The XSEED®mini Imaging System



INSTRUCTIONS FOR USE

KUBTEC® SCIENTIFIC

The XSEED® Mini Imaging System

Instructions for Use IFU-51 Rev A

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Read this manual thoroughly before using this device. Follow all safety procedures and guidelines when operating radiographic systems.

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PREFACE

Intended Use

The XSEED® Mini Imaging System is a digital cabinet X-ray system used for radiographic inspection and qualification of seed and plant samples. This system is intended for use by qualified/trained personnel. It is not intended for use on humans.

The purpose of the Instructions for Use (IFU) manual is to provide guidance for the proper use and care of your system. Keep this manual with the system for easy reference.

The most extensive system configuration is described in this manual and may not be representative of the system in your facility. Not every function, option, or accessory described in the manual may have been purchased or licensed on your system.

The Instructions for Use do not cover detailed electronic functions or major system troubleshooting and repair. For assistance in these areas, contact the KUBTEC® Customer Care Center.

KUBTEC Customer Care Center

KUBTEC offers customer support through the KUBTEC Customer Care Center (CCC) at any time for issues that cannot be resolved using online help or product documentation. If the Customer Care Center is closed when you call, leave a voicemail message. Make sure to have the following information available when you call:

- Your site name
- Hardware system type
- System serial number
- Software version number

Phone: USA: +1.203.364.8544, option 3
International: +1.203.364.8544, option 3

Email: service@kubtec.com

Web: www.kubtecscientific.com

Mail: KUBTEC®
111 Research Drive
Stratford, CT 06615 USA

NOTE: Any serious incident that occurs in relation to the device should be reported to the manufacturer and the competent authority of the Member State in which the user is established.

User Responsibility

When a system is assembled, operated, maintained, and repaired in accordance with the instructions provided, it conforms to the description in the Instructions for Use and with accompanying labels and/or inserts.

- It is the responsibility of the user to ensure that this system is checked periodically.
- Do NOT use a defective product.
- Replace broken, missing, plainly worn, distorted, or contaminated parts immediately.
- If repair or replacement is needed, request service by calling 203-364-8544, extension #3, or by emailing service@kubtec.com.
- Do NOT use this system or any of its parts other than in accordance with written instructions provided by KUBTEC and KUBTEC-trained personnel.
- Do NOT alter this product without the prior written approval of KUBTEC.
- The user of this system has the sole responsibility for any malfunctions resulting from improper use, faulty maintenance, improper repair, damage, or alteration by anyone other than KUBTEC.

NOTE: As part of the system installation, the Windows operating system has been configured to prevent Windows updates from being executed automatically. If there is a requirement by your facility's IT to make a change to this configuration, then your site assumes all responsibility for ensuring that updates are scheduled in a manner that does not impact the use of the system.

Training

Users of the system require adequate training on the safe and effective use before attempting to work with the system. Training requirements may vary from country to country. It is the responsibility of the user to make sure training is received in accordance with local laws or regulations that have the force of law. Information on training is available from your local KUBTEC representative.

Safety Information

Read, understand, and heed all warnings, cautions, and notes in the manual and on the system.



WARNING: Warnings are directions that, if not followed, can cause fatal or serious injury, and/or lead to damage to the system. Warnings in this manual are emphasized with a yellow triangle safety icon.

Safety Information (continued)



CAUTION: Cautions are directions that, if not followed, can cause damage to the system and/or cause environmental pollution. Cautions in this manual are indicated with a blue circle surrounding an exclamation point.

NOTE: Notes provide tips and important information to guide you in using the system. Notes in this manual are emphasized with the word **NOTE** in capital and bold letters.

Terms and Definitions

Click - Throughout the manual, the instruction for "click" means to left-click the mouse. When a right-click is needed, it will be stated as such.

A qualified engineer/technician is a person who has completed training conducted by KUBTEC and has been certified by KUBTEC on this system.

CE Mark

This product carries the CE Mark.

CE

Class 1

The CE Declaration of Conformity becomes invalid if the product is changed without the explicit consent of the manufacturer. This applies to all parts, not only to safety elements.

ETL Mark

C ETL CM US LISTED Intertek

Conforms to UL 61010-1 UL 61010-2-091

Certified to CSA C22.2#61010-1,

C22.2#61010-2-091

Name of Product

The XSEED® Mini Imaging System (XPERT20)

Manufacturer



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CHAPTER 1: GENERAL INFORMATION

Introduction

The XSEED® Mini Imaging System shown with an optional stand, is a shielded cabinet system used to provide 2-dimensional digital X-ray images of seed and plant samples. These systems utilize an appropriate X-ray source to provide the necessary energies for non-destructive testing of the seeds, along with a high-resolution detector, as well as image acquisition and analysis software.



Figure 2-1: The XSEED® Mini System

Safety Information

The following warnings and cautions appear at appropriate places in this manual and on the equipment. KUBTEC® recommends that you read, understand, and heed the stated precautions. Contact the KUBTEC Customer Care Center if you are unsure of the meaning of any of these statements.



WARNING: Do not remove covers. Potentially lethal voltages are present inside the system.



CAUTION: The sale of this item may be subject to regulation by the U.S. Food and Drug Administration and state and local regulatory agencies.



CAUTION: No operator serviceable parts inside. Refer servicing to qualified personnel.



CAUTION: This system is sensitive and needs to be handled with care. Dropping it from a height or banging it against a hard surface can damage interior components.



CAUTION: When transporting this system, do not drag the cables along the floor.

Additional safety precautions:

- Keep the system drawer closed at all times except during loading periods.
- Turn the power switch to the OFF position whenever the system will not be used for an extended period.
- Monitor the X-ray ON indicators to be certain they are OFF after each exposure.
- At least once a year and whenever the unit is moved or serviced by authorized personnel, a radiation survey should be performed by competent personnel.

System Handling

Transporting

- Use the utmost care when transporting this system. Any drop or bump can lead to extensive damage and the inability to produce images.
- Disconnect cables using the cable connector.
- Do not pull on the electric or data cable line, as this can result in an electric shock or fire.
- Do not drag the cables along the floor. Either hold them or drape them over the transport handle while moving the system.
- When you reach the destination, make sure the system rests on a flat surface. Then, lock the casters.

Environmental conditions

- To ensure consistent imaging, operate the system at normal room temperature within the guided operating levels specified in the specifications.
- Drastic and sudden changes in temperature will cause condensation to form on the surfaces. It is strongly recommended to wait until the condensation dissipates and the system acclimates to the surrounding environmental conditions before operating the system.

System storage

Store the system in a safe, dry location with particular caution to minimize any chances of damage from falling objects or tipping.

System Maintenance

The Maintenance chapter provides specific instructions for the care of the system. To ensure the safe and consistent use of the system, make sure to read, understand, and follow the stated instructions.



CAUTION: For safety reasons, be sure to inspect the system before using it. In addition, carry out a regular inspection at least once a year.



CAUTION: Changes, additions, or maintenance to the system performed by persons without appropriate qualifications and training and/or using unapproved spare parts can lead to a serious risk of injury and damage to the system as well as voiding the warranty.



CAUTION: Use ONLY a soft cloth, neutral detergents, or cleaning liquids to wipe system parts and accessories that come into contact with samples during use. Harsh liquids or rough surface cleaners will damage the system surfaces.



CAUTION:

All KUBTEC systems come with Windows updates turned off and Windows Defender is on. Both Windows Defender and Windows updates are the responsibility of the customer and/or facilities Security/IT department to manage and support. KUBTEC is not responsible for any mismanagement leading to unintended consequences.

System Inspection

Inspect the system daily before use by following the daily inspection checklist in the Maintenance chapter. Perform annual inspections by a KUBTEC engineer or a KUBTEC-trained engineer. This ensures your system is kept compliant with performance and regulatory guidelines.



WARNING:

If necessary, the dosimetry of this system must be performed by a qualified technician only.



WARNING:

The system must be repaired by a qualified engineer only. If it is not repaired properly, it can cause a fire, an electric shock, or an accident.

Inspection procedures

Periodically inspect the system for signs of wear and damage:

- Examine the interior of the seed compartment and make sure that the lead lining is intact.
- Examine the viewing glass, if present, for any cracks, chips, or scratches.

Instructions for performing each inspection are found in the Maintenance chapter. If any problem is found during the inspection, take the indicated measures. If the problem still cannot be corrected, contact the KUBTEC representative or distributor.

It is recommended that a record of the inspections be kept. You can make copies of the checklists or use one provided by your facility or administrator.

Labels

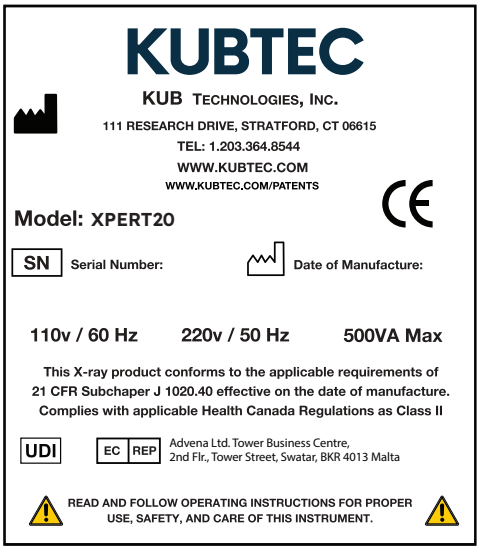
Warning labels are placed at strategic locations on the equipment. Warning labels must remain permanently displayed and in good condition. Tampering with labels is against federal law. Under NO circumstances should the labels be removed or re-affixed.



X-rays are produced when energized.



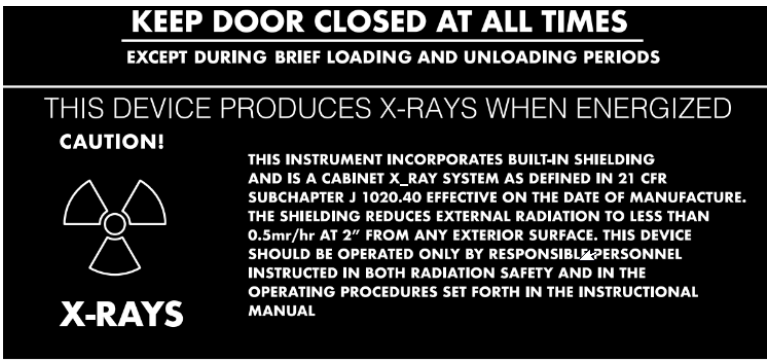
Possible shock hazard. Disconnect power before servicing.







CAUTION: To ensure safe system operation, read the Instructions for Use before operating this system.



Recommended Separation Distances

The XSEED® Mini System is intended for use in an electromagnetic environment where radiated RF disturbances are controlled. The customer or user of this system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and this system as recommended below, according to the maximum output power of the communications equipment.

Table 1-1: Recommended separation distances between portable and mobile RF communications equipment and The XSEED® Mini System

Rated maximum output power (W) of the transmitter	Separation distance (m) according to the frequency of the transmitter		
	150 kHz to 80 MHz $d = 1,2 \sqrt{P}$	80 MHz to 800 MHz $d = 1,2 \sqrt{P}$	800 MHz to 2.5 GHz $d = 2,3 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance (d) in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

Compliance

The XSEED® Mini System complies with US federal guidelines that require radiation leakage of not more than 0.5 mR/hr (0.005 mSv/hr) at a distance of 5 cm from the external machine surface.

