Digital Image Receptor

The PaxScan 4336W v4 is a radiographic digital x-ray imaging sub-system

Abstract The Operating Instructions (P/N 135165-000) covers safety, setup, operation, and maintenance of the PaxScan 4336Wv4 radiography digital image receptor. The imager is a component sub-system intended for integration by a qualified systems integrator.

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Updates For updates to these instructions, please refer to the *Release Notes.*

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To speak with our technical support personnel, please call (800) 432-4422.

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General Safety Information

PLEASE READ THIS ENTIRE MANUAL BEFORE USING. PRIOR TO USING PLEASE ENSURE UNDERSTADING OF THE WARNING, PRECAUTIONS AND ADVERSE EFFECTS RELATING TO THIS DEVICE.

Safety Warnings, Precautions and Contraindications

Warning: For portable applications, the operator and end-user must take precautions to protect themselves against dangerous X-ray exposure when using the flat panel imager in the X-ray beam path of an X-ray source.

Warning: The 4336Wv4 is not intended to be used as a primary barrier to X-rays. The user is responsible for ensuring the safety of the operator, bystanders, and the subjects being radiographed

Warning: The equipment is not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.

Warning: The equipment is not suitable for use in the presence of or in combination with active implanted devices such as defibrillators and pacemakers. Doing so may prevent normal operation of these peripherals.

Warning: Do not exceed maximum load weight of 100kg over a diameter of 40mm and 150kg distributed around the entire surface of the panel.

Important: This device is not intended to supply heat to a patient. However, during normal use surfaces will become heated due to power dissipation in the imager.

Be aware that the 4336Wv4 is an applied part (patient contact device) and the surface shall not exceed 41 degrees C. See Figure 1-0 for the view of the patient contact surfaces. Internal temperature sensor data is provided in the diagnostic data attached to each image. These temperature measurements are well correlated with the panel external surface temperature. It is advisable to monitor this diagnostic data as an additional safety precaution.

Note: There are no contraindication situations.

Explanation of Symbols

	On (power: connection to the mains)		Caution / Warning / Important: Describes action or conditions that could result in equipment damage, data loss, or personal injury		Protective Earth Ground
	Alternating Current		Off (power: disconnection from the mains)		Direct Current
	Handle With Care		Indicates step-by-step description of the respective function follows		Useful / Important information
	Authorized Representative in the European Community/European Union		Manufacturer		Consult Instruction for Use
IP51	Protected from limited dust ingress Protected from condensation - PaxScan 4336Wv4 Receptor		Type B Applied Part		Load Weight Restriction
	Non-ionizing radiation	**IP20**	Protected from touch by objects greater than 12 millimeters, not protected from liquids – Varex Battery Charger		

Chapter Summary

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Introduction

The PaxScan 4336Wv4 is a radiographic digital image receptor commonly referred to as a flat panel detector (FPD). The detector together with image processing and software called Varex Smart Panel (VSP) is designed for integration into a complete X-ray system. The imaging system has two main system components: The flat panel sensor, and VSP Software.

Shipment Contents

Flat Panel Receptor Assembly (includes a back-up cable for image recovery)

PaxScan Receptor Test Results DVD

(Files specific to the receptor in the shipment)

PaxScan Software DVD

VSP/ViVA System Software M01

PaxScan 4336Wv4 Operating Instructions

Optional Parts

Lithium-ion Battery – Varex model
– P/N 30773 (gray), 57834 (white), 81701 (black)

Battery Charger – Varex model

Laptop Style Power Supply for 1-Bay Battery Charger (includes power cable)
– P/N 82351 (black)
(OEM) Electrochem Solutions, Inc

Laptop Style Power Supply for 3-Bay Battery Charger (includes power cable)
– P/N 35205 (gray/white), 82350 (black)
(OEM) Electrochem Solutions, Inc.

Laptop Style Power Supply for 1-Bay Battery Charger (includes power cable)
– P/N 117402

Laptop Style Power Supply for 3-Bay Battery Charger (includes power cable)
– P/N 44666

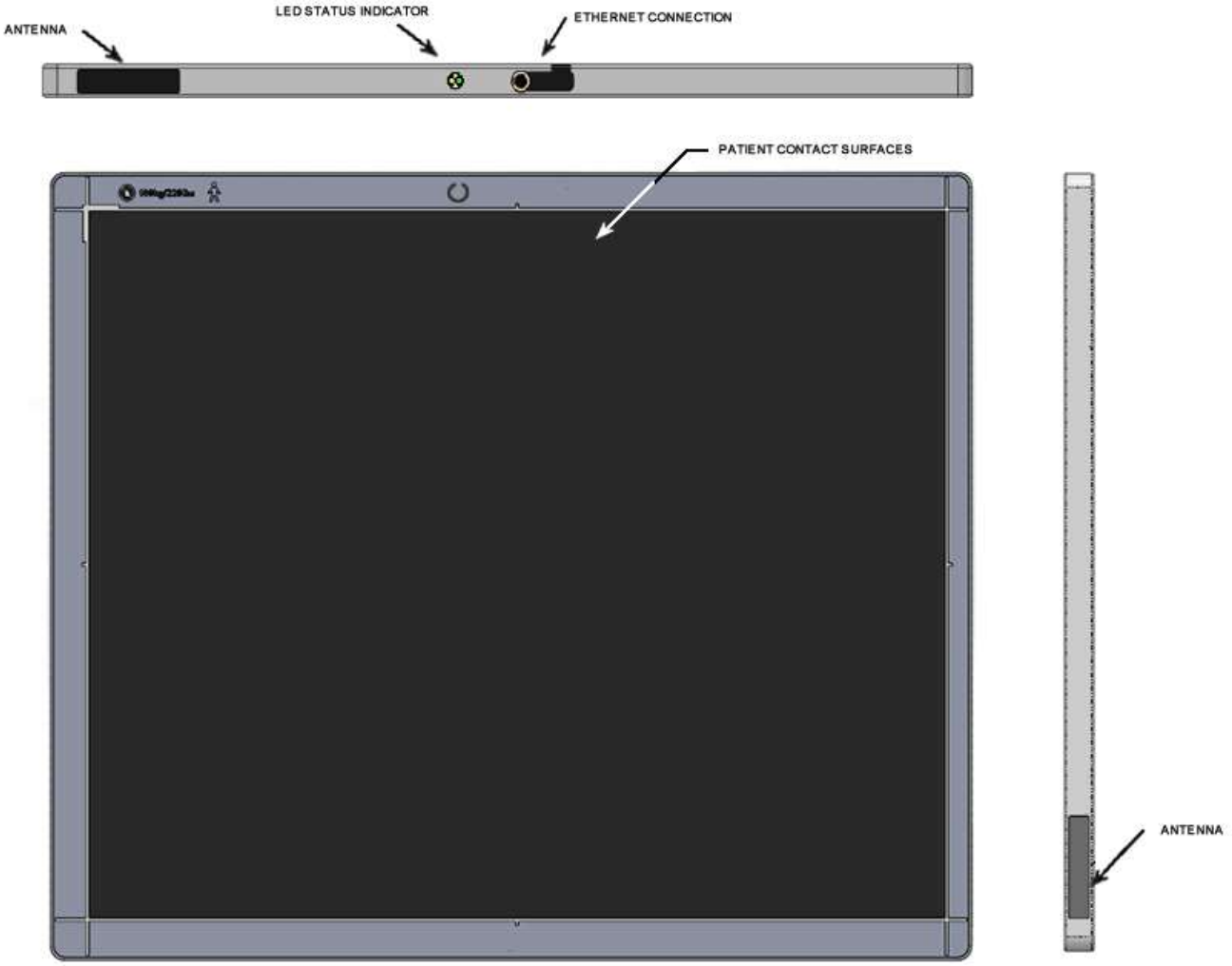
Customer Specific Overlay

Immediately upon receipt, inspect the shipment and its contents against the Delivery Note enclosed with the shipment for evidence of damage or missing components. Save all shipping containers in case a return is warranted. If there is any discrepancy, please call the PaxScan Service Center at (800) 432-4422 or (801) 972-5000.

Intended Use

The PaxScan 4336Wv4 receptor is a light weight, wireless flat panel detector designed for medical and veterinary use. The 4336Wv4 fits standard bucky trays and its wireless communication enables easy migration between table, above the table, chest stand, and mobile cart applications. This family model will acquire image over a wide range of dosage, while providing maximum access to the patient, with a minimum possible border on the active imaging area. An additional cable is supplied with the receptor to allow for set-up of the wireless interface and retrieve images from the receptor in the case of failed wireless transmission.

