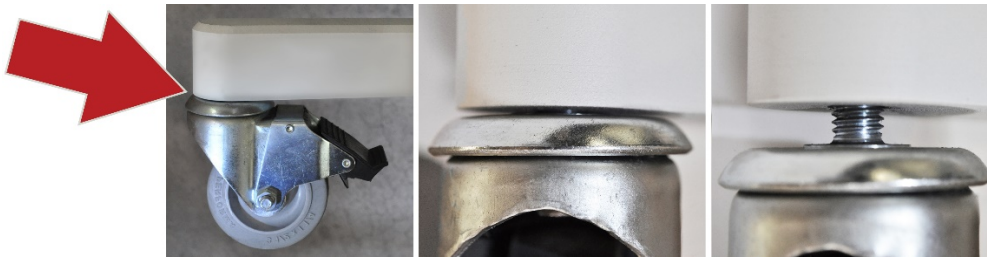
If not using a barrier, between each patient, perform the following cleaning and disinfecting steps.

1. Remove gross bio-burden from the cone, handles and structure with a disposable towel moistened with water.
2. Dry the cone, handles and structure with disposable towels.
3. Wipe the cone, handles and structure with a germicidal broad spectrum disinfectant product following the disinfectant manufacturer's instructions.
4. Clean any remaining disinfectant residue from the system with a disposable towel moistened with water. This additional step prevents possible product discoloration or corrosion.
5. Dry the cone, handles and structure with paper towels.

⚠CAUTION	The VetPro DC Animal Health Dental X-ray System is not waterproof. Use only moistened, not saturated, towels.

Inspecting the Casters

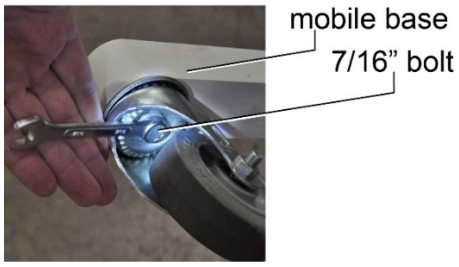
1. Casters attach to the mobile base, as shown in the left photograph below. When correctly seated, a caster will be snug against the base (middle). If the caster begins loosening, threads will be visible between it and the mobile base (right).



Visual inspection of the casters

If caster threads are visible, stop moving the X-ray system to avoid damage or injury.

2. Using a 7/16” box end wrench, tighten any loose caster bolts. This is done by reaching under the arm of the mobile base and positioning the wrench over the caster bolt. (Bolts will not be visible during this procedure but this photograph shows a properly positioned wrench.)



Inspecting the Casters

Optional:

⚠CAUTION	Two people are required to perform this step.

While the caster can be tightened without it, this step is considerably easier if the mobile base is elevated so the wheel is off the floor slightly. Lift the mobile base at one of the casters and slide something stable and at least 4.5” thick under it. In this example, three reams of standard copier paper were used.

Mobile base elevated

3. Test the operation of the casters by moving the X-ray system in different directions.

   For systems manufactured before October 2017, a service kit is available which will prevent casters from loosening. Refer to Technical Advisory Notice 003-10221-00, available through the Midmark Technical Library.

Checking System Functions

The following checks must be performed to complete the installation of the VetPro DC Animal Health Dental X-ray System and as part of the recommended maintenance as indicated in the User Manual. Failure to perform these checks may result in an installation that does not comply with U.S. Radiation Performance Standards 21 CFR Subchapter J.

⚠CAUTION	If the VetPro DC Animal Health Dental X-ray System does not perform the functions below, do not use the system. See the Troubleshooting section of the Installation Guide or contact Midmark's Technical Support.

System Function Checklist

Component	Directions	✓
Wall Mounting	Verify that the wall support is adequate and that the system is properly mounted to the wall.	
Labels	Verify that all certified components bear labels that include the model and serial number, date of manufacture and a statement of certification as noted elsewhere in this manual.	
Tubehead	Check for oil leaks or other evidence that could indicate internal damage. If necessary, replace the Tubehead.	
Tubehead Rotation	Ensure that the Tubehead maintains its position around the horizontal axis while remaining easy to rotate and position. Also check the vertical pivot of the Tubehead for easy movement while remaining in position after moving.	
Suspension	Check that all movements are smooth and quiet. Verify that the Tubehead is properly counterbalanced for vertical drift and that the Horizontal and Articulated Arms do not drift horizontally.	
Power Switch	Verify that the switch is working properly and that the Ready Indicator is illuminated when the power switch is in the ON position.	
Operator Panel Controls	With the power switch in the ON position, verify that technique factors appear on the Operator Panel. Also, check the function of the selection buttons for Tooth Selection, Image Receptor Type, and Patient Size. Pressing a selection button will cause indicator lamps to indicate the selected item.	
Exposure Button	Verify that the Exposure button on the Operator Panel functions properly. To make an exposure, press and hold the Exposure button until the Radiation Indicator goes off and the audible signal stops.	
Exposure Indicators	Make several exposures and verify that the Radiation Indicator illuminates and the audible signal is heard.	
Premature Termination	Select the longest exposure time possible using the up and down arrows. Initiate an exposure but release the Exposure button after a brief period of time (before the timer terminates the exposure). Verify that the display indicates “Pre-termination Error” and returns to normal operating mode.	
Coil-cord Hand Switch Option	If a coil-cord handswitch is used, inspect the switch housing and coil cord for damage or wear. Replace them if there is any evidence of damage.	
User Information	Verify that the owner of the system has received the user manual.	