The XSEED® Mini System is designed, manufactured, and registered in accordance with strict criteria established by the Food and Drug Administration (FDA), Center for Devices and Radiological Health (CDRH), and/or the Department of Health and Human Services (DHHS). The system meets or exceeds all certification requirements for a cabinet X-ray system used in an industrial/laboratory environment.

This system is manufactured, tested, and certified to comply with the US Federal Performance Standards for cabinet X-ray systems, Title 21, Sub-chapter J of the Code of Federal Regulations, Section 1020.40. Modification or damage to the equipment could result in an X-ray exposure hazard.

KUBTEC recommends that you review and comply with work site safety requirements regarding radiation safety.

The system has been designed and tested for compliance when used in all its modes of operation. KUBTEC products comply with IEC Safety Standards.

The XSEED® Mini System is intended for use in the electromagnetic environment specified in the following table. The customer or user of this system shall ensure that it is used in a Guidance and Manufacturer Declaration environment.

Table 1-2: Guidance and Manufacturer Declaration for Electromagnetic Immunity

Immunity test	IEC 61010-1 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	±2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line(s) and neutral	±1 kV line(s) and neutral	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions, and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0,5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5s	<5% U_T (>95% dip in U_T) for 0,5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles) <5% U_T (>95% dip in U_T) for 5s	Mains power quality should be that of a typical commercial or hospital environment. If a dip or an interruption of mains power occurs, the current of the system may drop off from the normal level, and it may be necessary to use an uninterrupted power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	Not applicable	Not applicable
NOTE: U_T is the AC mains voltage prior to application of the test level.			

Table 1-2: Guidance and Manufacturer Declaration for Electromagnetic Immunity (continued)

Immunity test	IEC 61010-1 test level	Compliance level	Electromagnetic environment – guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of this system, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: d = 1,2 √P d = 1,2 √P 80 MHz to 800 MHz d = 2,3 √P 800 MHz to 2.5 GHz • P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation. • Distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, and should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	
NOTE: At 80 MHz and 800 MHz, the higher frequency range applies. **NOTE**: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.			

Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcasts, and TV broadcasts cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, consider an electromagnetic site survey. If the measured field strength at the location where the system is used exceeds the applicable RF compliance level, observe the system to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the system.

Over the frequency range of 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Table 1-3: Performance specifications

Degree of protection against penetration of water	No protection provided
Classification in accordance with 61010-1 degree of protection against electric shock	This system has no applied parts
Methods of sterilization or disinfection	See Cleaning & Disinfection section in the Maintenance Chapter
Where equipment is not suitable for use	In the presence of flammable mixtures
Mode of operation	Suitable for continuous operation
Pollution degree rating	Pollution degree 2 (normal atmosphere)
Electromagnetic compatibility (EMC) in accordance with 61010-1 • Noise suppression • Immunity to interference	This system conforms to the requirements of IEC 61010-1 (EMC)
Variants	Software programmable variants from third-party
Product Life	Service life of the product is 7 to 10 years

Table 1-4: Wireless adapter specifications

Hardware	
Interface	USB 3.0
Button	WPS button
Dimensions (W x D x H)	1.59 × 0.78 × 0.41 in. (40.5 × 19.72 × 10.29 mm)
Antenna type	Internal
Wireless	
Wireless standards	IEEE 802.11ac, IEEE 802.11a, IEEE 802.11n, IEEE 802.11g, IEEE 802.11b
Frequency	5 GHz 2.4 GHz
Signal rate	**5 GHz** 11ac: Up to 867 Mbps (dynamic) 11n: Up to 300 Mbps (dynamic) 11a: Up to 54 Mbps (dynamic **2.4 GHz** 11n: Up to 400 Mbps (dynamic) 11g: Up to 54 Mbps (dynamic) 11b: Up to 11 Mbps (dynamic)
Transmit power	<23 dBm (EIRP)
Wireless modes	Ad-hoc/Infrastructure mode
Wireless security	Support 64/128 bit WEP, WPA/WPA2, WPA-PSK/WPA2-PSK
Modulation technology	DBPSK, DQPSK, CCK, OFDM, 16-QAM, 64-QAM, 256-QAM
Certification	CE, FCC, RoHS



For cybersecurity, ensure your network is secure.

WARNING:

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CHAPTER 2: COMPONENTS AND CONTROLS

System Overview

The XSEED® Mini System consists of the following major components:

- A cabinet mounted on a movable cart or table.
- A user interface that is attached to a height-adjustable extension arm.

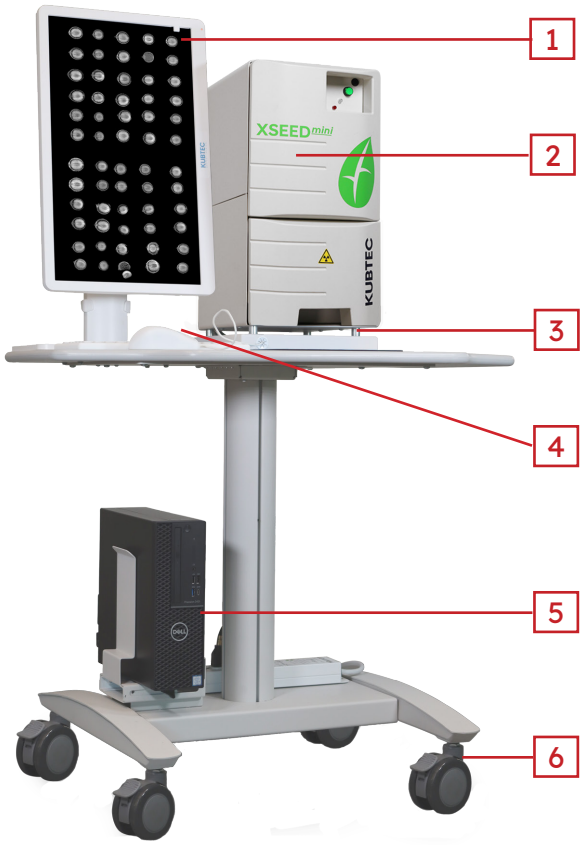


Figure 2-1: The XSEED® Mini System

Figure Legend

1 Monitor
2 Cabinet
3 Keyboard
4 Mouse
5 Computer
6 Optional cart with casters

User Interface

The user interface consists of a monitor, keyboard, and mouse.

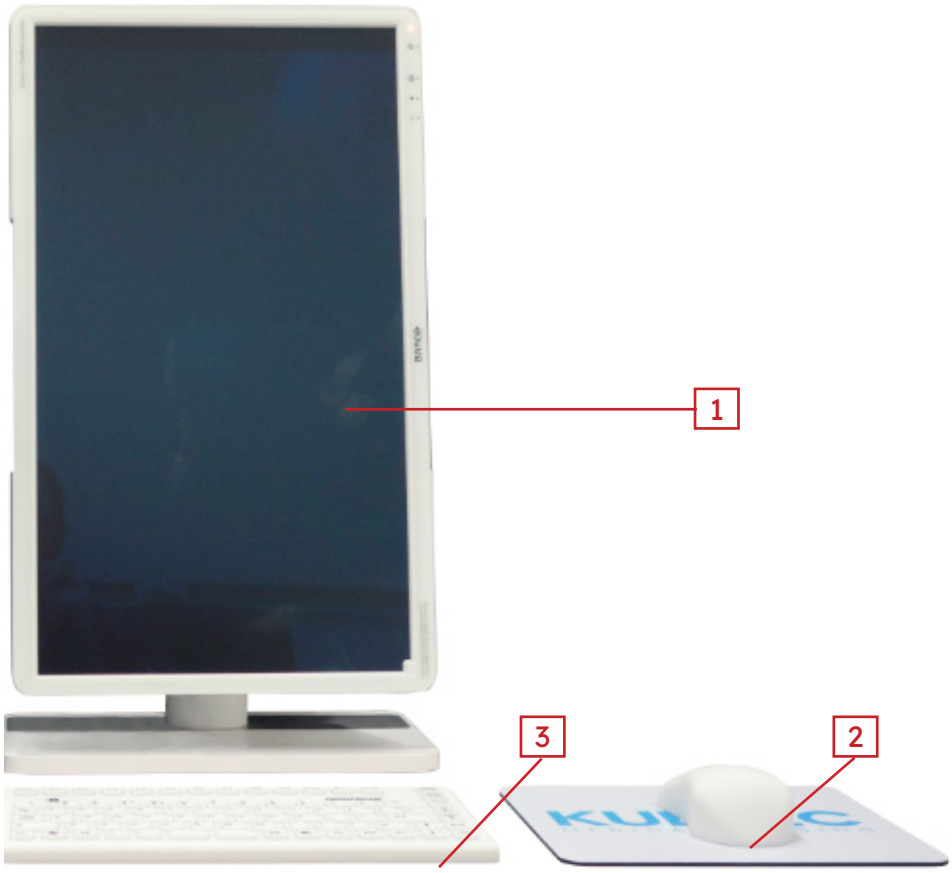


Figure 2-2: Monitor and Keyboard

Figure Legend

1 Monitor ON/OFF switch

2 Mouse

4 Keyboard

System Components: Cabinet

The cabinet has two sections:

- The upper section houses the X-ray generation components and the system control panel.

  NOTE: Users of the system should never attempt to access the interior of this upper section of the cabinet.

- The lower section is the sample drawer.

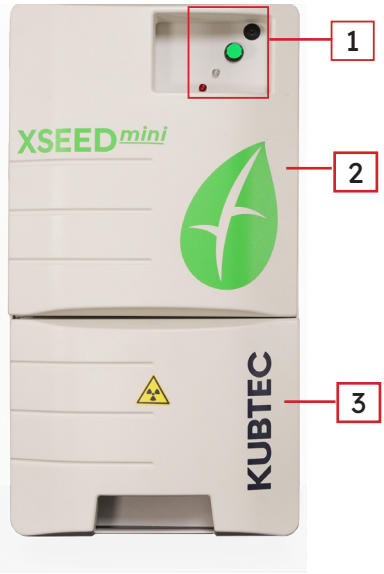


Figure 2-2: Cabinet

Figure Legend

1 Control panel

2 Upper section

3 Drawer

System Components: Control Panel

The control panel features functions for locking and unlocking the system, controlling power to the system, and displaying warning lights when X-rays are generated.

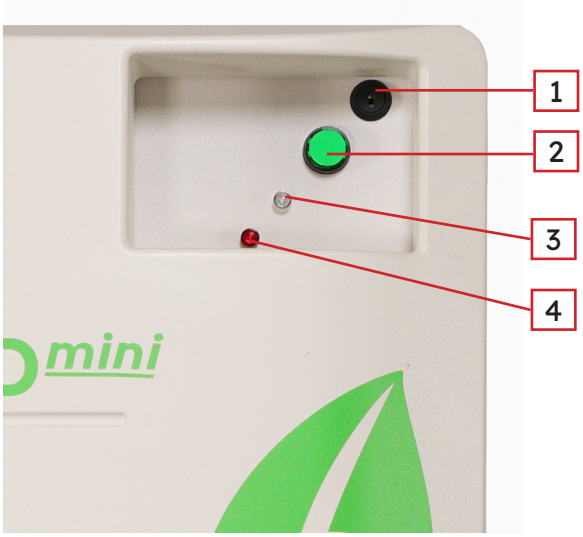


Figure 2-3: Control Panel

Figure Legend

1	Key switch	**OFF** position: The key is turned to the left. The system is locked. X-rays cannot be generated. **ON** position: The key is turned to the right. The system is unlocked and ready to be powered up. X-rays can be generated. **NOTE:** The key is removable when it is in the OFF position. To prevent unauthorized use of the system, KUBTEC® recommends removing the key when the system is not in use.
2	Power button	Power ON: LED is green. Power OFF: LED is clear.
3	Amber light	Solid amber when the X-ray source is on and ready.
4	Red light	Flashes red when the X-rays are being generated.

