

Enhanced Dynamic Platform User Guide



SUN NUCLEAR
A MIRION MEDICAL COMPANY

Enhanced Dynamic Platform User Guide

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Document 008PLX, Rev B, 6 March 2023



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Health and Safety Instructions

General Safety Notices

The following general safety notices supplement the specific warnings and cautions appearing elsewhere in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein

Safety Precautions

Operating and maintenance personnel must observe all safety regulations. High voltages of 110-250 volts at 50/60 Hertz are used in this equipment. Failure of the operator and maintenance personnel to observe all safety precautions could result in personal injury, damage to the equipment, and loss of product effectiveness. The general safety precautions that must be observed are as follows:



WARNING: High voltages capable of causing death are used in this equipment. Use extreme caution when operating and servicing the Controller. De-energizing the Controller by using the power switch does not remove the 110-250VAC power excitation from the Controller. These voltages remain present on the controller power switch and power connector unless it is disconnected.



WARNING: Do not operate the instrument in any strong magnetic fields (i.e., magnetic resonance (MR) environment). The model is MR Unsafe.

Cleanings

You can clean the phantom with a soft cloth dampened with water and mild detergent. Do not use disinfectants or solvent-based cleaners or sprays.

General



WARNING: To reduce the risk of fire, electric shock, or injury when using the motion Controller, follow these basic precautions.

- There are no user-serviceable parts inside. Refer servicing to qualified service personnel.
- Use only a grounded 3 prong electrical outlet when connecting this product to a power source. If you do not know whether the outlet is grounded, check with a qualified electrician.
- Do not remove ground prong.
- Do not install or use this product near water, or when you are wet.
- Operate the product securely on a stable surface.
- Set up the product in a protected location where no one can step on or trip over the power cord and the power cord cannot be damaged.
- It is recommended that the customer install an AC surge arrestor in the AC outlet to which the Controller is connected. This is to avoid damaging the equipment by local lightning strikes and other electrical surges.
- To prevent overheating, do not block the fan on the rear panel or the ventilation holes located on the rear panel and bottom of the Controller.



CAUTION: Unsecured phantoms may “Walk” during platform operation resulting in damage to phantom.



CAUTION: Maximum platform load is 70 LBS.

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1 Overview

Features of the Enhanced Dynamic Platform

The CIRS Enhanced Dynamic Platform provides an economical, user-friendly solution for the complex tasks associated with tumor motion and patient positioning in radiation therapy.

The platform is made from stiff, low-density plastics. The device enables precisely controlled inferior-superior motion up to 50 mm for any phantom up to 50 lbs. Multiple types of dosimeters and dosimeter arrays can be positioned on the platform and used for dose verification of moving target treatment plan. An independently controlled smaller platform provides Posterior-Anterior surrogate chest wall motion.

Features:

- Move any phantom with sub-millimeter accuracy and reproducibility
- Surrogate and phantom motion fully and independently programmable
- Easy transport, set-up and operation
- Motion software enables different cycles, amplitudes and waveforms
- Surrogate breathing platform accommodates numerous gating devices

Parts



Table 1-1. Parts List

Number	Part No.	Qty	Component Description
1	008PLX	1	Enhanced Dynamic Platform
2		1	Dynamic Motion Controller with firmware installed (110 - 220V, 50 - 60Hz)
3		1	Actuator attached to platform
-		1	CIRS Motion Control Software (USB)
4		1	Cable kit: <ul style="list-style-type: none"> • USB 3.0 Gigabit Ethernet Adapter • Network cable CAT5e, 75' • DB 25 male to male cable • DB 9 male to male cable • Power cord
		2	2 Amp fast acting fuses
5			Printing Plugs
6		1	3rd axis gating device (mounted to actuator)
-		1	User Guide
7		1	Carry Case

Table 1-2. Optional Parts

Part No	Component Description
008A-125	Chest plate with reflective 11.5 mm tracker balls
008A-253	Cable CAT5E 150 Feet for Dynamic Phantoms (008A, 008M, 008PL)

2 Setup

Unpacking

- 1 Before you open the case check the three Drop 'N' Tell indicators on the right side of the case. Drop 'N' Tell shipping damage indicator shows when a case has been dropped in transit and contains potential damaged goods. The sensor displays a red arrow when applied before shipping. If the container receives a shock exceeding 25 G force, the sensor display arrows will change to blue. If the sensor has been activated and is blue, a claim may need to be filed with the carrier. If activated, take extra care in inspecting the components as they are unpacked, assembled and tested.



