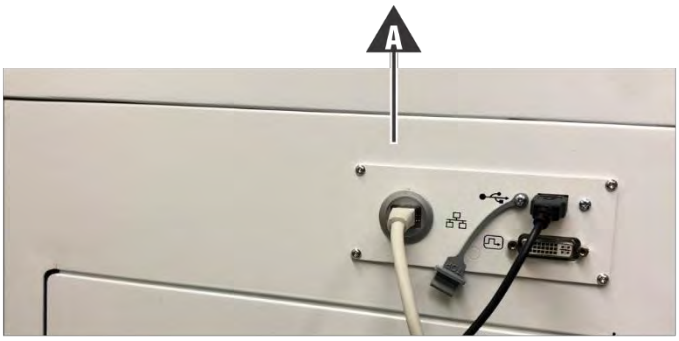
Appendix G: Setting up the Medtronic O-arm 1 Scanner

Use the procedures below to set up the Medtronic O-arm 1 scanner.

G.1: Connecting Ethernet Cable to XVISION-SPINE

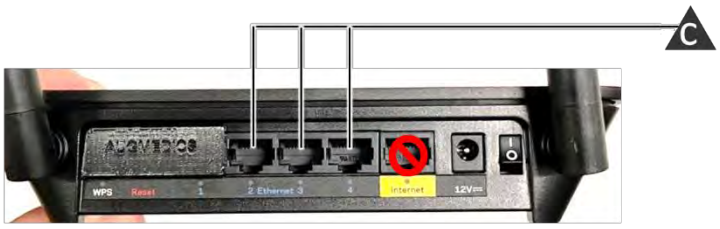
Note: The ethernet cable must be a CAT6a cable (10,000 Mbit/s, 500MHz) or higher.

Figure: Plugging Ethernet Cable to O-arm 1 Workstation (A)



1. Plug one end of the ethernet cable into the rear of the O-arm 1 workstation (A).
2. In case the system's configuration is Roll Stand AIO, proceed to step #3.
   If the system's configuration is WS-Cart **Skip Step #3**

   Figure: Plugging Ethernet Cable to Router (C) - Roll Stand configuration



3. Plug the other end of the ethernet cable into the rear of the XVISION-SPINE router as follows:
   - In the XVISION-SPINE router, plug the cable into any of LAN ports 2-4 (C).
   - Skip Step #4

Note: Do not plug the ethernet cable into the WAN port.

Figure: Plugging Ethernet (D) - WS-Cart configuration

Located at the left side below the storage drawer.

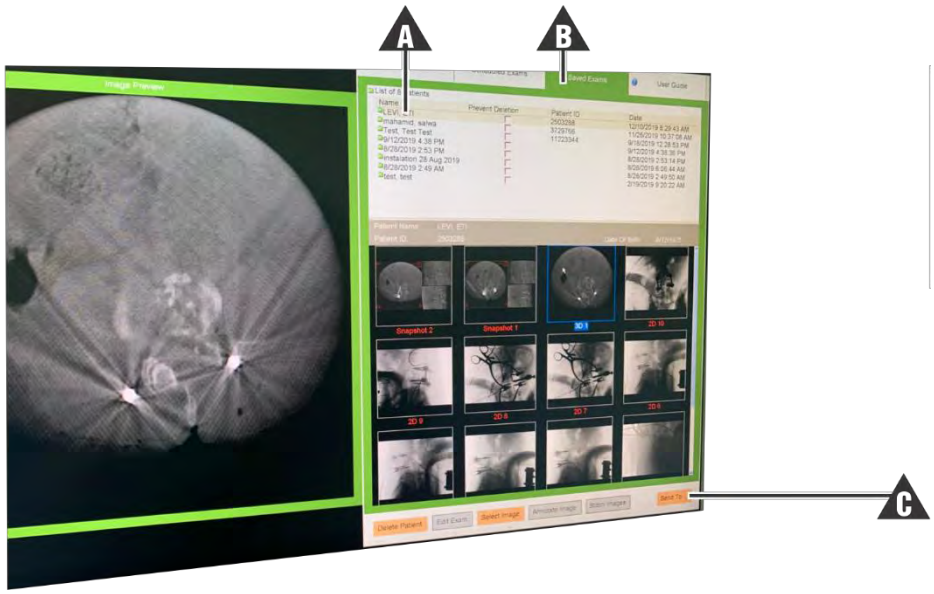
4. Plug the other end of the ethernet cable into the left side external LAN port of the WS-Cart as described in the figure above **(D)**.

Note: Do not plug the ethernet cable directly to the router.

G.2: Setting IP address

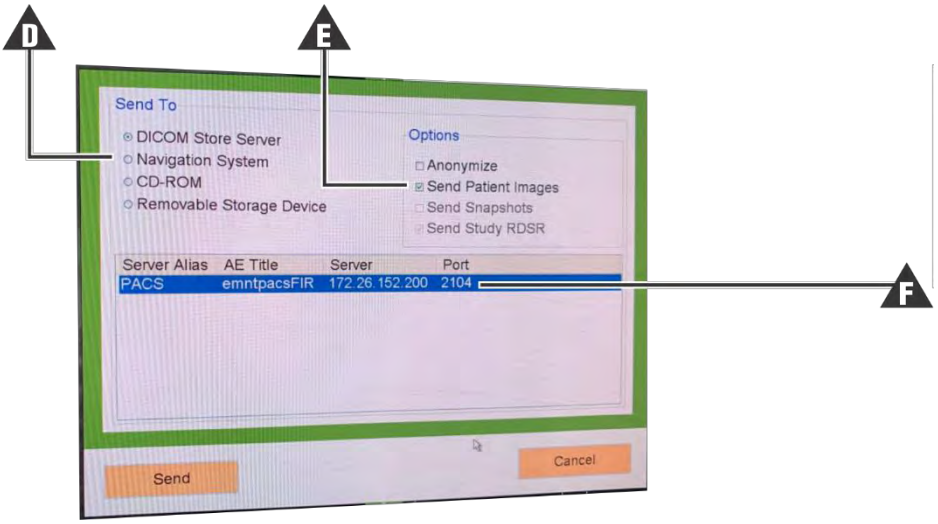
Use the procedure below to set the IP address.

Figure: Setting IP Address (1st step)



1. Select an existing study (A), select **Saved Exams** (B) and press **Send To...** (C).

Figure: Setting IP Address (2nd step)

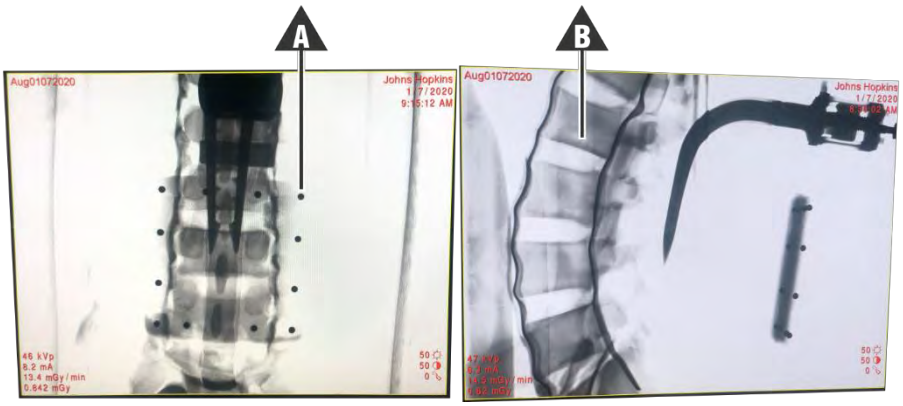


2. Press DICOM Store Server or Navigation System (D) and Send Patient Images (E).
3. Copy Stealth IP information (F) into the **XVS SOFTWARE**. See *Configuring the Scanner Imaging Protocol* on page 5-34 for more information.

G.3: Imaging Settings

Configure imaging setting as follows:

Figure: Configure Imaging Setting (1st step)



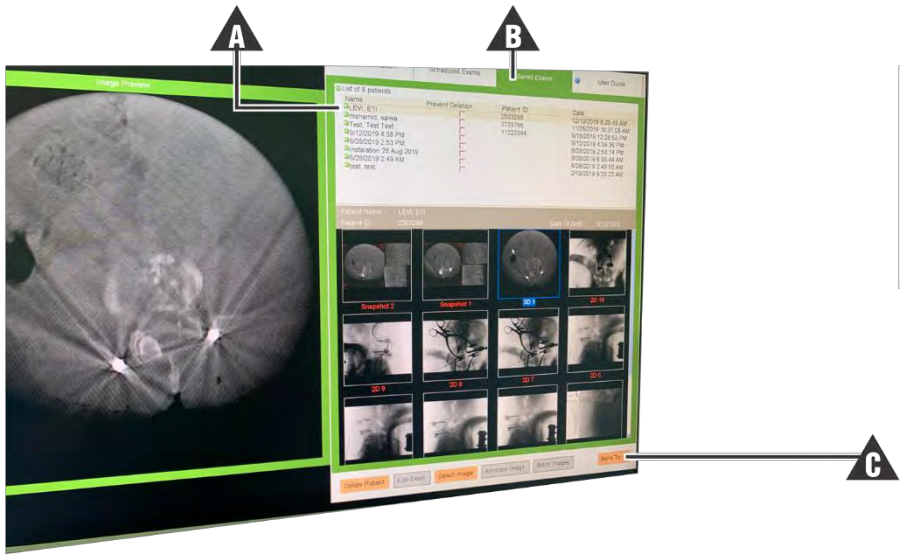
1. Make sure all Z-Marker beads (A) and anatomy (B) are in both axial and lateral scout shots.
2. Have the radiology technician set the following 3D settings prior to the 3D spin:
   - Always select **HD**
   - Select anatomy location
   - Select patient size (only use Medium, Large or XL)
   - Select patient positioning
   - Select side O-arm in coming in from
   - Patient's breath must be held before scan.
3. Scroll through 3D axial image and make sure all Z-Marker 12 beads are visible, as in the figure below.

Figure: Configure Imaging Setting (2nd step)

G.4: Sending Image to XVISION-SPINE

When the scan is complete, press **ESC** to return to the menu.

Figure: Sending Image to XVISION-SPINE (1st step)



1. Select the current patient (A), press **Saved Exams** (B) and then press **Send To…** (C).

Figure: Sending Image to XVISION-SPINE (2nd step)

2. Press **Navigation System** (D), **Send Patient Images** (E) and then press **Send** (F).

   Information is automatically sent to **XVS SOFTWARE**.

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Appendix H: Setting up the Brainlab Airo Scanner

Use the procedures below to set up the Brainlab Airo scanner.

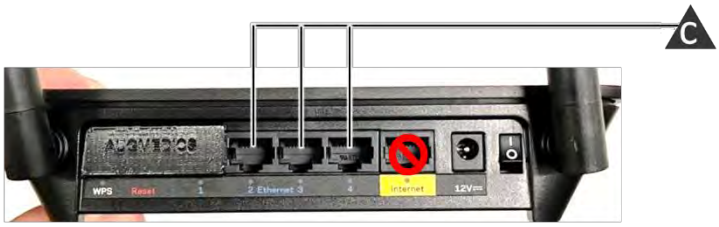
H.1: Connecting Ethernet Cable to XVISION-SPINE

Note: The ethernet cable must be a CAT6a cable (10,000 Mbit/s, 500MHz) or higher.

Figure: Plugging Ethernet Cable to Brainlab Airo Workstation (A)

1. Plug one end of the ethernet cable into the left NAV port at the rear of the Brainlab Airo workstation (A).
2. In case the system's configuration is Roll Stand AIO, proceed to step #3.
   If the system's configuration is WS-Cart Skip Step #3

   Figure: Plugging Ethernet Cable to Router (C) – Roll Stand configuration



3. Plug the other end of the ethernet cable into the rear of the XVISION-SPINE router as follows:
   - In the XVISION-SPINE router, plug the cable into any of LAN ports 2-4 (C).
   - Skip Step #4

Note: Do not plug the ethernet cable into the WAN port.

Figure: Plugging Ethernet (D) – WS-Cart configuration

Located at the left side below the storage drawer.

4. Plug the other end of the ethernet cable into the left side external LAN port of the WS-Cart as described in the figure above **(D)**.

Note: Do not plug the ethernet cable directly to the router.

H.3: Setting IP Address

Use the procedure below to set the IP address.

Figure: Setting IP Address (1st step)

1. Select an existing study (A) and press **Next** or **Export** (B).

Figure: Setting IP Address (2nd step)

2. Select the listed server (C) and then press **Send to DICOM node** (D).

Figure: Setting IP Address (3rd step)

3. If the image transfer fails (E), an error message will display the IP information (F). Copy the IP address into the XVS SOFTWARE. See *Configuring the Scanner Imaging Protocol* on page 5-34 for more information.

H.4: Imaging Settings

1. Make sure that all Z-Link beads and anatomy are in both axial and lateral scout shots.

Note: Because there is no monitor this is accomplished using hand control.

2. Have the radiology technician set the following 3D settings prior to the 3D spin:
   - Patient age and weight
   - Select anatomy location
   - Scanner automatically sets scan parameters based on patient information
   - Patient's breath must be held before scan

Figure: Imaging Settings

3. Scroll through the 3D axial image (A) and make sure that all Z-Marker 12 beads are in the image.

H.5: Sending Image to xvision-Spine

Information is sent automatically to XVS SOFTWARE after the scan.

Note: Archived studies cannot be sent.

Appendix I: Setting up the Ziehm RFD 3D Scanner

Use the procedures below to set up the Ziehm RFD 3D scanner.

I.1: Connecting Ethernet Cable to XVISION-SPINE

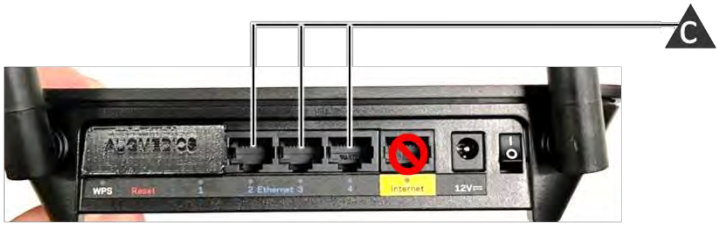
Note: The ethernet cable must be a CAT6a cable (10,000 Mbit/s, 500MHz) or higher.

1. Plug one end of the ethernet cable at the rear of the Ziehm monitor (A).

Figure: Plugging Ethernet Cable to Ziehm Monitor (A)

2. In case the system's configuration is Roll Stand AIO, proceed to step #3.
   If the system's configuration is WS-Cart **Skip Step #3**

   Figure: Plugging Ethernet Cable to Router (C) - Roll Stand configuration



3. Plug the other end of the ethernet cable into the rear of the XVISION-SPINE router as follows:

- In the XVISION-SPINE router, plug the cable into any of LAN ports 2-4 (C).
- Skip Step #4

Note: Do not plug the ethernet cable into the WAN port.

Figure: Plugging Ethernet (D) – WS-Cart configuration

Located at the left side below the storage drawer.

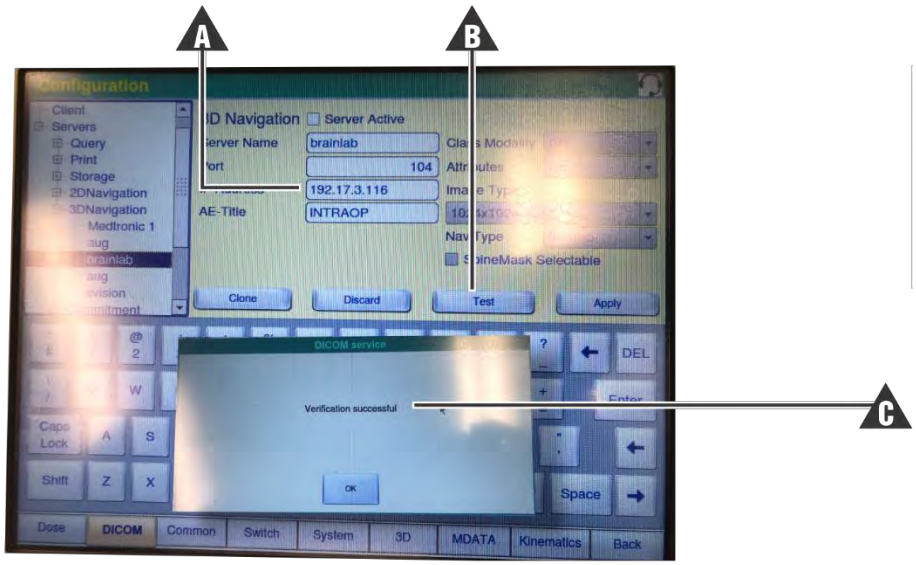
4. Plug the other end of the ethernet cable into the left side external LAN port of the WS-Cart as described in the figure above **(D)**.

Note: Do not plug the ethernet cable directly to the router.

I.2: Setting IP address

A trained Ziehm employee or distributor must be on site to set up the IP address.

Figure: Setting IP Address

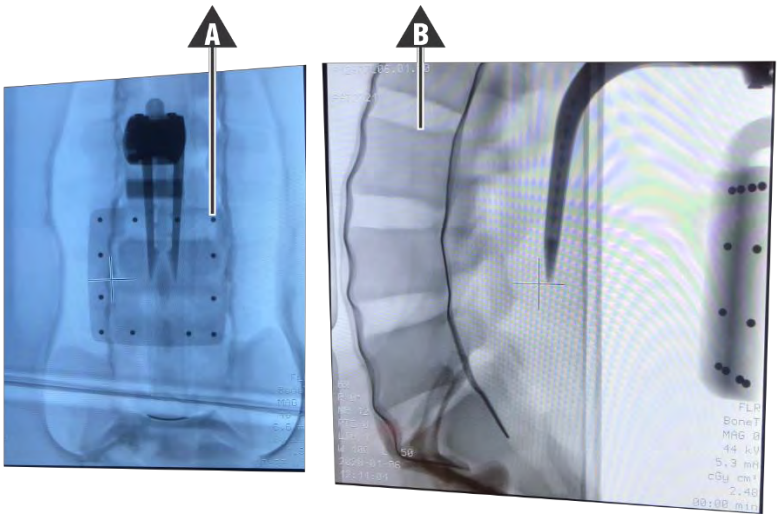


1. When this is performed, copy the IP address (A) into the **XVS SOFTWARE**. See *Configuring the Scanner Imaging Protocol* on page 5-34 for more information.
2. In the Ziehm console press **Test** (B). The **Verification Successful** window (C) indicates that the test has been completed.