System Components: Drawer

The pullout sample drawer in the lower section of the cabinet has drawers for contact and magnification imaging.



Figure 2-4: Sample Drawer

Figure Legend

1 Magnification level

2 Contact level

User Interface (continued)

The keyboard has the functionality of a standard Windows PC keyboard with the following exceptions, as indicated in the following figure.

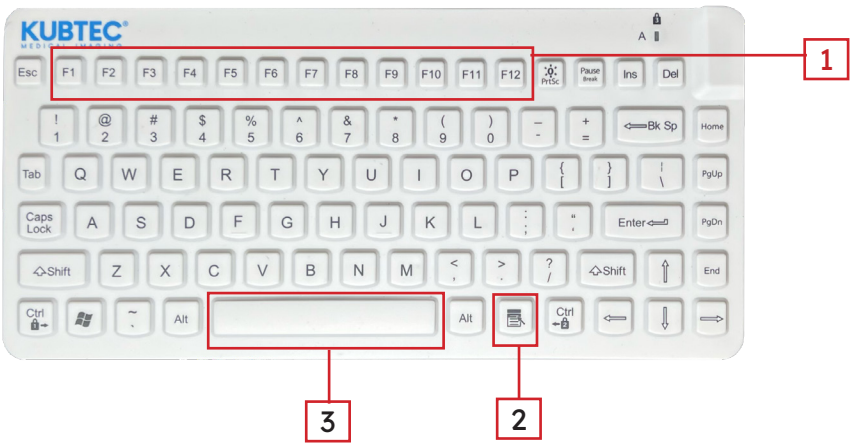


Figure 2-6: Keyboard

Figure Legend

1 "F" keys are not mapped to specific functions.

2 Use to display dropdown menus.

3 Space bar.

NOTE: There is no numeric keypad.

Clean Mode functionality locks the keys so that cleaning of the keyboard can be done without input from any key. To use the Clean Mode, follow these steps:

1. To clean your keyboard while it is plugged into the PC, press the left and right control (Ctrl) keys at the same time for 3 seconds to lock the keyboard.
2. When the keyboard is locked, the caps lock icon will blink.
3. After cleaning the keyboard, press both control (Ctrl) keys again for 3 seconds to unlock the keyboard.

Moving the System

The following information applies to systems that are mounted on a cart.

CAUTION: This system is sensitive and needs to be handled with care. Dropping it from a height or banging it against a hard surface can damage interior components.

CAUTION: When transporting this system, do not drag the cables along the floor.

How to lock/unlock the casters

To lock a caster, use your foot to press down on the locking lever until it snaps into the locked position.

To unlock a caster, use your foot to push up on the locking lever until it snaps into the unlocked position.



Locked Position



Unlocked Position

How to move the cabinet

1. Ensure that all cables are off the floor and that all components are securely positioned.
2. Unlock the casters.
3. Push (or pull) the sides of the table on which the system is mounted to move the system.
4. When you reach the desired location, ensure the system is on a flat surface, and then lock the casters.

Cable Connections

Follow these steps to connect the cables:

1. Insert the power cord fully into the wall receptacle.
2. If you do not have a wireless connection, insert the Ethernet cable into the Ethernet jack.



CAUTION: Before using The XSEED® Mini System, ensure it is placed on a flat surface.



CAUTION: To prevent electromagnetic interference, be sure to maintain at least the minimum distance between portable and mobile RF communications equipment (transmitters). Table 1-1 in Chapter 1 of this manual shows the recommended separation distances.

CHAPTER 3: SYSTEM START UP AND SHUT DOWN

Introduction

Before you start up the system for the first time each day, perform the daily inspection as stated in the checklist in the Maintenance chapter.

NOTE: To obtain consistent results, operate the unit at normal room temperature within the guided operating levels stated in the specifications sheet. Drastic and sudden changes in temperature may cause condensation to form on the surface. If this happens, it is strongly recommended to wait until the condensation dissipates and the system acclimates to the surrounding environmental conditions before resuming operation.

Pre-Startup Checks

Make sure of the following:

- The system is on a flat surface.
- The cart casters are in the locked position.
- The power cord is fully inserted into the wall outlet.

How to Start the System

Follow these steps to start the system:

1. Turn the key switch to the ON position.
2. Press the power button on the cabinet and the PC tower.
3. Double-click the  icon on the desktop. If an initialization screen displays, wait for the initialization process to finish.
4. When the software finishes loading, the Main screen will display along with a **Calibration** prompt message.

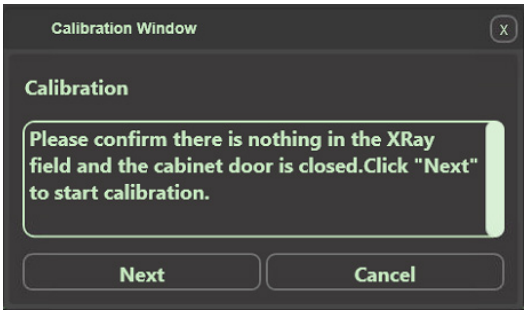


Figure 3-1: Calibration

How to Start the System (continued)

6. Click on **Next** to start calibration. Click **OK**. If you wish to bypass the calibration (not recommended), click **Cancel**.

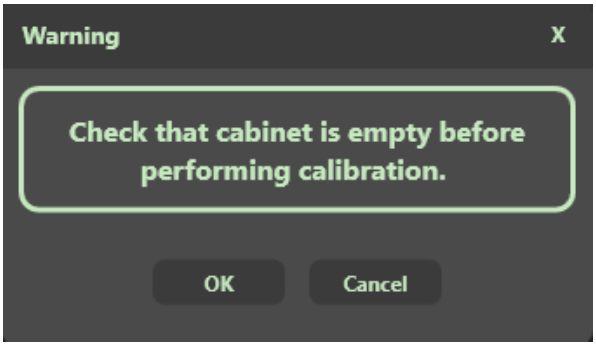


Figure 3-2: Calibration Warning

NOTE: X-rays are emitted during the calibration process.

7. When the calibration is done, a window will appear that displays, **Calibration Finished**. Click **Back To Main Window**.

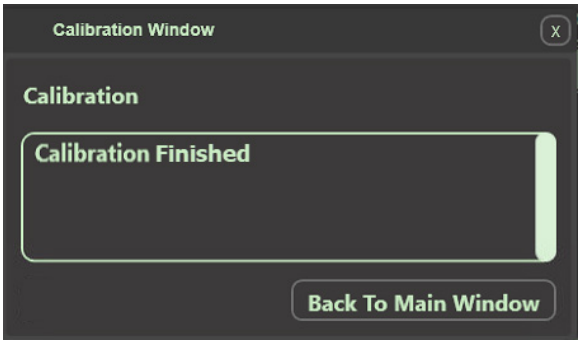


Figure 3-3: Calibration Finished

8. The system is now ready to start the image acquisition process.

Main Screen

The main screen provides access to all software functions of the system. Each component of this screen is explained in the Legend starting below.

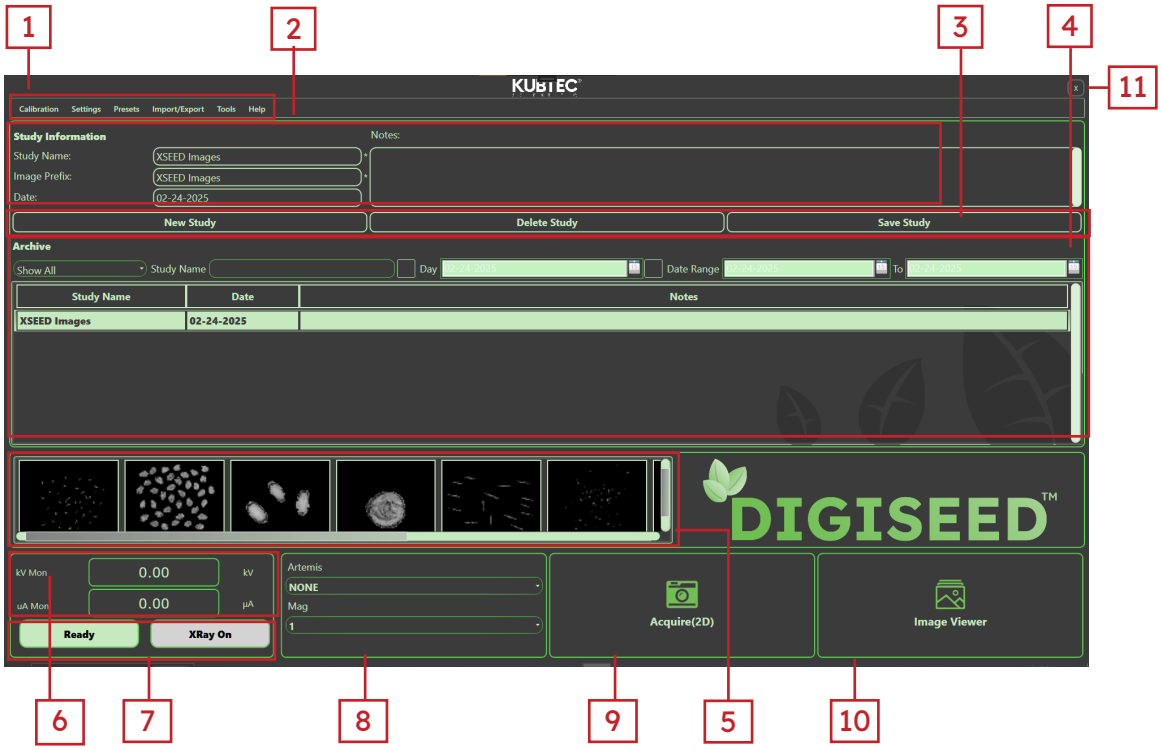


Figure 3-4: Main Screen

Main Screen Legend

Screen Legend

No.	Function
1	Menu bar provides access to the following: • Options for system setup • Exporting images • User documents
2	**Study information** displays study data that is retrieved from stored files or manually entered as a new study.
3	Options to create a **New Study**, **Delete** and **Save** the current study.
4	**Archive** allows searching for stored studies by study name or by the date.
5	Icons of acquired images are displayed in this area.
6	**kV and µA** feedback operates when X-rays are being generated.

Main Screen Legend (continued)

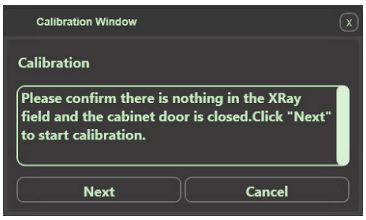
7	**Ready Light and XRay On Light** • **Ready** light illuminates when the system is prepared to generate X-rays. • **XRay On** light illuminates when the system is generating X-rays.
8	**Image Filter** and **Magnification** options.
9	**Acquire** initiates the X-ray exposure process.
10	**Image Viewer** provides full screen display of the last acquired image (or one selected thereafter by the user) along with a toolbar for image processing.
11	**Exit** closes the system software program.