Note: If there is any damage to the packaging case, containers, foam, and components, or operation, Immediately contact the carrier and the phantom supplier, and keep all packaging for carrier inspection.



Figure 2-1. Drop 'N' Tell Indicators on the Case

- 2 Remove the moving plate from the case and set aside.



Figure 2-2. Remove Moving Plate from Case

- 3 Remove the surrogate from the foam block and set aside.



Figure 2-3. Remove Surrogate from Foam Block

- 4 Remove the slide plates and set aside.



Figure 2-4. Remove Slide Plates

- 5 Remove and inspect all cables. Verify:
 - DB25 pin Cable
 - DB9 pin Cable
 - Ethernet Cable
 - Power Cable



Figure 2-5. Remove all Cables

- 6 Remove the bag of hardware and set aside. The bag includes:

- Nylon attaching screws
- Ethernet Network Adapter
- USB drive with Motion Control Software and USB Network Adapter Driver setup files
- Fuses
- Screw Driver

7 Remove the motion controller box from the tray and set aside.



Figure 2-6. Remove Motion Controller Box

8 Remove the wedge from the case and set aside.



Figure 2-7. Remove the Wedge

- 9 Remove the foam tray from the case set aside.



Figure 2-8. Remove the Tray

- 10 Remove the small foam insert from the case and set aside.



Figure 2-9. Remove the Foam Insert

- 11 Using the handles, pull the platform base and actuator from the case.



Figure 2-10. Remove the Platform Base and Actuator

3 Assembly Procedure



WARNING: Follow the cable connection steps as they are presented in this User Guide. Connecting the cables with the controller “Power On” can seriously damage the Phantom’s electronics.

Platform Assembly

- 1 Organize the Platform parts and tool (Figure 3-1):
 - Platform Base
 - Extension Plate
 - Slide Plates
 - Nylon screws
 - Flat head screwdriver



Figure 3-1. Platform Assembly Parts Layout

- 2 Attach the extension plate to the base plate using two slide plates (Figure 3-2).



Figure 3-2. Attach Extension Plate to Base Plate with Slide Plates

- 3 Fasten the two slide plates with a flat screwdriver using eight nylon screws (Figure 3-3). Do not over-tighten the screws to avoid any damage.



Figure 3-3. Fasten Two Slide Plates with Flat Screwdriver

- 4 Slide the end of the moving platform with two cam followers underneath the metallic block (Figure 3-4). Make sure the two bearings (cam followers) are contained within the slots of the metallic block.



Figure 3-4. Cam Followers Contained Within the Slots of the Metallic Block

- 5 Put down the moving platform to a horizontal level (Figure 3-5).



Figure 3-5. Moving Platform Horizontal

- 6 Connect the surrogate to the actuator in a vertical position (Figure 3-6). Use the thumb screws to fasten to the actuator.



Figure 3-6. Fasten Surrogate to Actuator

- 7 Connect the DB 25 pin and DB9 pin cables to the back plate of the actuator (Figure 3-7).



Figure 3-7. DB 25 and DB9 Pin Cables Attached to Actuator

- 8 Connect the other end of the DB 25 pin cable to the back plate of the controller (Figure 3-8).



Figure 3-8. DB 25 Pin Cable Connected to Controller

- 9 Connect the other end of the DB 9 pin cable to the surrogate connector (Figure 3-9).



Figure 3-9. DB 9 Pin Cable Connected to Surrogate Connector

- 10 Connect the power cord and the Cat5 Ethernet cables to the back of the controller (Figure 3-10).