Figure 1-0 Patient Contact Surfaces – 4336Wv4



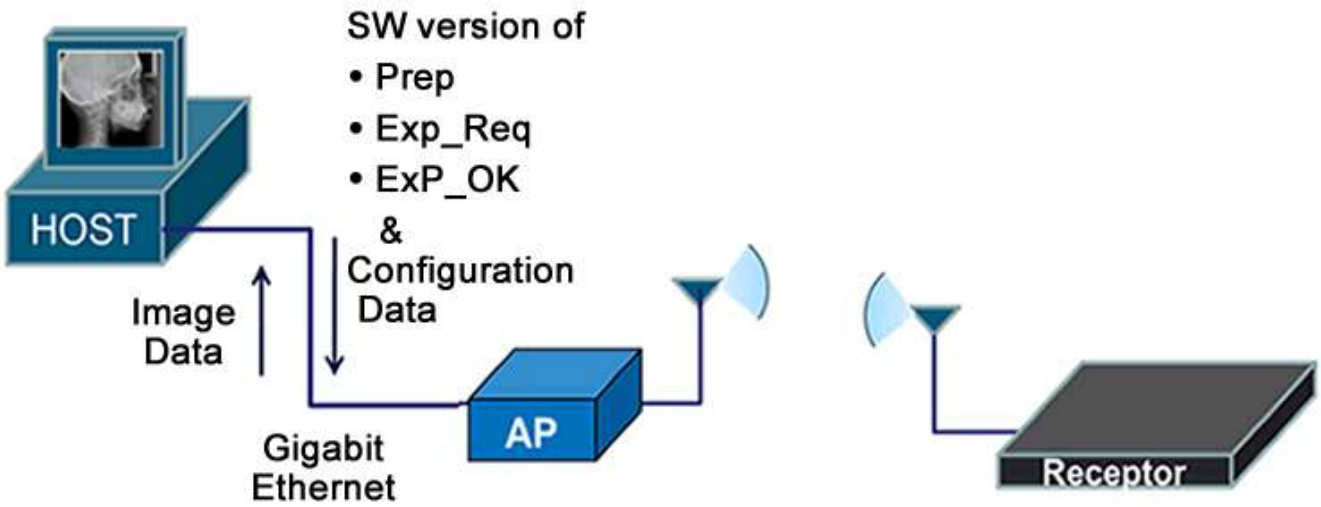
Getting Started

System Overview

In medical applications, the function of the 4336Wv4 FPD is to absorb the X-rays that pass through the patient's anatomy and convert them into a digital image. The wireless access point is the interface between the FPD and the imaging system and may be mounted in an equipment enclosure, or it may also be wall or ceiling mounted to maximize wireless signal strength. The Receptor comes with a software application package, Varex Smart Panel (VSP. The VSP performs all the interface functions with the receptor; such as control, image acquisition and calibration. During operation, the Receptor is often draped or bagged to ensure cleanliness and sterilization, and is manipulated such that the Receptor's input window is located near, but on the opposite side of the patient, from the X-ray source.

Figure 2-0 shows the configuration of the Receptor in the context of the overall imaging system. The dimensions for receptor are 459.5mm x 383.5 x 15mm.

Figure 2-0 Imager Configuration



Note:

For proper operation, receptor antennas and access point antennas should be unobstructed.

Access point should not be installed next to power supply or generator equipment.

Figure 3-0 Imaging System Overview – without Router

Figure 3-1 Imaging System Overview – with Router

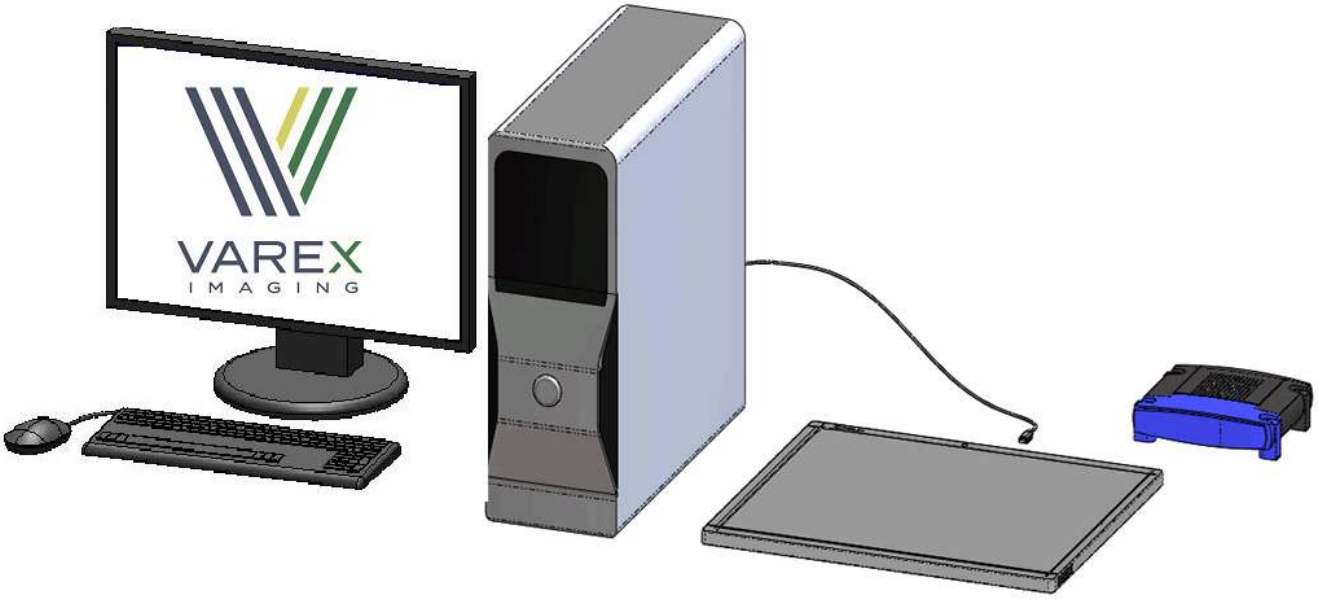


Figure 4-0 Imaging System Overview - Cable Connection

Note: **There is one (1) cable connections for the 4336Wv4 Flat Panel Receptor which is the back-up cable.** This cable functions as an interface between the receptor and the workstation by providing a 100T Ethernet connection for set-up of the wireless interface and retrieval of images in the case of wireless transmission failure.

Power on Sequence

Step	Action / Results

1. Place battery into receptor making sure the battery latches into place. The receptor will automatically power on when battery is inserted.
2. The yellow and *green LEDs are solid while receptor boots.*
3. Wireless connected is green blinking.
4. The yellow LED indicates the status of the receptor. Refer to Figure 5-1 for explanation of LED status indicators.

Figure 5-0 4336Wv4 Receptor Power/LED

Figure 5-1 4336Wv4 LED Status - Details

Receptor LED's

LED Behavior	Action
Green and Yellow Solid	Booting
Green Blinking (100000)	Not Linked
Green Blinking (101010)	Connected Wireless
Green Solid	Link Opened
Green Blinking (1100)	Connected Service Cable
Yellow Solid	Panel Error

Note: The blinking behavior occurs based on a 4Hz clock. Each digit for the blinking pattern represents 1/4s.

Important: The Service Cable does not provide power to the receptor when tethered. Before servicing, ensure that a fully charged battery is inserted.

Warning: PaxScan *4336Wv4* Moisture Resistance Level Tested, horizontal position, x-ray window face up, without backup cable attached; protected against falling water equivalent to 3-5mm rainfall per minute for duration of 10 minutes.

IP51 Receptor Ingress Dust Level Tested, not entirely prevented, but must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment; complete protection against contact (dust proof).

Caution: Accessory or optional equipment connected to the analog and digital interfaces must be certified to the respective IEC standards (i.e., IEC 60950-1 for data processing equipment and IEC 60601-1 for medical equipment). Furthermore, all configurations shall comply with the system standard IEC 60601-1-1. Anyone connecting additional or optional equipment to the signal inputs or signal outputs as part of a configuration for medical equipment is therefore responsible for compliance with the equipment standard IEC 60601-1. If in doubt, consult our technical support personnel.

Warning: Precautions should be taken to not open the receptor module. Depending upon the type of scintillator used, opening the receptor module may expose the user to potentially toxic materials.

Warning: Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

PaxScan System Software

The PaxScan 4336Wv4 receptor is part of a new series of Flat Panel Detectors which deploy the Varex Smart Panel (VSP) architecture. Imager software is composed of two parts: 1. Software necessary to capture, process, and correct x-ray images is embedded within the receptor; 2. The VSP COMM workstation libraries comprise the VSP SDK. Because the main software is embedded within the receptor, the only software required on the workstation is a small set of DLLs that should be copied from the DVD to the workstation.

The VSP COMM libraries are copied to the workstation. Software interfacing to this receptor will make API calls to these SDK libraries to control the image acquisition process. These libraries manage connections to the receptor and the transfer of files from the receptor to the workstation.

The contents of the DVD include the following files:

1. VSP COMM (SDK) files:
    a. libvsp.dll
    b. libvsp-zf.dll
    c. libwinpthread.dll
    d. vspcs.dll
    e. vsp.h

This set of files should be copied to the workstation. For customers working with C/C++, a vsp.h header file is included along with the libraries. For customer working with C#, the vspcs.dll provides the C# wrapper interface.

2. FP2032_VarexSmartPanel_SoftwareInterfaceSpecification.pdf – This .pdf file provides API documentation for the software.

3. Bonjour installation files
    a. Bonjour.msi
    b. Bonjour64.msi

Bonjour is an optional installation and is required if you use the List()/vsp_list() API function.

4. Sample Code
    a. vsp-example.cs – C# sample code project
    b. vsp-example.c– C/C++sample code project

5. Utility software
    a. vsp-example.exe

The vsp-file.exe utility is used to transfer a configuration file to the receptor.

Important: For interfaces connection, synchronization and timing diagrams information please reference the Software Interface Specification.

Modes of Operation

The PaxScan 4336Wv4 supports the radiography mode of operation as defined in Table 1-0. In general, there is a tradeoff between varying operation modes of resolution, or field of view, or cycle time, or noise. The sensitivity of the imager is optimized to match the X-ray dose used in each mode.

The purpose of each mode is to configure the detector to achieve optimal performance during specific imaging procedures. Modes are defined by a combination of factors, such as cycle time and analog gain. Each mode requires a unique set of calibration files.

Note: The system may be in only one mode at a given moment.

Not every mode will be available with every system. The OEM should work with PaxScan technical support for configuration of the mode(s) which best suit the customers intended application.