I.3: Imaging Settings

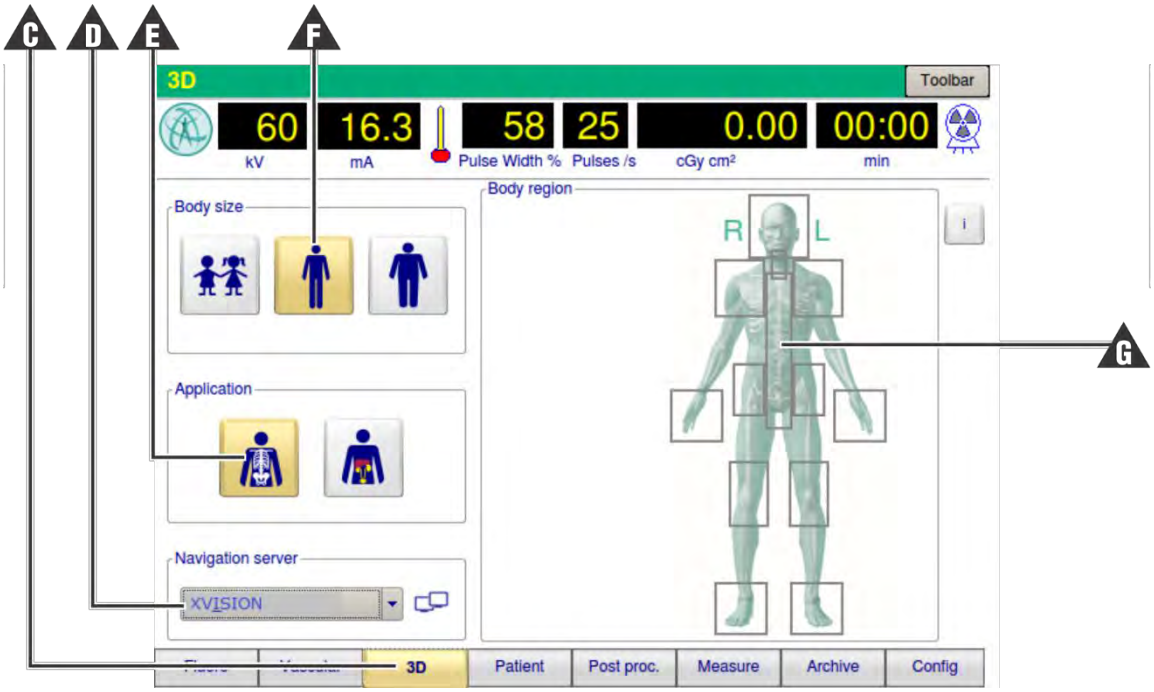
Configure imaging setting as follows:

Figure: Imaging Settings (1st step)



1. Make sure all Z-Marker beads (A) and anatomy (B) are in both axial and lateral scout shots.

Figure: Imaging Settings (2nd step)



2. Have the radiology technician set the following 3D settings prior to the 3D spin:
   - **3D** (C)
   - Navigation Server: **XVision** (D)
   - Application: **Bone** (E)
   - Body Size: **Adult** (F)
   - Body region: **Spine** (G)
3. Follow the instructions and steps to perform a 3D scan. The scanner automatically sets the scan parameters based on patient information.

Note: Patient's breath must be held before the scan.

When the scan is complete, scroll through the 3D axial image and make sure that all Z- Marker 12 beads are in the image.

I.4: Sending Image to xvision-Spine

The 3D images are sent automatically to the navigation system.

Note: If data is not received by the navigation system, press **Navigation** on the right monitor of the C-arm monitor card. See the service manual for more information.

Appendix J: Setting up the Siemens Healthineers Cios Spin Scanner

Use the procedures below to set up the Cios Spin scanner.

J.1: Initial Set Up

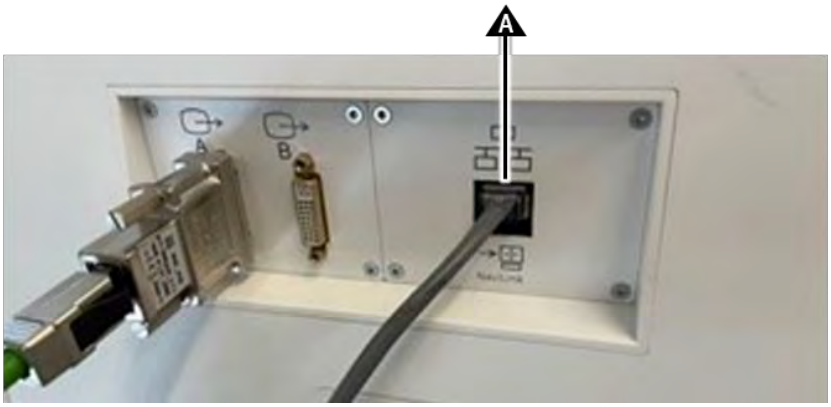
1. Power on the XVISION-SPINE system.
2. Make sure the All-In-One Computer is connected to the XVISION-SPINE network.
3. Power on the Siemens Healthineers Cios Spin system.
4. Make sure that the C-Arm is connected to the Cios Spin workstation.

J.2: Connecting Siemens Healthineers Cios Spin to XVISION-SPINE

Note: The ethernet cable must be a CAT6a cable (10,000 Mbit/s, 500MHz) or higher.

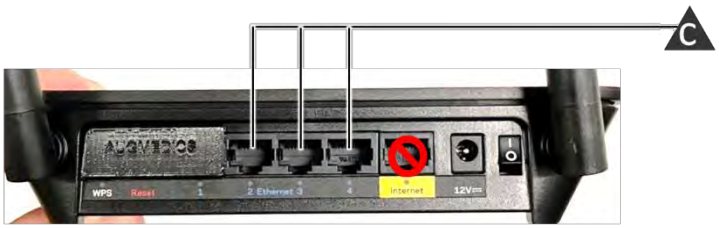
1. Plug one end of the ethernet cable into the NaviLink port at the Cios Spin workstation (A) side.

Figure: Plugging Ethernet Cable to Cios Spin Monitor (A)



2. In case the system's configuration is Roll Stand AIO, proceed to step #3.
   If the system's configuration is WS-Cart Skip Step #3

   Figure: Plugging Ethernet Cable to Router (C) - Roll Stand configuration



3. Plug the other end of the ethernet cable into the rear of the XVISION-SPINE router as follows:
   - In the XVISION-SPINE router, plug the cable into any of LAN ports 2-4 (C).
   - Skip Step #4

Note: Do not plug the ethernet cable into the WAN port.

Figure: Plugging Ethernet (D) – WS-Cart configuration

Located at the left side below the storage drawer.

4. Plug the other end of the ethernet cable into the left side external LAN port of the WS-Cart as described in the figure above **(D)**.

Note: Do not plug the ethernet cable directly to the router.

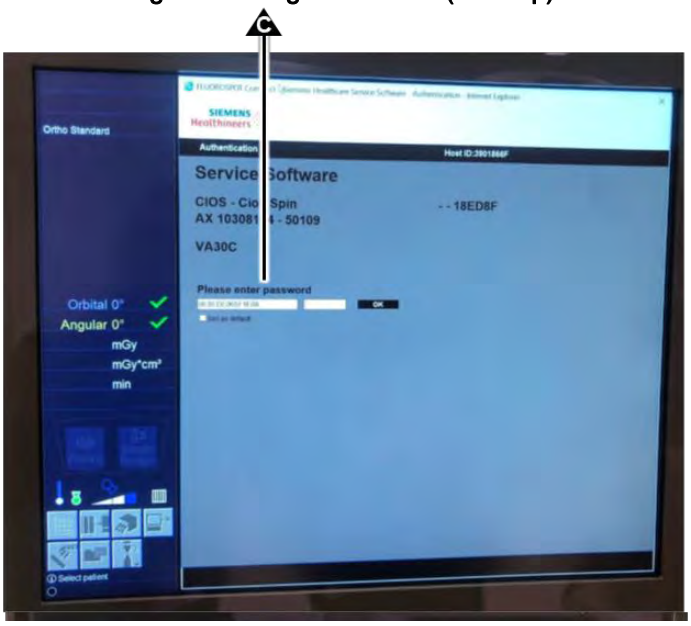
J.3: Setting IP Address

A Siemens Healthineers representative must be on site to set up the IP address.

Figure: Setting IP Address (1st step)

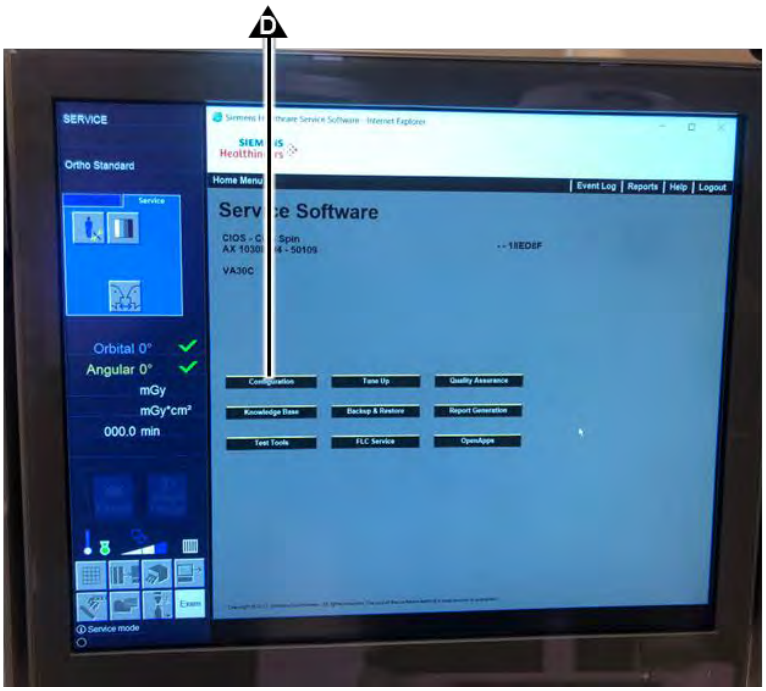
1. Select the **Service** tab (A) and the **Man/Tool box** icon (B).

Figure: Setting IP Address (2nd step)



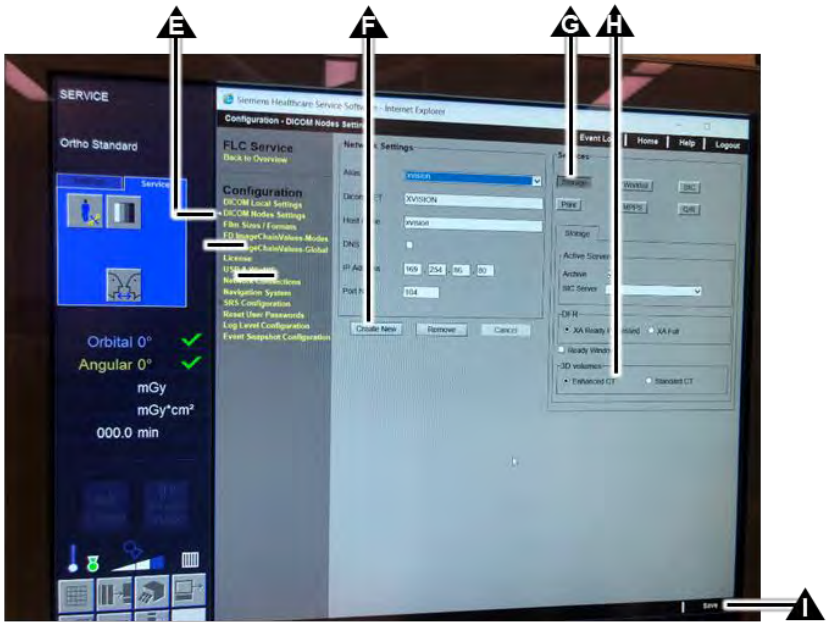
2. The Siemens Healthineers representative enters the password (C).

Figure: Setting IP Address (3rd step)



3. Press Configuration (D).

Figure: Setting IP Address (4th step)



4. Press DiCOM Node Settings (E)
5. Press Create New (F).

6. The Siemens Healthineers representative assigns the following information:
   - Server
   - Port
   - IP Address
   - AE Title
7. Press **Storage** (G).
8. Press **Enhanced CT** (H) for 3D Volumes.
9. Press **Save** (I).
10. Copy the Cios Spin IP information into the **XVS SOFTWARE**. See *Configuring the Scanner Imaging Protocol* on page 5-34 for more information.

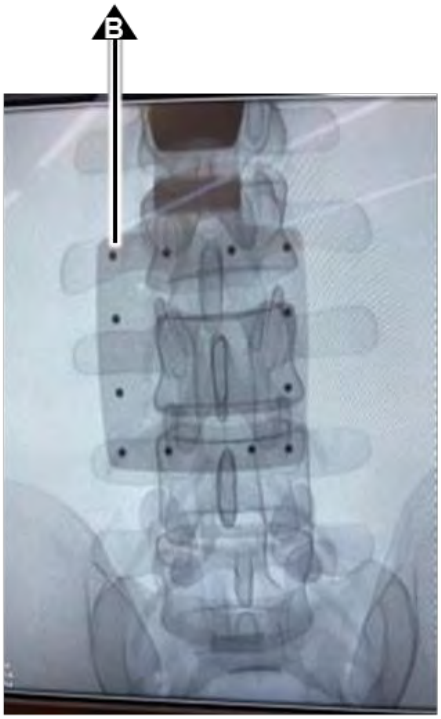
J.4: Imaging Settings

After attaching the Registration Marker to the clamp, follow the procedure below.

1. Prepare for 2D scout shots as follows:
   - Make sure that the Registration Marker is as close to the skin as possible without it applying pressure.
   - Use the lasers to align the C-arm with the midline of the patient and the Registration Marker in the AP/coronal plane.
   - Adjust the height of the C-arm/bed to line up the lasers in the Lateral/sagittal plane. Try to get the patient in the iso-center of the C-arm.
   - Make sure that the Ethernet cable is correctly connected to the **XVISION-SPINE** router and Cios Spin workstation.

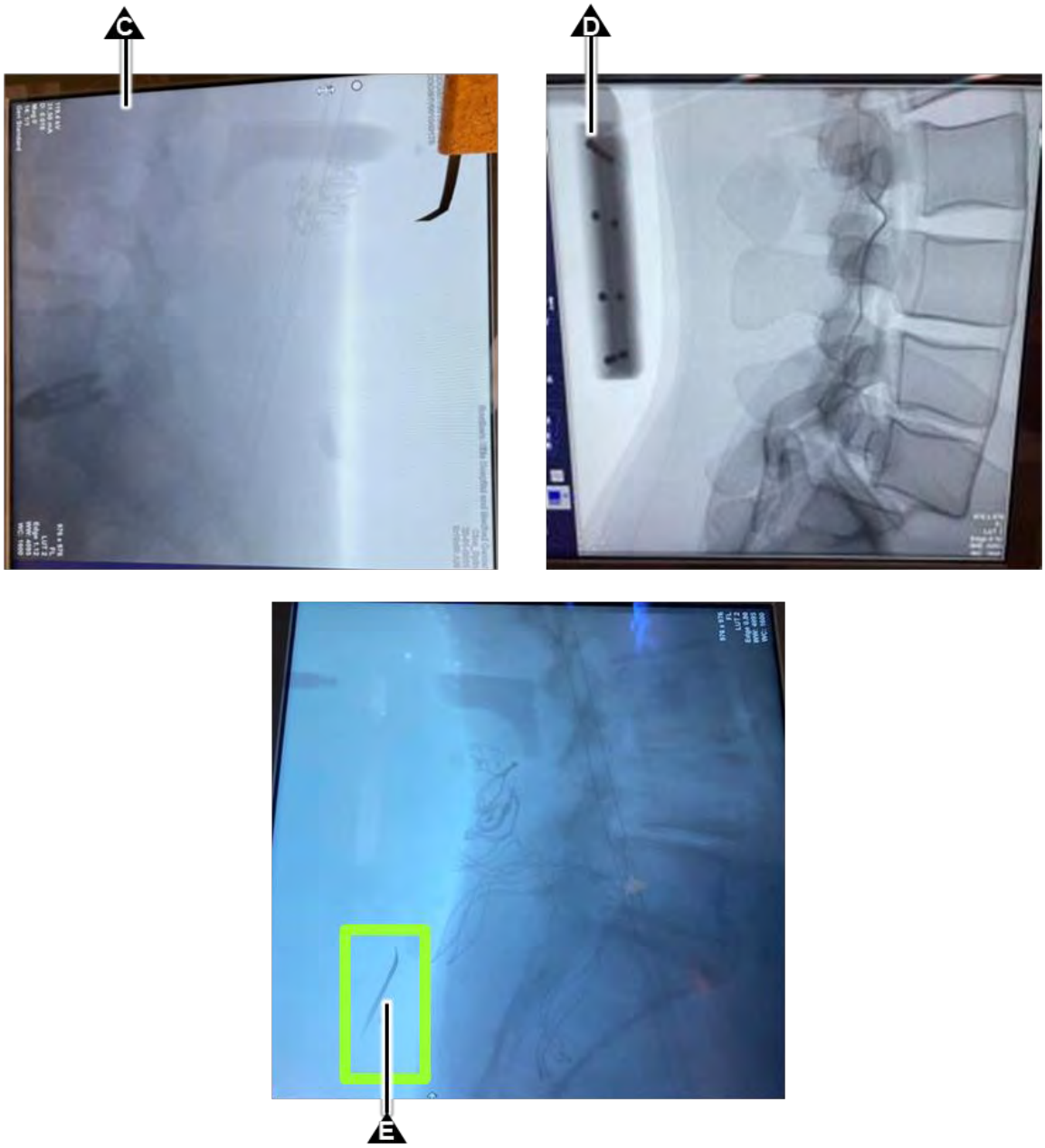
Note: In most cases it is recommended to capture four lumbar bodies or five to six thoracic bodies per 3D scan.