New Tube Seasoning Procedure

X-ray tubes that sit dormant for several months can become electrically unstable. To remedy this condition, it is recommended you perform a new tube seasoning procedure. This process establishes stable high voltage operation and will ultimately extend the life of the tube. Repeat this procedure before returning to normal operation any time the system has been unused for more than two months.

1. Verify system operation.
2. Energize the system.
3. Select 60 kilovolts [kV], 7 milliamperes [mA], and the exposure time of one second.
4. Make five exposures at this level, observing the normal cooling time.
5. Select 65 kilovolts, 7 milliamperes, and the exposure time of one second.
6. Make five exposures at this level, observing the normal cooling time.
7. Select 70 kilovolts, 6 milliamperes, and the exposure time of one second.
8. Make five exposures at this level, observing the normal cooling time.

Solving Performance Issues

Performance Issues

Light or Dark X-ray Images	1. Adjust the selected exposure time, kilovoltage [kV] or tube current to produce an acceptable image. If necessary, reprogram the techniques factors, as explained in the System Configuration section on page 29. 2. Verify the kilovoltage and tube current during an exposure using the diagnostic mode, as explained in the System Configuration section (pg. 29). Alternatively, you may employ a non-invasive meter to evaluate kilovoltage and exposure time. 3. Inspect the condition of the remaining imaging chain components such as the film, chemistry and processor, or the condition of the X-ray sensor and computer.
No X-ray	If no X-ray is produced, check the following: 1. Verify that the line cord (if one is in use) is properly connected. 2. Verify that the power switch is in the ON position.
Pre-termination Error	Early release of the exposure switch will cause a pre-termination error to occur. After five seconds, the system will return to the normal operating condition. Be advised that this will result in an underexposed image.

Default Exposure Times

The tables below show the default exposure settings for each combination of Tooth, Image Receptor Type, and Patient Size on the Operator Panel. These exposure settings can be modified using the System Configuration mode. See the System Configuration section for details.

8" Cone		Progeny		Schick		Dexis		Kodak		Sirona		PSP		D Speed		E/F Speed	
Setting		Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small
Upper	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
Canine	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.100	0.080	0.080	0.050	0.125	0.080	0.100	0.064	0.080	0.050	0.125	0.080	0.250	0.160	0.125	0.080
Lower	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
Canine	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.080	0.064	0.064	0.040	0.100	0.080	0.080	0.064	0.064	0.040	0.100	0.080	0.200	0.160	0.100	0.080
Incisors	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.100	0.080	0.064	0.040	0.100	0.080	0.080	0.064	0.064	0.040	0.100	0.080	0.200	0.160	0.100	0.080
Premolars	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.100	0.080	0.064	0.040	0.100	0.080	0.080	0.064	0.064	0.040	0.100	0.080	0.200	0.160	0.100	0.080
Molars	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.125	0.080	0.080	0.050	0.125	0.080	0.100	0.064	0.080	0.050	0.125	0.080	0.250	0.160	0.125	0.080

12" Cone		Progeny		Schick		Dexis		Kodak		Sirona		PSP		D Speed		E/F Speed	
Setting		Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small
Upper	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
Canine	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.200	0.160	0.160	0.100	0.250	0.160	0.200	0.125	0.160	0.100	0.250	0.160	0.500	0.320	0.250	0.160
Lower	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
Canine	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.160	0.125	0.125	0.080	0.200	0.160	0.160	0.125	0.125	0.080	0.200	0.160	0.400	0.320	0.200	0.160
Incisors	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.200	0.160	0.125	0.080	0.200	0.160	0.160	0.125	0.125	0.080	0.200	0.160	0.400	0.320	0.200	0.160
Premolars	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.200	0.160	0.125	0.080	0.200	0.160	0.160	0.125	0.125	0.080	0.200	0.160	0.400	0.320	0.200	0.160
Molars	kV	65	65	65	65	60	60	65	65	65	65	65	65	65	65	65	65
	mA	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Sec	0.250	0.160	0.160	0.100	0.250	0.160	0.200	0.125	0.160	0.100	0.250	0.160	0.500	0.320	0.250	0.160

Note: Large = over 40 lbs. Small = under 40 lbs.

