



PRIMO S
Release 1.8.0.0

TECHNICAL Manual
Revision D

Issued on 29/05/2020
Revised on 29/07/2022

PRIMO S is an application software for image acquisition and processing, in radiography mode using Flat Panel detectors.

PRIMO S could be installed on:

- *Complete Radiographic rooms,*
- *Portable Units,*
- *Mobile Units.*

Note: depending on the device, some features should not be present. Please refer to the following Manual for full details.

This X-ray device is produced by:



The equipment complies with European Directive 93/42 EEC and subsequent amendments, 2007/47 EEC.

The following harmonised standards apply to the EM equipment:

EN 62304 :	2006 + A1 : 2015
EN 62366-1 :	2015
EN 62563-1 :	2010
EN ISO 14971 :	2012
EN ISO 15223-1:	2016
EN 1041:	2008



Part 1: INSTALLATION AND SETUP

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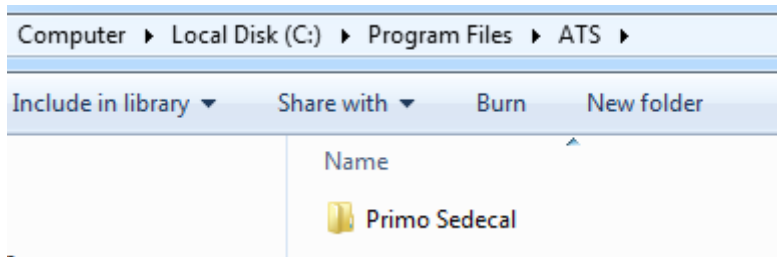
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1 PRIMO S INSTALLATION AND SETUP

1.1 INSTALLATION

To perform the installation properly you have to add a '**D**' volume for the calibration data and the database data.

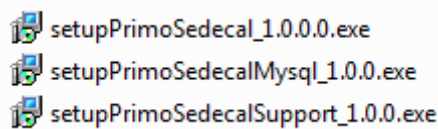
The Primo Sedecal software will be installed inside the path 'C:\Program Files\ATS\Primo Sedecal':



Primo Sedecal path

➤ **Software:**

- **setupPrimoSedecal_x.x.x.x.exe**: software supplied for the first installation and for future updates
- **setupPrimoSedecalMysql_x.x.x.x.exe**: software supplied for the first installation
- **setupPrimoSedecalSupport_x.x.x.x.exe**: software supplied for the first installation



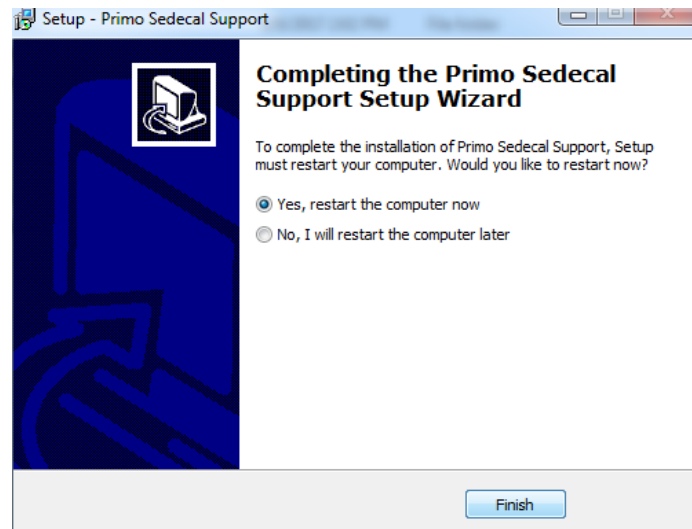
Software supplied for installation

Depending on the detector type, it is required to install:

- Toshiba software and CMosaix software (with **Detector type: Toshiba**)
- CMosaix software (with **Detector type: CMosaix**)