Table 1-0 PaxScan 4336Wv4 Operational Modes

Mode	Cycle Time	Pixel Binning	Panel Scan Time	X-Ray Window Time	Image Area	Frame Size	Acquisition Type
Radiography – Full Resolution	7 sec	1 x 1	550ms	0.35 to 3.5s	Full Field	2,476 x 3,072	Accumulation

Default Mode

Mode 0 is the default. The default mode will be invoked automatically upon system power-up when a link is opened or receipt of a reset state command.

Operation States

The operational states of the imager can be categorized as follows:

- **Radiography acquisition**: (Radiography-type)
- **Offset calibration**: (OEM-initiated)
- **Gain calibration**: (always-OEM initiated)
- **Analog offset calibration**: (always OEM-initiated)

Each operating mode employs all types of calibration. In radiography-type acquisitions, the PaxScan 4336Wv4 will acquire one frame with its respective offset.

Calibration Procedures

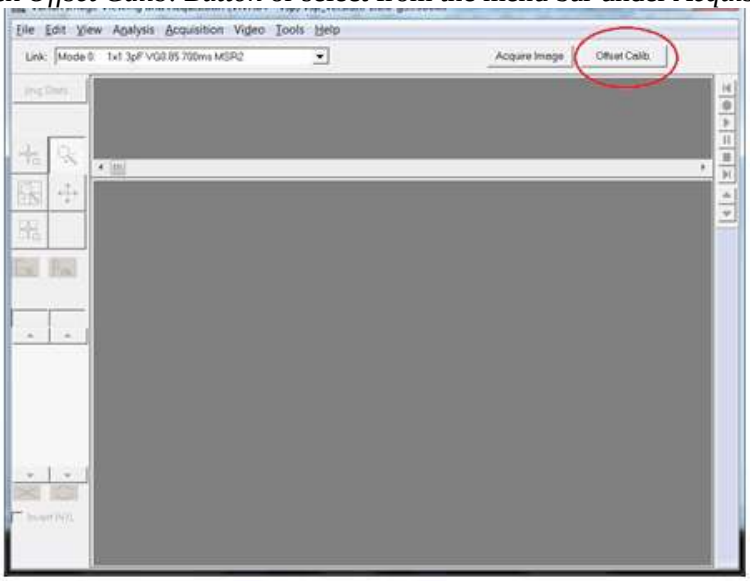
Offset Calibration

Offset calibration compensates for fixed pattern pixel intensity variations in the image associated with the dark current and electronic offsets. The Offset reference image is an average of a series of frames acquired without X-ray illumination and referred to as dark fields.

- Offset calibration should not be performed during X-ray.
- The X-ray-to-digital conversion factor does not change as a result of calibration.

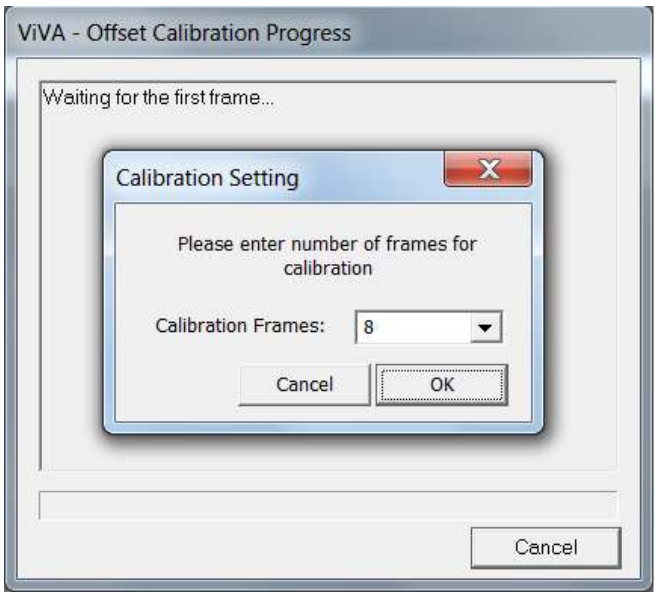
Preview Offset Calibration

There are two types of offset calibration; one is used for the preview image and the other to calibrate the final image. Prior to acquiring images, an offset calibration must be performed in each mode. This offset calibration is used for the preview image. In addition, an offset calibration is automatically performed after each single acquisition. ▶

Step	Action / Results
1.	To perform offset calibration, click the *ViVA* icon  launches the application.
2.	Ensure required receptor appears in the *Mode* drop down. The 4336WV4 currently supports Rad 1x1 3pf. Click *Offset Calib. Button* or select from the menu bar under *Acquisition*. 

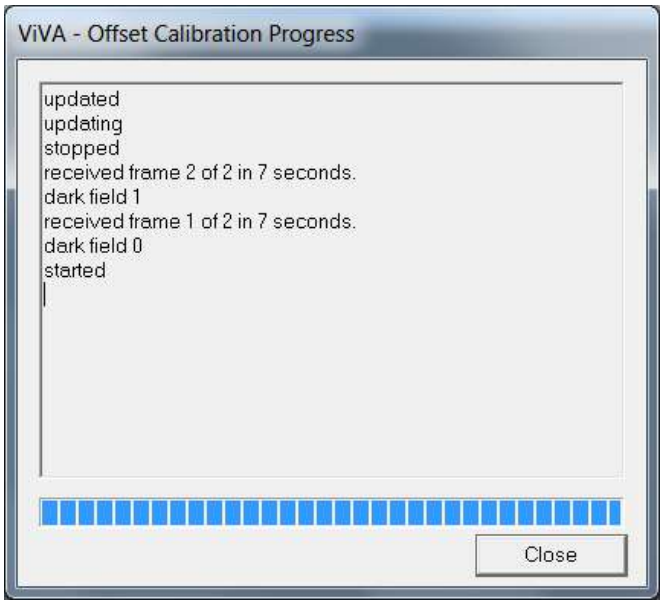
Step	Action / Results

3. A *Calibration Setting* window appears followed by an *offset Calibration Progress window*.



4 The number of frames acquired can be selected from the *Settings window*. Once all frames are acquired, the receptor is updated with the averaged offset calibration frame for the current mode. The updated message will show on the progress window and calibration process is complete.

Press *Close button* to close the window.



Gain Calibration

To compensate for non-uniformities in the Receptor, a gain reference image (flat field) is used by the Corrections module as required to correct all images. The flat field image must be captured by the Varex Smart Panel (VSP) prior to acquiring images. The process of capturing the flat field image is known as Gain Calibration.

Note: Every time a gain calibration process is run, an offset calibration is enforced beforehand. This will ensure that the receptor is properly calibrated.

Gain calibration is based upon the linear response of the Receptor to dose. Normalization is achieved by applying the flat field image acquired during the Gain calibration to all images corrected by the VSP. Normalization will fail with pixels that are responding to dose in a non-linear manner. Pixels responding to dose in a non-linear manner are usually caused by the saturation of the Receptor, or a low signal-to-noise ratio.

Note: It is critical to acquire the flat field image within a range that is large enough to be higher than the background noise created by the X-ray source and readout electronics of the Receptor, but lower than the saturation point of the imager.

Flat field images acquired near or exceeding the saturation point will cause normalization failures with all images acquired until a Gain calibration with the correct dose is performed. We recommend that flat field images be acquired with a median count of approximately 13000 - 14000. This range will ensure that Gain calibration will meet both the upper and lower dose requirements under all modes of operation. Dose requirements are determined by the settings of the generator X-ray source.

To reduce the effects of noise, the average of each pixel in the flat field image is calculated by accumulating a number of frames into an internal memory buffer, then dividing the sum of each pixel by the number of frames acquired.

Note: Using larger numbers of calibration frames to capture the flat field image will result in more accurate calibration.

Important: Gain calibration requires the production of X-rays and therefore certain precautions must be taken by the human operator.

The number of calibration frames used during Gain and Offset calibrations can be adjusted under the *Mode Settings* pull down menu. We recommend accumulating 32 frames for gain calibration and 8 frames for offset calibration for optimal image quality. However, the actual number of calibration frames used must be determined solely by the system integrator depending upon their specific performance requirements.

The general procedure for Gain calibration for all modes is as follows in Table 2-0 and described in the next section. Detailed instructions on performing gain calibrations are covered in the ViVA Online help documentation. ▶

Table 2-0 Gain Calibration: All Modes

Step	Action	Results
1.	Warm Up	To ensure proper warm up, the PaxScan 4336Wv4 Receptor must be operational for a least 30 minutes prior to Gain calibration.
2.	Offset Calibration	Software performs a new Offset calibration referred to as dark field acquisition. Note: X-Rays must not be used for this part of the calibration.
3.	X-Ray Radiation	A uniform flat field with no obstructions in the path of the X-Ray beam. The radiation should ideally be at a level and technique representative of the typical radiation dose for the Receptor during typical procedures, keeping in mind the general consideration outlined above.
4.	Repeat	The above procedure must be repeated for each of the stored imaging modes.

Radiographic Mode Gain Calibration

Radiography Gain calibration requires an Offset calibration performed prior to collecting the Flat Field image. Therefore an Offset Calibration process must be run prior to the gain Calibration. X-Ray illuminated frames are then offset-corrected and accumulated in the VSP. A series of accumulated frames equals one radiographic X-ray exposure. Exposures are averaged to obtain the Flat Field image used by the VSP. The number of exposures acquired can be selected from the *Settings window*.