Baseline Technique Charts

Canine Baseline Technique Charts

Use the charts below for recording acceptable settings

D speed film	**Small Dog**			**Medium Dog**			**Large Dog**		
	kV	mA	Secs	kV	mA	Secs	kV	mA	Secs
Maxillary incisors									
Maxillary canine									
Maxillary anterior premolars									
Maxillary PM4									
Maxillary PM4 caudal view									
Maxillary M1 M2									
Mandibular incisors									
Mandibular canine									
Mandibular anterior premolars (lateral oblique view)									
Mandibular posterior pm & molars									
Digital	**Small Dog**			**Medium Dog**			**Large Dog**		
	kV	mA	Secs.	kV	mA	Secs.	kV	mA	Secs.
Maxillary incisors									
Maxillary canine									
Maxillary anterior premolars									
Maxillary PM4									
Maxillary PM4 caudal view									
Maxillary M1 M2									
Mandibular incisors									
Mandibular canine									
Mandibular anterior premolars (lateral oblique view)									
Mandibular posterior pm & molars									

Feline Technique Settings

D speed film			
	kV	mA	Secs
Maxillary incisors	60	7	0.1
Maxillary canine	60	7	0.1
Maxillary premolars M1 intraoral	60	7	0.1
Maxillary premolars M1 extraoral	60	7	0.125
Mandibular incisors and canine	60	7	0.1
Mandibular PM3 lateral oblique	60	7	0.16
Mandibular PM3 M1	60	7	0.1
Digital			
	kV	mA	Secs.
Maxillary incisors	60	7	0.032
Maxillary canine	60	7	0.032
Maxillary premolars M1 intraoral	60	7	0.04
Maxillary premolars M1 extraoral	60	7	0.05
Mandibular incisors and canine	60	7	0.032
Mandibular PM3 lateral oblique	65	7	0.025
Mandibular PM3 M1	65	7	0.025

Changing Language

Five languages are preprogrammed in the display panel. To change follow the steps below.

1. Push and hold the Tooth and Patient selection switches, a menu screen will appear after about 5 seconds. (See Figure 3)
2. Using the down arrow highlight “Configure Unit” and press the right arrow key. (See Figure 3)
3. “Select Languages” on the next screen is highlighted press the right arrow key.
4. Select the desired language and press the right arrow key. If you do not see your desired language listed arrow down to “More” and press the right arrow key.
5. After selection arrow down to Exit and press the right arrow key then repeat this procedure to return to the main screen.

Figure 3
VetPro DC Operator Panel

System Configuration

System Configuration Mode

About System Configuration Mode

The VetPro DC Animal Health Dental X-ray System has a software-driven system configuration mode. When the VetPro DC is in system configuration mode, you can perform the following procedures:

- Adjusting the Display
- Changing Preprogrammed Exposure Settings
- Changing the Cone Size
- Showing Current System Configuration
- Displaying Diagnostic Data

Using System Configuration Mode

1. To enter system configuration mode, depress the Tooth Selection and Patient Size Selection buttons on the Operator Panel simultaneously for 5 seconds. The display shows the Main System Configuration menu, as shown in Figure 4, and the Ready Indicator blinks.
2. To select menu items while in system configuration mode, use the up and down arrows to highlight a menu option. Then use the right arrow button as an Enter button to select the highlighted option. When changing presets, the right arrow button is also used to select the technique factor.
3. After selecting a menu option, use the up and down arrows to increase or decrease values.

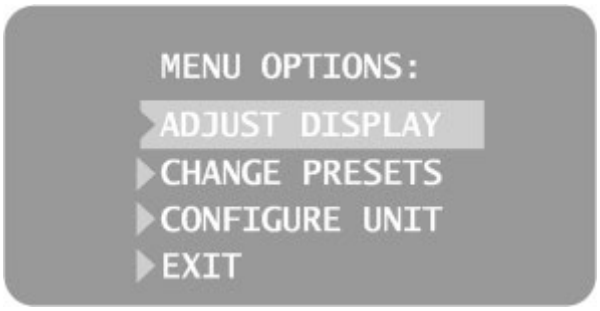


Figure 4
Main System Configuration Menu

Adjusting the Display

The VetPro DC Animal Health Dental X-ray System allows the operator to adjust the display image.