Menu Bar

The menu bar provides options for setting up the system and customizing it for client use. The use of each menu bar option is described next.



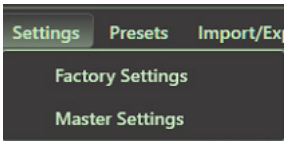
Menu Bar: Calibration



Click the **Calibration** option to access the **Calibration Wizard**, which is used to automatically calibrate the system.

1. Click **Next** to start the Wizard.
2. Click **Back to Main Window,** when the calibration ends.

Menu Bar: Settings



The two options in the **Settings** menu (Factory Settings and Master Settings) require password access.

Factory Settings are those that are in place when the system is delivered.

Master Settings include those for the Online Image Filter, for Window/Level, and for Preset Technologists and Radiologists.

Menu Bar: Presets

The Presets option accesses the **Presets Manager** screen, where users can create settings for exposure parameter combinations. Each created setting is displayed as a selectable option on the **Presets** screen, which is displayed when the manual mode is selected for image acquisition.

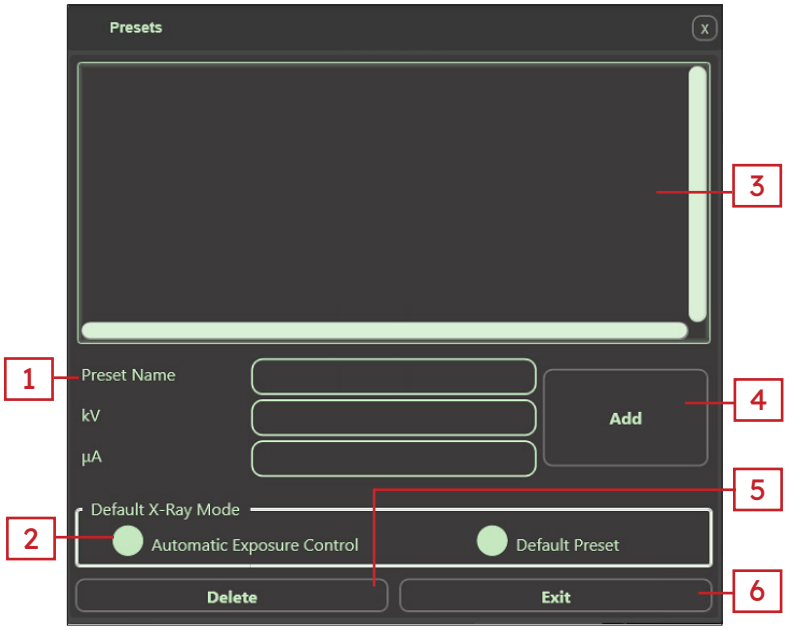


Figure 3-5: Present Management Screen

Screen Legend

1 Create a new preset of exposure parameters.

2 Select the default exposure mode.

3 Display area for existing Presets.

4 Add a new preset to the list.

5 Delete a selected preset from the list.

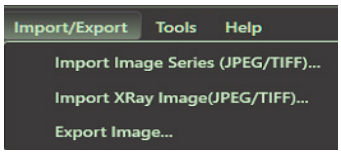
6 Close the Presets Manager screen

To create a new Preset:

1. In the Presets Manager screen, enter a name for the preset that is being created.
2. Enter the desired kV and µA for this preset.
3. Click **Add**.
4. If you want the new Preset to be the default, click the **Default Preset** option at the bottom of the screen.

Menu Bar: Import/Export

The Import option in the **Import/Export** menu enables users to import images that are saved in a different location into the current series. The Export option enables users to transfer images stored in the system to an external device.



Menu Bar: Import Image Series

The Import Image Series screen enables users to import a series of images (JPEGs or TIFFs) from a different location into the current location.

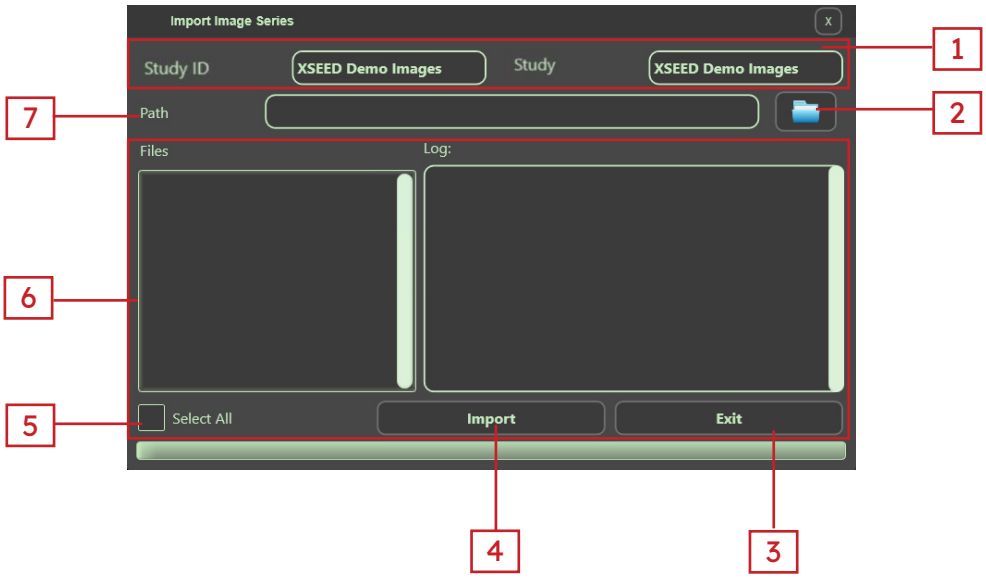


Figure 3-6: Import Image Series Screen

Screen Legend

1 Current study identification.

2 Browse to the location of the series to be imported.

3 Exit the Import screen.

4 Import the selected series into the current study.

5 Click to select all the images displayed in the Files area.

6 List of files for preview.

7 Location of the files to be imported.

Menu Bar: Import image

To import X-ray images into the current study:

1. From the **Import/Export** menu, click **Import Image Series**.
2. Click the Browse button and navigate to the series to be imported.
3. Select the images to import, then click **Import**.
4. Click **Exit** to close the screen.

Menu Bar: Import XRay Image

The **Import Images** screen allows you to import images saved in a different location into the series.

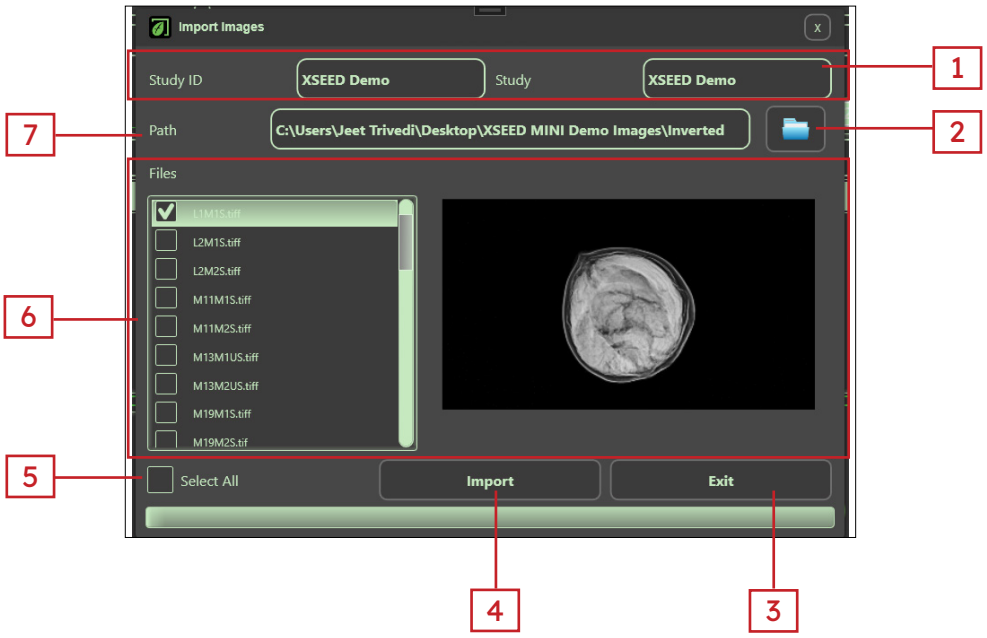


Figure 3-7: Import Image Screen

Screen Legend

1. Current study identification.
2. Browse to the location of the series to be imported.
3. Exit the Import screen.
4. Import the selected series into the current study.
5. Click to select all the files displayed in the list.
6. List of files for preview.
7. Location of the files to be imported.

To import X-ray images into the current study:

1. From the **Import/Export** menu, select **Import XRay Image**.
2. Click the Browse button, then navigate to the location of the files/folder to be imported.
3. Select the images to import, then click **Import**.
4. Click **Exit** to close the screen.

Menu Bar: Export Images

The **Export Images** option provides the means to send selected images to an external storage device.

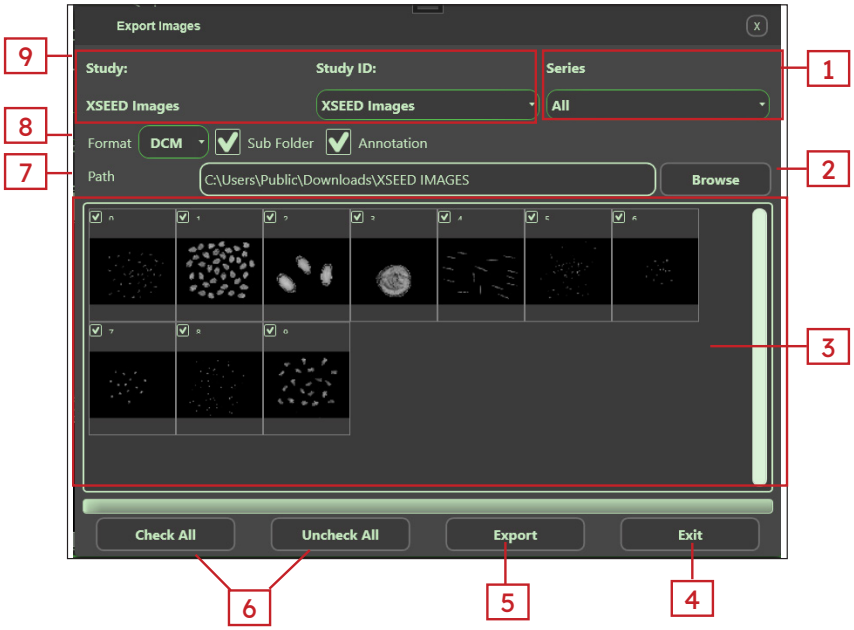


Figure 3-8: Export Images Screen

Screen Legend

1 The dropdown allows the selection of all images in the series or individual images.

2 Allows navigation to an external storage device.

3 Image preview.

4 Exit the Export screen.

5 Export selected images to the designated location.

6 Select or unselect all images in the display area.

7 Location of the images to be exported.

8 The dropdown menu options for the format of images to be exported:

- **DCM** is DICOM. This is the default and recommended format for systems that have a DICOM viewer.
- **JPEG** reduces image size, making it more compact by producing a lower resolution image.
- **TIFF** provides a full-resolution image, and it is recommended for systems that do not have a DICOM viewer.