Figure: Imaging Settings (1st step)



2. Take a 2D AP scout shot (A), making sure that:
   - The spine and ROI are in the middle of the scan
   - All Z-Marker 12 beads (B) and the relevant anatomy are visible
   - Space is left above and below the ROI to Make sure all the relevant anatomy is present in the 3D scan

Figure: Imaging Settings (2nd step)



3. Take a 2D lateral scout shot (C), as follows:
   - Make sure that the anterior edges of the vertebral bodies are aligned with the edge of the screen, by adjusting the height of the C-arm/bed as necessary.
   - Make sure the relevant anatomy and, ideally, four rows of beads (D) on the Z-Marker are visible.
   - If the Z-Marker is difficult to see in the shot, adjust the scanner brightness and contrast as necessary (E).
   - If desired, the surgeon can place a radiopaque item (Penfield) near the Z-Marker for

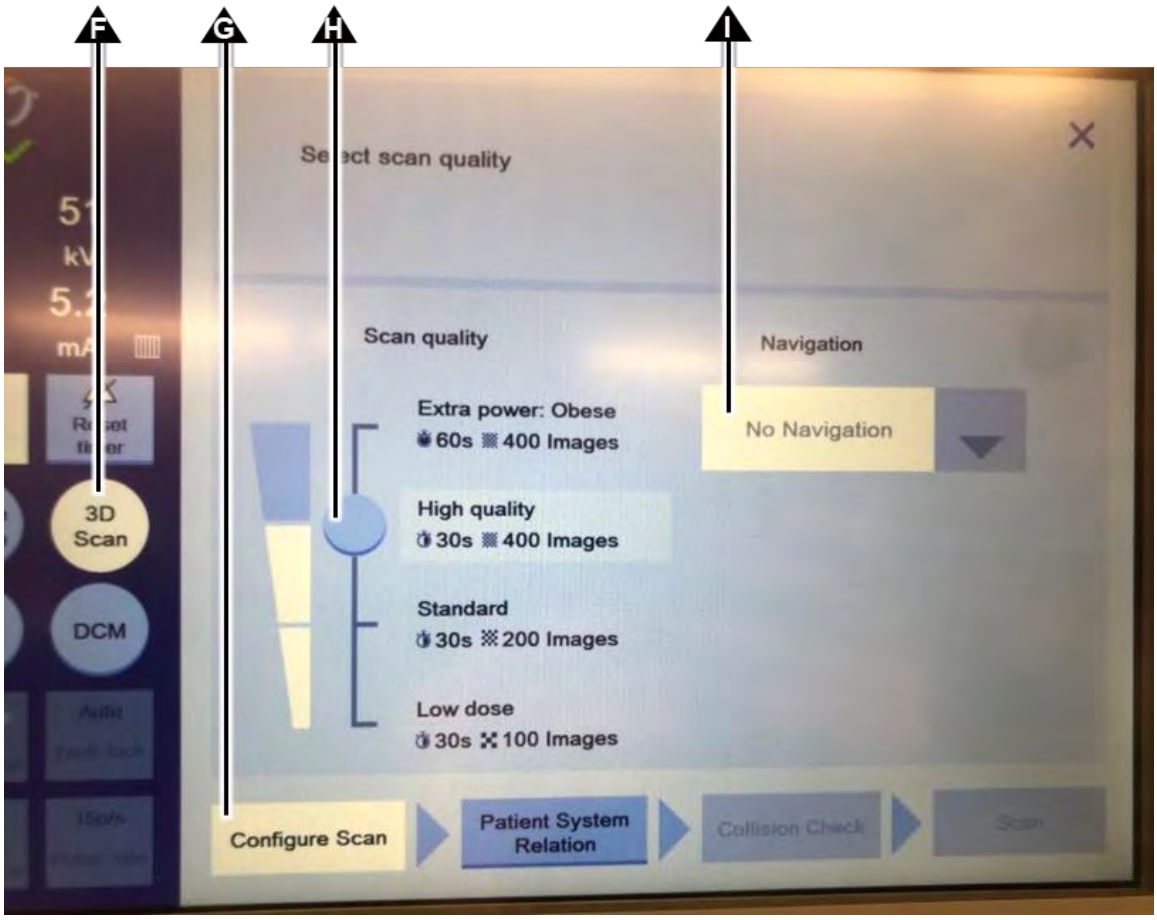
reference.

- Leave space above the Z-Marker to make sure that, during the scan, parallax does not distort the beads and prevent them from registering.
- Leave space cranial and caudal of the ROI to Make sure all the relevant anatomy is present in the 3D scan.

Note: If significant adjustments are made to the C-arm/bed, take another AP Scout shot to confirm that all is as required before performing the collision check and 3D scan.

4. Remove any radiopaque item (Penfield) that was used.

Figure: Imaging Settings (3rd step)



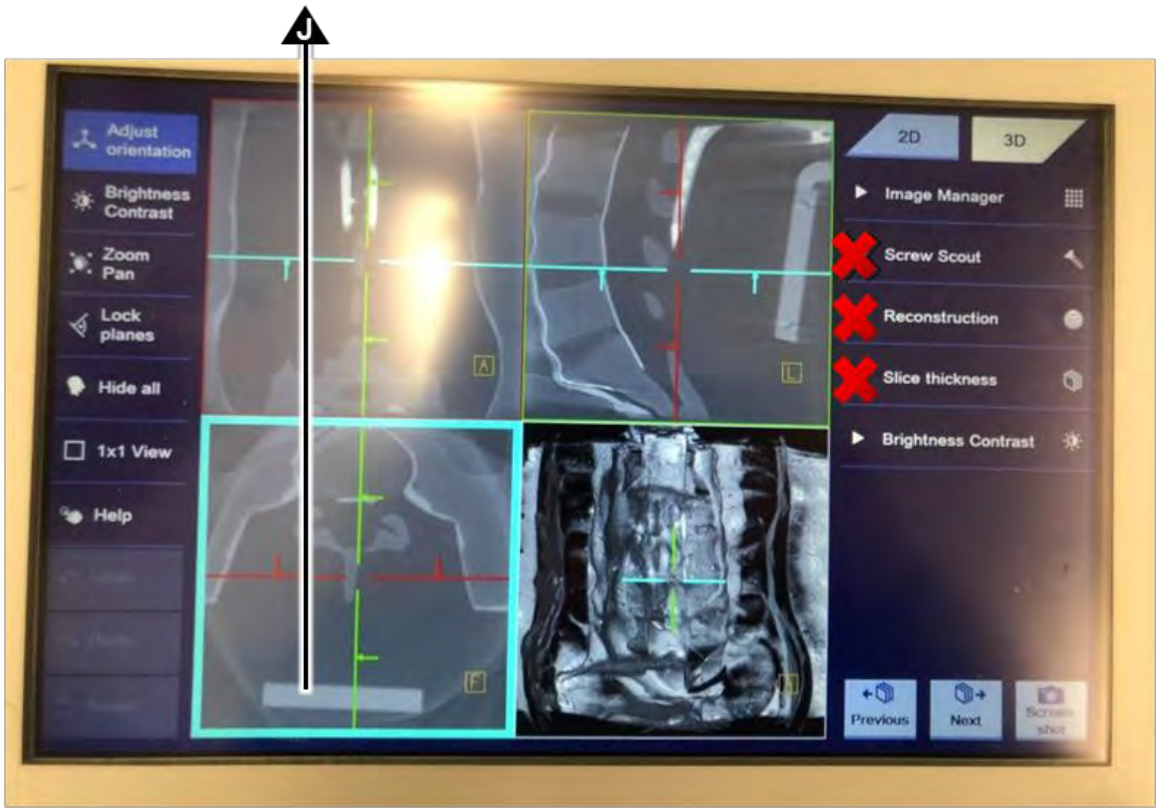
5. In the **3D Scan** settings (F), in the **Configure Scan** screen (G), set the following:
   - **Scan quality** = **High Quality** (H): recommended for most patients
   - **Navigation** = **No Navigation** (I)
6. In the **Patient System Relations** screen, perform the following:
   - Select patient positioning
   - Select the side from which that the C-arm comes

7. Perform a **Collision Check**.

Note: If the C-arm does not pass the Collision Check and needs to be adjusted, consider retaking both scout shots after the adjustment.

8. Perform a 3D **Scan**, making sure that:
   - The patient's breath is held
   - The patient does not move

Figure: Imaging Settings (4th step)



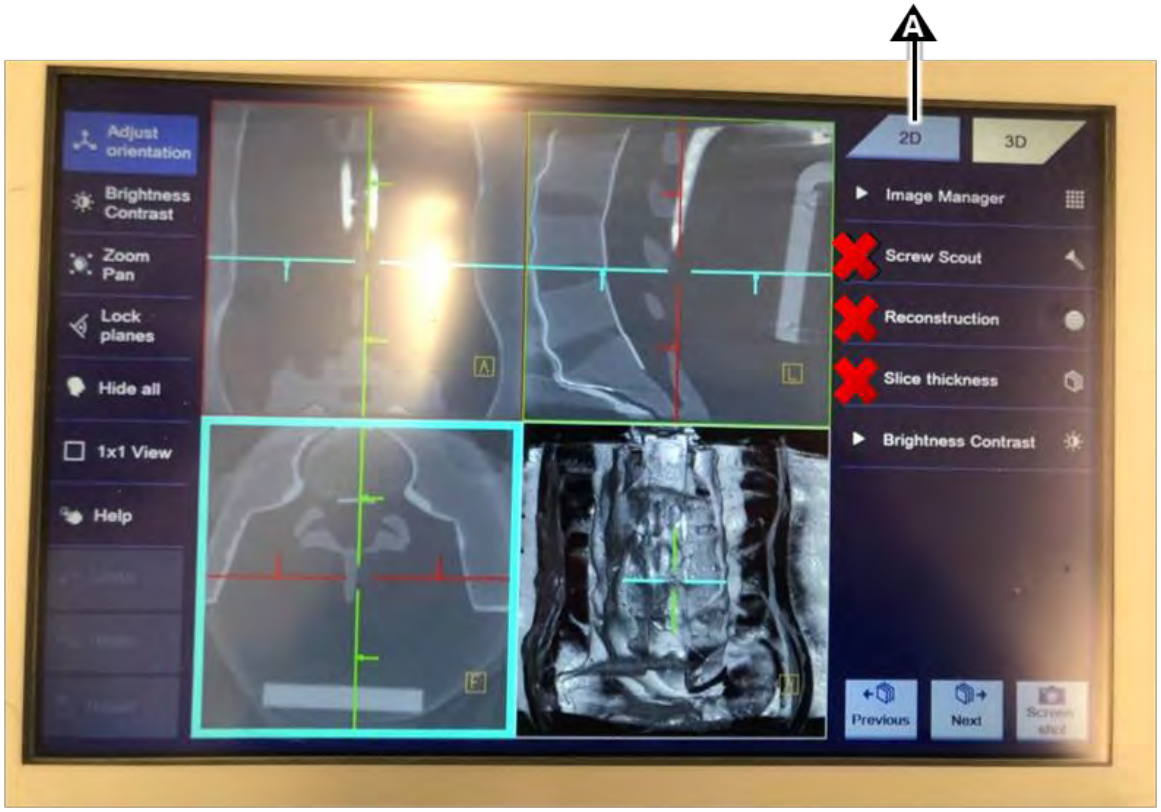
9. Scroll through the 3D axial images (J) and make sure that all Z-Marker 12 beads and the relevant anatomy are both in the image.

Note: Do not make any reconstructions or image modifications before sending the original 3D axial scan to XVISION-SPINE.

J.5: Sending Image to XVISION-SPINE

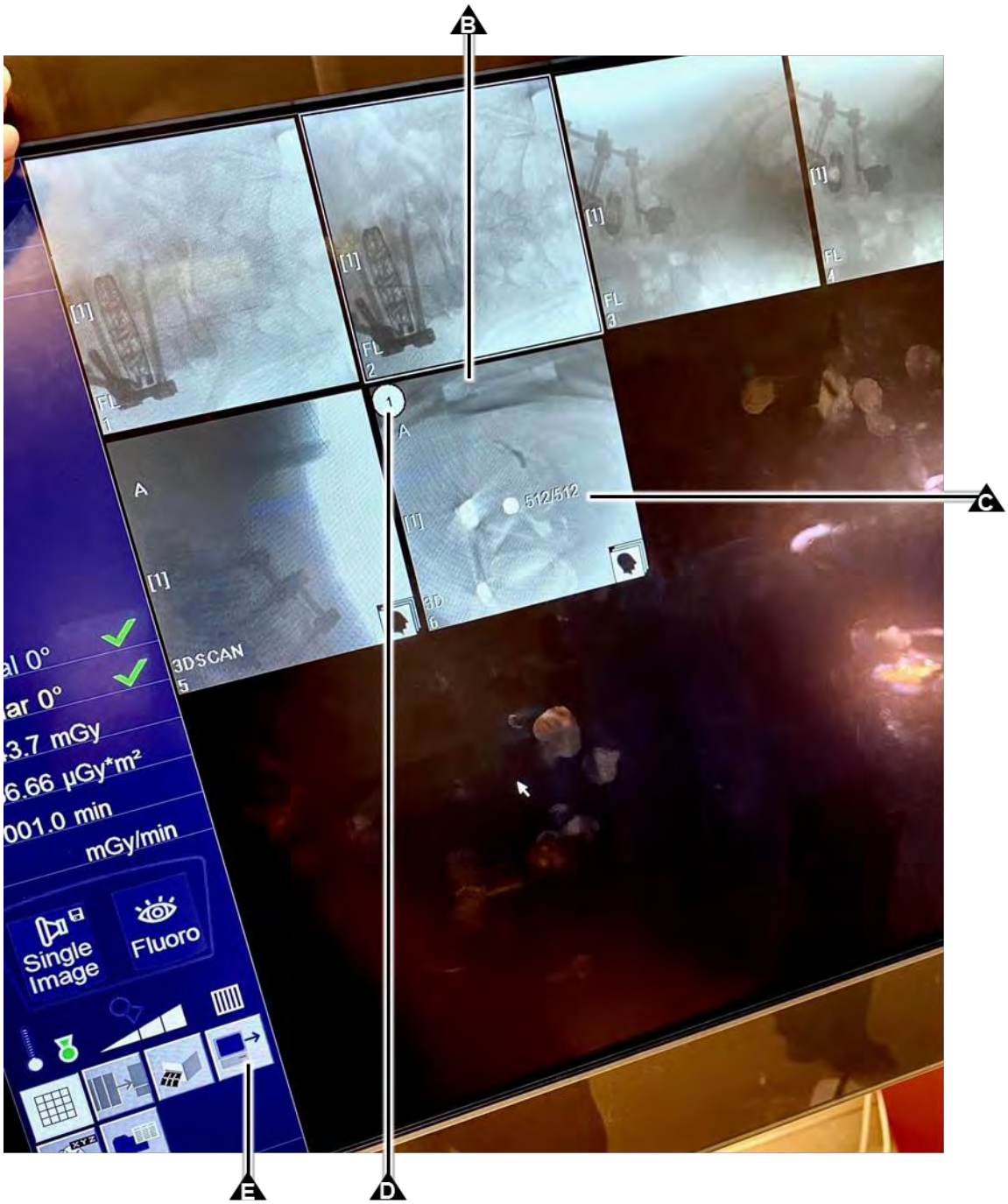
After reviewing the 3D axial scan follow the procedure below.

Figure: Sending Image to XVISION-SPINE (1st step)



1. On the workstation screen, select **2D** (A).

Figure: Sending Image to XVISION-SPINE (2nd step)



2. Select the axial 3D scan (B), making sure that the scan has 512 slices (C) (A Sagittal 3D scan will have 400 slices and will not be transferred to XVISION-SPINE).