Figure 3-10. Connect Power Cord and Cat5 Ethernet Cables to Controller

- 11 The cutout and cavities are for future use. To plug the cutout and the cavities use the 3D printing plugs to provide a flat surface for the Moving Plate when the AP Wedge is not used (Figure 3-11).



Figure 3-11. 3D Printing Plugs for Plugging Cutout and Cavities

Using the Wedge

- 1 To use the platform with 11.3° AP Wedge lift the moving plate, and slide the wedge underneath (Figure 3-12).

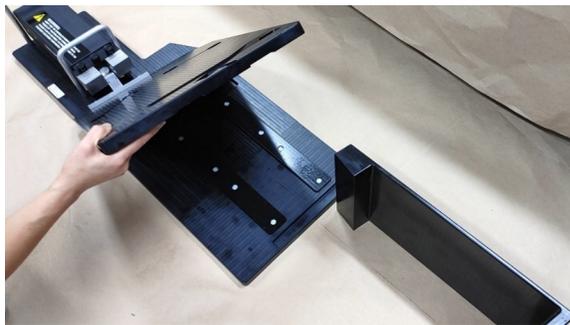


Figure 3-12. Lift Moving Plate and Position Wedge Underneath

- 2 The wedge is set in the two cavities for each side of the base plate (Figure 3-13).

- 3 Gently let the moving platform down onto the wedge.

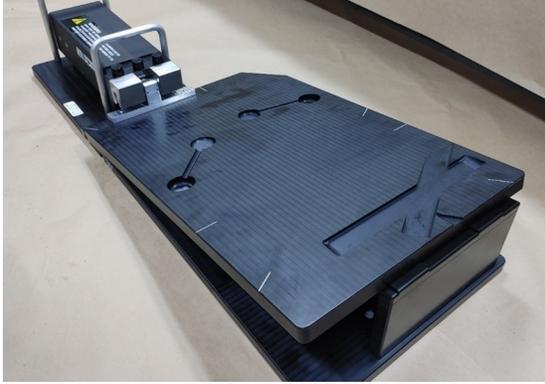


Figure 3-13. Insert Wedge

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4 Positioning the Enhanced Dynamic Platform

Position the Enhanced Dynamic Platform on the Couch

The Enhanced Dynamic Platform accommodates an indexing bar for positioning on the couch. On the underside of the platform, there are two grooves. The first groove positions the Enhanced Dynamic Platform aligned with the Y axis of the couch (0°). The second groove positions the Enhanced Dynamic Platform 30° off the Y axis of the couch (Figure 4-1).



Figure 4-1. Location of the Indexing Bar Grooves for Positioning on Couch

- 1 Position the indexing bar on the couch.
- 2 Align the groove with the desired orientation. Figure 4-2 below shows the Enhanced Dynamic Platform positioned at the 30° orientation.

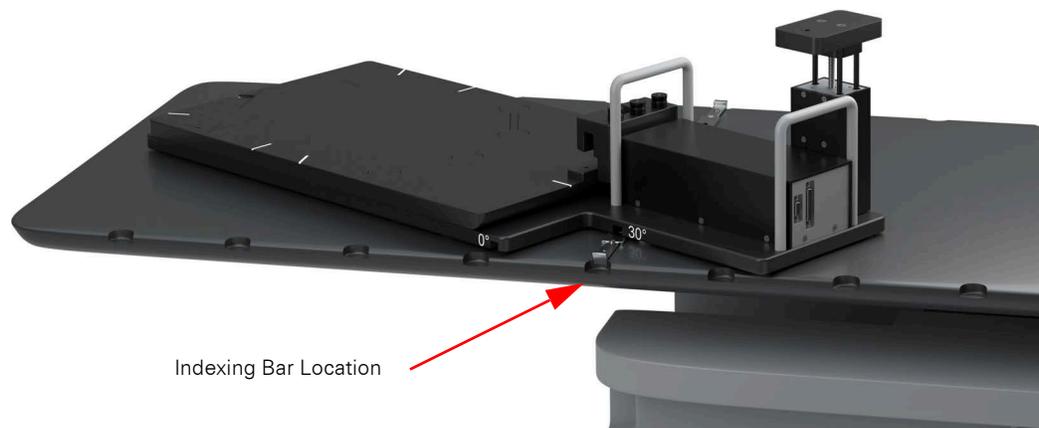


Figure 4-2. Enhanced Dynamic Platform Positioned 30°

Positioning Phantoms on the Enhanced Dynamic Platform

The Enhanced Dynamic Platform can support phantoms weighing up to 50lbs.