Subfolder: Option to have all selected images contained in a separate folder when they are exported to the location in the Path field.

Annotation: Option to keep existing annotations with the images to be exported.

9 Current study identification

Menu Bar: Export Images (continued)

To export images:

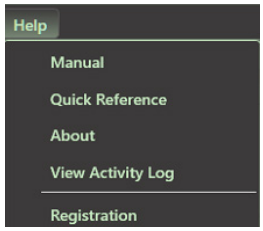
1. Select **Import/Export** menu from the menu bar, then select **Export Image**.
2. Click the Browse button, then navigate to the location of the files/folder to be imported.
3. Assign a format.
4. Identify the destination.
5. Select **Export**.

Menu Bar: Tools



Options in the **Tools** menu display when plug-ins are enabled.

Menu Bar: Help

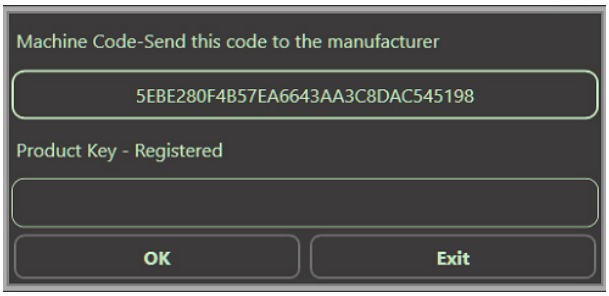


The **Help** option provides access to following information about the system:

- **Manual** option provides access to the Instructions for Use.
- **Quick Reference** to access the Quick Reference Guide.
- **About** provides an option to see KUBTEC contact information and the version of software running on the system.



- **Registration** option is for service personnel to register the software.



How to Shut Down the System

To shut down the system, follow these steps:

NOTE: Log out of The DIGISEED® Software before logging out of Windows. Neglecting to do this prevents other users from being able to launch The DIGISEED® Software.

1. Click  on the Main screen, then click **OK** to exit the program prompt.
2. Click  on the lower left area of the screen.
3. Click the power icon, and then click **Shut down** to turn off the computer.



WARNING:

Do not turn off the monitor. It will automatically enter standby mode and power on with the computer.

4. On the control panel of the shielded cabinet, push the power button. The power button light extinguishes.
   - If you plan to leave the unit in its current location, leave the key switch in the **ON** position, and the power cord connected to the wall.
   - If you plan to move the unit, turn the key switch to the **OFF** position, disconnect the power cord from the wall receptacle, and prepare the unit for transport.

Uninterruptible Power Supply (UPS)

The following information applies to systems that are equipped with a UPS.

The UPS beeps when the system is running on battery backup. This occurs when the system power cord is unplugged from the wall outlet and the system is in operation. The UPS will continue to beep until one of the following happens:

- The system is connected to another power source.
- Battery reserve in the UPS runs out.
- UPS is shut down.

To manually shut down the UPS:

1. Remove the lower cabinet cover.
2. Press and hold down the power button for five seconds.
3. Click **YES**, then select **Shutdown without delay**.
4. Replace the lower cabinet cover.

NOTE: Remaining runtime depends on the available charge, the duration of X-ray exposure, and idle power demand.

NOTE: The UPS battery backup is intended for room-to-room placement of the system, and then should be plugged into an outlet. Using the UPS to take images or leaving the system unplugged and running on UPS battery power for an extended period will result in damage to the UPS battery.

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CHAPTER 4: IMAGE ACQUISITION AND ANALYSIS

Introduction

After the system is properly set up, it is ready to start the image acquisition process. The first step is to associate the seeds to be X-rayed with a study.

The Main screen offers two options to do this:

- Recall an existing study from the system archive.
- Create a new study.

The use of each option is explained next.

Recall an Archived Study

To recall an archived study, follow these steps:

1. From the dropdown menu in the archive section of the screen, select **Show All** (OR, select **Show by Study ID** and then enter the ID). A list of studies loaded into the system is displayed.

   NOTE: Additional filtering options allow searching the archived studies by a date or date range.



Figure 4-1: Main Screen: Study Selection Options

2. Double-click the study you want. Information about that study is displayed in the **Study Information** section of the screen, and images of the study are displayed below the list of studies.

Create a New Study

To create a New Study, follow these steps:

1. On the Main screen, click **New Study**.
2. In the **New Study** screen, type in the required information, then click **Save Study**. The new study information is displayed at the top of the Main screen and in the Archive section.



Figure 4-2: New Study Screen

Acquire X-ray Images

The system offers the following options for acquiring X-ray images:

- Automatic Exposure Control (AEC)
- Presets
- Manual

The use of each option is described in the next sections.

Acquire with AEC

Automatic Exposure Control selects the optimal kV and µA settings for image acquisition.

To use the AEC feature, follow these steps:

1. Ensure that the study selected on the Main screen is the one you want to select.
2. Center the seeds within the imaging area indicated by the marks on the drawer of preference (contact or magnification).
3. Close the system drawer tightly.
4. Ensure that the XRay On ready indicator is lit.
5. Left-click the Acquire(2D) button at the bottom of the screen.

When the X-rays are turned on, the KUBTEC® logo on the control panel flashes red, and "**Acquiring images, please wait...**" appears. Shortly thereafter, the 2D image is displayed.



Figure 4-3: Image Viewer

Acquire with Presets and Manual

To acquire images using a Preset or with manual entry of exposure factors, follow these steps:

1. Ensure that the study selected on the Main screen is the one you want to select.
2. Center the seeds within the imaging area indicated by the marks on the contact level or specimen magnification tray.
3. Close the system drawer tightly.
4. Ensure the XRay Ready indicator is lit.
5. Right-click the **Acquire(2D) button** at the bottom of the Main screen. The Preset screen displays.



Figure 4-4: Preset Screen

6. Acquire the X-ray image:
   - To acquire an X-ray image using a **Preset**, double-click the preset option that you want from the list and then click **Acquire**.
   - To acquire an X-ray image using **Manual** settings, type in the desired kV (between 20 and 50) and µA (between 50 and 1000), then click **Acquire.**

   When the X-rays are turned on, the XRay On indicator on the control panel lights, and "**Acquiring images, please wait...**" appears. Shortly thereafter, the 2D image is displayed.

How to Add a Preset

To add a Preset to the Presets list, follow these steps:

1. In the menu bar at the top of the Main screen, select the Preset(P) option.
2. In the **Preset Manager** screen, type in the Preset Name, the desired kV, and the desired µA (within the range of values for your system).
3. Click **Save Preset**, then click **Exit**.

Magnification

To acquire magnification images, follow these steps:

1. Ensure that the study selected on the Main screen is the study you want to select.
2. Center the seeds on the magnification tray.
3. Close the drawer tightly. Ensure the XRay ready indicator is lit.
4. At the bottom of the Main screen, select the **Mag** setting from the dropdown menu.



5. Acquire the image:
   - To use **AEC**, left-click the **Acquire(2D)** button. Shortly thereafter the 2D image displays.
   - To use a **Preset** value, right-click the **Acquire(2D)** button, then double-click the Preset option you want from the list.
   - To use **Manual** settings, right-click the **Acquire(2D) button**, enter the desired kV and µA (within the range of values for your system), and then click **Acquire**.

   When the X-rays are turned on, the XRay On indicator on the control panel lights, and "**Acquiring images, please wait...**" appears. Shortly thereafter, the 2D image is displayed.

Create a Copy Path

You can create a copy path to a designated location to store images. Once a copy path has been set up, acquired images are automatically stored in that location.

To create a copy path, follow these steps:

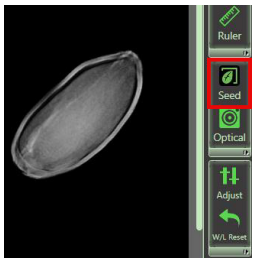
1. Select **Master Settings** from the **Setting(s)** tab in the menu at the top of the Main screen.
2. Enter the password (kubtec), then click **OK**.
3. Click **Copy Path**, then identify the location where you want to store the acquired images.
4. Select the image type from the dropdown.
5. Click **Save** > **OK**.
6. Click **Exit Master Settings** to return to the Main screen.

To avoid software issues, ensure the shared drive is always connected.

CAUTION:

DIGISEED®: Main Screen

To use The DIGISEED® Seed Analysis Software, click the Seed Analysis icon  in the Image Viewer Main screen. The DIGISEED® Main screen will display. The various tabs on the right-side of this screen provide options for image viewing.



The **Main** tab tools on The DIGISEED® Software Main screen provide tools for load image export, seed analysis, and annotations.

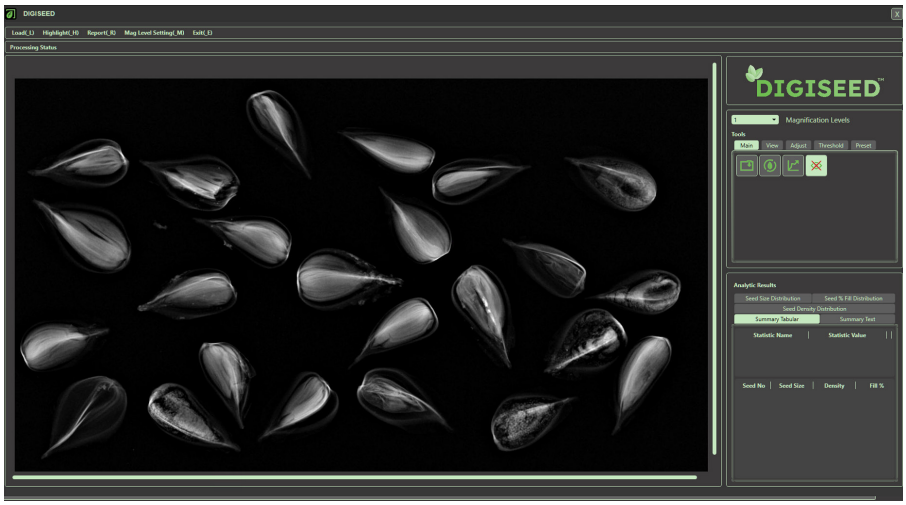


Figure 4-5: DIGISEED® Main Screen

Figure Legend

Icon	Name	Function
	Load image file	Click the Load image file icon, then navigate to and select the exported image you want to load into the viewer. The selected image will be displayed.
	Seed analysis	Click the Seed analysis icon to allow the software algorithm to establish the ROI's and present the size or density distributions.
	Export report	Click the Export report icon to save the .cvs output of the image data.
 	Show/Hide seed annotations	Click the Show/Hide icon to toggle between showing or hiding annotations.

DIGISEED®: Main Screen, View Tab

The **View** tab tools on the Main screen provide tools for adjusting the visualization of the displayed image.



Figure 4-6: DIGISEED® Main Screen - View Tab Tools

Figure Legend

Icon	Name	Function
	Zoom In	Increase the magnification of the image.
	Zoom out	Decrease the magnification of the image.
	Fit screen	Adjust the image to fit the maximum screen width and height.
	Fit Width	Scale the image to fit its width within the viewer while maintaining the visibility of the borders.
	Fit Height	Scale the image to fit its height within the viewer while maintaining the visibility of the borders.
	Zoom 100	Zoom the image by 100%.
	Zoom 200	Zoom the image by 200%.