Important:

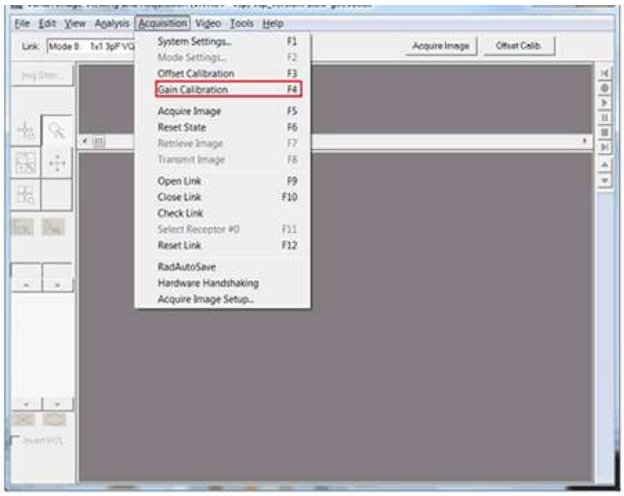
VivA provides a convenience of running Offset Calibration as part of the Gain Calibration process.

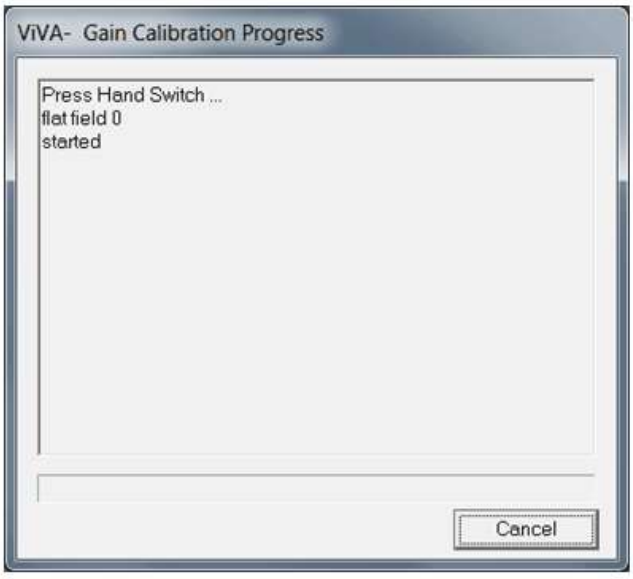
However, API driven Gain Calibrations do not automatically run Offset Calibration. OEM Applications should be sure to run Offset Calibration prior to Gain Calibration.

Take the following steps to complete radiographic gain calibration. ▶

Step	Action / Results

1. Ensure the desired receptor and imaging mode appears in the *Mode* drop down.
2. Click *Gain Calibration* from the menu bar under *Acquisition* invokes hardware handshaking for the dark field calibration.
3. Finish Offset Calibration process as explained earlier.





4. Use *operator control* to perform an exposure. Once all x-ray frames have been acquired click Finish to Complete the calibration.

The number of frames acquired can be selected from the Setting window. Once all X-ray frames have been acquired, the receptor is updated with the averaged gain calibration for the current mode. The updated message will show on the progress window and calibration process is complete. Press *Close button* to close the windo*w.*

Note: *Operator Control* is user supplied equipment.

Note: Gain calibration should be performed at regular intervals, typically once every six (6) months, or whenever the central beam of the X-ray source has been moved relative to the Receptor.

Replacement of the X-ray tube will require a new gain calibration to be performed.

Note: Varex recommends accumulating 32 frames for gain calibration for optimal image quality. However, the actual number of calibration frames used must be determined solely by the system integrator depending upon their specific performance requirements.

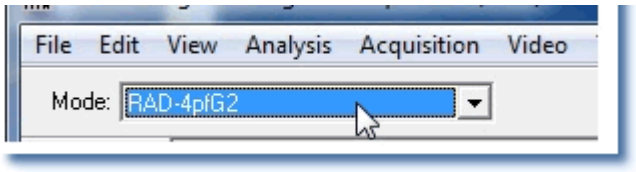
Note: For additional assistance operating ViVA™, use the ViVA Online help documentation.

ViVA Mode Settings

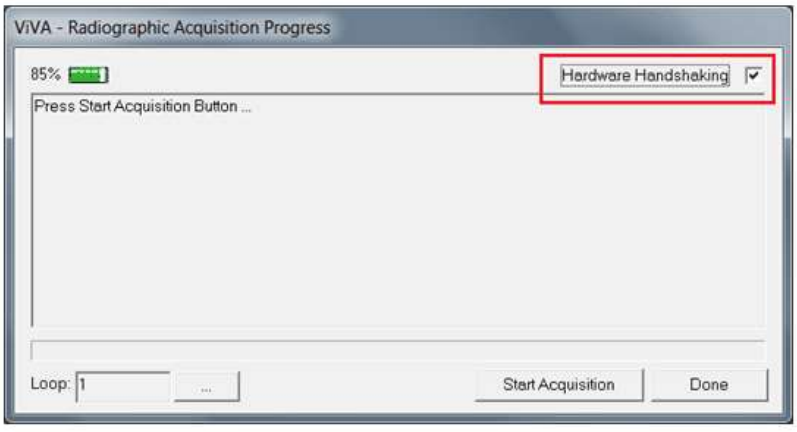
The calibration and system settings are verified as follows. ▶

Step	Action / Results

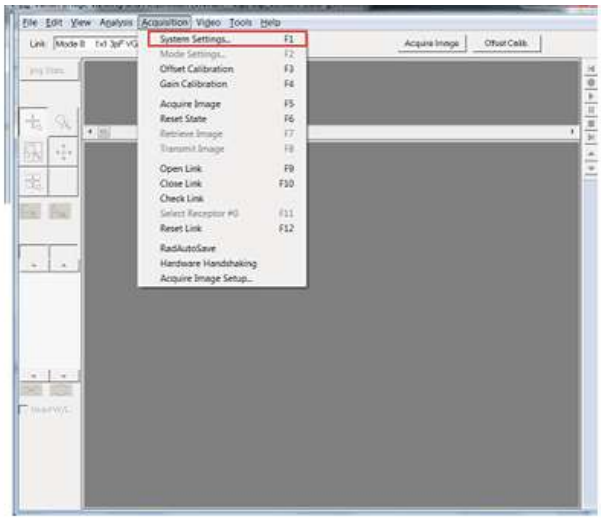
1. Make sure the desired receptor is selected from the *Mode* drop down menu; and, that **"Hardware Handshaking"** is *"checked"* from the menu bar under *Acquisition*. ViVA will remember your preference for future launches.



2. ***Or*** check the Hardware Handshaking from Radiographic *Acquisition Progress window*.



3. System settings are verified as follows.


File Edit View Analysis Acquisition Video Tools Help
System Settings... F1
Mode Settings... F2
Offset Calibration F3
Gain Calibration F4
Acquire Image F5
Reset State F6
Retrieve Image F7
Transmit Image F8
Open Link F9
Close Link F10
Check Link
Select Receptor #0 F11
Reset Link F12
RadAutoSave
Hardware Handshaking
Acquire Image Setup...
Acquire Image
Offset Calib.

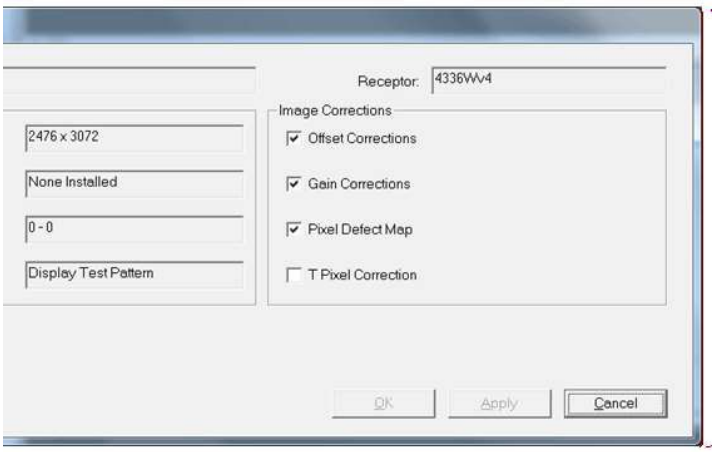

Receptor: 4336WV4
Image Corrections
2476 x 3072
None Installed
0 - 0
Display Test Pattern
Offset Corrections
Gain Corrections
Pixel Defect Map
T Pixel Correction
OK
Apply
Cancel

Image Acquisition

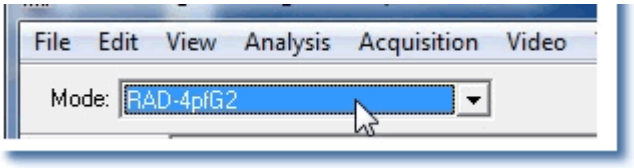
Once Offset and Gain Calibration is performed, you are ready to acquire images.