1. From the system configuration main menu, shown in Figure 4, select ADJUST DISPLAY. You will see the Display Options menu shown in Figure 5.
2. Selecting EXIT returns the display to the Main System Configuration menu shown in Figure 4.

Adjusting Contrast

1. Select ADJUST CONTRAST from the menu. You will see the Progeny® logo.
2. Use the up and down arrows to increase or decrease the contrast between the menu text and the display background.
3. Press the right arrow to save your settings.

Reversing the Image

1. Select REVERSE IMAGE from the menu. The text and display background colors will be swapped.
2. Press the right arrow to save your settings.

Figure 5
Display Options Menu

Changing Preprogrammed Exposure Settings

The VetPro DC Animal Health Dental X-ray System allows the operator to increase or decrease image density for all presets for a receptor simultaneously or to change each of the technique factors for a preset individually. You can also restore factory default settings. For charts of the factory default settings, refer to Default Exposure Settings on page 25.

Note: If the 12 inch [30 cm] cone is going to be used, configure the VetPro DC for use with the 12 inch cone before changing preprogrammed exposure settings. Configuring the VetPro DC for use with the 12 inch cone will reset exposure settings to the default settings used with the 12 inch cone.

Note: Before changing presets, use the tables on pages 33 and 34 to write down the presets you are programming.

Displaying the Preset Options Menu

1. From the Main System Configuration menu, shown in Figure 4, select CHANGE PRESETS. You will see the Preset Options menu shown in Figure 6.
2. Selecting EXIT returns the display to the Main System Configuration menu shown in Figure 4.

Figure 6
Preset Options Menu

Changing All Receptor Settings Globally

1. Select ALTER DENSITIES from the Preset Options menu. The first Image Receptor Type illuminates. The display shows the selected Image Receptor Type and current density.
2. Using the Image Receptor Type button, select the image receptor to adjust.
3. Use the up and down arrow buttons to specify a percentage by which densities will be increased or decreased for the selected receptor. Densities can be increased or decreased according to values provided on the display.
4. Press Enter to save your settings.

Preprogramming to Digital Sensors

1. Energize the system.
2. Press the Tooth Selection and Patient Size Selection buttons for five full seconds.
3. Select CHANGE PRESETS from the Menu Options screen.
4. Select SELECT RECEPTOR from the Preset Options menu (Figure 6).
5. Press the up or down button to highlight the sensor or phosphor plate to change, and press Enter.
6. Select YES or NO on the Verification screen.
7. Exit the Preset Options menu.
8. Exit the Menu Options menu. A message of “Saving Settings” will display briefly, and then the system will return to the normal operational mode.

Note: When you are working in service mode, the green light next to the exposure button will blink.

Changing Presets Individually

1. Select EDIT PRESETS from the Preset Options menu. The display notifies you that you are entering Edit Preset Mode, and Tooth Size, Image Receptor Type, and Patient Size are illuminated.
2. Use the Tooth Selection, Image Receptor Type, and Patient Size Selection buttons to select the preset to change. The display shows the current values for the preset.
3. Use the right arrow button to display the technique factor to change.
4. Use the up and down arrow buttons to set the value for the selected technique factor and preset.
5. Repeat steps 2-4 to change additional presets.
6. When you have completed all changes, press the Tooth Selection and Patient Size Selection buttons simultaneously for 5 seconds to record the change.

Recall Presets

1. To return all presets to factory defaults, select RECALL PRESETS from the Preset Options menu. The menu will ask you to confirm your choice.
2. Select YES using the up arrow button and return all presets to factory default settings. **Selecting YES will erase any custom presets that have been set up.**
3. Select NO using the down arrow button and retain current presets. To retain the presets, select YES.

Record Your Exposure Settings

If the preprogrammed exposure settings do not produce the density desired, adjust the settings using System Configuration mode. Record your settings in the table below.

Canine

8 inch (20 cm) Cone		Digital Receptor		D-speed Film		E/F Speed Film	
Tooth Selection	Setting	Large*	Small*	Large	Small	Large	Small
Upper Canine	kV						
	mA						
	seconds						
Lower Canine	kV						
	mA						
	seconds						
Incisors (Upper and Lower)	kV						
	mA						
	seconds						
Lower Molar and Premolars	kV						
	mA						
	seconds						
Upper Molar and Premolars	kV						
	mA						
	seconds						

Note: Large = more than 30 lbs. Small = 30 lbs. and under

Record Your Exposure Settings

If the preprogrammed exposure settings do not produce the density desired, adjust the settings using System Configuration mode. Record your settings in the table below.