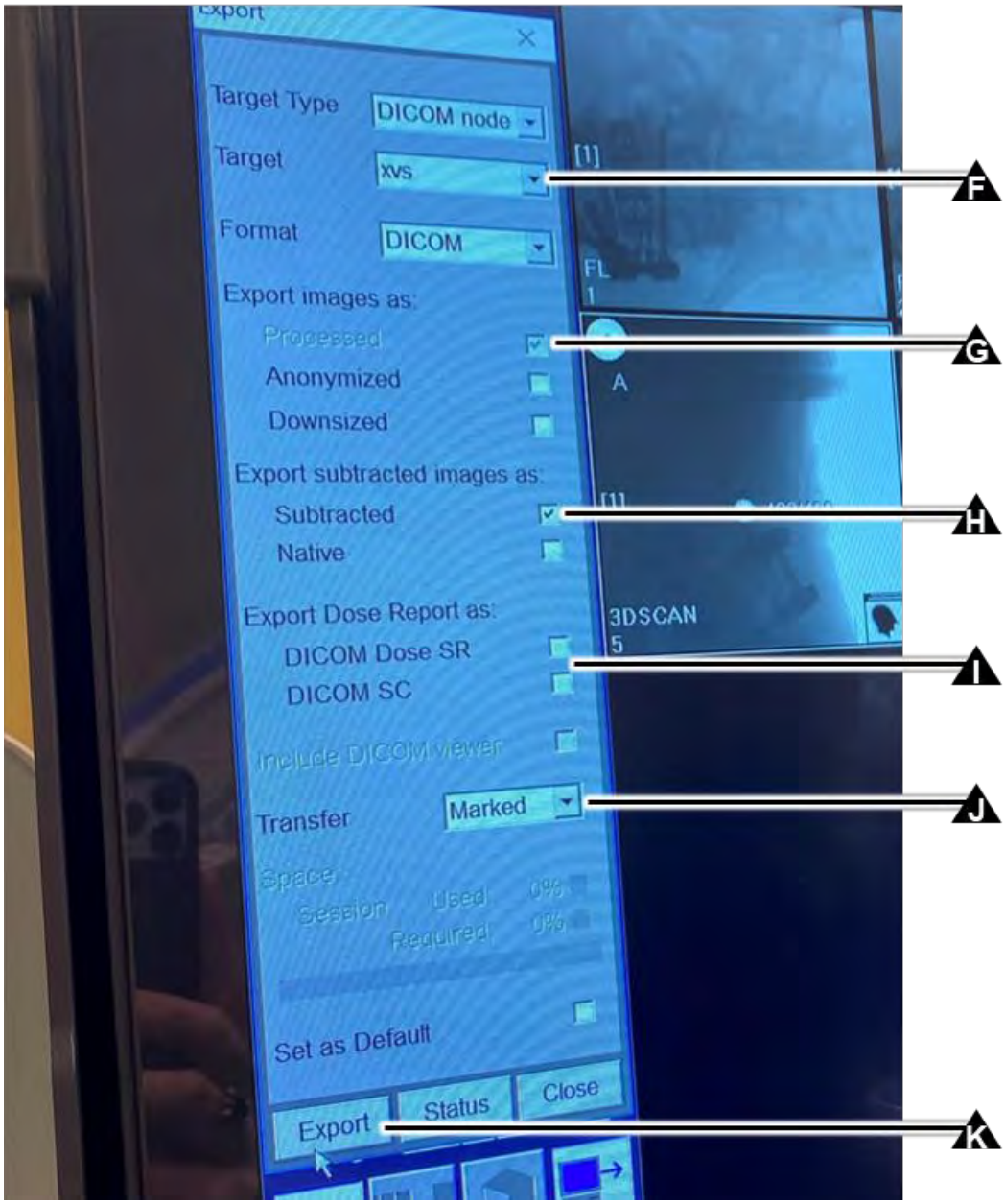
Note: The selected scan has a white highlight.

3. On the workstation controls, press **Mark**.

Note:	A white circle with the number one (1) appears at the corner of the selected scan (D). If any other number is in the circle, see what other scans are marked, and unmark them.

4. Press the Export icon (E).

Figure: Sending Image to XVISION-SPINE (3rd step)



5. In the **Export** screen, make sure that the settings are as follows:
   - Target = XVS (F)
   - Under Export images as, only the Processed checkbox is checked (G)
   - Under Export subtracted images as, only the Subtracted checkbox is checked (H)
   - Under Export Dose Report as, none of the checkboxes are checked (I)
   - Transfer = Marked (J)
6. Press **Export** (K).
   Information is automatically sent to XVS SOFTWARE.

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Appendix K: Setting Up Siemens Healthineers InstantLink™

Siemens Healthineers InstantLink™ can be used to stream XVISION-SPINE GUI content to the Siemens Healthineers Cios system and provides a return channel for mouse/touch input to control the XVISION-SPINE GUI from the Cios integrated display. A license for InstantLink™ can be obtained from Siemens Healthineers.

To set up InstantLink™, each relevant Siemens Healthineers Cios Spin scanner needs to be integrated with XVISION-SPINE by means of a certificate. There are two ways to perform this:

- *Integration Using Self-Signed Certificate* (page K-K-1) - this can be used in all circumstances, including when the hospital does not support Certificate Authority (CA), or CA is not available to during the scanner set-up time.
- *Integration Using Certificate Authority (CA)* (page K-K-9) - this can be used if the hospital supports CA, and when CA is available during the scanner set-up time.

K.1: Integration Using Self-Signed Certificate

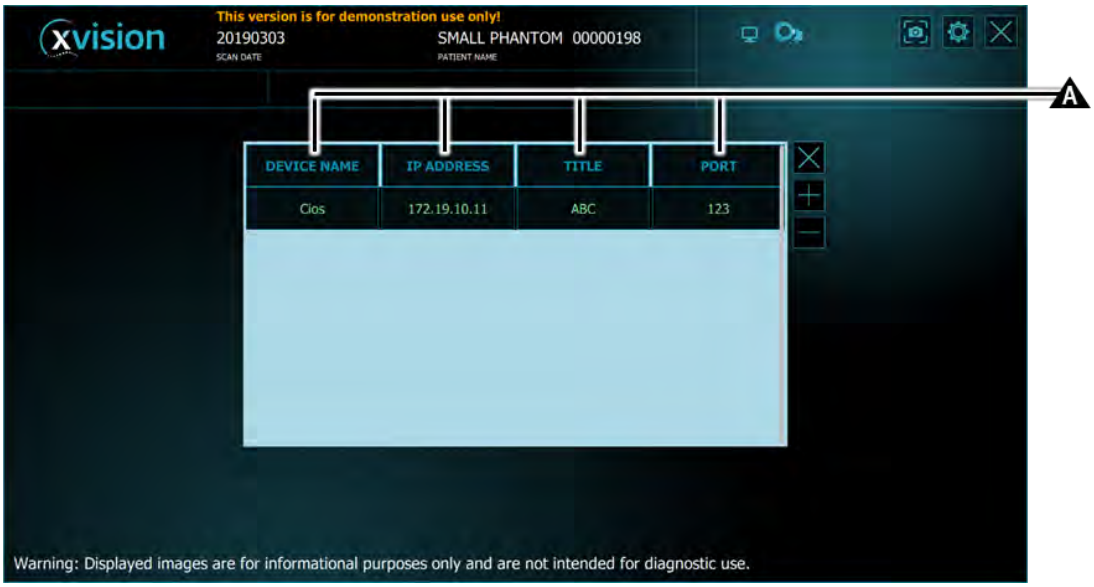
There are two stages to integration by using a self-signed certificate:

- *Stage 1: Installing xvision-Spine in a Hospital* (page K-K-1)
- *Stage 2: Installing a New Siemens Healthineers Cios Spin Scanner* (page K-K-6)

Stage 1: Installing XVISION-SPINE in a Hospital

1. Connect a flash drive to the computer.

Figure: Installing XVISION-SPINE in a Hospital (1st step)

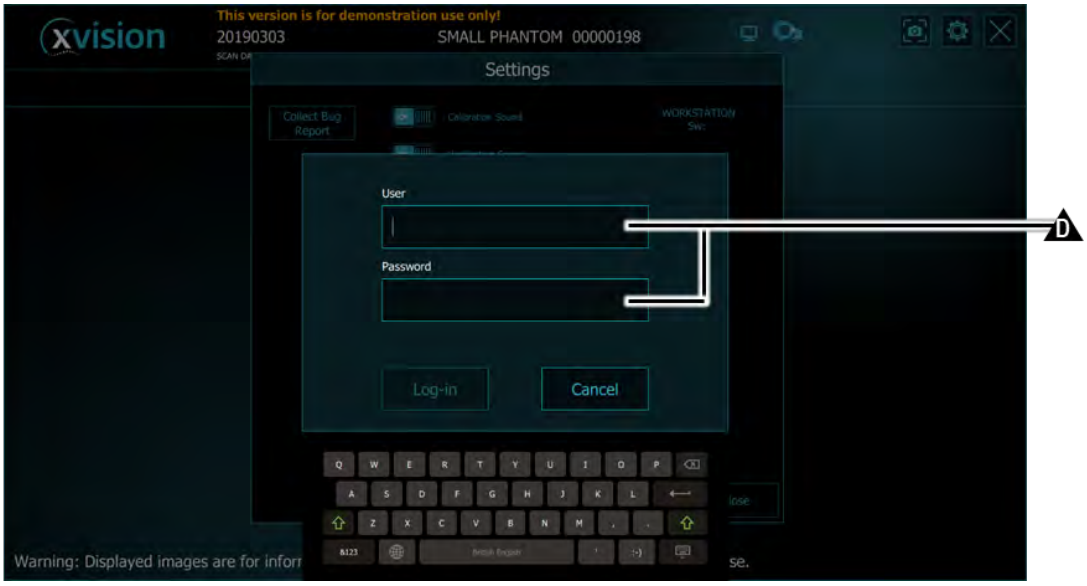


2. In XVISION-SPINE, open the **Scanner Configuration** window and set the following (**A**):
   - Device Name = as desired
   - IP Address = 172.19.10.11
   - Title = according to Cios configuration
   - Port = according to Cios configuration

Figure: Installing XVISION-SPINE in a Hospital (2nd step)

3. In the **Settings** window (**B**), press **Service** (**C**).

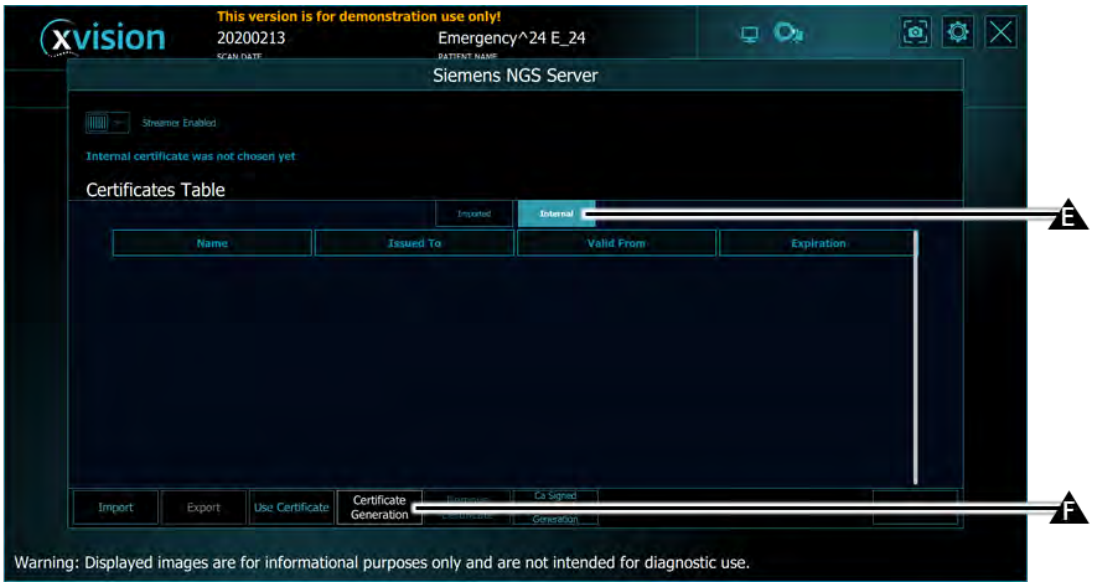
Figure: Installing XVISION-SPINE in a Hospital (3rd step)



4. In the login window (**D**) that pops up, enter the admin credentials (**user name** and **password**) or the Siemens Healthineers credentials.

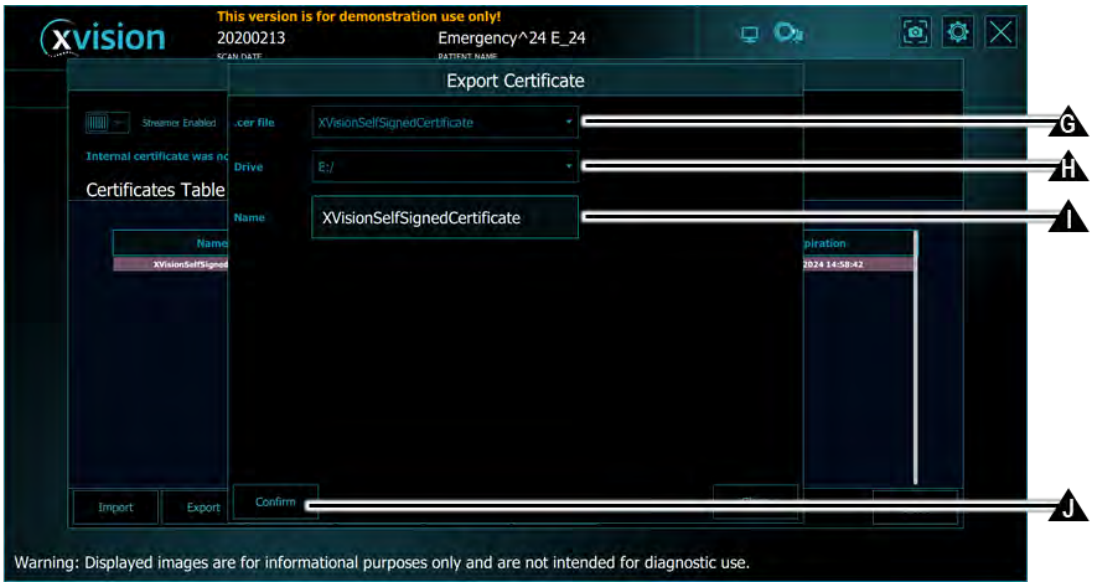
5. Press **Siemens NGS Server**.

Figure: Installing XVISION-SPINE in a Hospital (4th step)



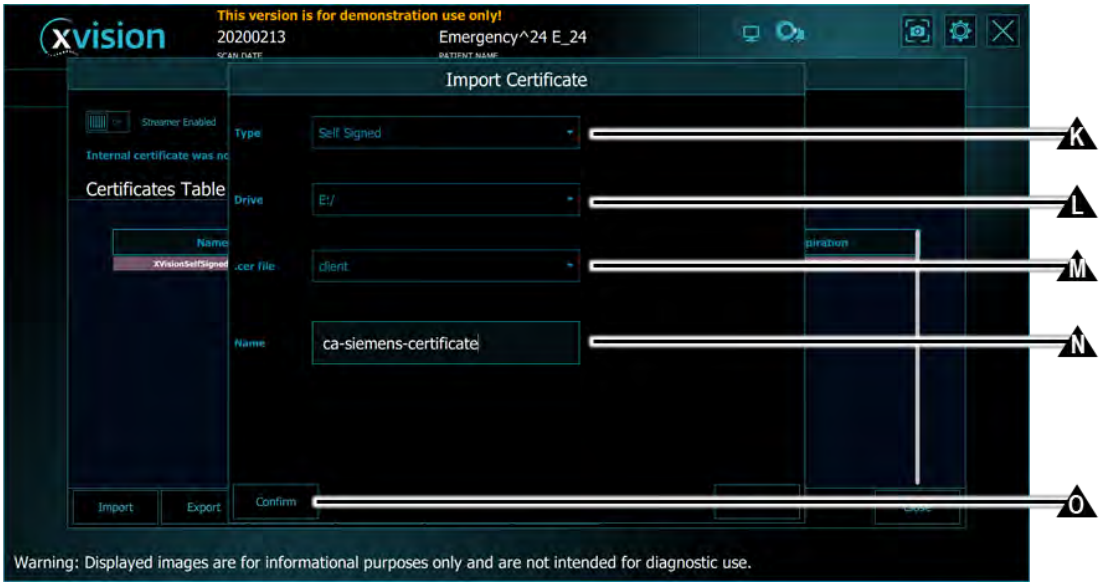
6. In the **Siemens NGS Server** window, select the **Internal** tab (E), and then press **Certificate Generation** (F).
7. Name the certificate (for example, XVisionSelfSignedCertificate), and then press **Confirm**.
8. Mark the certificate and then press **Export**.

Figure: Installing XVISION-SPINE in a Hospital (5th step)



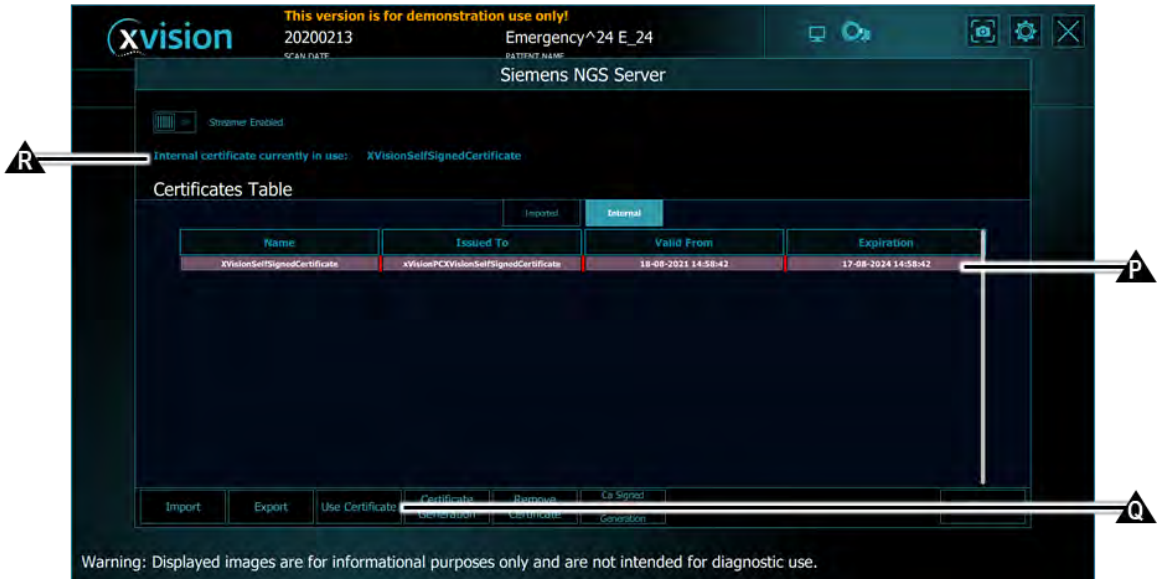
9. In the **Export Certificate** window, perform the following:
   - Note that **.cer file** (G) = the name given to the certificate in step **7**
   - Set **Drive** (H) = the flash drive connected to the computer
   - Set **Name** (I) = the filename for the certificate to be saved on the Flash Drive.
   - Press **Confirm** (J).
10. With the help of the Siemens Healthineers representative as necessary, perform the following for each Cios Spin scanner in the hospital:
    - Connect a flash drive to the scanner.
    - Import the certificate that was exported to the flash drive in step **0** (see the public key import instructions in the Siemens Healthineers Cios Spin user manual).
    - Export the CA-Siemens Healthineers certificate of the Cios Spin scanner to the flash drive (see the export instructions in the Siemens Healthineers Cios Spin user manual).
11. Connect the flash drive to XVISION-SPINE.