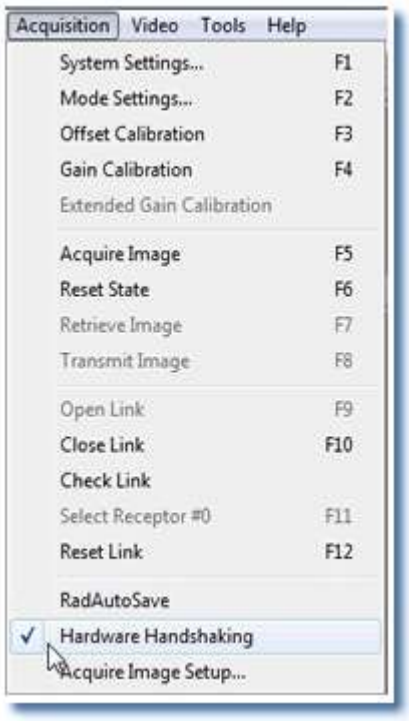
Radiography Mode

The Radiography mode provides the technician with superior single-shot, higher resolution images, for diagnosis. ▶

Step	Action / Results

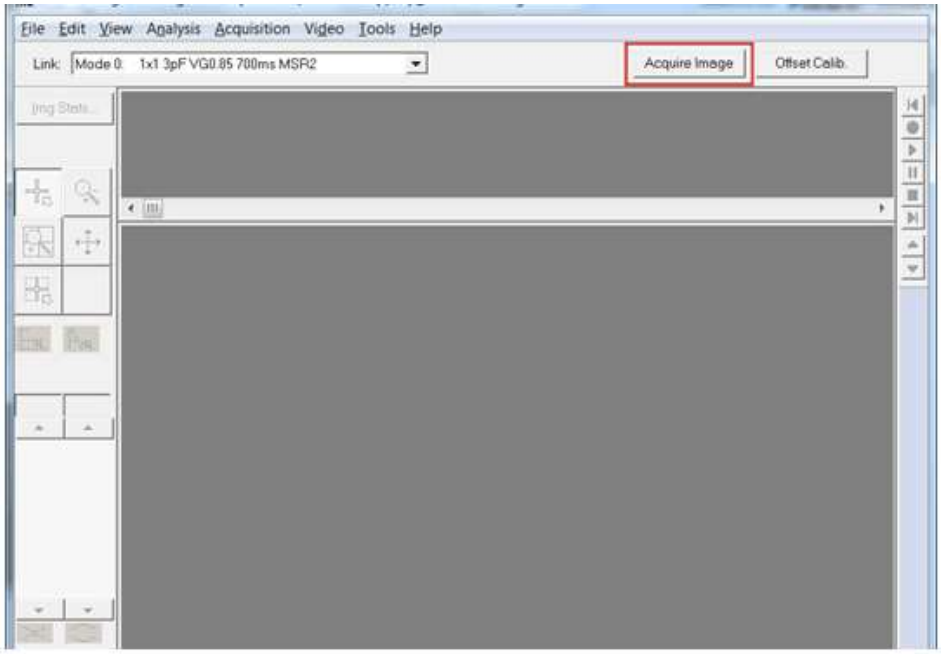
1. Select required receptor from *Mode* drop down menu.
2. Make sure hardware handshaking is checked.



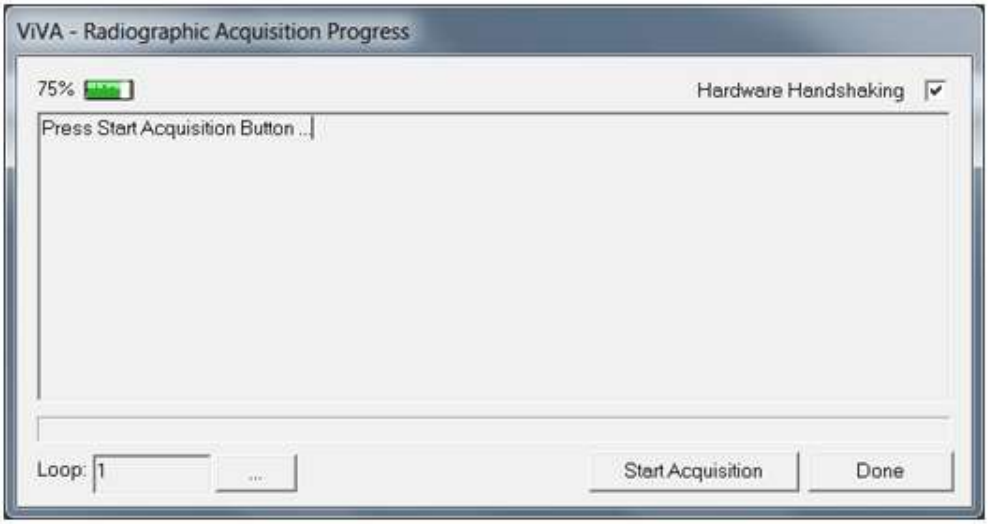


Step	Action / Results

3. Select the *Acquire Image button* to begin acquiring images. *Acquisition Progress window* will appear. Click *Start Acquisition button*.



4. Press *Start Acquisition button*.



Step	Action / Results

5. Acquired image can be saved in the desired file format by selecting File / Save As.

Safety

Electro-Magnetic Interference

This equipment generates, uses and can radiate radio frequency (RF) energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other devices or may be affected by other equipment in the vicinity. If this equipment does cause harmful interference to other devices or is affected by other equipment, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the measures listed in the **Troubleshooting** section.

This equipment uses wireless LAN (WLAN) radios for transferring images. The WLAN power levels and antenna configurations have been tested and certified compliant through specific absorption rate (SAR) limits set by FCC/IC Canada (Less than 1.6W/kG) with separations as small as 0 cm between the panel antennas and human tissue. While compliant, it is still recommended to reduce exposure when possible by 1) positioning subject to be X-rayed away from the antennas (this also helps reduce image transfer time) and 2) removing the detector panel promptly when X-ray exposure is complete.

Electromagnetic Emissions

Table 3-0 Radiated/Conducted Emissions, Harmonics, Voltage, Fluctuations & Flicker

Emissions test	IEC 60601-1-2 test level	Compliance	Electromagnetic environment
RF conducted emissions EN55011/CISPR11	Group 1, Class B, 150 kHz – 30 MHz	N/A Battery power equipment not connected to mains	The FPD uses RF energy for its internal function. Nearby electronic equipment may be affected.
RF radiated emissions EN55011/CISPR 11	Group 1, Class B, 30 MHz – 1 GHz	Group 1, Class B, 30 MHz – 1 GHz	The FPD uses RF energy for its internal function. Nearby electronic equipment may be affected.
Harmonic emissions EN/IEC 61000-3-2	Class A	N/A Battery power equipment not connected to mains.	The FPD is suitable for use in all establishments other than domestic and those directly connected to the low voltage power supply network that supplies buildings used for domestic purposes.
Voltage fluctuations / flicker emissions IEC 61000-3-3	Complies	N/A Battery power equipment not connected to mains	The FPD is suitable for use in all establishments other than domestic and those directly connected to the low voltage power supply network that supplies buildings used for domestic purposes.

Electromagnetic Immunity

Table 4-0 ESD, Transient/Burst, Surge, Voltage Variation, Magnetic Fields

Immunity test	IEC 60601-1-2 test level	Compliance	Electromagnetic environment
Electrostatic discharge (ESD) IEC 61000-4-2	± 8 kV contact discharge ± 2, 4, 8, 15 kV air discharge	± 8 kV contact discharge ± 2, 4, 8, 15 kV air discharge	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 AC Mains ±2 kV I/O Lines	N/A Battery power equipment not connected to mains	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±0.5 kV, ±1 kV Line to Line ±0.5 kV, ±1 kV, ±2 kV Line to Ground	N/A Battery power equipment not connected to mains	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	Voltage dips: 0 % U_T (100 % dip in U_T) for 0,5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315° 0 % U_T (100 % dip in U_T) for 1 cycle at 0° 70 % U_T (30 % dip in U_T) for 25/30 cycles at 0° Voltage Interruptions: 0 % U_T (100 % dip in U_T) for 250/300 cycle	N/A Battery power equipment not connected to mains	Mains power quality should be that of a typical commercial or hospital environment. If the user of the FPD requires continued operation during power mains interruptions, it is recommended that the system be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Magnetic field should be that of a typical location in a typical commercial or hospital environment.

RF Immunity

Table 5-0 Conducted / Radiated RF

Immunity test	IEC 60601-1-2 test level	Compliance	Electromagnetic environment
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	N/A Battery power equipment not connected to mains	Portable and mobile RF communications equipment should be used no closer to any part of the FPD than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = [\frac{3,5}{V_1}]\sqrt{P}$
Radiated RF IEC 61000-4-3	10 V/m 80 MHz to 2.7 GHz	10 V/m 80 MHz to 2.7 GHz	$d = [\frac{3,5}{E_1}]\sqrt{P}$ 80 MHz to 800 MHz $d = [\frac{7}{E_1}]\sqrt{P}$ 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:  Some degradation of video & increase in video noise possible.

Immunity test	IEC 60601-1-2 test level	Compliance	Electromagnetic environment

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.

a 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 the [EQUIPMENT or SYSTEM] is used exceeds the applicable RF compliance level above, the [EQUIPMENT or SYSTEM] should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the [EQUIPMENT or SYSTEM].

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [*V*1] V/m.

Temperature, Humidity & Atmospheric Pressure

Category	Limits
Storage & Transport (ambient)	Receptor: -20º C to +70º C Battery: -20º C to +60º C Battery Charger: -20º C to +60º
Storage Humidity Range (non-condensing)	Receptor: 10% to 90% Battery Charger:10% to 90% at 20º C
Normal Operation Temperature (measured at the center of the back cover)	Receptor: 10º C to 35º C
Operation Humidity (non-condensing)	10% to 90%
Atmospheric Pressure Range	700hPa to 1060hPa
Normal Operation Range (ambient) Note: that normal charging must be terminated if the battery cell temperature is above 45C or below -20C. Outside of the 0º C to 35C ambient temperature, the charger will remain active, but the charge current will be off or limited so that charge time will be extended.	Battery Charger: 0º C to 35C

Altitude Limits

The Paxscan Digital Imager Receptor is rated to operate at an altitude ≤ 3000m.
The Varex Battery Charger is rated to operate at an altitude -610m to 3050m (-2000 to 10,000 ft)

Varex Lithium-Ion Rechargeable Battery

Please only use the lithium-ion rechargeable battery listed below that is supplied with the receptor.

Battery type: Lithium-ion
Battery model: Varex – P/N 30773 (gray), 57834 (white), 81701 (black)

Rated voltage: 14.8V ⎓ 2.1Ah, 31.1 Wh

Caution: Risk of fire, explosion or burns. Do not short circuit, crush, heat above 100ºC, incinerate, or disassemble the battery. Charge only with the receptor or battery charger supplied. *Please follow local governing ordinances and recycling plans regarding proper disposal or recycling of the lithium-ion rechargeable battery*.