Feline

8 inch (20 cm) Cone		Digital Receptor		D-speed Film		E/F Speed Film	
Tooth Selection	Setting	Large*	Small*	Large	Small	Large	Small
Upper Canine	kV						
	mA						
	seconds						
Lower Canine	kV						
	mA						
	seconds						
Incisors (Upper and Lower)	kV						
	mA						
	seconds						
Lower Molar and Premolars	kV						
	mA						
	seconds						
Upper Molar and Premolars	kV						
	mA						
	seconds						

Note: Use small settings for feline dentistry.

Showing Current System Configuration

The VetPro DC Animal Health Dental X-ray System displays the current system configuration. This display is informational only.

1. From the Main System Configuration menu, shown in Figure 4, select CONFIGURE UNIT. You will see the Configuration menu shown in Figure 7.
2. Select SHOW CONFIG. The display will show:
   - Current software version
   - Cone size
   - Diagnostic mode on or off
3. Press any button on the Operator Panel to return to the Configuration menu.

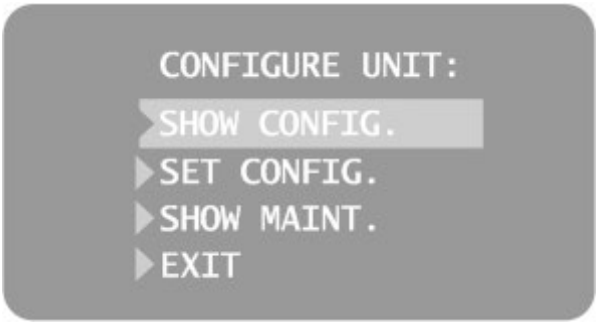


Figure 7 Configuration Menu

Changing the Cone Size

Selecting SET CONFIG. from the Configuration menu, shown in Figure 7, displays the Set Configuration menu, Figure 8, with options to change the cone size. The VetPro DC Animal Health Dental X-ray System is factory set for use with the standard supplied 8 inch [20 cm] Cone. The 12 inch [30 cm] Cone [30-A2200] is available. Using the longer Cone requires longer exposure times, which the VetPro DC automatically selects when you change the Cone size in the Set Configuration menu.

Using a 12 inch [30 cm] Cone

1. From the Main System Configuration menu, shown in Figure 4, select CONFIGURE UNIT. You will see the Configuration menu shown in Figure 7.
2. Select SET CONFIG. You will see the Set Configuration menu, shown in Figure 8.
3. From the Set Configuration menu, use the up and down arrows to highlight 12” CONE SIZE.
4. Press the right arrow button to select the 12” CONE. The display warns you that selecting the 12 inch Cone will override custom presets with the default factory settings for the 12 inch Cone.
5. Using the up arrow, select YES to install presets for the 12 inch Cone.

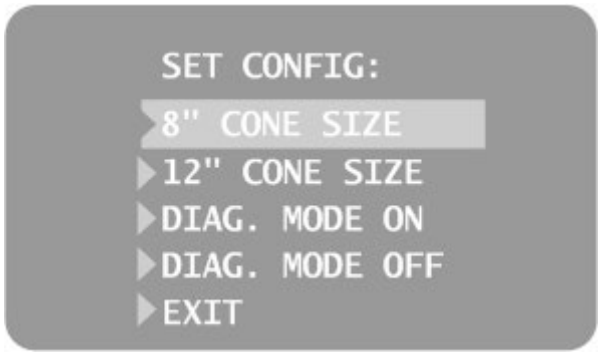


Figure 8
Set Configuration Menu

Diagnostic Mode

About Diagnostic Mode

The VetPro DC Animal Health Dental X-ray System has a diagnostic mode in which you can display a summary of maintenance data or display feedback values after each exposure.

Showing the Maintenance Summary

1. From the Main System Configuration menu, shown in Figure 4, select CONFIGURE UNIT. You will see the Configuration menu shown in Figure 7.
2. Select SET CONFIG. You will see the Set Configuration menu, shown in Figure 8.
3. To display a summary of maintenance data, highlight select SHOW MAINT. The following maintenance data are displayed:
    - Total KJ (kilojoules—total system heat on X-ray tube)
    - Exposure Count
    - Reboots (power up cycles)
    - OT Counts (over-threshold counts)
4. Press any button on the Operator Panel to return to the Configuration menu.

Showing Feedback Values After an Exposure

If you take an X-ray while in diagnostic mode, the display shows feedback values for that exposure. Until you exit diagnostic mode, the display will continue to show feedback values after each exposure.

1. From the Main System Configuration menu, shown in Figure 4, select CONFIGURE UNIT. You will see the Configuration menu shown in Figure 7.
2. Select SET CONFIG. You will see the Set Configuration menu, shown in Figure 8.
3. From the Set Configuration menu, use the up and down arrows to highlight DIAG MODE ON. Press the right arrow button to turn on diagnostic mode.
4. Exit System Configuration mode by highlighting and selecting EXIT in the Configuration and Main menus.