The cutouts and cavities on the Enhanced Dynamic Platform are provided for future use with other phantoms. Use the provided plugs to provide a flat surface.

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5 Setup and Launch Software

Set Up the USB to Ethernet Network Adapter

If you do not want to use the PC's internal network adapter, the USB to Ethernet adapter is provided for convenience. Otherwise, skip to 6 in the procedure below if you choose to use the PC's internal network adapter.

The following are the recommended steps to install the "USB to Network Adapter" that was shipped with this phantom. The new Network Connection must be setup as a Static IP address in order for the PC to communicate with the motion controller of the phantom. Refer to *Specifications* on page 22 for the requirements for the computer that will run the CIRS Motion Control Software.

- 1 Plug in the provided thumb drive into a USB port.
- 2 Using Windows File Explorer, open the contents of the thumb drive.
- 3 To install the necessary driver, unzip the "USB-to-Network Adapter" folder found on the provided USB drive or download the zipped folder from the CIRS website. Unzip to a known location. Setup instructions are also in the Instructions.pdf document.

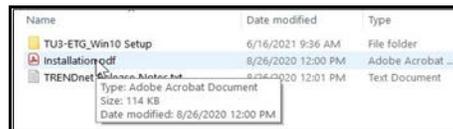


Figure 5-1. Extract the USB-to-Network Adapter Folder



Note: The provided "USB to Network Adapter" can act as Plug and Play device on some PC but CIRS recommends doing the installation of the driver as outlined above.

- 4 Follow the on screen steps and acknowledge all the messages from the installation wizard. Once the driver installation is finished, plug the "USB-to-Network Adapter" into your PC's USB port and acknowledge the Windows installation message. Exit the "USB-to-Network Adapter Software" menu by clicking Exit.

Once the setup finishes, the installer screens present two more dialogs: Select Yes to the changes, then select Finish to exit.

- 5 From the Control Panel, open the Network and Sharing Center and then select "Change adapter settings".



Figure 5-2. Change Settings on the Network and Sharing Center

- 6 Providing that the installation of the "USB-to-Network Card" was successful, the newly installed Network Adapter should show as "ASIX AX88179 USB 3.0 to Gigabit Ethernet Adapter". Right-click on the desired adapter (USB to Ethernet Network Adapter or PC's

internal Network Adapter) and select Properties as shown below. The Ethernet Properties window displays.

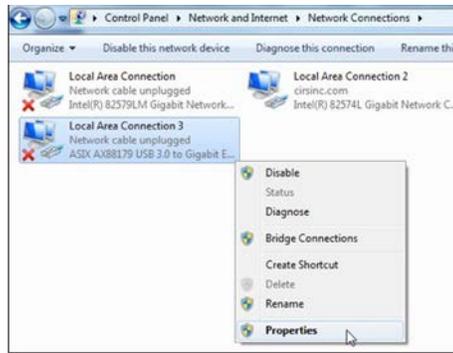


Figure 5-3. Network Adapter Select Properties

- 7 In the Ethernet Properties window (Control Panel > , select Internet Protocol Version 4 (TCP/IPv4) and click on properties. Double-click on it to open the Ethernet Properties window.

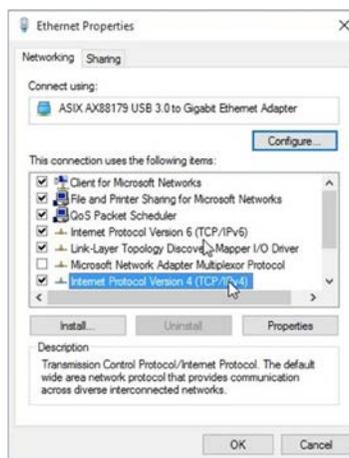


Figure 5-4. Set Up Ethernet Properties

- 8 In the internet Protocol Version 4 (TCP/IPv4) properties window, change from default "Obtain an IP address automatically" to "Use the following IP address:" Enter "192.168.0.101" as the IP address and "255.255.255.000" as the Subnet mask.