➤ **Procedure:**
a) setupPrimoSedecalSupport

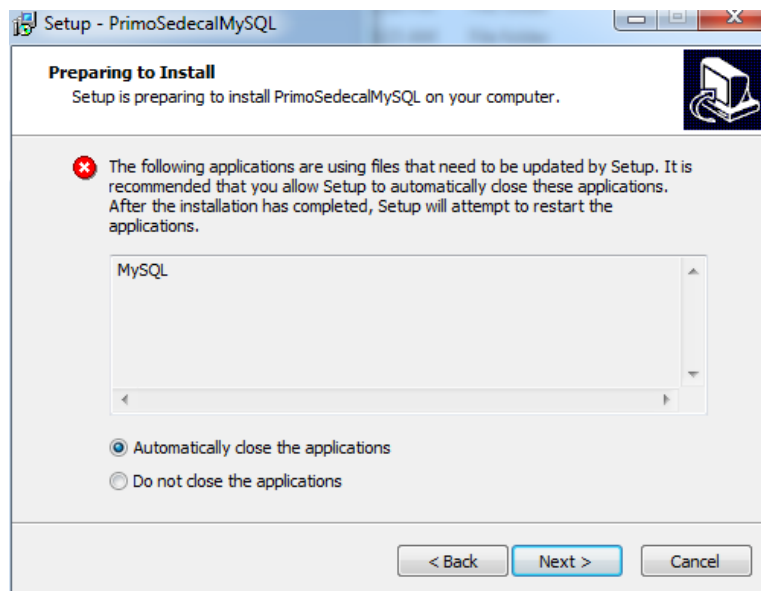
Run the *setupPrimoSedecalSupport_x.x.x.exe* and just follow the instructions. If there are no problems, the following screen is shown at the end of the procedure:



Primo Sedecal Support installation

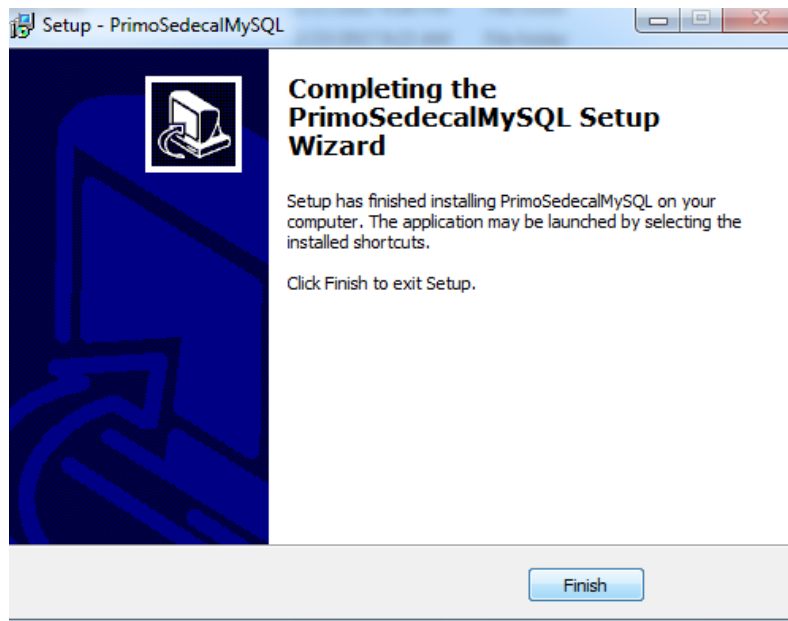
b) setupPrimoSedecalMysql

Run the *setupPrimoSedecalMysql_x.x.x.exe*. If an instance on MySQL is running it will be closed before starting the installation:



Primo Sedecal MySql installation

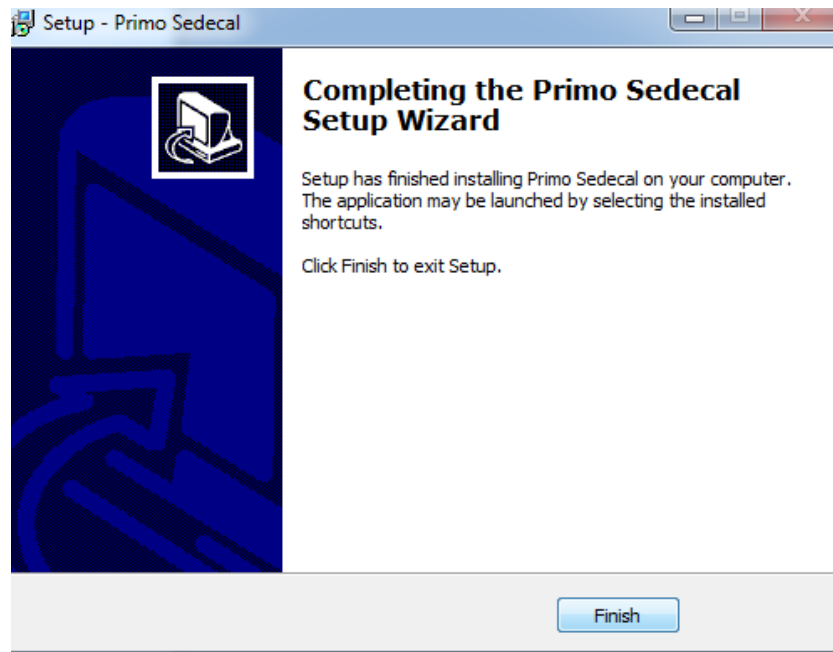
After the installation procedure, the screen represented below is shown:



Primo Sedecal MySql installation

c) **setupPrimoSedecal**

Run the *setupPrimoSedecal_x.x.x.x.exe* and follow the instructions. If there are no problems, the following screen is shown at the end of the procedure:



Primo Sedecal installation

1.2 PRIMO S LICENSE MANAGEMENT

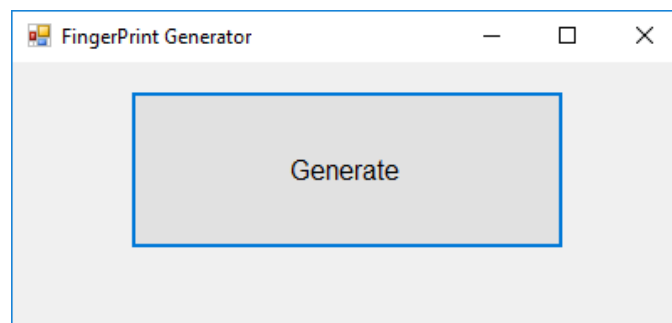
To protect the software from illegal copy, it has been introduced a **Software key**.

The Software Key is a particular file, that can enable specific features of the application and it is related to a single PC hardware.

The procedure to generate the Software key is divided in three phases.

Phase 1

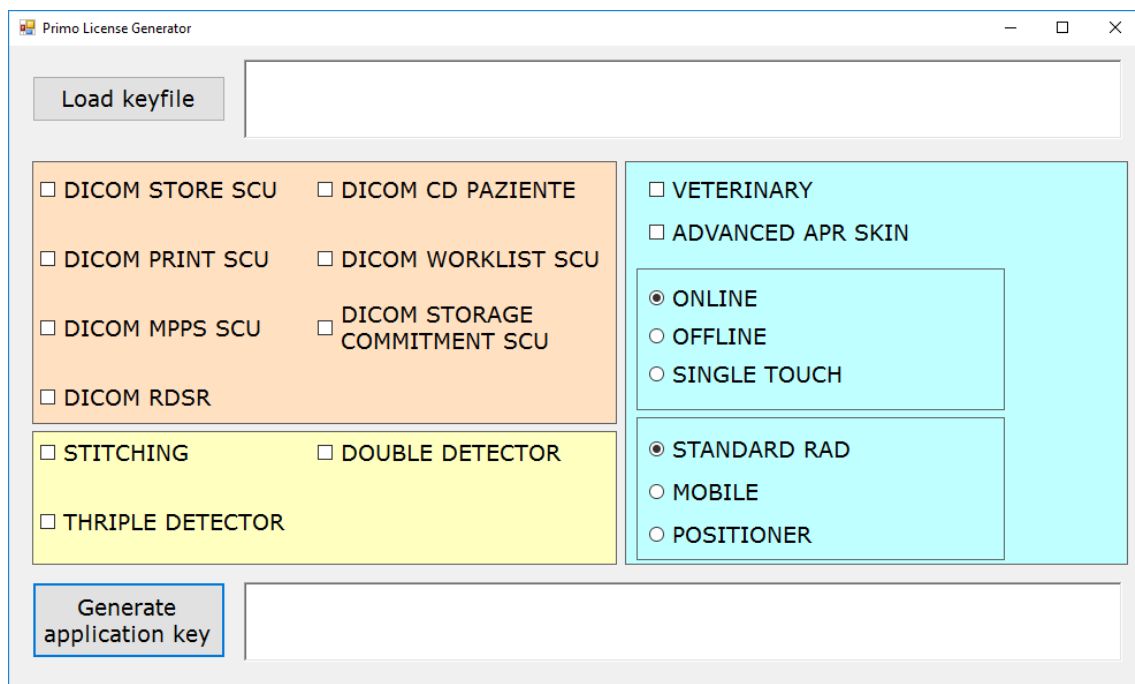
- Install the PRIMO S application on a PC.
- Go to **C:\Program Files (x86)\ATS\Primo Sedecal\licenseGenerator** (with x64 operating system) or go to **C:\Program Files\ATS\Primo Sedecal\licenseGenerator** (with x86 operating system).
- In this directory, open the **PrimoHwFingerprintGenerator.exe** application; pressing the **Generate** key, the **data.fgp** file is created in the same folder.