Figure: Installing XVISION-SPINE in a Hospital (6th step)



12. In the **Siemens NGS Server** window, import the CA-Siemens Healthineers certificate of each Cios Spin scanner as follows:
    - Press Import to open the Import Certificate window
    - Set Type (K) = Self Signed
    - Set Drive (L) = the flash drive connected to XVISION-SPINE
    - Set .cer file (M) = the CA-Siemens Healthineers certificate to be imported
    - Set Name (N) = the filename to save the CA-Siemens Healthineers certificate in XVISION-SPINE
    - Press Confirm (O).

Figure: Installing XVISION-SPINE in a Hospital (7th step)

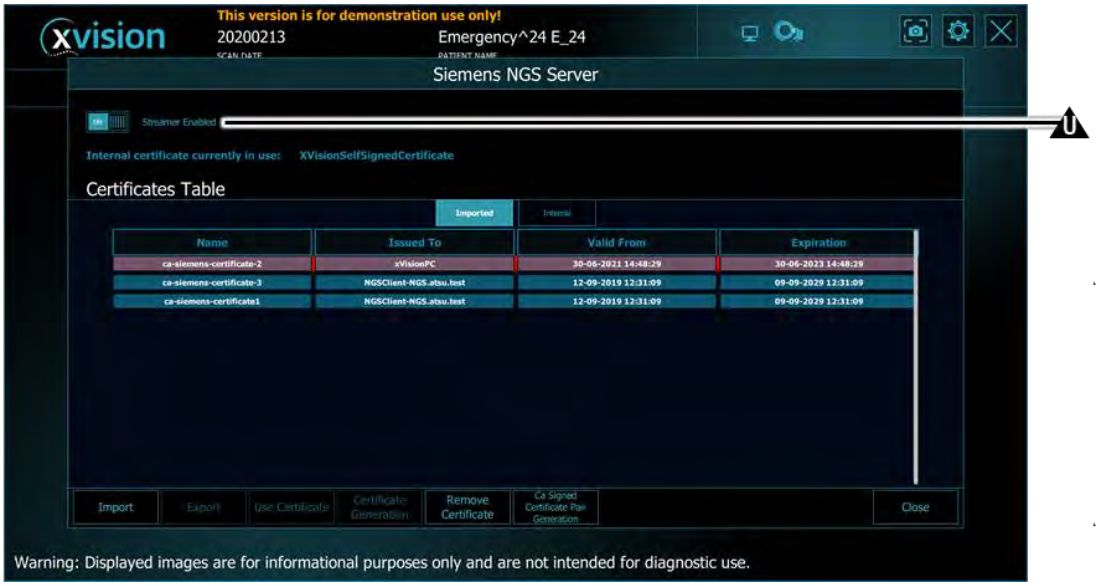


13. In the **Internal** tab, perform the following:
    - Select the self-signed certificate that was exported to the flash drive in step **9**
    - Press **Use Certificate** (**Q**).
    - Make sure that **Internal certificate currently in use** = the self-signed certificate selected above (**R**).

Figure: Installing XVISION-SPINE in a Hospital (8th step)

14. Select the **Imported** tab (**S**), and make sure that it lists the CA-Siemens Healthineers certificate (**T**) of each Cios Spin scanner in the hospital.

Figure: Installing XVISION-SPINE in a Hospital (9th step)

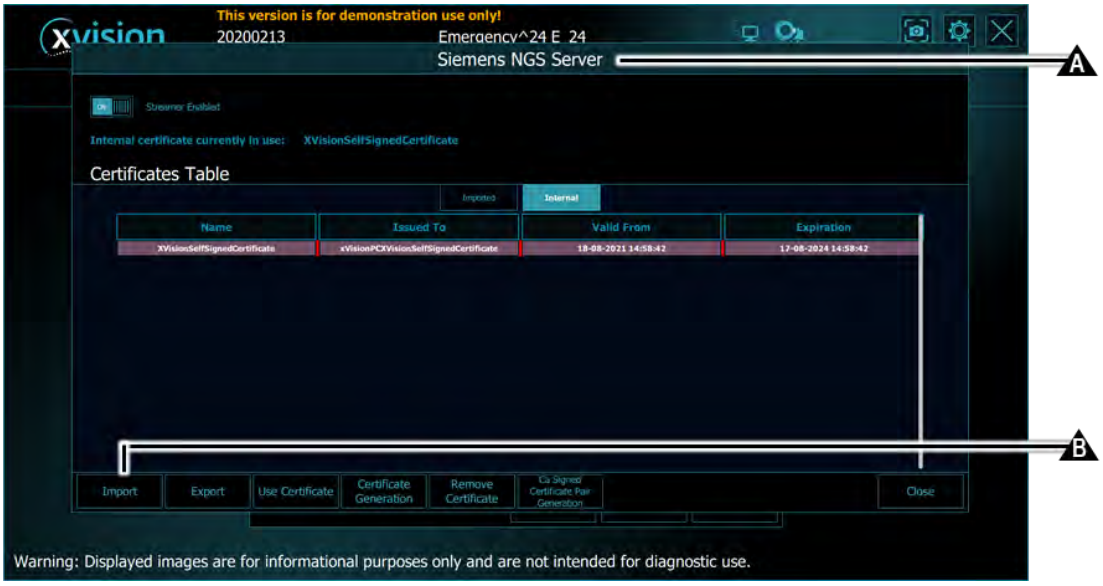


15. Set Streamer Enabled = On (U)

Stage 2: Installing a New Siemens Healthineers Cios Spin Scanner

1. Export the new scanner's CA-Siemens Healthineers certificate to a flash drive (see the export instructions in the Siemens Healthineers Cios Spin user manual).
2. Connect the flash drive to XVISION-SPINE.

Figure: Installing a New Siemens Healthineers Cios Spin Scanner (1st step)

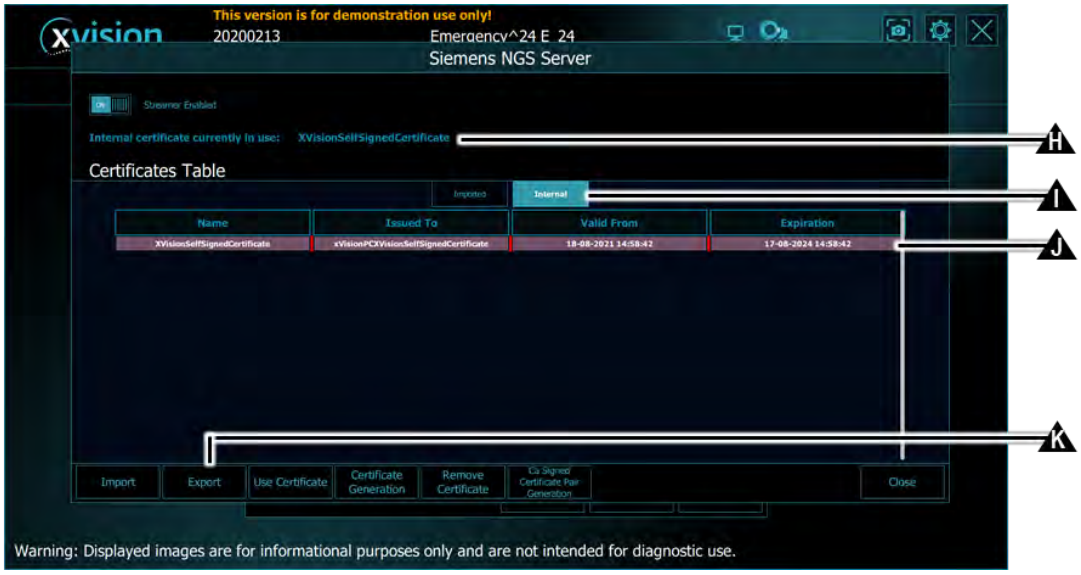


3. In XVISION-SPINE, open the **Siemens NGS Server** window (**A**), as detailed in *Stage 1: Installing xvision-Spine in a Hospital* (page K-K-2), steps **3**
4. In the **Siemens NGS Server** window, press **Import** (**B**).

Figure: Installing a New Siemens Healthineers Cios Spin Scanner (2nd step)

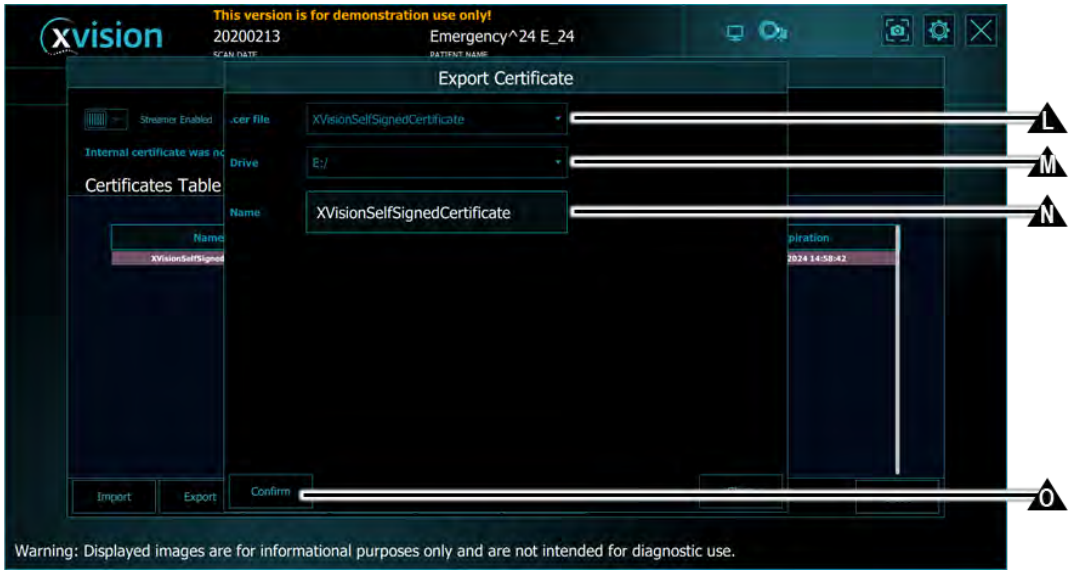
5. In the **Import Certificate** window, set the following:
   - **Type (C)** = Self Signed
   - **Drive (D)** = the flash drive connected to the computer
   - **.cer file (E)** = the CA-Siemens Healthineers certificate of the new scanner (from step 1)
   - **Name (F)** = the filename to save the CA-Siemens certificate in **xvision- Spine**
6. Press **Confirm** (G).

Figure: Installing a New Siemens Healthineers Cios Spin Scanner (3rd step)



7. In the **Siemens NGS Server** window, perform the following:
   - Note the name of the **Internal certificate currently in use (H)**
   - Select the **Internal** tab (I)
   - In the **Internal** tab, select the certificate noted as currently in use (J)
   - Press **Export** (K).

Figure: Installing a New Siemens Healthineers Cios Spin Scanner (4th step)

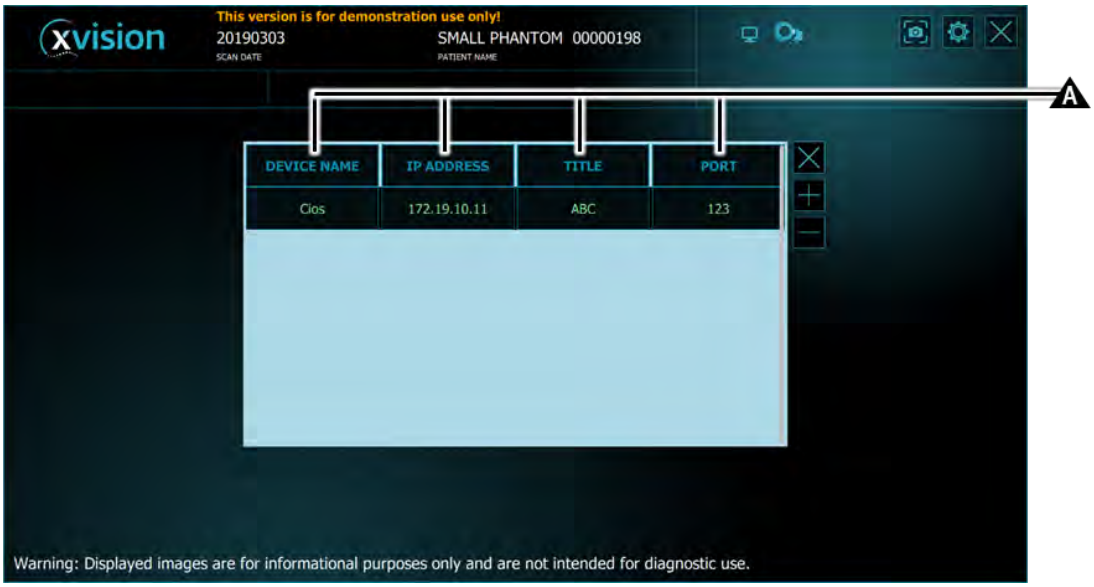


8. In the **Export Certificate** window, set the following:
   - **.cer file (L)** = the name of the Internal certificate currently in use
   - **Drive (M)** = the flash drive connected to the computer
   - **Name (N)** = the filename to save the certificate on the flash drive
9. Press **Confirm** (O).
10. If the new scanner needs to be integrated with more than one installation of XVISION-SPINE, repeat steps **2-9** for each additional installation.
11. Connect a flash drive to the new scanner and import each XVISION-SPINE installation's **Internal certificate currently in use** to the scanner (see the public key import instructions in the Siemens Healthineers Cios Spin user manual).
12. Reset the scanner and one of the XVISION-SPINE installations and check their connectivity.

K.2: Integration Using Certificate Authority (CA)

1. Obtain the following from the IT department of the hospital, and save the files on a flash drive:
   - Certificate Authority (CA) file
   - .pfx file
   - The passphrase for the pfx file.

Figure: Installing XVISION-SPINE in a Hospital (1st step)

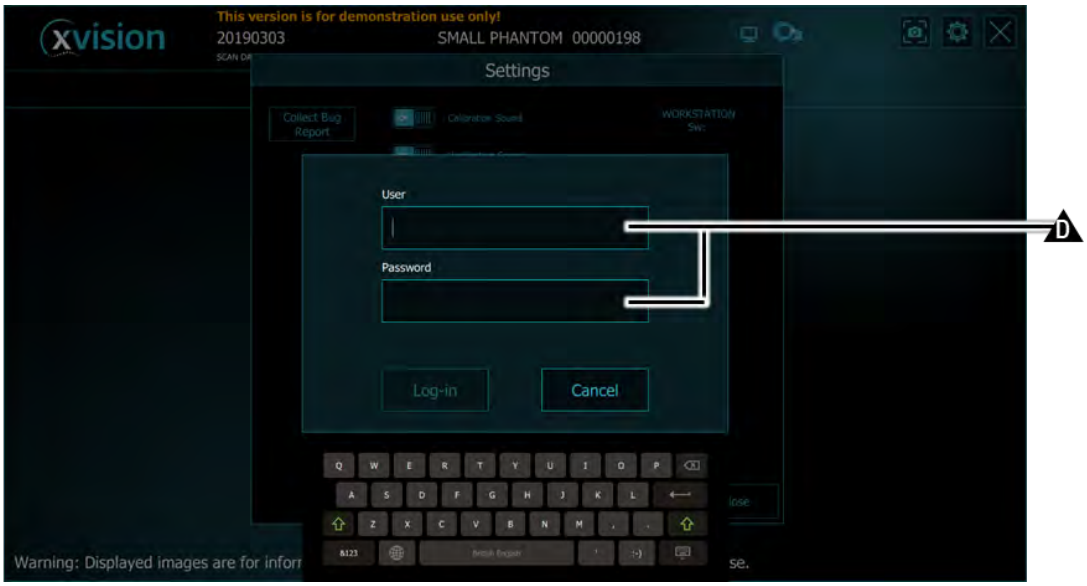


2. In XVISION-SPINE, open the **Scanner Configuration** window and set the following **(A)**:
   - **Device Name** = scanner name
   - **IP Address** = 172.19.10.11
   - **Title** = according to Siemens Healthineers Cios Spin configuration
   - **Port** = according to Siemens Healthineers Cios Spin configuration

Figure: Installing XVISION-SPINE in a Hospital (2nd step)

3. In the **Settings** window (**B**), press **Service** (**C**).

Figure: Installing XVISION-SPINE in a Hospital (3rd step)

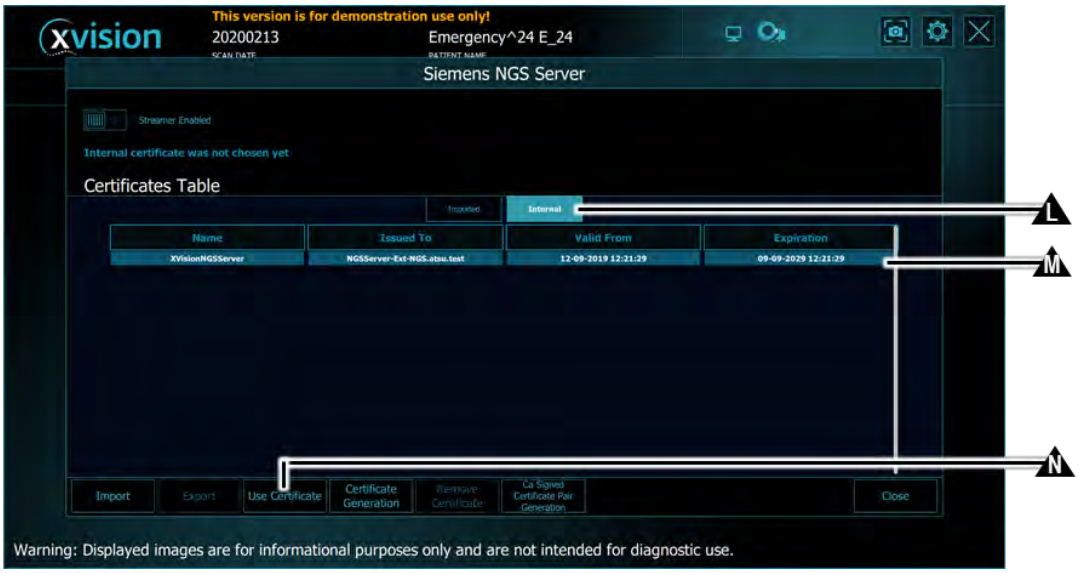


4. In the login window (**D**) that pops up, enter the admin credentials (**user name** and **password**) or the Siemens Healthineers credentials.
5. Press **Siemens NGS Server**.
6. Connect the flash drive (with the files from step **1**) to XVISION-SPINE.
7. Press **Import**.