DIGISEED®: Main Screen, Adjust Tab

The **Adjust** tab tools on the Main screen allow users to adjust the window and level of the image or change the window center/window size.

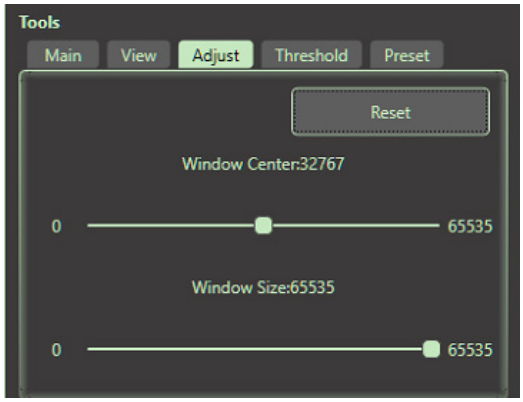


Figure 4-7: DIGISEED® Main Screen - Adjust Tab Tools

Figure Legend

Name	Function
Reset	Click the **Reset** button to restore the Window Center and Window Size values to the default settings.
Windows Center	Use the **Window Center** slider to adjust the midpoint of the displayed number range: • Decrease the number to brighten the image. • Increase the number to darken the image.
Window Size	Use the **Window Size** slider to adjust the range of pixel intensities displayed in the image.

DIGISEED®: Main Screen, Threshold Tab

The DIGISEED® Software allows users to create new analysis standards with custom-set thresholding parameters and save it as a **Preset**. To create a new preset, adjust the threshold tab tools. The Threshold tab tools on the Main screen allow users to adjust the **Seed Fill %**, etc. The **Threshold** tab tools on the Main screen allow users to adjust the window and level of the image or change the window center/window size.

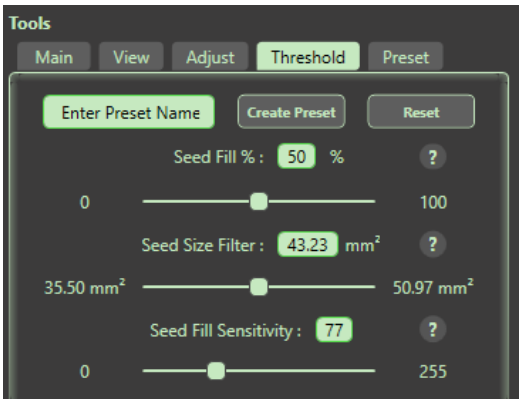


Figure 4-8: DIGISEED® Main Screen - Threshold Tab Tools

Figure Legend

Name	Function
Create Preset	Click the **Create Preset** to create a new preset of exposure parameters.
Reset	Click the **Reset** to restore all settings to their default values.
Seed Fill%	Use the **Seed Fill %** slider to adjust the threshold of when a seed is considered filled.
Seed Size Filter	Use the **Seed Size Filter** slider to adjust the threshold of when a seed is an acceptable size.
Seed Fill Sensitivity	Use the **Seed Fill Sensitivity** slider to adjust the threshold for determining when a pixel is considered part of the empty seed area based on its value. A pixel with a value of zero appears black (empty area), while a value of 255 appears white (part of the seed fill). Increasing the slider value causes more of the seeds to be classified as empty, decreasing it causes more of the seeds to be classified as filled, and allowing for customization based on seed type.

DIGISEED®: Main Screen, Preset Tab

The **Preset** tab tools on the Main screen allow users to save their settings as a preset and easily reuse them later. This allows them to quickly apply the saved settings when analyzing a different seed or the same seed with a new batch.



Figure 4-9: DIGISEED® Main Screen - Preset Tab Tools

DIGISEED®: Seed Analysis

To perform an analysis using a preset, follow these steps:

1. Click the Load image icon , then locate the desired tiff. The image will appear on the screen.
2. Click the Seed analysis icon . The seed size screen is presented. The data loads and displays in the **Summary Text** tab.

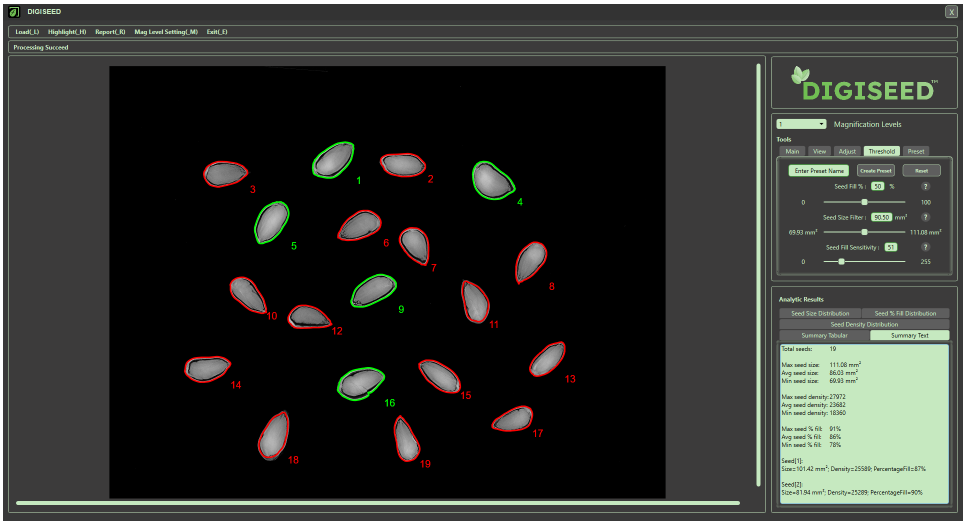


Figure 4-10: Summary Text Tab

DIGISEED®: Seed Analysis (continued)

To review the density data as a histogram, click the **Seed Density Distribution** tab.

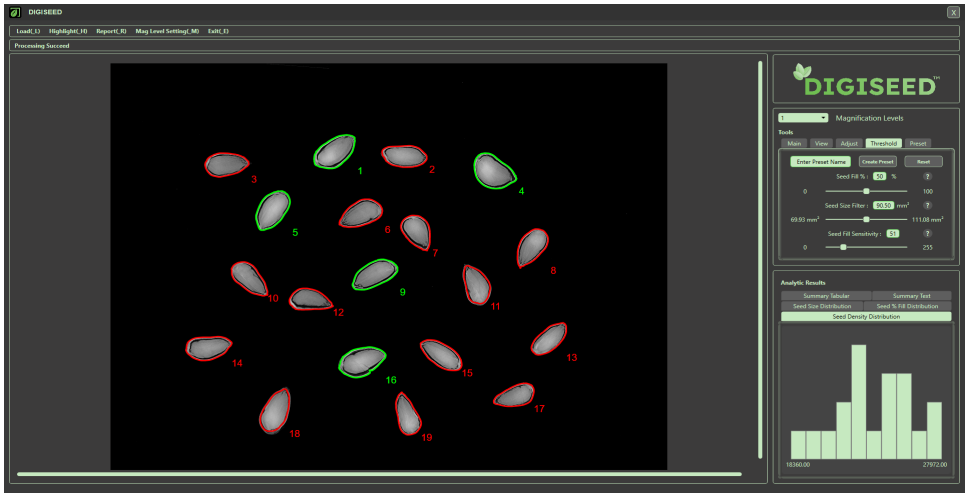


Figure 4-11: Seed Density Distribution Tab

To review the size data as a histogram, click the **Seed Size Distribution** tab.

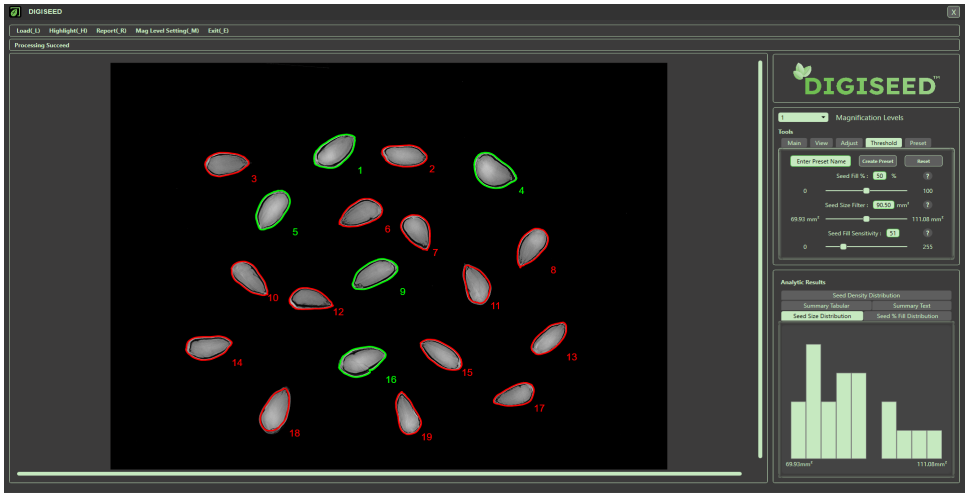


Figure 4-12: Seed Size Distribution Tab

DIGISEED®: Seed Analysis (continued)

To review a summary of seed analysis, click the **Summary Tabular** tab.

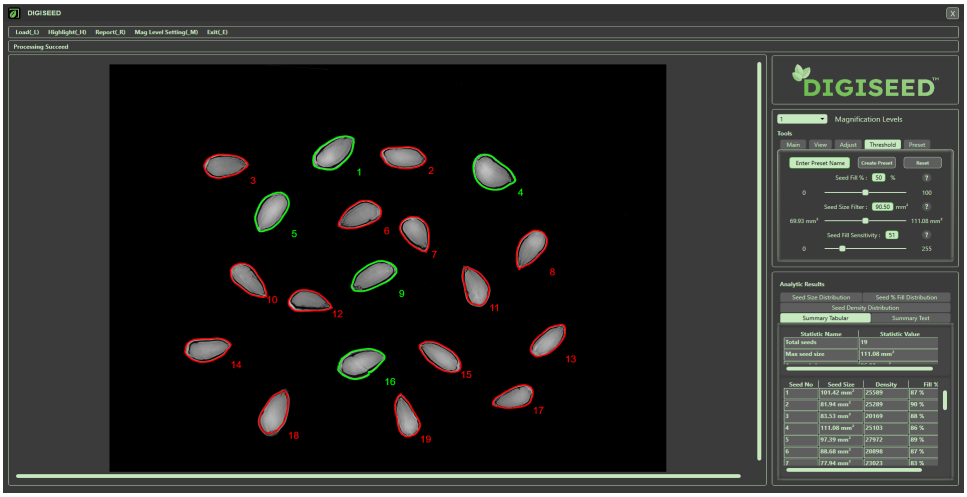


Figure 4-13: Summary Tabular Tab

To review the seed percent fill as a histogram, click the **Seed Percent Fill Distribution** tab.