   The device must not be operated in the significant zone of occupancy. The operator of an intraoral dental X-ray device must remain 2 meters (6.6 feet) away from the focal spot and out of the path of the X-ray beam.

5. Make an exposure. The display will show the following feedback values:
    - kV
    - mA
    - Filament current
6. Press any button on the Operator Panel to clear the feedback values from the display.
7. To exit diagnostic mode, depress the Tooth Selection and Patient Size Selection buttons simultaneously for 5 seconds to display the Main System Configuration menu. From the Main System Configuration menu, highlight and select CONFIGURE UNIT. Then highlight and select SET CONFIG. On the Set Configuration menu, highlight and select DIAG MODE OFF.

Specifications

This chart contains information required to be provided to the user by 21 CFR.

Parameter	Description
Line Voltage	AC 110 V to 230 V, 50 Hz or 60 Hz
Line Load	250 V, UL Recognized –branch circuits must not exceed 15A
Fuse Rating	5 amp
Tube Potential	60 kV, 65 kV or 70 kV
Tube Potential Accuracy	5% of selected value
Tube Current	4 mA to 7 mA
Tube Current Accuracy	±1 mA
Irradiation Time	20 ms through 2 s
Irradiation Time Accuracy	1 ms + 5% of indicated value
Minimum Source to Skin Distance	8 inch (20 cm) 12 inch (30 cm)
Minimum Inherent Filtration	2 mm Al equivalent @ 70 kV
Focal Spot	0.4 mm (per IEC 60336)
Tube Cooling Time	Automatic wait time is 15x the exposure time.
Target Angle	12.5 degrees
Temperatures	
Operating	+10 °C to +35 °C (+50 °F to +95 °F)
Storage	-35 °C to +66 °C (-31 °F to +151 °F)
Transport	0 °C to +50 °C (+32 °F to +122 °F)
Atmospheric Pressures	
Operating	70 kPa to 106 kPa
Storage	70 kPa to 106 kPa
Transport	70 kPa to 106 kPa
Humidity Range	
Operating	10 to 80% non-condensing
Storage	10 to 80% non-condensing
Maximum Altitude	3,000 m (9,843 ft.)
Cone Focal Length	8 inch (20 cm) for bisecting angle technique 12 inch (30 cm) for paralleling technique
X-ray Beam Dimension	Diameter of 7 cm (2.72 in.) at the end of the 7-inch cone. Cones with smaller diameter and rectangular beams are available.
U.S. Patents	D470237, D469182, D470589, and 6,837,468

Statements and Information According to 21 CFR Sub Chapter J	
1020.30 (h) (1) (i)	Instructions for the use of the VetPro DC system and precautionary statements are part of this user manual.
1020.30 (h) (1) (ii)	As described in the Recommended Maintenance section, the VetPro DC system should be serviced on an annual basis to ensure proper functionality. It is the owner's responsibility to arrange for this service and to assure that the personnel performing this service are fully qualified to service Midmark Corporation X-ray equipment.
1020.30 (h) (2) (i)	Leakage technique factors: 70 kV, 0.4 mA Minimum filtration (half-value layer) in useful beam: 1.7 mm Al equivalent at 70 kV
1020.30 (h) (2) (ii)	The cooling curve charts for the anode can be found on page 40. Note that due to the integrated design of the VetPro DC system, there is no meaningful separate cooling curve for the tube housing.
1020.30 (h) (2) (iii)	Since the VetPro DC device operates as a complete system in only one mode as a high frequency X-ray system, there is no need to provide a tube rating chart.
1020.30 (h) (3) (i)	Rated nominal line voltage: 110 V – 230 V Line voltage regulation: 10% of the nominal line voltage
1020.30 (h) (3) (ii) and (iii)	The maximum momentary line current (less than 5 s) of the VetPro DC system is 10 A when operated on 120 V (1.2 kW). Operation at higher input voltage will reduce the maximum current (5 A at 240 V). The technique factors producing the maximum momentary line current are 65 kV, 7 mA, 2 s.
1020.30 (h) (3) (v)	Generator rating at maximum technique factor of 65 kV, 7 mA is 455 W. Duty cycle is 1:15.
1020.30 (h) (3) (vi)	Maximum deviation from indicated values: a) Peak tube potential, maximum deviation: ±5% b) Tube current, maximum deviation: ±1 mA c) Exposure time: min 20 ms, max. 2 s, max. deviation: ±5%+1 ms
1020.30 (h) (3) (viii)	The measurement criteria for all technique factors used in paragraphs (h) (3) (iii), and (h) (3) (vi) is 90% of the selected peak tube voltage.