Figure: Installing XVISION-SPINE in a Hospital (4th step)

8. In the **Import Certificate** window, set the following:
   - **Type** (E) = **CA**
   - **Drive** (F) = the flash drive connected to XVISION-SPINE
   - **CA.cer file** (G) = the Certificate Authority (CA) file obtained from the IT department
   - **.pfx file** (H) = the .pfx file obtained from the IT department
   - **Passphrase** (I) = the passphrase obtained from the IT department
   - **Name** (J) = the filename to save the Certificate Authority (CA) in xvision- Spine
9. Press **Confirm** (K).

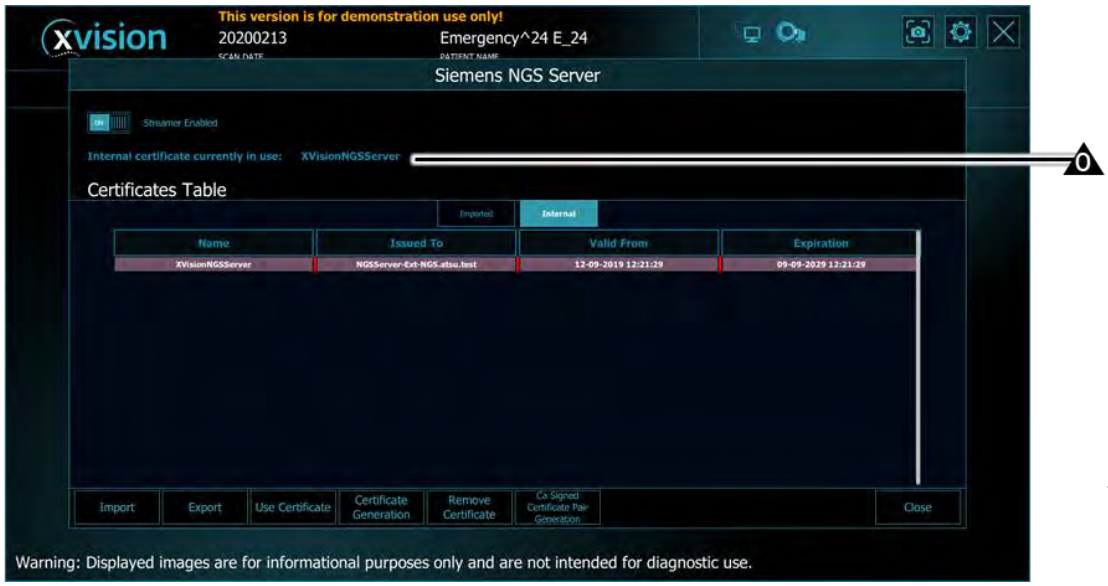
Figure: Installing XVISION-SPINE in a Hospital (5th step)



10. Select the **Internal** tab (L).
11. Select the Certificate Authority (CA) that was imported in steps **8-9** (M).

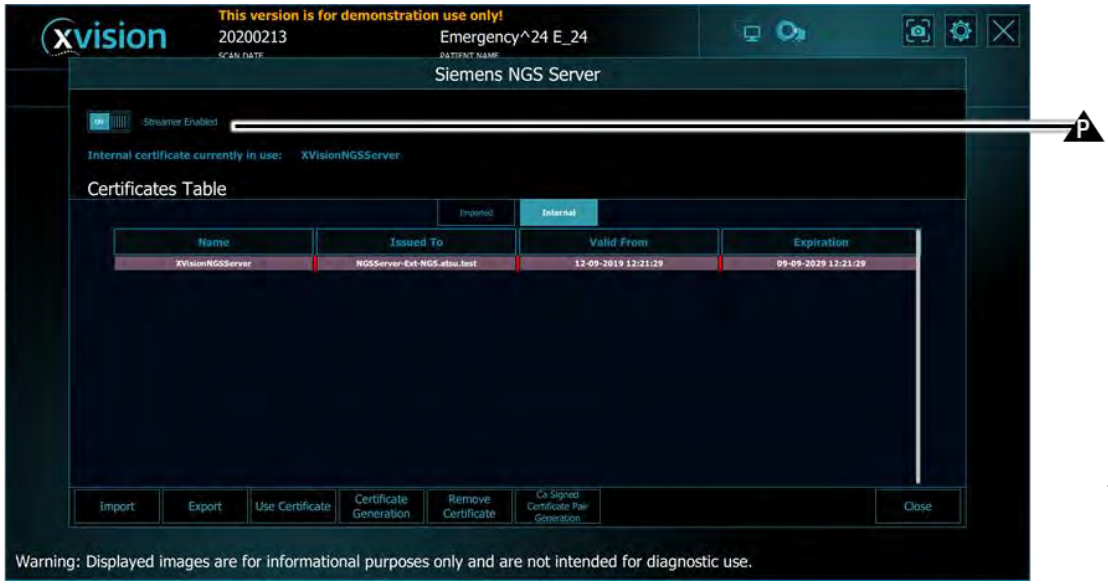
12. Press Use Certificate (N).

Figure: Installing a New Siemens Healthineers Cios Spin Scanner (1st step)



13. The selected Certificate Authority (CA) appears next to **Internal certificate currently in use** (O).

Figure: Installing a New Siemens Healthineers Cios Spin Scanner (2nd step)



14. Set Streamer Enabled = On (P)
15. Check whether the integration has been successful: if it is, the Siemens Healthineers Cios Spin scanner will have the hospital Certificate Authority (CA) installed as detailed in the Siemens Healthineers Cios Spin manual.

Appendix L: Setting Up the GE OEC 3D Scanner

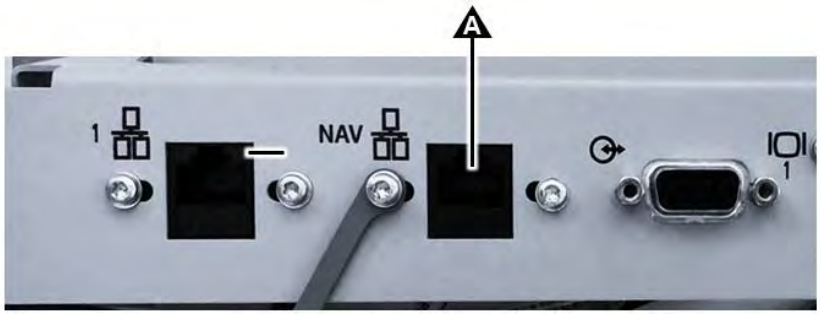
Use the procedures below to set up the GE OEC 3D Scanner.

L.1: Connecting Ethernet Cable to XVISION-SPINE

Note: The ethernet cable must be a CAT6a cable (10,000 Mbit/s, 500MHz) or higher.

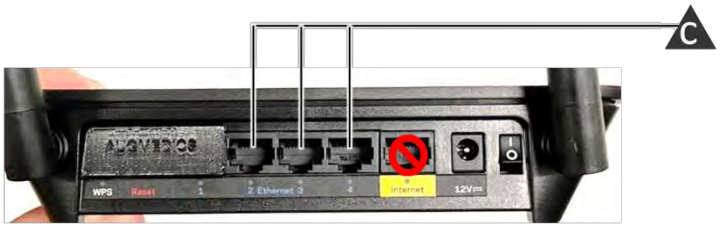
1. Plug one end of the ethernet cable at the rear of the GE OEC 3D Scanner workstation (A).

Figure: Plugging Ethernet Cable to GE OEC 3D Scanner Monitor (A)



2. In case the system's configuration is Roll Stand AIO, proceed to step #3.
   If the system's configuration is WS-Cart **Skip Step #3**

   Figure: Plugging Ethernet Cable to Router (C) - Roll Stand configuration



3. Plug the other end of the ethernet cable into the rear of the XVISION-SPINE router as follows:
   - In the XVISION-SPINE router, plug the cable into any of LAN ports 2-4 (C).
   - Skip Step #4

Note: Do not plug the ethernet cable into the WAN port.

Figure: Plugging Ethernet (D) – WS-Cart configuration

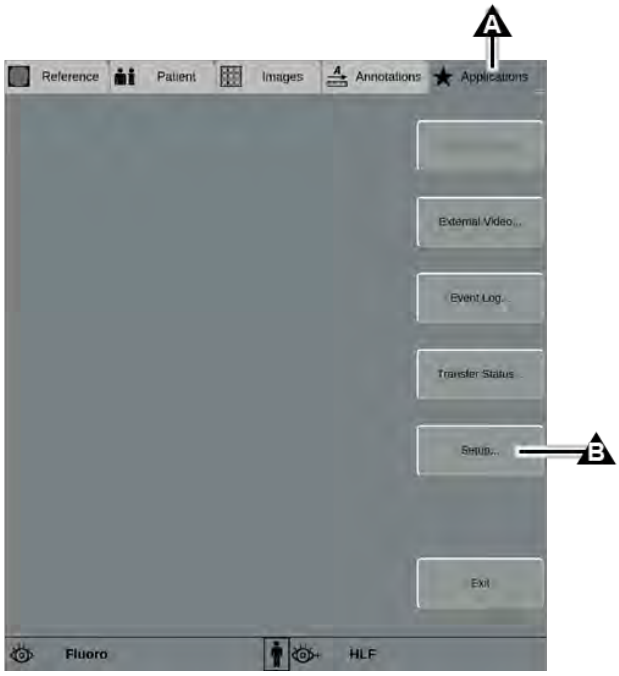
Located at the left side below the storage drawer.

4. Plug the other end of the ethernet cable into the left side external LAN port of the WS-Cart as described in the figure above **(D)**.

Note: Do not plug the ethernet cable directly to the router.

L.2: Setting IP Address

Figure: Setting IP Address (1st step)



1. In the **Home** screen, select **Applications** (**A**).
2. Select **Setup** (**B**).

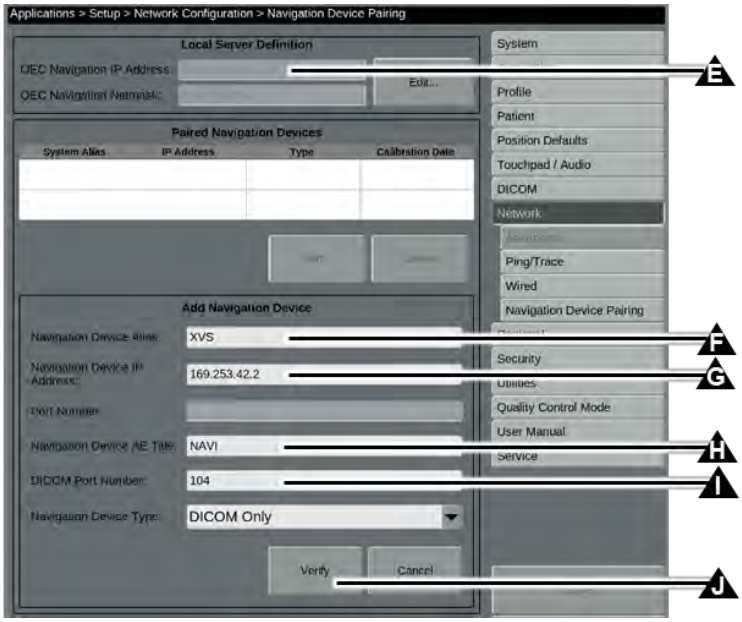
Figure: Setting IP Address (2nd step)

3. Select **Network** (**C**).

Figure: Setting IP Address (3rd step)

4. Select Navigation Device Pairing (D).

Figure: Setting IP Address (4th step)

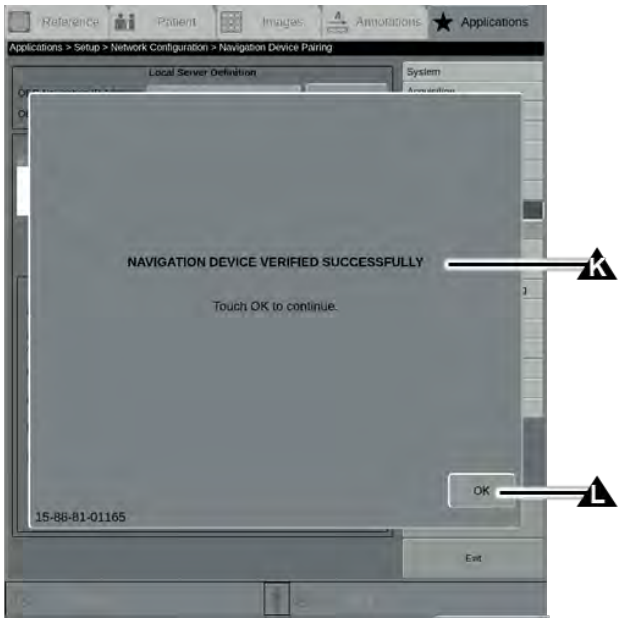


5. In **OEC Navigation IP Address**, set the following (for the GE scanner): **169.253.42.1** (E).
6. Under **Add Navigation Device**, set the following (for XVISION-SPINE):
   - **Navigation Device Name = XVS (F)**
   - **Navigation Device IP Address = 169.253.42.2 (G)**

- **Navigation Device AE Title = NAVI (H)**
- **Port = 104 (I)**

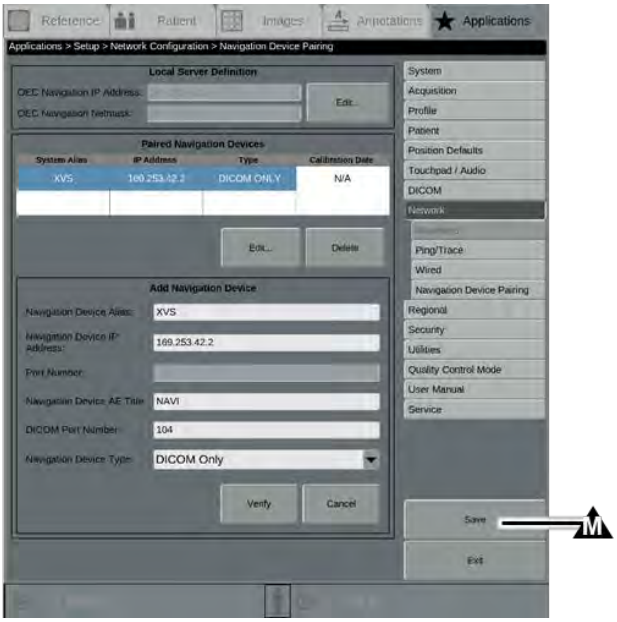
7. Tap **Verify** (J).

Figure: Setting IP Address (5th step)



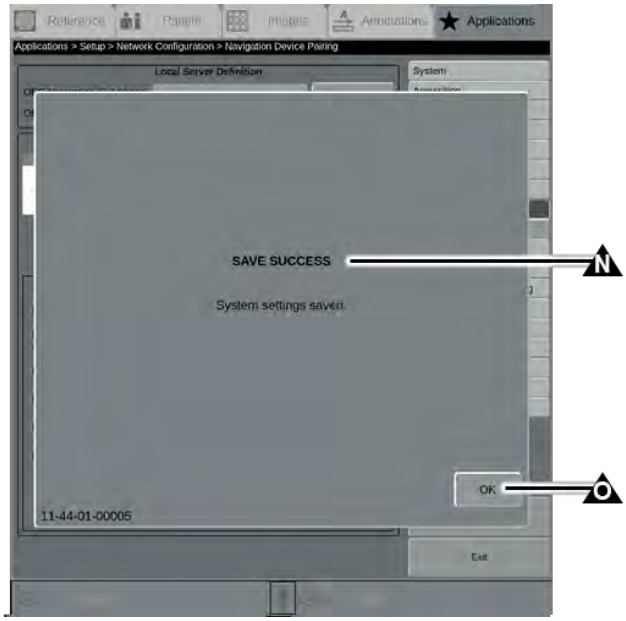
8. When the screen displays the message **Navigation device verified successfully** (K), tap **OK** (L).

Figure: Setting IP Address (6th step)



9. Tap **Save** (M).

Figure: Setting IP Address (7th step)



10. When the screen displays **Save success** (**N**), tap **OK** (**O**).

L.3: Imaging Settings

Configure the imaging settings as detailed below.

Figure: Setting IP Address (1st step)

1. Have the radiology technician set the following 3D settings prior to the 3D spin:
   - Select **HD** (**A**) - recommended option.
   - Select patient positioning.

- Select the side from which the 3D scanner is coming.