Note: If an IP address conflict occurs because IP address 192.168.0.101 is already assigned to another Network Adapter, the user can try any other IP address between 192.168.0.102 and 192.168.0.249.

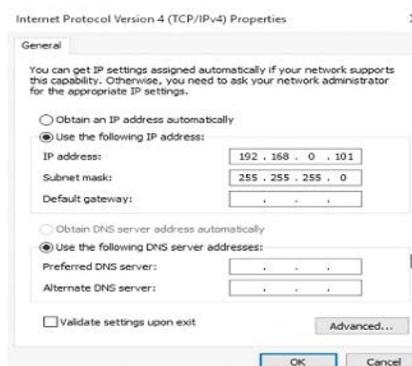


Figure 5-5. Specify IP Address

- 9 Once the IP address is entered, click OK.

- 10 Connect the PC to the Controller using the provided Ethernet cable by inserting one end of the cable in the controller's Ethernet port and the other one in the "USB-to-Network Adapter".
- 11 Power on the controller. The homing process executes.
- 12 To check that the PC to controller connection was successful, ensure the icon of the "ASIX AX88179 USB 3.0 to Gigabit Ethernet Adapter" in the Control Panel matches the image below. Network Connection can be renamed using the right mouse click menu.

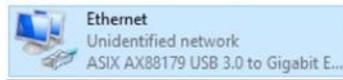


Figure 5-6. Rename Connection

- 13 A more in depth check of the PC-to-controller communication connection can be done by running a "ping command" in Command Prompt as seen in the image below. To ping the controller, type "ping 192.168.0.250" and press enter. Ping certifies IP-level connectivity to another TCP/IP device. If you receive Ping statistics for IP address 192.168.0.250 (controller IP address) the communication connection between the PC and controller was successful.

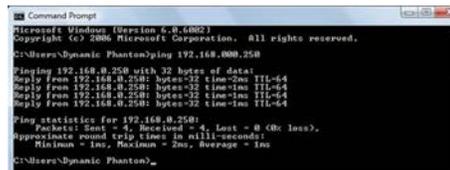


Figure 5-7. Command Complete

Installing the CIRS Motion Control Software

The CIRS Motion Control application requires the Trio PC Motion library, which allows the computer to recognize the Trio controller board in the Dynamic Phantoms or Platforms.

Using Windows file explorer, navigate to the USB drive.

To install the Trio PC Motion library, double-click TrioPCMotion_4_0_6(x86) and follow the steps in the InstallShield Wizard. When prompted, click OK to the installation messages.

To install CIRS Motion Control, double-click MotionControlSetup 3.0.7, then setup.exe. Follow the steps in the Setup Wizard. Microsoft Version 4.8 NET Framework must be enabled for the application to run.

Introduction to the CIRS Motion Control Software

CIRS Motion Control is an application which allows you to control the movement of all the motion phantoms from the CIRS family of Dynamic phantoms (models 008A, 008PL, 18023-A, 008P, 008C, 008Z, and 0085PLX). With CIRS Motion Control, you can quickly set up a movement based on a library of pre-defined motions, including Sin, Cos4, Cos6, Sawtooth, Sharkfin, Hysteresis (Models 00A, 18023-A, 18043-A and 008Z), and Continuous Drift, Tansient Excursion, Persistent, Excursion, Hight-Frequency Excursion (model 008P), or you can import custom motion data from any tab-delimited or comma-separated text file as well as some motion tracking systems native formats. CIRS Motion Control also allows you to save any motion to easily access the same parameters for repeated calibration and testing.

To use the Motion Control Software with the FER21640001 Enhanced Dynamic Platform after it is installed and launched, select Motion > Phantom > 008PLX in the software's main window (Figure 5-8).