- This file must be sent to Sedecal (or to ATS) to activate the specific application feature.

Phase 2

- The received file is used on a dedicated application, called **PrimoLicenseGenerator**, to create the licenses for the software application.



- **Load keyfile** button allows to select the received file.
- Select the option to be activated and press the **Generate application key**. A new keyfile, called **data.fgp.lic** is created.

Phase 3

- The file generated in Phase 2 must be moved to the directory **C:\Program Files (x86)\ATS\Primo Sedecal** (with x64 operating system) or to **C:\Program Files\ATS\Primo Sedecal** (with x86 operating system).

Notes: *The previous procedures must be performed in case of:*

- *First software installation,*
- *The software key gets corrupted,*
- *New options required,*
- *Some components of PC are replaced.*

1.3 ADMINISTRATOR LOGIN FOR THE PRIMO S APPLICATION

To carry out the setup and installation procedures, you are required to log in as **Administrator**: enter the default password provided on the removable label you find pasted on the monitor.



Once the default password provided by the manufacturer is entered, **it is required to update it.**

Enter the old password in field #1. In field #2 enter a new personal password and repeat it in field #3. Finally, confirm with the accept command:



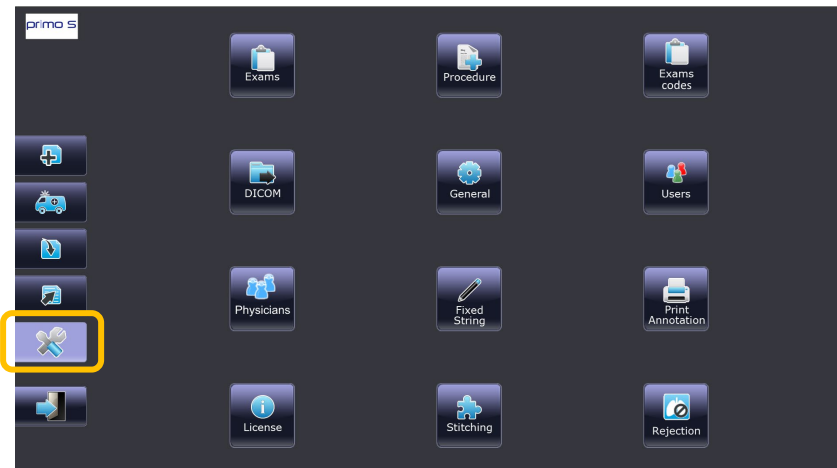
1.4 SETUP INTRODUCTION

The installation procedure for the PRIMO S basically involves the activities listed in the table below. They are reported according to the suggested order to follow.