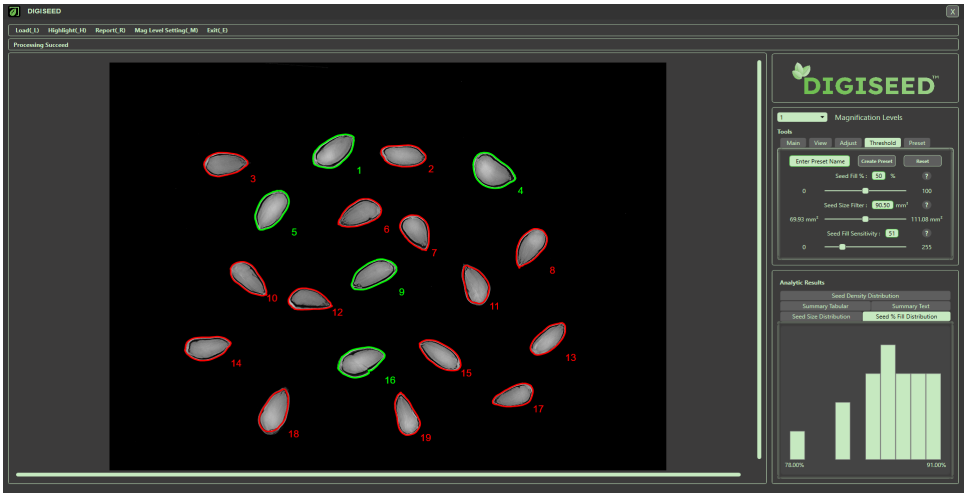


Figure 4-14: Seed Percent Fill Distribution Tab

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CHAPTER 5: IMAGE VIEWER TOOLS

Introduction

The XSEED® Mini System has a variety of tools for processing and annotating acquired images. These tools, by default, appear as icons on the right side of the acquired image in the Image Viewer.



Figure 5-1: Image Viewer

Figure Legend

1	Image viewer menu	**5**	Window/Level adjustments
2	Image processing tools	**6**	Reset
3	Annotation tools	**7**	Exit the Image Viewer
4	Viewing options		

How to Use Image Viewer Tools

Select the image you want to use the tool on. Click a tool to activate it, then click on the image to use the tool.

- Some tools, such as Invert, Flip V, Flip H, and Reset to perform their stated function upon activation.
- Other tools require additional steps. The following tables provide details for the use of each tool:

Image Processing Tools

Table 5-1: Image processing tools

Icon	Name	Function
	**Zoom**	• Click the **Zoom** icon, then left-click on the image to zoom in, or right-click on the image to zoom out. • You can also use the left mouse button to pan the image, or the right mouse button to zoom in or out, or scroll down the mouse for zoom. • To disable it, click the Zoom icon again.
	**Crop**	• Click the **Crop** icon, then click on the image • Draw a box over the area that you want to extract from the image. • Select the Copy icon, then click OK. The cropped image is added as the last image in the series or study. • To return to the original image, keep clicking the Up arrow until you see the original image. OR, click the Exit Image Viewer icon to return to the Main screen where you can scroll to and select the original image.
	**Invert**	• Click the **Invert** icon to change the black pixels to white pixels. • Click this icon again to reverse the pixels.
	**Flip V**	• Click the **Flip V** icon to reverse the positions of the top and bottom of the image. • Click the icon again to return the image to its original position.

Image Processing Tools (continued)

	**Flip H**	• Click the **Flip H** icon to reverse the positions of the left and right sides of the image. • Click this icon again to return the image to its original position.
	**Rotate**	• Click the **Rotate** icon to display the Rotation window. • Select from one of three programmed rotation angles, or use the slider to select another rotation angle. • The Crop option removes areas of the image that fall outside of the image frame during rotation. • The Resize option fits the image within the frame so that no data is lost.
	**Magnifier**	• Click the **Magnifier** icon to display the Magnifier window which has a variety of options. • Select the tool shape, the size of the viewer, and the number of times you want the view to zoom in. • Move the mouse over the image. A window appears. As you move this window around the image, all data within the window is magnified. • To stop the tool, click the Exit icon on the Magnifier screen.
	**Apply To ALL**	Click the **Apply To ALL** check box to apply processing to all images in the grid.

Annotation Tools

Table 5-2: Annotation tools

Icon	Name	Function
	**Left Tag**	• Click the **Left** icon, then click on the image. • To access the Text Input box, which offers options for text entry and formatting and options for presets, double-click the L tag in the image. • To delete an L tag, close the Text Input box (if opened), left-click the green box above the L tag on the image, then press Delete on the keyboard. • To stop the Left Tag tool, click the highlighted L icon in the toolbar.
	**Right Tag**	• Click the **Right** icon, then click on the image. • To access the Text Input box, which offers options for text entry and formatting, and options for presets, left double-click the R tag in the image. • To access options for the R tag for all slices, right-click the R tag on the image. • To delete an R tag, close the Text Input box (if opened), left-click the green box above the R tag on the image, then press Delete on the keyboard. • To stop the Right Tag tool, click the highlighted R icon in the toolbar.
	**Texts**	• Click the **Texts** icon, then click on the image. • The Text Input screen appears on the image, allowing you to add text to the image. Font size and color can be adjusted using the Texts toolbar above the text box. • Close the Text Input screen to stop the Texts tool.
	**Arrow**	Click the **Arrow** icon, then click on the image. • Move the mouse to draw an arrow to a region in the image, then click to end the arrow creation. • To stop the creation of additional arrows, double right-click on the image. • To change the direction or length of the arrow, click and hold one end of the arrow while dragging it. • To stop the Arrow tool, click the highlighted Arrow icon.

Annotation Tools (continued)

Table 5-2: Annotation tools

Icon	Name	Function

	**Ruler**	• Click the **Ruler** icon, then click one end of the area on the image to be measured.
		• Move the mouse along the path to be measured, then click at the end of that path. The distance between the two points is displayed while you move the mouse.
		• To change the measurement from inches to mm or cm:
		  • Click Annotation Settings in the top menu bar.
		  • In the dropdown menu for Unit Type, select mm or cm.
		  • Click Save.
		• To delete the ruler path, select the marker on the image, then press the delete button on the keyboard.

	**Density Box**	• Click the **Density Box** icon, then click on the image. • Drag the mouse to create a rectangle shape, then click to finish the creation of the rectangle. The average pixel intensity in the rectangular region is displayed at the top left corner of the rectangle. • To delete the density box annotation, select it, then press the delete button on the keyboard.
	**Rectangle**	• Click the **Rectangle** icon, then click on the image. • Move the mouse to create a rectangle shape, then click to finish the creation of the rectangle. • To delete the rectangle, select it, then press the delete button on the keyboard.
	**Show Grid on Image**	• Click the **Grid** icon to display a grid on the image along with the Grid Size window. • Options in this window allow to adjust the width and height of the displayed grid and to show or hide the grid. • Use the grid to section out the image into the desired dimensions.

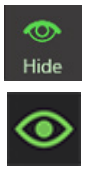
Annotation Tools (continued)

Table 5-2: Annotation tools

Icon	Name	Function
	**Line**	• Click the **Line** icon, then click on the image. • Move the mouse to draw a line from one point to another, then click to finish the creation of the line.
	**Free Hand**	• Click the **Free Hand** icon, then click on the image. • Move the mouse to draw free hand on the image, then click to end the creation of the drawing.
	**Polygon**	• Click the **Polygon** icon, then click on the image. • Move the mouse to create one side of the shape, then click and move again to create another side of the shape. • Repeat this sequence to create the desired shape, then double-click to end the creation of the shape.
	**Ellipse**	• Click the **Ellipse** icon, then click on the image. • Move the mouse to create the shape, then click to end the creation of the shape.
	**Degree**	• Click the **Degree** icon, then click on the image. • Move the mouse and create one side of an angle, then click. • Move the mouse to create the other side of the angle, then click. The degree of the created angle displays. • To stop the tool, click the highlighted Degree icon.
	**Polygon Ruler**	• Click the **Polygon Ruler** icon, then click on the image. As you move the mouse to create one side of the shape, the measurement is displayed. • Click and move again to create another side of the shape. As you repeat this sequence to create the desired shape, measurements show. • Double-click to end creation of the shape.
	**Rectangle Area**	• Click the **Rectangle Area** icon, then click on the image. As you move the mouse to create the rectangle, the area of the shape is displayed. • Click to end creation of the shape.

Annotation Tools (continued)

Table 5-2: Annotation tools

Icon	Name	Function
	**Ellipse Area**	• Click the **Ellipse Area** icon, then click on the image. As you move the mouse to create the ellipse, the area of the shape is displayed. • Click to end creation of the shape.
	**Histogram**	View a graph (**Histogram**) of pixels vs. gray scale values of the whole image.
	**ROI His**	View a graph (**ROI His**) of pixels vs. gray scale values of a selected region of interest.
	**Density Profile**	View a graphical representation (**Density Profile**) of gray scale values as a line profile drawn through any part of the image. This tool is useful in highlighting breaks in continuity or distinct changes in the density of the image.
	**Hide**	Click the **Show/Hide** icon to show/hide annotations on an image.
	**Erase**	Click the **Erase** icon, then click Yes to the prompt to erase all annotations in the image.

View Options

Table 5-3: View options

Icon	Name	Function
	**Seed Analysis**	• Click the **Seed Analysis** icon to use The DIGISEED® seed analysis software.
	**Compare Two Images**	• Click the **Compare** icon to enable a comparison of two images. On the screen that displays, you have options to select the accession number, series, view, image ID, and blended images. • To stop the tool, click another view icon.
	**Display 2D Image**	• Click the **2D View** icon to display the 2D image only.
	**Horizontal Toolbar**	• Click the **Horizontal Toolbar** icon to display the toolbar at the bottom of the screen.
	**Vertical Toolbar**	• Click the **Vertical Toolbar** icon to display the toolbar at the side of the screen.

Window/Level Options

Table 5-4: Window/Level options

	**W/L Adjusts**	• Click the Window/Level **Adjust** icon to display the vertical slides that allow you to adjust W/L in the displayed image. • In either slide, click and hold the button, then drag up or down the slide.
	**W/L Reset**	• Click the Window/Level (**W/L**) **Reset** icon to return the image to the original Window/Level settings.
	**Region of Interest**	• Click the **ROI His** icon to create a box in the image. • Hold the left mouse button down and drag the box within the image to an area you want, then release the mouse. • You can now adjust the W/L within that static box. This W/L is the setting for areas that show within that box as you move around the image.
	**Window of Interest**	• This **WOI** icon adjusts W/L as you move the window around the image.
	**Window/ Level Preset**	• To use a Window/Level Preset, click the Preset you want. The image automatically adjusts to the values. • To change a preset, adjust the Window/Level of the image then Right-click the preset that you want to change then click **Yes** to the prompt about overwriting the existing preset. • Select **YES** to confirm the new value.

Other Image Viewer Tools

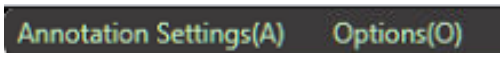
Table 5-5: Other image viewer tools

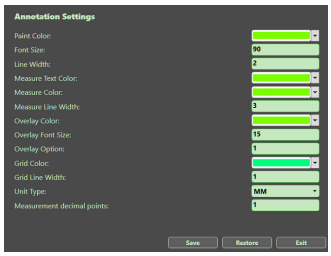
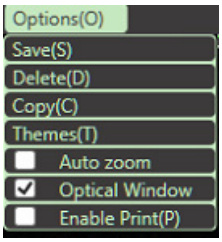
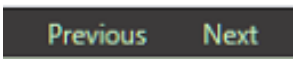
Icon	Name	Function
	**Reset**	Click the **Reset** icon to delete all the annotations on the displayed image.
	**Exit**	Click the **Exit** icon to return to the Main screen.