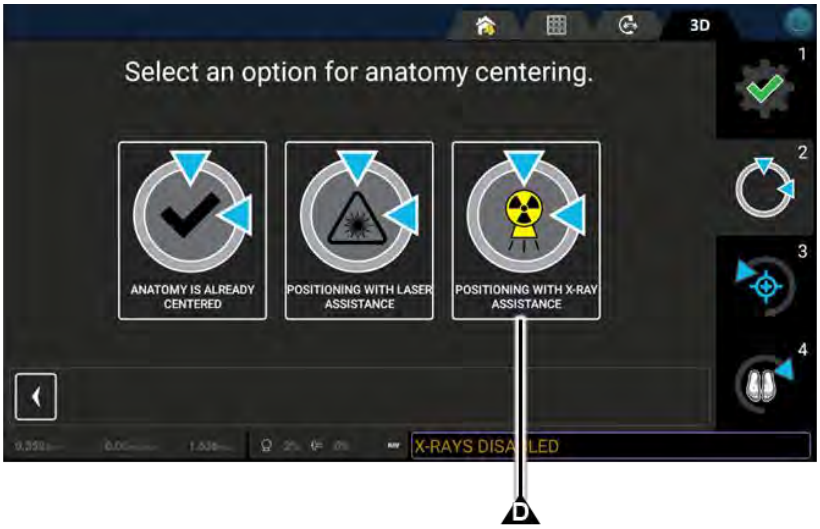
Figure: Setting IP Address (2nd step)

2. Select **3D+NAV** (**B**).

Figure: Setting IP Address (3rd step)

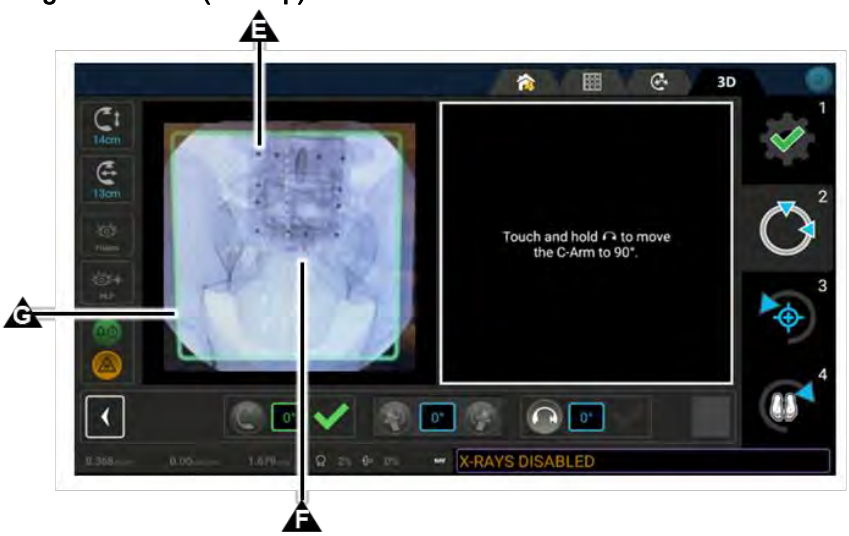
3. **XVS connected** (**C**) appears on the screen.

Figure: Setting IP Address (4th step)



4. From the Anatomy Centering options, select Positioning with X-ray Assistance (D).

Figure: Setting IP Address (5th step)



5. Make sure all twelve (12) reference Marker beads (**E**) and the relevant part of the anatomy (**F**) are in both axial and lateral scout shots.

Note: The green frame (**G**) indicates the field of view for the 3D scan.

Figure: Setting IP Address (6th step)

6. Perform a collision check by touching and holding the sight icon (H).
7. After the system has passed the collision check, perform a scan, making sure that:
   - The patient's breath is held
   - The patient does not move

L.4: Sending Image to xvision-Spine

Information is automatically sent to XVS SOFTWARE.

Appendix M: CT Protocol for Pre-op workflow

General

This protocol is dedicated to CT scanning of the Spine.
The required Region of Interest for the procedure should be per surgeon preference.

Requirements to format of CT data

1. Modality = CT
2. Slice Thickness <= 1.0mm
3. Slice Spacing <= 1.0mm
4. Slice spacing should be consistent
5. No Missing frames/slices
6. Number of Slices > 30
7. DICOM Service-Object Pairs (SOP) with the following fields:
    a. CT image storage
    b. Enhanced CT image storage
8. Existing fields: “window level” and “window width” in DICOM
9. The slices saved on CD should not be compressed (DICOM)

blank

Appendix N: USM-500 Workstation User Manual

USM-500 series

USM-500-XXXXXXXXXXX

Professional Tower/Standalone Medical Computer

Instructions for the User

The document combines text and illustrations, providing a comprehensive overview of the system. The information is presented as a sequential series of actions, allowing the user to learn directly how to use the device.

The text provides explanations and instructs the user step-by-step in the practical use of the product, with short, clear instructions in an easy-to-follow sequence.

Definitions

Warning! *A WARNING statement provides important information about a potentially hazardous situation which, if not avoided, could result in death or serious injury.*

Caution! *A CAUTION statement provides important information about a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to the user or patient or in damage to the equipment or other property.*

Note! *A NOTE provides additional information intended to avoid inconveniences during operation.*

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All other product names or trademarks are properties of their respective owners.

Product Warranty (2 years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.
This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.
Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, customers are billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.
If you believe your product to be defective, follow the steps below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Have the manual, product, and any helpful information to hand when you call.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) in a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.

5. Write the RMA number clearly on the outside of the package, then ship it pre- paid to your dealer.

Edition 2
Feb 2020

Declaration of Conformity

FCC Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to pro- vide reasonable protection against harmful interference in residential installations. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on again, users are encouraged to try to correct the interference using one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and receiver.
- Connect the equipment to an outlet on a circuit that differs from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

Warning! *Any changes or modifications made to the equipment that are not expressly approved by the relevant standards authority may void your authority to operate the equipment.*

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - Comprehensive description of the problem
   - The exact wording of any error messages

Safety Instructions

1. Strictly follow these Instructions for Use; please read these safety instructions carefully.
2. Please keep this User Manual for later reference; any use of the product requires full understanding and strict observation of all portions of these instructions. Observe all WARNINGS and CAUTIONS as rendered throughout this manual and on labels on the equipment.
3. Repair of the device may only be carried out by trained service personnel. Advantech recommends that a service contract be obtained with Advantech Service and that all repairs also be carried out by them. Otherwise the correct functioning of the device may be compromised.

Warning! *Because of the danger of electric shock, never remove the cover of a device while it is in operation or connected to a power outlet.*

4. If one of the following situations arises, have the equipment checked by service personnel:

   - The power cord or plug is damaged.
   - Liquid has penetrated into the equipment.
   - The equipment has been exposed to moisture.
   - The equipment does not work well, or you cannot get it to work according to the user manual.
   - The equipment has been dropped and damaged.
   - The equipment has obvious signs of breakage.

5. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning and keep this equipment away from humidity.

Caution! *To avoid short-circuiting and otherwise damaging the device, do not allow fluids to come in contact with the device. If fluids are accidentally spilled on the equipment, remove the affected unit from service as soon as possible and contact the service personnel to verify that patient safety is not compromised.*

6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.

Caution! *To prevent overheating, do not cover the openings or place the device in direct sunlight or near radiant heaters.*

7. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet. Position the power cord so that people cannot step on it. Do not place anything over the power cord. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over voltage.

Caution! *Do not leave this equipment in an uncontrolled environment where the storage temperature is below -40° C (-40° F) or above 70° C (156° F). This may damage the equipment.*

8. If your computer does not keep the correct time or the BIOS configuration has been reset to default, the battery may have no charge.

9. Classification:

   1). Supply Class II adapter
   2). No applied part
   3). Continuous Operation
   4). Not AP or APG category

Warning! *This device is not suitable for use in the presence of flammable anesthetic mixture with air, oxygen, nitrous oxide, or for life support systems.*

10. Environmental protection: follow national requirements to dispose of unit.

11. Maintenance: to properly maintain and clean the surfaces, use only the approved products or clean with a dry applicator.

Caution! *When servicing the device, always use replacement parts that are qualified to Advantech standards. Advantech Digital Healthcare cannot war-rant or endorse the safe performance of third-party replacement parts for use with our medical device.*

12. Make sure the user does not allow contact between SIP/SOPs and the patient at the same time.
13. When networking with electrical devices, the operator is responsible for ensuring that the resulting system meets the requirements set forth by the following standards:

    - EN 60601-1 (IEC 60601-1) Medical electrical equipment
      Part 1: General requirements for safety
    - EN 60601-1-1 (IEC 60601-1-1) Medical electrical equipment
      Part 1-1: General requirements for safety
      Collateral standard: Safety requirements for Medical electrical systems
    - EN 60601-1-2 (IEC 60601-1-2) Medical electrical equipment
      Part 1-2: General requirements for safety
      Collateral standard: Electromagnetic compatibility; Requirements and tests

CLASSIFIED C UL US
E349709
4LY4

MEDICAL - GENERAL MEDICAL EQUIPMENT
AS TO ELECTRICAL SHOCK, FIRE AND MECHANICAL
HAZARDS ONLY IN ACCORDANCE WITH ANSI/AAMI
ES 60601-1 (2005) + AMD (2012),
CAN/CSA-C22.2 No. 60601-1 (2008) + (2014)

14. Accessory equipment connected to analog and digital interfaces must be in compliance with the respective nationally harmonized IEC standards (i.e. IEC 60950 for data processing equipment, IEC 60065 for video equipment, IEC 61010-1 for laboratory equipment, and IEC 60601-1 for medical equipment.)
    Furthermore all configurations shall comply with the system standard IEC 60601-1- 1. Anyone who connects additional equipment to the signal input part or signal output part is configuring a medical system, and is therefore, responsible that the system complies with the requirements of the system standard IEC 60601-1-1. The unit is for exclusive interconnection with IEC 60601-1 certified equipment in the patient environment and IEC 60XXX certified equipment out-side of the patient environment. If in doubt, consult the technical services department or your local representative.

Caution! *Use suitable mounting apparatus to avoid risk of injury.*

15. Grounding reliability can only be achieved when the equipment is connected to an equivalent receptacle marked "Hospital Only" or "Hospital Grade".

16. Use a power cord that matches the voltage of the power outlet, which has been approved and complies with the safety standard of your particular country.

Note! *Environmental protection*
Follow national requirements to dispose of unit.

17. “WARNING - Do not modify this equipment without authorization of the manufacturer.”

18. “WARNING – To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.
19. Remove the power cord to fully turn off the device.
20. Installation is only to be carried out by trained and authorized personnel.
21. CAUTION! WARNING! If this device was not used in the manner which manufacturer suggested, the end system shall evaluate for further compliance.

Explanation of Graphical Symbols

IEC 60878 and ISO 3864-B.3.6 : Warning: dangerous voltage

ISO 7000-0434 : Caution, consult ACCOMPANYING DOCUMENTS.

IEC 60417 -5009 : STAND-BY.

IEC 60417-5032 : Alternating Current

IEC 60417-5021 : Equipotentiality.

ISO 7010-M002: Follow instructions for us

Environmental Protection

Follow national requirements for disposing of this unit.

Disposing of Old Products

Within the European Union

EU-wide legislation, as implemented in each member state, requires that all waste electrical and electronic products bearing the mark shown on the left be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. To dispose of display products, follow the guidelines specified by your local authority, or ask the original equipment vendor for assistance, or if applicable, follow any agreements between yourself and the manufacturer.
The above mark for electrical and electronic products is only applicable in current European Union member states.

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1. INTRODUCTION

Advantech's USM-500 of medical-grade computers are aimed at diverse hospital applications. Equipped with an NVIDIA RTX A series graphics card that supports an NVIDIA DICOM platform, USM-500 offers easy customization and the rapid development of unique AI-based solutions. By delivering accelerated performance with NVIDIA technology, USM 500 computers enable the implementation of medical AI solutions in healthcare.

Other I/Os include RJ-45 ports, USB 3.0 ports and USB 2.0 ports, RS-232 port, and Audio out/in 3.5mm stereo jack connectors With the SATA 3.0 interface, the USM-500 is a user-friendly computer that system integrators can use this highly integrated multimedia system to easily implement into your applications. Apart from that, USM-500 provides SDKs and APIs for system integrators to program their video applications efficiently. In other chapters, the SDKs and APIs provided will be described in more detail.

WARNING!

Before unpacking and using the USM-500 equipment, read these user instructions to ensure correct usage. After reading these instructions, store them in a safe place for future reference. Incorrect handling of this product could possibly result in personal injury or physical damage. The manufacturer assumes no responsibility for any damage caused by mishandling that is beyond normal usage defined in these manuals.

WARNING!

Shut down your equipment immediately if it produces smoke, a strange odor, or unusual noise. Continued use may lead to fire. Immediately unplug the equipment and contact your dealer.
Never attempt to repair this product yourself. Improper repair work can be dangerous. Never disassemble or modify this product. Tampering with this product may result in injury or fire.
Be sure to use the power source delivered. Connection to an improper power source may cause fire.
If water or other liquid spills into this equipment, do not continue to use it. Continued use may lead to fire. Unplug the power cord immediately and contact your dealer.

2. INTENDED USE

USM-500 is intended to serve as a medical video recorder for integration with hospital systems. USM-500 is designed for general purpose used in medical image or video related application in the hospital environment, for data collection and for dis-playing information via connecting a display.

It should not be used as a life-support system.

The USM-500 system and its components have CE approval and comply with IEC60601-1-2. Installers, system integrators, and OEMs have to mitigate system and application specific risks. For critical systems, installers and system integrators are advised to consider arranging additional risk control measures, like external back-up system(s).

2.1. Intended User Profile

Intend user profile:

Age: 18 to 55
Weight: not relevant
Health: not relevant
Nationality: Global
Patient state: patient will not be the operator.
Occupation: medical IT engineer
Part of the body or type of tissue applied to or interacted with: hands, expected contact time shall be less than 1 min, and will not touch USM-500 so frequently once it is set up.
Education level: at least 8 years intensive reading experience (school)
Knowledge:
Minimum – read and understand "westernized Arabic" numerals when written in Arial font
– can distinguish: every parts of body as described in user manual
– trained and authorized by manufacturer only.
To be considered as trained and authorized, they must complete the training course of the manufacturer; see document number USM-500_User Manual for qualification method, when considered necessary by the manufacturer, technician shall be called back for retraining and annual training is also considered necessary.
Language understanding: English, whenever other languages are required, professional translation company shall translate and review by the manufacturer, see SOP document number: SOP_Writing_Guidelines-ed.3
Experience: Mentally and physical competent, specific medical training to understand basic knowledge for symbols.
Permissible impairments:
– Mild reading vision impairment or vision corrected to log MAR 0,2 (6/10 or 20/32)
– Average degree of aging-related short term memory impairment
– impaired by 40 % resulting in 60 % of normal hearing at 500 Hz to 2 kHz

2.2. Medical Installations

For integration into an IEC60601-1-compliant Medical Electrical System, the USM-500 have been tested and are compliant with IEC 60601-1-2:2007 in combination with the power supply delivered. This power supply has a low leakage current (<50uA@264VAC) and is double isolated (MOOP&MOPP).

The system integrators (RESPONSIBLE ORGANIZATIONS) are reminded that the assembly of ME SYSTEMS and modifications during the actual service life must be checked for compliance with the requirements of IEC 60601-1. The standard gives more information about the general safety requirements for ME systems.