Note: Lithium-ion rechargeable battery is for use with the model PaxScan 4336Wv4.

Lithium-Ion Battery Handling, Storage, & Shipping

Handling

- Do not short circuit, crush, heat above 100ºC, incinerate, or disassemble the battery.
- Do not dispose of battery in fire or water.
- Do not expose battery to temperatures above 60 °C (140 °F).
- Do not use a damage battery.

Storage

- Remove battery and store it separately from device.
- Charge or discharge the battery to approximately 50% of capacity before storage.
- Charge the battery to approximately 50% of capacity at least once every six month.
- Store the battery at temperatures between -20 °C and 60 °C (-4 °F and 140 °F).

Shipping

- Always check all applicable local, national, and international regulations before transporting a Lithium-Ion battery.
- It is customers responsibility to ship battery according to local and international shipping regulation for Lithium-Ion battery in effect at the time of shipment.

Regulatory

- The PaxScan® 4336Wv4 model family and the Varex Battery Charger are an associated equipment x-ray medical equipment with respect to electrical shock, fire and mechanical hazards only in accordance with:

  UL 60601-1 Medical Electrical Equipment, Part 1: General Requirements for Safety 1st ed.

  IEC 60601-1 Medical Electrical Equipment Part 1: General Requirements for Safety 2nd ed.

IEC 60601-1 Medical Electrical Equipment Part 1: General Requirements for Basic Safety and Essential Performance 3rd ed.

ANSI/AAMI ES60601-1 (2005) Medical Electrical Equipment – Part 1: General Requirements for Basic Safety and Essential Performance.

CSA-C22.2 No 60601-1 (2008) Medical Electrical Equipment, Part 1 General Requirements for Basic Safety and Essential Performance.

CAN/CSA-C22.2 No 601.1-M90, 2005 Medical Electrical Equipment, Part 1 General Requirements for Safety.

EN/IEC 60601-1-2 Medical Electrical Equipment Part 1-2: General Requirements for Basic Safety and Essential Performance Collateral Standard: Electromagnetic Compatibility 4th ed.

RF compliant in accordance with FCC Part 15 Subpart C and Part 15 Subpart E.

- Type B Applied Part 
- CE Mark - Varex Imaging' imaging products are designed and manufactured to meet the MDD 93/42/EEC, and R&TTE Directive 1999/5/EC
- MDD Class IIa
- A Declaration of Conformity has been filed for this product and available upon request by contacting Varex Imaging.
- The Varex Battery Charger is a Class 1, continuous operation device and meets the following:

IEC 61000-4-2 Electro-Static Discharge

IEC 61000-4-3 RF Electromagnetic Fields Immunity

IEC 61000-4-4 EFT/Burst

IEC 61000-4-5 Surge Immunity

IEC 61000-4-6 Conducted RF Disturbances Immunity

IEC 61000-4-8 Magnetic Field Immunity

IEC 61000-4-11 Dips, Interruptions, and Variations

IEC 61000-3-2 Harmonics Current Emission

IEC 61000-3-3 Voltage Fluctuation and Flicker

Radio Frequency (RF) Compliance Information

FCC/IC Compliance

This device complies with Part 15 of the FCC Rules and RSS-Gen (RSS-210, etc.) of IC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

   Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules and Canadian ICES-003. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation

of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

The Interference Handbook
This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

In the 5150 to 5250 MHz frequency range this transmitter is restricted to indoor use only.

Industry Canada Notice

To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmitting antenna) that is installed outdoors is subject to licensing. The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's web site www.hc-sc.gc.ca/rpb.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada
Avis de Conformité à la Réglementation d'Industrie Canada:

Pour empêcher toute interférence aux services faisant l'objet d'une licence, cet appareil doit être utilisé à l'intérieur seulement et devrait être placé loin des fenêtres afin de fournir un écran de blindage maximal. L'installateur du présent matériel radio doit s'assurer que l'antenne est située ou pointée de manière à ce que cette dernière n'émette pas de champs radioélectriques supérieurs aux limites specifées par Santé Canada pour le grand public; consulter le Code de sécurité 6, disponible sur le site Web de Santé Canada, à l'adresse suivante: www.hc-sc.gc.ca/rpb.

This equipment complies with FCC RF radiation and RSS 102 exposure limits set forth for an uncontrolled environment. Body-worn operation and use near the head this device has been tested and meets both FCC/ IC RF exposure guidelines when used within this product guideline. The maximum SAR Value (Head) is 1.34W/kg. The maximum SAR Value (Body) is 1.37W/kg."

Cet équipement est conforme aux rayonnements RF de la FCC et RSS 102 limites

d'exposition définies pour un environnement non contrôlé. Opération Porté au corps et utiliser près

de la tête de ce dispositif a été testé et répond aux consignes d'exposition à la fois FCC / IC RF

lorsqu'il est utilisé dans ce produit directive. La valeur maximale SAR (Head) est 1.34W / kg. Le maximum Valeur SAR (Body) est 1.37W/kg."

European Community – CE Notice CE !

The CE! mark indicates compliance with the essential requirements of Directive 1999/5/EC. Such marking is indicative that this equipment meets or exceeds the following technical standards:

- EN 300 328
- EN 301 893
- EN 301 489-17
- EN 60950

Marking by the symbol: **!** indicates that usage restrictions apply in countries listed on this product's packaging.

Europe - Declaration of Conformity in Languages of the European Community.

cs Česky [Czech]	*Varex Imaging, Inc.* tímto prohlašuje, že tento Radiolan je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
da Dansk [Danish]	Undertegnede *Varex Imaging, Inc.* erklærer herved, at følgende udstyr Radiolan overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
de Deutsch [German]	Hiermit erklärt *Varex Imaging, Inc.*, dass sich das Gerät Radiolan in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
et Eesti [Estonian]	Käesolevaga kinnitab *Varex Imaging, Inc.* seadme Radiolan vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
en English	Hereby, *Varex Imaging*, declares that this Radiolan is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
es Español [Spanish]	Por medio de la presente *Varex Imaging.* declara que el Radiolan cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
el Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ *Varex Imaging.* ΔΗΛΩΝΕΙ ΟΤΙ Radiolan ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.

fr Français [French]	Par la présente *Varex Imaging* déclare que l'appareil Radiolan est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
it Italiano [Italian]	Con la presente *Varex Imaging.* dichiara che questo Radiolan è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski [Latvian]	Ar šo *Varex Imaging* deklarē, ka Radiolan atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių [Lithuanian]	Šiuo *Varex Imaging* deklaruoja, kad šis Radiolan atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
nl Nederlands [Dutch]	Hierbij verklaart *Varex Imaging* dat het toestel Radiolan in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
mt Malti [Maltese]	Hawnhekk, *Varex Imaging*, jiddikjara li dan Radiolan jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
hu Magyar [Hungarian]	Alulírott, *Varex Imaging* nyilatkozom, hogy a Radiolan megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
pl Polski [Polish]	Niniejszym *Varex Imaging* oświadcza, że Radiolan jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
pt Português [Portuguese]	*Varex Imaging* declara que este Radiolan está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
sl Slovensko [Slovenian]	*Varex Imaging* izjavlja, da je ta Radiolan v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Slovensky [Slovak]	*Varex Imaging* týmto vyhlasuje, že Radiolan spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
fi Suomi [Finnish]	*Varex Imaging* vakuuttaa täten että Radiolan tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
sv Svenska [Swedish]	Härmed intygar *Varex Imaging* att denna Radiolan står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Europe - Restrictions for Use of 2.4GHZ Frequencies in European Community.

België/ Belgique:	For private usage outside buildings across public grounds over less than 300m no special registration with IBPT/BIPT is required. Registration to IBPT/BIPT is required for private usage outside buildings across public grounds over more than 300m. For registration and license please contact IBPT/BIPT.
	Voor privé-gebruik buiten gebouw over publieke groud over afstand kleiner dan 300m geen registratie bij BIPT/IBPT nodig; voor gebruik over afstand groter dan 300m is wel registratie bij BIPT/IBPT nodig. Voor registratie of licentie kunt u contact opnemen met BIPT.
	Dans le cas d'une utilisation privée, à l'extérieur d'un bâtiment, au-dessus d'un espace public, aucun enregistrement n'est nécessaire pour une distance de moins de 300m. Pour une distance supérieure à 300m un enregistrement auprès de l'IBPT est requise. Pour les enregistrements et licences, veuillez contacter l'IBPT.
Deutschland:	License required for outdoor installations. Check with reseller for procedure to follow
	Anmeldung im Outdoor-Bereich notwendig, aber nicht genehmigungspflichtig.Bitte mit Händler die Vorgehensweise abstimmen.
France:	Restricted frequency band: only channels 1 to 7 (2400 MHz and 2454 MHz respectively) may be used outdoors in France.
	Bande de fréquence restreinte : seuls les canaux 1- 7 (2400 et 2454 MHz respectivement) doivent être utilisés endroits extérieur en France. Vous pouvez contacter l'Autorité de Régulation des Télécommuniations (http://www.art-telecom.fr) pour la procédure à suivre.
Italia:	License required for indoor use. Use with outdoor installations not allowed.
	E'necessaria la concessione ministeriale anche per l'uso interno. Verificare con i rivenditori la procedura da seguire.
Nederland	License required for outdoor installations. Check with reseller for procedure to follow.
	Licentie verplicht voor gebruik met buitenantennes. Neem contact op met verkoper voor juiste procedure.
All EU member states and EFTA countries	This device may only be used indoors in the frequency bands 5150 – 5250 MHz and 5250 – 5350 MHz.