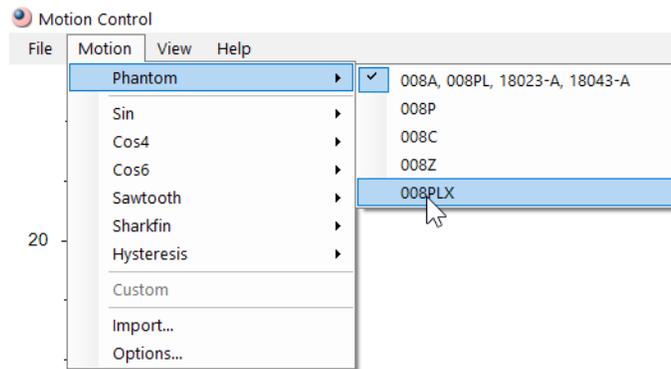


Figure 5-8. Select 008PLX From the Motion > Phantom Drop Down Menu

With CIRS Motion Control, you can quickly set up a movement based on a library of pre-defined motions, including Sin, Cos4, Cos6, Sawtooth, Sharkfin, Hysteresis (Model 008A only) and Continuous Drift, Transient Excursion, Persistent Excursion, High-Frequency Excursion, or you can import custom motion data from any tab-delimited or comma-separated text file. CIRS Motion Control also allows you to save any motion to easily access the same parameters for repeated calibration and testing.

General Use

The software automatically creates a log file where data about waveform parameters are saved. The log file is usually located under the current user in the Application Data folder. A Windows OS search function can be used to find the log file. Searching hidden files and folders should be enabled.

The log file provides a record of the motion history of the device and can be used as objective evidence that proper QA was performed

Software User Manual and Software Upgrades

CIRS Motion Control software has an online user manual. After software installation, a copy may be viewed and downloaded using either the "User Manual" button from Help Menu and selecting "Motion Control User Manual.pdf" or by pointing a web browser to the CIRS Software Updates web page: https://www.cirsinc.com/wp-content/uploads/2020/11/CIRS_Motion_Control_User_Manual.pdf

If the end-user is offline during use of the phantom, it is recommended that a copy of the CIRS Motion Control User Manual is downloaded and saved. Once a copy of the manual is saved in a known location, the PDF document can be opened and viewed in a window separate from the CIRS Motion Control software window to aid in phantom set up and use.

The user manual is regularly updated to incorporate new information based on the addition and/or modification of features as well as end-user feedback.

CIRS recommends that the end-user routinely check the CIRS Software Update web page using the "User Manual" button from Help Menu. This page indicates the current software version. The latest free software upgrade is posted as soon as it becomes available. Instructions for updating the software are also posted. Please note, controllers with serial numbers containing P136 may experience PC communication failures upon updating Windows OS. If this occurs, CIRS strongly recommends a motion controller update. For details on how to upgrade, refer to the model 008A product brochure.

6 Packing Instructions

Perform the following packing instructions to store and transport the Enhanced Dynamic Platform

- 1** Shut down software by stopping all waveforms and clicking the Window's close button.
- 2** Power off the controller.
- 3** Disconnect the power cord from the power source and the rear of the controller (Figure 3-10).
- 4** Disconnect the DB25 cable from the rear of the controller (Figure 3-8).
- 5** Disconnect the Ethernet network adapter and the Ethernet cable (Figure 3-10).
- 6** Disconnect the Ethernet cable from the rear of the controller (Figure 3-10).
- 7** Disconnect the DB 25 and DB9 cables from the actuator (Figure 3-7).
- 8** Disconnect the DB9 cable from the surrogate (Figure 3-9).
- 9** Remove the motion plate (Figure 3-4).
- 10** Remove the surrogate (Figure 3-6).
- 11** Unscrew the slide plates from the base and extension. Place the screws in the bag and secure it (Figure 3-3).
- 12** Gently but firmly push the moving part towards the actuator until it stops.
- 13** Using the handles, pick up the base and place it in the bottom of the packing case (Figure 2-10).
- 14** Place the side foam insert over the actuator (Figure 2-9).
- 15** Place the foam tray over the base plate (Figure 2-8).
- 16** Place the cables in the center slot of the foam tray (Figure 2-5).
- 17** Place the surrogate in the foam insert over the actuator (Figure 2-3).
- 18** Place the controller in the larger slot of the foam tray (Figure 2-6).
- 19** Place the slide plates in the slot between the cables and the surrogate (Figure 2-4).
- 20** Place the extension plate on top of the slide plates.
- 21** Place the moving plate on top of extension plate and controller (Figure 2-2).
- 22** Close the lid of the case and secure the latches.