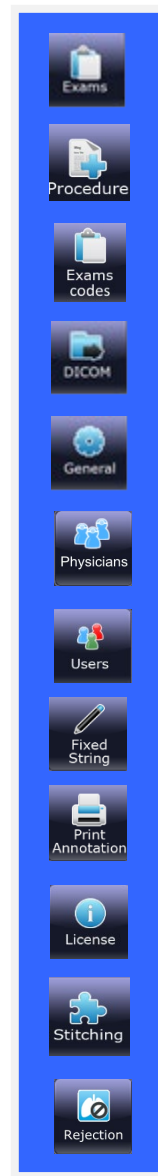
Setup stages	Operations	Menus used	Paragraphs
Detector Installation	- Install, add or replace a Flat Panel Detector.		Chapter 2
Equipment General Configuration	- hardware settings - patient data management - grid parameters - Work List code mapping - Remote workstation settings	-General Setup: <i>General</i> <i>Patient Registration</i> <i>Grid Setup</i> <i>WL mapping</i> <i>Remote Settings</i>	1.5.1 1.5.3–1.5.6
Detector Setup	- detector identification parameters - wireless connection parameters	- General Setup: <i>Detectors List</i>	1.5.2
Exam setup	- choice of exam card - filling-in of the exam card - study list organisation	- Exam Setup	1.6
Procedures setup	- creation of new procedures	- Procedures setup	1.7
Exams codes setup	- association of univocal code to a specific projection.	- Exams codes setup	1.8
DICOM network setup	- remote DICOM devices - Store parameters - Print parameters - DICOM Media parameters - DICOM Spooler setup	- Windows Control Panel - Dicom Setup - Dicom Spooler	1.9.1 1.9.4 - 1.9.9 1.9.10
User setup	- User / Advanced accounts	- User account	1.10
Physicians setup	- name of Physicians that make the examinations	- Physicians setup	
Fixed strings setup	- fixed text to be added to images	- Fixed String Setup	1.12
Print annotation setup	- notes to be added to print films	- Print Annotation Setup	1.13
DICOM licence upgrading	- upgrading of any retrofit DICOM options	- License Setup	1.14
Stitching setup	- create and edit Stitching profiles	- Stitching setup	1.15
Rejection setup	- create a list of rejection reasons	- Rejection setup	1.16
Detector calibration	- detector calibration procedure		Chapter 3

Notes: *the Advanced user, too, can perform the previous setup procedures, except DICOM Network setup and Detectors setup.*

In the SETUP frame, you can find the menu to set the PRIMO S. Touch the relevant button to open it:



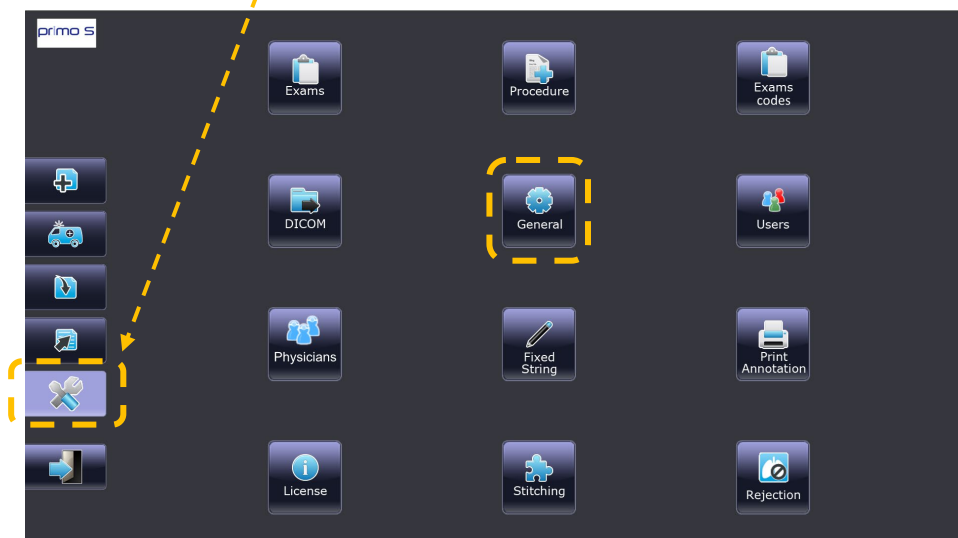
- **Exams** setup
- **Procedure** setup
- **Exam Codes** setup
- **DICOM** setup
- **General** setup
- **Physicians** setup
- **Users** setup
- **Fixed String** setup
- **Print Annotation** setup
- **License**
- **Stitching** setup
- **Rejection** setup



Note: Some of the functions should be not available on your Software version; in this instance, they will be shown in grey.