Image Viewer Menu

The Image Viewer menu at the top of the screen has options for displaying and handling acquired images. Menu items are described in the following table.

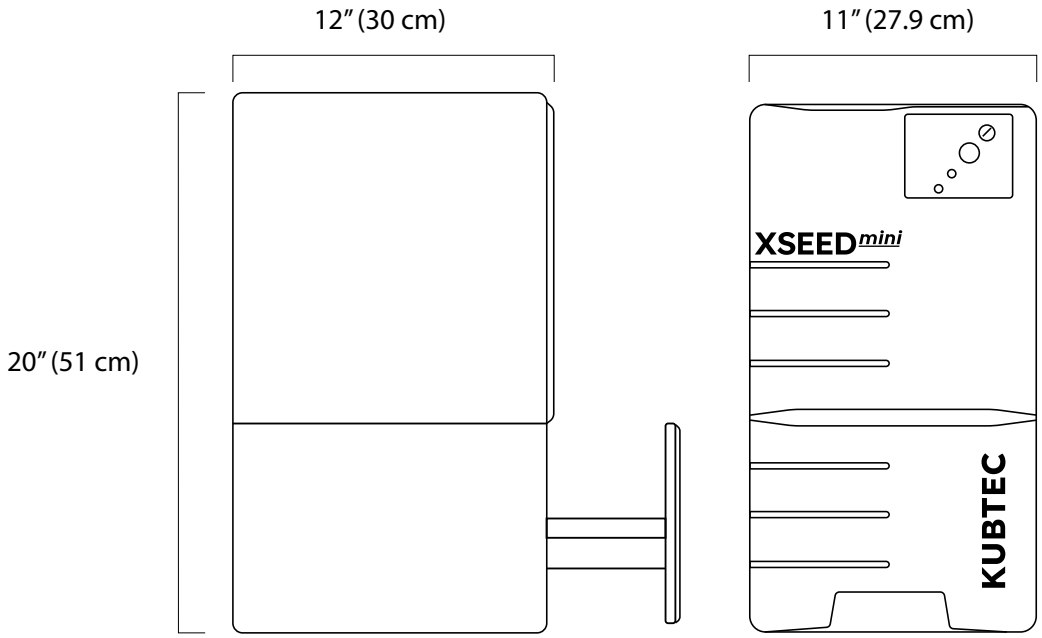
Table 5-6: Image Viewer menu



Menu Item	Function
Annotation Settings (A) 	Provides options for the appearance of annotations on the image. You can select the color and size of the overlay as well as the grid, and adjust the unit of measurement.
Options (O) 	**Save(S)** - Click **Save** to overwrite the original image with the current image that is displayed in the image viewer. **Delete(D)** - Click **Delete** to remove the displayed image from the study. **IMPORTANT: Deleted images cannot be recovered.** **Copy(C) -** Makes a copy of the displayed image. **Themes(T) -** Provides options for changing the color scheme of the image viewer. **Auto zoom** - When enabled, uses image processing to locate the seed, then zooms in until the whole seed is visible and fills as much of the screen as possible. **Optical Window** - *Not available in this system.* **Enable Print(P) -** When enabled, it allows printing the image displayed on the screen.
	Provides the means to scroll through acquired images.

CHAPTER 6: SYSTEM SPECIFICATIONS

System Diagram



System Specifications

The following tables list specifications for The XSEED® Mini System components:

Electrical Requirements

Table 6-1: Electrical requirements

Input line voltage	100–130 VAC 200–250 VAC
Peak input power	500 W
Frequency	50/60 Hz

Physical Construction

Dimensions - exterior cabinet	11″ x 12″ x 20″ (28 cm x 30 cm x 51 cm)
Dimensions - exterior with cart	23″ x 34″ x 52″ (58 cm x 86 cm x 132 cm)
Dimensions - interior	**Lower drawer:** 6.88″ W x 8.16″ D x 1.25″ H (17.47 cm x 20.74 cm x 3.18 cm) **Upper (mag) drawer:** 5.96″ W x 6.58″ D x 1″ H (15.14 cm x 16.73 cm x 2.54 cm)

Physical Construction (continued)

Weight (cabinet)	70 lbs (32 kg)
Weight with cart	170 lbs (77 kg)
Temperature range (user operation)	0–35°C (32–95°F)
Humidity	10–80% RH

X-ray Source

Table 6-3: X-ray source specifications

Energy range	20–50 kV
Anode type	Tungsten
Maximum potential	50 kVp
Maximum current	1.0 mA
Maximum wattage	50 W
Focal spot	50 µm nominal
Window material	0.127 mm (0.05″) beryllium

Detector

Table 6-4: Detector specifications

Type	CMOS
Pixel matrix	1300 pixels x 2304 pixels
Image size	3″ x 5″ (8 cm x 12 cm)
Imaging area	Lower drawer: 3″ x 4″ (6 cm x 11 cm) Upper (mag) drawer: 2″ x 3″ (4 cm x 8 cm)
Active imaging area	5″ x 3″ (13 cm x 8 cm)
Pixel size	49.5 µm
Resolution	1300 x 2304
DQE	76% @ 1 lp/mm
Bit depth	16-bit

Geometric Magnification

Table 6-5: Geometric magnification

Type	Two levels (drawers)
Magnification	Contact - 1.0x Magnification drawer - 1.5x

CHAPTER 7: SYSTEM MAINTENANCE

Introduction

This chapter provides information on actions that users need to perform to maintain the safe and consistent performance of the system. The first section of this chapter provides information about cleaning and disinfection. There are recommendations for products to use and procedures to follow.

The second section of this chapter contains checklists for the routine system inspections.

NOTE: To avoid damage to the system and unnecessary cleaning, protect the equipment from dust, dirt, and any other environmental hazards that can damage surfaces or impair operation.

Cleaning and Disinfecting

Cleaning

At the completion of each study, clean and disinfect the interior components of the upper cabinet and all system controls and components that the user touched during the examination. This practice is both for user protection and to avoid cross-contamination of samples.

For the purposes of this manual, cleaning means wiping off dust, fingerprints, and other substances that do not contain bodily fluids. Solutions for this purpose are over-the-counter neutral detergents and/or liquids. Be sure to use a soft cloth with these cleaners.



CAUTION: Harsh liquids or rough clothes will damage system surfaces.



CAUTION: Use only a glass cleaner and a soft cloth on any leaded glass, if present. The leaded glass is designed especially for protection against X-ray radiation exposure. Abrasives may damage its protective capabilities.

- Clean controls and stainless steel surfaces with a no-rinse liquid cleaner.
- Clean glass surfaces with a glass cleaner and a soft cloth.
- Clean other machine surfaces with a glass cleaner and a soft cloth.
- To keep the displayed images distinct, regularly clean the following:
  - Top and bottom of the acrylic tray with an acrylic plastic cleaner and a soft cloth.
  - Top of the carbon fiber detector with a mild, non-abrasive cleanser such as isopropyl alcohol.

Cleaning and Disinfecting (continuation)

Disinfection

For the purposes of this manual, disinfecting means using approved solutions to wipe areas that have come into contact with body fluids.

Approved solutions

The following list shows solutions (and their main ingredients) that KUBTEC® approves for use in cleaning/disinfecting the system.

KUBTEC approved item	Ingredients
CaviWipes-XL	Quaternary ammonium + alcohol disinfectant
Accel-TB wipes	Stabilized hydrogen peroxide
PDI and Clorox disinfectant bleach wipes	1:10 hypochlorite: water
PDI super sanicloth wipes	Quaternary ammonium and isopropyl alcohol (IPA) disinfectant

Areas to clean/disinfect



WARNING: To disinfect trays, use a soft cloth that is dampened with an approved solution to wipe the tray surface. DO NOT spray or spill solutions directly onto the detector surface.

In addition to cleaning/disinfecting surfaces that come in contact with and hold the samples, surfaces touched by the user(s) also need to be cleaned/disinfected at the end of each exam. These surfaces include:

- Interior and exterior walls of the cabinet
- Inside cover on the system drawer
- Magnification tray rails
- Cabinet control panel buttons and indicators
- Monitor
- Keyboard and keyboard tray

NOTE: It is also recommended that you clean and disinfect the power cord before removing the system from the facility.

Daily Inspection Checklist

Perform the following inspection daily, before you use the system. Contact a KUBTEC representative or distributor if there is any problem.

Inspection	Review	Remedy
Visual	Are there any anomalies with the system?	If there are any visual anomalies during this procedure, contact KUBTEC or your distributor.
Test image	Were you able to complete a test exposure?	If there are any issues completing a test exposure, or with the quality of the image, contact KUBTEC or your distributor.

Yearly Inspection

Preventive Maintenance services are to be performed annually by a KUBTEC engineer or a KUBTEC-trained engineer. This ensures your system is kept compliant with performance and regulatory guidelines.

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Frequently Asked Questions

Frequently Asked Questions

This section provides answers to questions that users typically ask about the system.

Q: How do I turn on the computer?

The computer initiates automatically when the power switch of the system cabinet is turned on.

Q: How long does the UPS (optional) last when AC power is interrupted?

The standard UPS maintains the usability of the system for about 24-30 minutes. The longevity of usability depends on the activity being performed by the system.

Q: Do I have to keep the unit plugged in?

If the system has a UPS, KUBTEC® recommends leaving the system plugged in so that the UPS is always charged. If the system does not have a UPS, you can unplug the unit when it is not in use.

Q: Should I remove the key at night?

Follow institutional policy regarding X-ray equipment. To prevent unauthorized use of the system, KUBTEC recommends the removal of the key when the system is not in use.

Q: Is the unit equipped with Wi-Fi?

The unit has a wireless Ethernet adapter.

Q: Does it matter how I position the seed in the unit?

Arrange the seeds within the border lines on the tray, ensuring they do not overlap for proper analysis with The DIGISEED® Software. For customers imaging seeds in a well plate, we do not recommend using The DIGISEED® Software for image analysis.

Q: Am I being exposed to radiation? Do I need a lead apron for shielding?

X-rays are controlled and sealed inside the unit. A lead apron is not required.

Q: How can I clean the unit?

Wipe the tray of the seed chamber with a soft cloth that is dampened with an ethanol or glutaraldehyde solution to disinfect and prevent infection. Do not spray or spill solutions directly onto surfaces. Refer to the Maintenance chapter in the Instruction for Use for more details about cleaning and disinfection.

Q: How often does the system need to be serviced?

Manufacturer's recommendation is that the system gets serviced once a year by a KUBTEC trained/certified technician.

Troubleshooting

Problem	Cause	Solutions
Key switch is set to ON, and the power button is pressed. (Power indicator is not lit: system does not start).	System is not receiving power	• Make sure the red rocker switch (the power switch) is in the ON position. • Make sure the power cord is fully inserted into the power outlet on the wall. • Make sure the wall receptacle that the unit is plugged into is live.
System has power but will not generate X-rays. **(Ready light on the control panel is not lit).**	• System is still warming up. **AND/OR** • X-RAY interlock switch is not engaged.	• Make sure the system drawer is shut tightly. • Turn off power, wait a few minutes, then restart the system. • When the system is ready to generate X-rays, the "READY" light is lit.
"Out of Memory" message appears on the monitor	Too many computer applications running along with The DIGISEED® Software.	• Close some of the computer applications. • Reboot Windows®.

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