Thermal Characteristics Charts

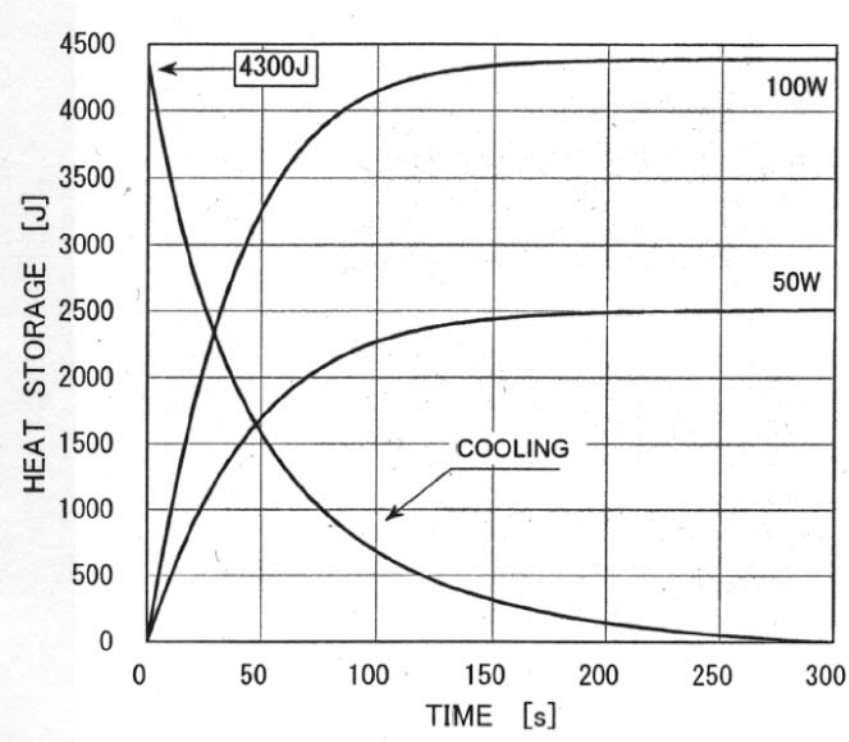
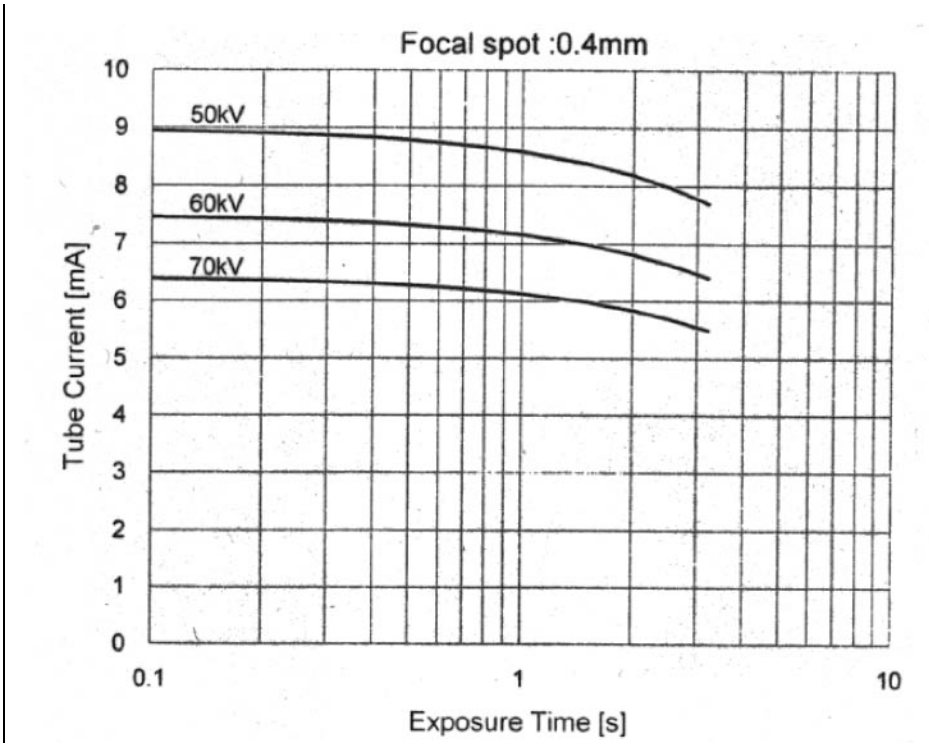
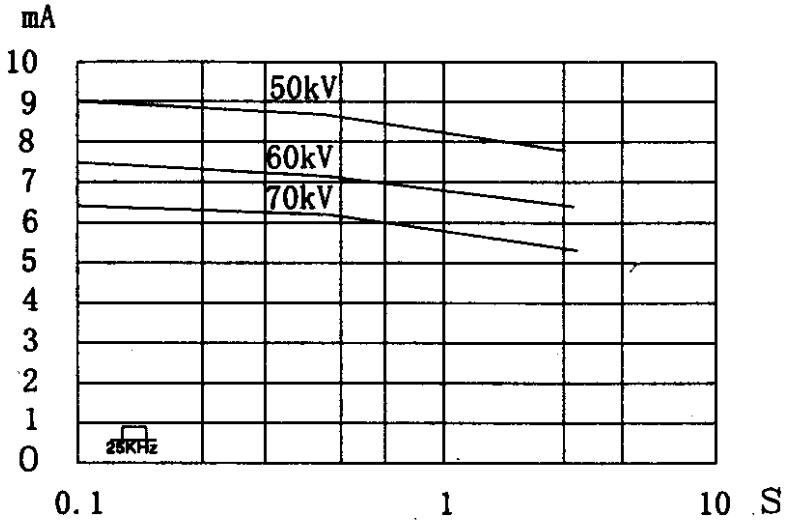
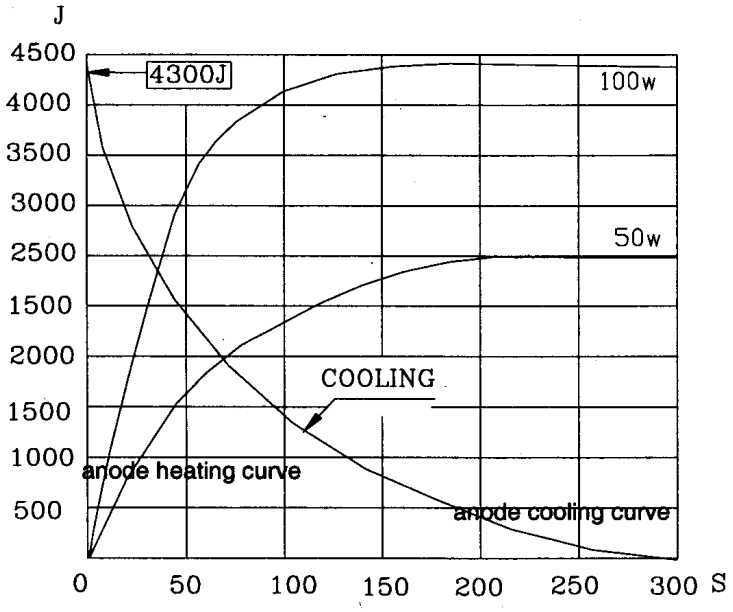