---

3. SYSTEM COMPONENTS

3.1. Specification

System	CPU	Intel® Core™ i7-9700 2.6GHz, i7-8700 3.2GHz
	Memory	16GB, Up to 32GB DDR4 2133MHz
	Storage	1TB, based on customers' requirement
System input rating	Input Voltage	100-240 AC
Video	Input Resolution	Up to 4K
	Output Resolution	Up to 4K
	Compression Format	MPEG2 H.264, H265
Audio	Audio	2 (Mic-in/ Line-out) (Mic-in could be configured as "Line-in" under Win OS.)
Network	WiFi/Bluetooth	Intel AC9260 with embedded antenna by option
IO Port	Video Display	1 x DVI, 1 x Display Port, 1 x HDMI (can be optional)

	Video Capture	By options
	COM	1 x RS232
	USB Ports	6 x USB 3.0 ports
		4 x USB 2.0 ports
	LAN	2 x RJ-45 , supports up to quad 10/100/1000Mbps Ethernet port(s) via PCI Expressx1 bus which provides 500MBs data transmission rate.
	Audio	2 x Audio out/in 3.5mm stereo jack connectors
Power Supply	Input Voltage	100-240V, 8-4A, 60-50Hz, 500W
Certification	UL/CB 60601-1, RED, KCC, CE &FCC Class B certified	
Environment	Temperature	0 ~ 35°C(Operating) -40 ~70°C (Storage/Transportation)
	Humidity	10%-90% @ 40°C (non-condensing) (Operating) 5 ~90% (non-condensing) (Storage/ Transportation)
	Pressure	700-1060 hPa (Operation) 500-1060 hPa (Storage/Transportation)
Physical Characteristics	Dimensions (W x H x D)	340.9mmX320mmX145mm
	Weight	10Kg

3.2. Dimension

Dimensions: 340.9 x 320 x 145 mm

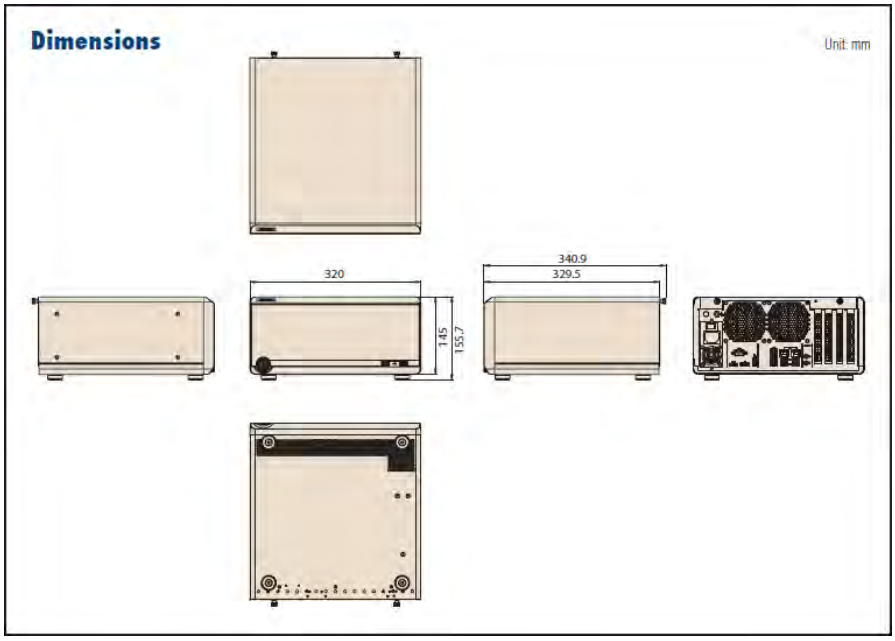

Figure 3-1 Dimensions of the USM-500

Figure 3-2 USM-500 Front Panel

(1) Power button (blue light)
(2) USB 3.0 x2

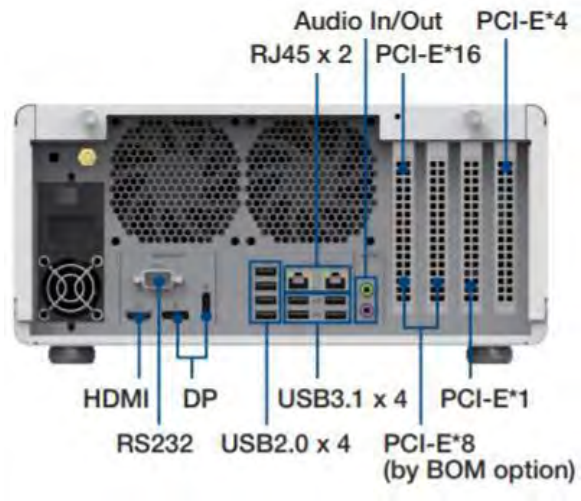

Figure 3-3 USM-500 Rear Panel

(3) RS232
(4) DVI-D Output
(5) Display Port Output
(6) HDMI Output
(7) USB 2.0
(8) USB 3.0
(9) RJ-45
(10) Headphone
(11) MIC
(12) HDMI Output
(13) DVI-D Output
(14) DVI-D Input
(15) SDI Input
(16) HDMI Input

3.3. Optional Add-on Cards

Capture cards

Part Number	Description
DVP-7011HE	1-ch Full HD H.264/MPEG4 PCIe video capture card with SDK
DVP-7011UHE	1-ch Full HD H.264/MPEG4 PCIe video capture card with SDK
DVP-7611HE	1ch HDV/SDI/CVBS/YPrPr/S-video PCIe HW card
DVP-7021HE	2ch HDMI/DVI/VGA/YPbPr/composite/S-video PCIe SW

There are SDKs and APIs for video capturing and recording which allow system integrators to implement into their use applications. After installing the capture cards to USM-500, software programmers can easily program their customized software application. For SDKs and APIs contents, you can download the related documents from Advantech official website.

Graphic card

Part Number	Description
SKY-QUAD-RTXA2000B*	NVIDIA Quadro RTX-A2000
SKY-QUAD-RTXA4000B*	NVIDIA Quadro RTX-A4000
SKY-QUAD-RTXA5000B** (1700031334-01)	NVIDIA Quadro RTX-A5000 (extra power cable required)
SKY-QUAD-RTXA6000B** *** (1700032552-01)	NVIDIA Quadro RTX-A6000 (extra power cable required)

* RTX-A2000 and RTX-A4000 leverage USM-500 default power cable (yellow color in 6pin) for power supply.
**RTX-A5000 and RTX-A6000 require one extra power cable (P/N: 1700031334-01 / 1700032552-01) with USM-500 default power cable (yellow color in 8pc) for more power supply.
*** RTX-A6000 require individual barebone with one extra fan added.

3.4. Cleaning and Maintenance Instructions

Before cleaning the USM-500, first disconnect the power supply, and then disconnect all other cables.

Use only a moist, soft, and lint-free cloth. Avoid abrasive cloths, towels, paper towels, and similar items that might cause damage to the aluminum housing. Ensure that no moisture enters any opening and only use mild cleaning agents.

The enclosure of USM-500 is made of aluminum that can help heat dissipation. Please provide regular maintenance to remove any dirt or dust on the enclosure that can reduce the cooling capacity of the enclosure.

Steps:
1. Prepare cleaning water
2. Wipe USM-500 with a clean cloth that has been moistened in the pure water.
3. Wipe thoroughly with a clean cloth.

Caution!

- *Do not immerse or rinse the USM-500 or its peripherals. If you accidentally spill liquid on the device, disconnect the unit from the power source. Contact your IT support department regarding the continued safety of the unit before placing it back in operation*
- *Do not spray cleaning agent on the chassis.*
- *Do not use disinfectants that contain phenol.*
- *Do not autoclave or clean the USM-500 or its peripherals with strong aromatic, chlorinated, ketone, ether, or ether solvents, sharp tools or abrasives. Never immerse electrical connectors in water or other liquids.*

USM-500 Pass Cleaning verification test

- Test Standard: Reference ASTM D 4752-03 and in house test method of Advantech
- Test Solvent:

1. AHP Accel TB (CAS Number:7722-84-1)
2. 75% Alcohol (CAS Number: 64-17-5)
3. Glutaral dehyde [C5H8O2], 2% concentration (CAS Number:111-30-8)
4. Isopropyl alcohol [(CH3)2CHOH], 70% concentration (CAS Number:7681-52-9)
5. Sodium hypochlorite [NaOCl], 10% concentration (CAS Number:2893-78-9)
6. CHLOR-CLEAN-1.7g NaDCC(1000 ppm available chlorine) (CAS Number:2893-78-9)
7. Clorox Healthcare® Hydrogen Peroxide (CAS Number:7722-84-1)
8. Clorox Healthcare® VersaSure
9. Clorox Healthcare® Bleach Germicidal Wipes

3.5. EMC Notice

The USM-500 are IEC 60601-1-2: 2014; EN 60601-1-2: 2015 products.
The Recorder are designed for use in general light industrial and medical environments according to the CENELEC standard definition.

Only use the power supply unit that was delivered with the Recorder, otherwise EMC compliance and warranty can be void.

3.6. Warm Surface Notice

CAUTION!
This USM-500 are passively cooled by heat convection via the enclosure of the product. The temperature of the enclosure can rise to nearly 50°C
at an ambient temperature of 40ºC without air flow.

4. SYSTEM SETUP

4.1. A Quick Tour of the USM-500

Before you start to set up the USM-500, take a moment to become familiar with the locations and purposes of the controls, drives, connections and ports, which are illustrated in the figures below.

When you place the USM-500 upright on the desktop, its front panel appears as shown in Figure 2.1.

4.1.1. Front View

Figure 4-1 Front View of the USM-500

Front View

(1) Power Button w/ indicator blue light when it is switched on

(2) USB 3.0 x2

4.1.2. Rear View

Most of I/O ports of USM-500 are located at the rear cover, including Display port, COM port, HDMI port, DVI-D port, Ethernet ports, USB ports and so on. Apart from the I/O ports shown in below fig 2.2, additional I/O ports are also included (not shown here) as add-on cards have been assembled to USM-500 for capturing and recording video.

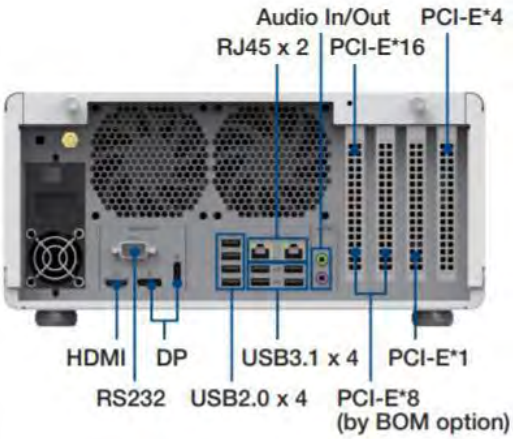

Figure 4-2 Rear View of the USM-500

Front View

(3) RS232
(4) DVI-D Output
(5) Display Port Output
(6) HDMI Output
(7) USB 2.0
(8) USB 3.0
(9) RJ-45
(10) Headphone
(11) MIC
(12) HDMI Output
(13)DVI-D Output
(14)DVI-D Input
(15)SDI Input
(16)HDMI Input

NOTE: Equipotential terminal need link to hospital ground/earth system before system boot to protect operator and system.

CAUTION!

The enclosure of the USM-500 is used to cool the device. Please ensure that sufficient space is available around the USM-500 for heat convection. Do not stack the USM-500.

The mains coupler is used as “disconnect device”, and must be available as such, or the socket outlet must be installed near the equipment and must be easily accessible, or an appropriate external disconnect device must be externally added in the installation.

5. INSTALLATION PROCEDURE

5.1. Connecting Power Cord

The USM-500 can only be powered by connecting the power cord to its power supply (FSP500M-80PA), and pressing the power button on the front cover. Be sure to always handle the power cords by holding the plug ends only.
Follow these procedures in order:

- Connect the female end of the power cord to the 3-pin AC male plug of USM-500.
- Connect the 3-pin male plug of the power cord to an electrical outlet.

5.2. Connecting The Ground Pin

Step1. System ready and find the Equipotential Terminal on rear side of USM-500. An Equipotential Terminal is provided to optionally connect to a hospital ground/earth system.

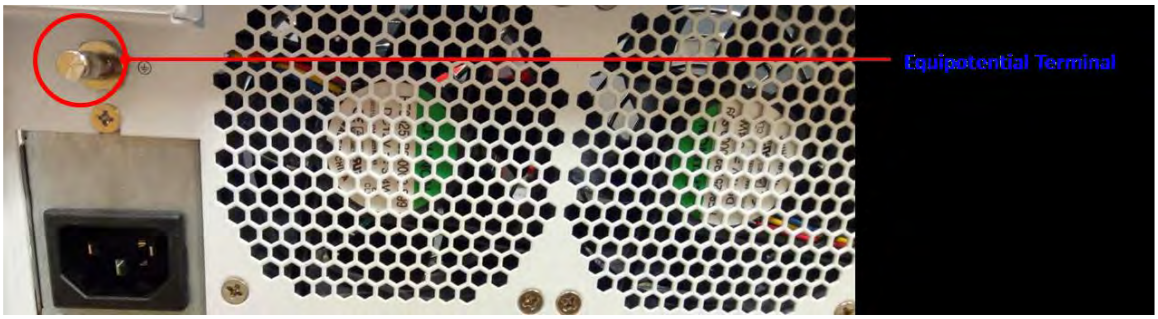

Figure 5-1: USM-500 Equipotential Terminal Pin

Step2. Prepare the Grounding cable and the other terminal link to hospital ground/earth system.

Figure 5-2: Grounding cable with connector

Step3. Grounding cable plug with USM-500 Equipotential Terminal (See Figure 5-1)

5.3. Running BIOS Setup Program

Your USM-500 was probably set up and configured by your dealer prior to delivery. You may still find it necessary to use the BIOS (Basic Input-Output System) setup program to change system configuration information, such as the current date and time or your type of hard drive. The setup program is stored in read-only memory. It can be accessed either when you turn on or reset the USM-500, by pressing the “F2 or Del” key on your keyboard immediately after powering on the computer.

The settings you specify with the setup program are recorded in a special area of memory called CMOS RAM. This memory is backed up by a battery so that it will not be erased when you turn off or reset the system. Whenever you turn on the power, the system reads the settings stored in CMOS RAM and compares them to the equipment check conducted during the power on self-test (POST). If an error occurs, an error message will be displayed on screen, and you will be prompted to run the setup program.

5.4. Install System Software

Recent releases of operating systems from major vendors include setup programs which load automatically and guide you through hard disk preparation and operating system installation. The guidelines below will help you determine the steps necessary to install your operating system on the USM-500 hard drive.
NOTE: Some distributors and system integrators may have already
pre-installed system software prior to shipment of your USM-500.
If required, insert your operating system's installation or setup diskette into the external diskette drive until the release button pops out.
The BIOS supports system boots up directly from the CD-ROM drive. You may also insert your system installation CD-ROM disk into your external CD-ROM drive.
Power on or reset the system by pressing the “Esc” or Del” key to boot into BIOS menu and adjust the boot device sequence.
You can also press F7 key when booting; a bootable device popup menu will appear, you can select bootable device that you want. USM-500 will automatically load the operating system from the diskette or CD-ROM.
If you are presented with the opening screen of a setup or installation program, follow the instructions on screen. The setup program will guide you through preparation of your hard drive, and installation of the operating system.

5.5. Install Driver

After installing your system software, you will be able to set up the Chipset, Graphics, Ethernet, and Audio functions from your own external CD-ROM drive. All the drivers can be downloaded via Advantech official website.
The standard automatic installation procedures for installing the Chipset, Graphics, Audio, and Ethernet are described in Chapter 3.

Troubleshooting
When system behaves abnormally, such as:
1. Failure to power on 25 USM-500 User Manual

2. Failure to power off
3. AC power in and all switches ON, but system doesn't power on

Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:

- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages
- Symptoms, photo or video if available.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions

Emissions Test	Compliance	Electromagnetic Environmental Guidance
RF emissions CISPR 11	Group 1	USM-500 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	USM-500 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and the USM-500

Rated Maximum Output Power of Transmitter W	Separation Distance According to Frequency of Transmitter m		
	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 in the table above 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 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Guidance and Manufacturer's Declaration – Electromagnetic Immunity

USM-500 is intended for use in the electromagnetic environment specified below. The Customer or the user of the model USM-500 should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environmental Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±15 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 ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Main power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth	±1 kV line(s) to line(s) ±2 kV line(s) to earth	Main power quality should be that of a typical commercial or hospital environment.
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 5 sec	<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 5 sec	Main power quality should be that of a typical commercial or hospital environment. If the user of the model USM-500 requires continued operation during main power interruption, it is recommended that the model USM-500 be powered from an uninterruptible power supply.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE *U*T is the A.C. main voltage prior to application of the test level.

Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The model USM-500 is intended for use in the electromagnetic environment specified below. The customer or the user of the model USM-500 should assure that it is used in such an environment.

Immunity test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environmental Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the model USM-500, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended Separation Distance** $d = 1{,}2\sqrt{P}$ $d = 1{,}2\sqrt{P}$ 80 MHz to 800 MHz $d = 2{,}3\sqrt{P}$ 800 MHz to 2,5 GHz where 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, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol:
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150 kHz to 80 MHz 3 V/m 80 MHz to 2,5 GHz	Vrms V/m	

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2 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 broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which USM-500 is used exceeds the applicable RF compliance level above, USM-500 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the unit.
- Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

6. OPERATION AND SAFETY

6.1. General Safety Guide

For your own safety and that of your equipment, always take the following precautions. Disconnect the power plug (by pulling the plug, not the cord), from your computer if any of the following conditions exists:

- The power cord or plug becomes frayed or otherwise damaged
- You spill something into the case
- Your computer has been dropped or the case has been otherwise damaged
- You suspect that your computer needs service or repair
- You want to clean the computer
- You want to remove/install any parts

6.2. Thermal

The vent hole on the rear cover of USM-500 as well as system fans, CPU fan function as a cooling air flow inlet and outlet. These air inlets and outlets transfer heat from inside the computer to the cooler air outside. Do not block these holes/vents with any soft material, nor should its system fans and CPU fan be removed arbitrary.

Warning! Do not place your USM-500 system on a pillow or other soft material when it is on, as the material may block the airflow and cause the com-puter to overheat.

6.3. Disconnect the Power

The only way to disconnect power completely is to unplug the power cord. Make sure at least one end of the power cord is within easy reach so that you can unplug the computer when you need to.

Warning! Your AC cord came equipped with a three-wire grounding plug (a plug that has a third grounding pin). This plug will fit only a grounded AC out-let. If you are unable to insert the plug into an outlet because the outlet is not grounded, contact a licensed electrician to replace the outlet with a properly grounded outlet. Do not defeat the purpose of the grounding plug.

Warning! Never push objects of any kind into this product through the openings in the case. Doing so may be dangerous and result in fire or a dangerous electric shock.

6.4. Proper Handling

Handle your USM-500 with care. It is made of metal, and has sensitive electronic components inside.
Don't use a damaged USM-500.
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Set USM-500 on a stable work surface.
Do not push objects into the ventilation openings.
To lift or move your system, hold its sides.

7. CERTIFICATIONS AND APPROVALS

7.1. EC Declaration of Conformity

USM-500 comply to the following standards and regulations:
2014/30/EU EMC directive
IEC 60601-1-2: 2014; EN 60601-1-2: 2015
CISPR 11: 2009 + A1: 2010;
EN 55011: 2009 + A1: 2010 (Group 1, Class B)
IEC 61000-4-2: 2008; EN 61000-4-2: 2009
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010;
EN 61000-4-3: 2006 + A1: 2008 + A2: 2010
IEC 61000-4-4: 2012; EN 61000-4-4: 2012
IEC 61000-4-5: 2014 + A1: 2017; EN 61000-4-5: 2014 + A1: 2017
IEC 61000-4-6: 2013; EN 61000-4-6: 2014
IEC 61000-4-8: 2009; EN 61000-4-8: 2010
IEC 61000-4-11: 2004 + A1: 2017; EN 61000-4-11: 2004 + A1: 2017
IEC 61000-3-2: 2014; EN 61000-3-2: 2014
IEC 61000-3-3: 2013; EN 61000-3-3: 20132011/65/EC RoHS directive 2012/19/EU WEEE
directive 2001/95/EC General product safety
EN 60950-1:2006

7.2. Manufacturing

USM-500 have been manufactured in compliance with ISO13485.

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