7 Specifications

Hardware and Electrical Specifications

Table 7-1. Specifications

Specification	Definition
Overall Dimensions	92.8cm (L) x 37.5cm (W) x 27.5cm (H) (for all motions at home position)
Platform Plate size	37.5cm (W) x 60cm (L)
Overall Weight	18.4kg
Power	110-250 VAC, 50/60 Hz
Maximum Platform Weight	50 lbs
Maximum Inferior-Superior Motion	50mm for phantoms up to 50lbs
Posterior-Anterior Direction using 11.3degree inclined plane	+/- 5.0mm (10 total) motion
Position Accuracy	+/- 0.25mm
Maximum Amplitude Inf/Sup	+/- 25.0mm (50 total)
Maximum Amplitude Lateral	+/- 12.5mm (25 total)
Maximum Amplitude Pos/Ant	+/- 5.0mm (10 total)
Maximum Amplitude Surrogate	+/- 25.0mm (50 total)
Editable built-in waveforms	sin(t), 1-2cos4(t), 1-2cos6(t), sawtooth, sharkfin

Software Specifications

- Windows XP® / Vista / Windows 7/ Windows 8/ Windows 10 (32 and 64 Bit)
- Pentium 3® or equivalent
- 512 MB RAM
- 2 MB of available disk space

Appendix A: Regulatory Supplement

Sun Nuclear Corporation Symbols

The following symbols are used in this guide and in Sun Nuclear Corporation's product labels.



WARNING: This symbol indicates a risk of electric shock. (EN ISO 7010, W012)



WARNING: This symbol indicates a hazard that could result in major injury or equipment damage. (EN ISO 7010, W001)



CAUTION: This symbol indicates a potential hazard that could result in minor injury or equipment damage. (EN ISO 15223-1, 5.4.4)



CAUTION: This symbol indicates a pinch hazard. (EN ISO 7010, W024)



Note: Important or supporting information.



Manufacturer's Identification (name and address). (EN ISO 15223-1, 5.1.1)



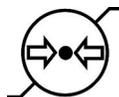
Date of Manufacture. (EN ISO 15223-1, 5.1.3)



Temperature limitation. (EN ISO 15223-1, 5.3.7)



Humidity limitation. (EN ISO 15223-1, 5.3.8)



Atmospheric pressure limitation. (EN ISO 15223-1, 5.3.9)



Serial Number. (EN ISO 15223-1, 5.1.7)



Consult instructions for use. This equipment must be used in accordance with the instructions in this manual. Read all instructions and safety labels before use. (EN ISO 15223-1, 5.4.3)



Do not throw in trash; dispose of in an environmentally friendly way. (EN 50419)

Risk and Regulatory

This phantom is a 3rd party QA or research tool. The phantom is not part of patient or clinical workflows. It does not specifically enable imaging equipment to be used in accordance with its intended purpose nor does it specifically and directly assist the medical functionality of the equipment in terms of its intended purpose as a medical device and therefore would not be considered a medical device accessory

Reporting Health or Safety Related Issues or Concerns

A notice to the user and/or patient that any serious incident that has occurred in relation to the device should be reported to the manufacturer and the competent authority of the Member State in which the user and/or patient is established.

To report any safety or health related issues or concerns regarding the use of Sun Nuclear products, contact Sun Nuclear directly.

Modifications to Equipment

Any changes or modifications to the device that are not expressly approved by Sun Nuclear Corporation could void your warranty.



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