To remain in conformance with European spectrum usage laws for Wireless LAN operation, the above 2.4GHz channel limitations apply for outdoor usage. The user should use the wireless LAN utility to check the current channel of operation. If operation is occurring outside of the allowable frequencies for outdoor use, as listed above, the user must contact the applicable national spectrum regulator to request a license for outdoor operation.

International Compliance

Argentina Compliance

Certificate Number: C-15871

Mexico Compliance

The operation of this equipment is subject to the following two conditions: (1) it is possible that this equipment or device does not cause harmful interference and (2) this equipment or device must accept any interference, including interference that may cause undesired operation.

"La operación de este equipo está sujeta a las siguientes dos condiciones: (1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada."

Nigeria Compliance

Connection and use of this communications equipment is permitted by the Nigerian Communication Commission

Philippines Compliance

NTC

Type Accepted
No. ESD-1511767C

UAE Compliance

United Arab Emirates
DA0114880/13

Singapore Compliance

Complies with
IDA Standards
N3386-15

Thailand Statement

This telecommunication equipment conforms to the requirements of the National Telecommunications Commission.

"เครื่องโทรคมนาคมและอุปกรณ์นี้ มีความสอดคล้องตามมาตรฐานทางเทคนิค เลขที่ ..."

"เครื่องโทรคมนาคมและอุปกรณ์นี้ มีความสอดคล้องตามข้อกำหนดของ กทช."

Taiwan NCC Warning Statement

Based on low-power radio waves radiated motor management approach

Article 12 Type certified low power radio frequency motor, unlicensed, company, firm or user shall not alter the frequency, increase the power or change the characteristics of the original design and function.
Article XIV using low power radio frequency motors shall not affect flight safety and interference lawful communication; when there is interference by the discovery should be immediately suspended, and to improve without interfering may continue to be used. Legal communications in the preceding paragraph refers to the

wireless telecommunication operations in accordance with the provisions of telecommunications. Low-power radio communication interference motor must endure radiation and Electronic Equipment legal or industrial, scientific and medical radio

This module after getting certified in accordance with the provisions of the Flag tag in the examination and certification body modules and require manufacturers to label platform to platform.

The equipment belongs to the module certification, applicable to a variety of platforms.

Transmitter module includes: EW5270UM

Certificate #: CCAJ16LP0440T3

MPE (Maximum Permission Exposure) statement
Electromagnetic exposure amount MPE standard value 1mW / cm2, send test products measured value: 0.9846 mW / cm2.

NCC 警語

低功率電波輻性電機管理辦法
第十二條經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。第十四條低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾

本模組於取得認證後，將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示

本器材屬於模組認證, 可適用於各種平台

變送器模組包括: EW5270UM

證書編號: CCAJ16LP0440T3

MPE (最大允許曝光) 聲明
電磁接觸量 MPE 標準值 1mW / cm2，發送測試產品測量值: 0.9846 mW / cm2

Maintenance

Cleaning and Disinfection

The flat panel receptor and connected cables are likely to be soiled during use. The specific material most likely to become soiled is the X-ray grade carbon fiber input window and aluminum/magnesium housing.

Cleaning and disinfecting of the input window should be performed as needed. Wiping the surfaces with a soft cloth dampened with soap and water will generally clean the surfaces.

Proper disinfection requires that a disinfectant solution be used; such as Sani-Cloth® Plus, a hospital grade, EPA registered low to intermediate-level product for hard, non-porous surfaces and equipment. Use disinfectants in accordance with the manufacturer's instructions. Alternatively, the below chemical cleaning solutions may also be used.

Cleaning and disinfecting of the battery and battery compartment should also be performed as needed using the same practices described above. Care should be taken when cleaning the battery contacts, use a non-abrasive cleaner that will not damage the copper contact material.

The battery charger can be cleaned with a wet cloth using one of the chemicals below. The battery charger cannot be submerged any time during cleaning.

Chemical Cleaning Solutions Recommended:

- Isopropyl alcohol, 70% aqueous solution.
- Mild soap and water.
- Chlorine bleach, 3% aqueous solution. *Do not clean electrical contacts or connector with bleach.*
- Quaternary ammonium compounds, such as Steris "Coverage Plus NPD" (one part Coverage Plus NPD to 255 parts water).
- CAVI-Wipes. *Use in accordance with the manufacturer's instructions*.

Caution: Do not use flowing liquid or immersion on the receptor, battery, battery compartment, or battery charger.

Do not sterilize

Repairs

Note: No user serviceable parts. If repairs are necessary, please see *How To Reach Us.*

The least replaceable units (LRU) are:

- Receptor Assembly
- Back-up Cable
- Varex Battery
- Varex Battery Charger

Proper Disposal

The 4336Wv4 receptor should be returned to Varex Imaging for disposal. We request that you obtain an RMA number using the same procedure for warranty/returns of products.

Contact: flatpanelwarranty@vareximaging.com

Do not dispose of the lithium-ion rechargeable battery in the garbage. Please consult local governing ordinances and recycling plans regarding proper disposal.

Warning: Precautions should be taken to not open the receptor module. Depending upon the type of scintillator used, opening the receptor module may expose the user to potentially toxic materials

Troubleshooting

Problem	Solution
Imager fails to respond.	1. Check wireless connection or cable connections.
Imager causes Electro-Magnetic Interference.	1. Reorient or relocate the receiving device. 2. Increase the separation between the equipment. 3. Connect the other device(s) into an outlet on a different circuit. 4. Consult the manufacturer or field service technician for help.
Poor Image Quality.	1. Confirm that image corrections are all selected in the Systems Settings dialog box in ViVA . 2. Re-acquire gain and offset images. 3. Assure that the exposures are appropriate for gain calibration images (not saturated).
Software hangs up.	Restart ViVA.
Acquired image is completely dark.	Increase the exposure and acquire a new image. If the image is still dark, verify that all cables are properly connected. Turn the power "OFF" and "ON". Acquire a new image.
Out of virtual memory.	Close some of the windows that are currently open.
Residual x-ray image from previous exposure shows in current image.	Charge on the sensor pixels from a super saturated exposure may cause a residual image. It can be erased by taking another image or multiple images without X-rays until the residual image is gone.
ViVA error message.	1. Please complete PaxScan 4336Wv4 Problem Report. 2. Email the error log file generated to: flatpanelwarranty@vareximaging.com. This log file is normally found at C:\users\{username}\AppData\Local\crashdumps\viva.log
Drop Receptor.	1. Remove battery from receptor and inspect for damage. 2 If the battery does not appear damage place into battery charger to see if battery charger reports an error. 3 Inspect the receptor for any physical damage. 4. Insert a charged battery into the detector and see if it powers on. Note: It is best to use a different battery than the one that was in the receptor when it was dropped. 5. Generate a link to the workstation. 6. Acquire an image from the receptor and inspect for regions of missing data. 1. For additional information on how to handle dropped receptor refer to OEM System Service Manual

PaxScan 4336W v4 Problem Report Customer Information

Date:	Your Name	Company/Unit Name:
Email:	Phone Number:	Fax Number:
Product Information.		
PaxScan Part Number: Imager Serial Number: Software Revision #:		
Operation I was trying to perform (be as specific as possible:		
What happened (use additional sheets as necessary):		