Figure 9
Canon (Toshiba)
Tube Rating Charts


Focal spot :0.4mm
50kV
60kV
70kV
Tube Current [mA]
10
9
8
7
6
5
4
3
2
1
0
0.1
1
10
Exposure Time [s]



Rating Chart



Thermal Characteristics Chart

Figure 10
Kailong Tube Rating Charts

Kerma Area Product

Kerma[8], *K*, is the quotient of dE_{tr} divided by d*m* where

dE_{tr} is the sum of the initial kinetic energies of all the charged particles liberated by uncharged particles in a mass of material

d*m* is the mass of the material

K is the kerma in J/kg, expressed in the SI unit *gray (Gy)*

When the material is air, the quantity is referred to as air kerma.

Kerma area product, abbreviated KAP, has replaced the older terminology, dose area product (DAP).

The air kerma-area product, expressed in the SI units mGy·cm^2, is a commonly used quantity associated with the amount of X-ray used in dental panoramic and CBCT radiography. It is calculated with this formula:

KAP = (air kerma) × (area of the cone opening)

Modular BLD Cone Dimensions				
Part Number	Length (cm)	Width		Opening Area (cm^2)
		(mm)	(cm)	
30-A2195	20	70	7	21.98
30-A2200	30			
30-A2196	20	60	6	28.27
30-A2228				
30-A2201	30			
30-A2198	20	30 × 40	3 × 4	12.00
30-A2203	30			
30-A2221	20	35 × 45	3.5 × 4.5	15.75
30-A2222				
30-A2223	30			
30-A2224				
30-A2199	20	20 × 30	2 × 3	6.00

[8] As defined by the International Commission on Radiation Units and Measurements

Midmark
1001 Asbury Drive
Buffalo Grove, Illinois 60089
USA
(847) 415-9800
Fax: (847) 415-9801
www.midmark.com

Technical Library
www.midmark.com/technical-library

Technical Support
(800) 643-6275
www.midmark.com/service-support
imagingtechsupport@midmark.com