E-mail: Flatpanelwarranty@vareximaging.com

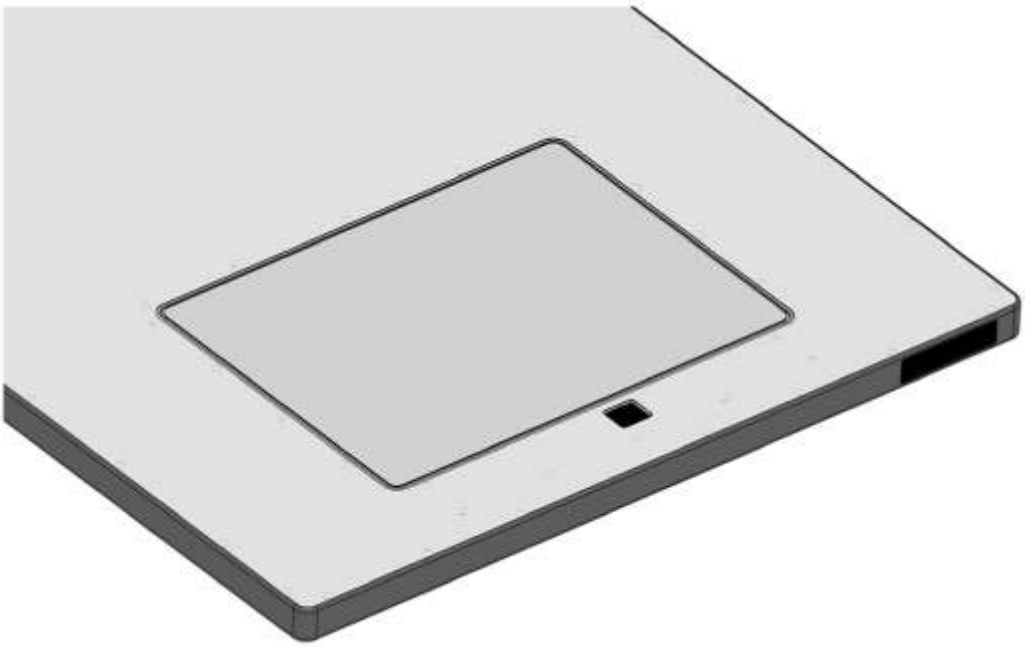
Appendix A

Battery Installation/Removal for 4336Wv4

Battery Installation

Step	Action / Results

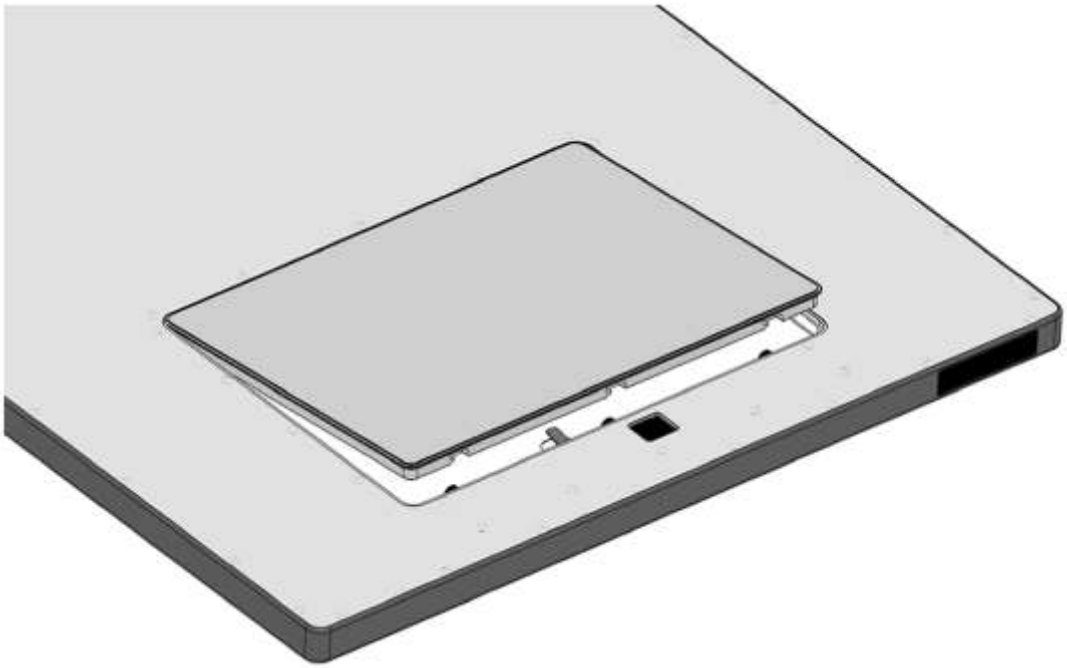
1. Insert battery at a slight angle so that the side with contacts sits over the adjoining contacts in the battery compartment.
2. Press down on the lifted side of battery snapping it into place in the battery compartment. Receptor is now ready for user.



Battery Removal

Step	Action / Results

1. First ensure that the receptor is powered off. Then slide the battery latch release to the side, which will cause one side of the battery to life out of the battery compartment.
2. Grab the lifted side of the battery and finish removing.



Battery Charger

The Varex 1 bay and 3-bay charger is intended for use with the Varex Lithium-ion Battery. The Varex charger will fully charge a Varex battery in maximum 3 1/2 hours when operating at room temperature (20º C Ambient) for the 2.1Ah battery to 97% of available capacity in the battery. The charge time may change depending on the battery cell temperature. The charger is used with the PaxScan wireless radiographic digital image receptors.

Over-Discharged Battery Wake-up

The charger will wake up a battery that is in over-discharge protection mode.

Over-Charge Battery Protection

Over-charge due to excessive or uncontrolled current is prevented by redundant software functions monitoring a minimum of two independent sources combined with software independent method.

Over charge due to excessive or uncontrolled voltage is prevented through continual monitoring of two independent measurement sources. The charger has charge timeout functionality.

Setting Up the Varex Charger

Step	Action / Results

1. The Varex Charger must be installed near the outlet to which it will be connected.
2. Do not block the charger's ventilation slots underneath the charger.
3. Use the charger only with Varex batteries and the provided external power supply

4. To connect the charger to power:

- Plug the DC cable from the power supply into the charger
- Plug the AC cable into the power supply
- Plug the AC cable into the appropriate power outlet
- Ensure the charger is plugged into an outlet and mains cable that is equipped with an earth ground connection.

The charger is now ready for use.

Battery Charging Using the Stand-Alone 3-Bay Battery Charger

The Varex 3-bay charger requires

1. 24V DC, 3.3A max input.
2. The output of the charger is 16.8V DC, 1.5A max (+/-1 1% and 10 Hz).

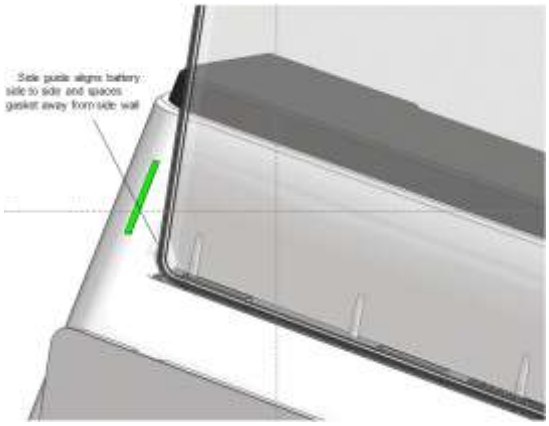
Step	Action / Results

1. Hold battery on end opposite of the contacts with the contacts facing toward the charger**.**

2. Gently slide battery into battery compartment on the charger. When properly inserted, a light next to the battery slot will turn on showing the charge status of the battery. When the battery is charging the light will be orange, when charging is complete the light will turn green and when there is a fault the light will be red.

- In the case that the battery charger status indicators show a fault, then the inserted battery should not be used. Note the behavior of the status indicators and contact service support with the fault status indicator information.

Charging a fully discharged battery will take 3.5 hours maximum and 2.5 hours typical when operating at room temperature. Up to three batteries can be charged at a time. Refer to below Figure A-1 for explanation of LED status indicators.



Battery Charger LED's

LED	LED State	Description
Green	Solid	Battery Full
Orange	Solid	Battery is charged
Red	Solid	Charger timeout, or bad battery ID
	2 Blinks	Bad Smbus
	3 Blinks	Voltage Fault
	4 Blinks	Temperature Fault

Figure A-1 3-Bay Battery Charger Status Indicators

Battery Charging Using the Stand-Alone 1-Bay Battery Charger

The Varex 1-bay charger requires:

1. 19V DC, 2.1A max input.
2. The output of the charger is 16.8V DC, 1.4A max (+/-1% and 10 Hz).

Step	Action / Results

1. The Varex battery communicates with the Varex 1-bay charger when it is plugged into the charger. The battery monitors its readiness state and is mechanically keyed to charger for easy installation.

2. The charger has LED indicators to identify the following charge process and charge faults (see below Figure A-2).

- When all four (4) green LEDs are continuously illuminated (with the red LED off), the battery has reached maximum charge. It can either be removed or left in the charger to maintain full charge. Charging time typically is 2.5 hours, maximum 3.5 hours.
- In the case that the battery charger status indicators show a fault, then the inserted battery should not be used. Note the behavior of the status indicators and contact service support with the fault status indicator information.

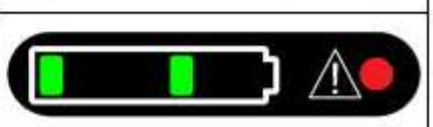
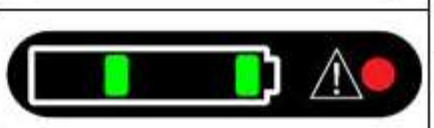
Description	Green LEDs	Red LED	Example
Battery Charging Normally – up to 25%	1 – On – Blinking 2 – Off 3 – Off 4 – Off	Off	
Battery Charging Normally – 26% to 50%	1 – On – Continuously 2 – On – Blinking 3 – Off 4 – Off	Off	
Battery Charging Normally – 51% to 75%	1 – On – Continuously 2 – On – Continuously 3 – On – Blinking 4 – Off	Off	
Battery Charging Normally – 76% to 99%	1 – On – Continuously 2 – On – Continuously 3 – On – Continuously 4 – On – Blinking	Off	
Battery Charging Normally – Fully Charged	1 – On – Continuously 2 – On – Continuously 3 – On – Continuously 4 – On – Continuously	Off	
Fault – No Charge Current accepted or Battery Voltage too high	1 – On – Blinking 2 – Off 3 – Off 4 – Off	On	
Fault – Battery Over-discharged cannot wakeup in less than 210 seconds	1 – On – Blinking 2 – On – Blinking 3 – Off 4 – Off	On	
Fault – Battery exceeds allowable charge time	1 – On – Blinking 2 – On – Blinking 3 – On – Blinking 4 – Off	On	
Fault – Battery ID does not match V4336W or non-recoverable over-discharged battery	1 – On – Blinking 2 – On – Blinking 3 – On – Blinking 4 – On – Blinking	On	
Fault – Battery Temperature either too high or too low	1 – Off 2 – Off 3 – Off 4 – Off	On	
Fault – SMBus between the charger and battery is not operating properly	1 – On – Blinking 2 – Off 3 – On – Blinking 4 – Off	On	
Fault – Battery Permanent Fault	1 – Off 2 – On – Blinking 3 – Off 4 – On – Blinking	On	

Figure A-2 1-Bay Battery Charger Status Indicators

Warning: Do not remove the charger cover. The Charger has no internal user serviceable parts.

Warning: Do not use in operating room or other oxygen rich environment.

Do not use in conjunction with flammable agents.

Do not use in an environment with condensing moisture.

Caution: Do not use flowing liquid or immersion on the receptor, battery, battery compartment, or battery charger.

Do not sterilize.

Caution: Do not attempt to insert objects other than the Varex battery into the charger bay.

Important: Use the Varex Battery Charger only with the Varex supplied power supply and power cord.

Important: Use only the Varex supplied batteries in the battery charger and receptor. The systems are not designed to work in conjunction with any other battery type or design.