1.5 GENERAL SETUP

This menu is opened from the SETUP frame. Select the relevant button:



General | General 2 | Detectors List | Patient Registration | Grid Setup | WL Mapping

Display Info

Institution Name	New York hospital
Institution Address	via Volta n.10 Torre
Station Name	PRIMO R
Manufacturer Name	ATS Srl
Manufacturer Model Name	PRIMO R
Host IP Address	192.168. 8.188

Electronic Shutters

☒ Electronic shutters

HorizontalShutters Offset (±500) 0

VerticalShutters Offset (±500) 0

General

Default Modality: DX ☒ Detector Warnings

Studies List

View last x day (0 view all) 0

Auto Delete

☒ On Login ☒ On Exit

Minimum number of excess studies 2

Number of studies to keep 20

Language

German (Germany)

Italian (Italy)

Czech (Czech Republic)

Monitor settings

Monitor Width [mm] 475

Monitor Height [mm] 270

Dose Range

Max properly exp. (0.1 - 9.9) 1.0

Max Acceptable exp. (0.1 - 9.9) 3.0

% Roi Reduction Factor (0-80) 30

Auto Crop Settings

Centered Collimation ☒ Collimated images rotated ☒

W/L factor setting

Factor for W/L [1-20] 10

% HDD Minimum limit

hdd space (%) (>10%) 15

Enable special magnifier glass

☒ Special Magnifier Glass

Rejection Reasons

☒ Show Rejection

Detector Battery Management

Sleep Timeout [min] 5

Deep Sleep Timeout [min] 8

Power Off Timeout [min] 10

Buttons: Close Edit, Save Changes

The General setup is divided in 6 different categories:

1. **General / General 2**
2. **Detector List**
3. **Patient Registration**
4. **Grid Setup**
5. **WL (Work List) Mapping**

1.5.1 GENERAL

This menu lets you set equipment general parameters:

Display Info		Notes
Institution Name	Hospital name	The name does not appear on the monitor, but it is sent via the DICOM STORE and DICOM PRINT functions.
Institution Address	Hospital address	The address does not appear on the monitor, but it is sent via the DICOM STORE and DICOM PRINT functions.
Station Name	PrimoS workstation name	The name does not appear on the monitor, but it is sent via the DICOM STORE and DICOM PRINT functions.
Manufacturer Name	Name of the manufacturer of the equipment	The name does not appear on the monitor, but it is sent via the DICOM STORE and DICOM PRINT functions.
Manufacturer Model Name	Equipment name	The name does not appear on the monitor, but it is sent via the DICOM STORE and DICOM PRINT functions.
Host IP Address	IP address of the PC Host, needed for connection with the FP detector.	Typically set in the factory. The IP Address can be changed using Windows network settings.

Electronic Shutters		Electronic shutters are displayed on top of the real shutters. The position is received from the X-ray collimator. <i>Note: The function is available only in case of integration with an x-ray collimator.</i>	
		Settings	Notes
Electronic Shutters		Select to enable the function	Valid only if an integrated collimator is present
Horizontal Shutters offset		Set: $\pm$ x pixel	The nominal dimensions of the electronic shutters are increased (+) or decreased (-) of the offset value
Vertical Shutters offset		Set: $\pm$ x pixel	

General		Notes
Default Modality	To set the default DICOM image mode, CR or DX	
Detector Warnings	To enable / disable the internal detector alarms	It may be useful to disable the warnings during servicing of the equipment

Studies List		Notes
View last x days	Set the number of days you want to see the studies of (in the Study List). Set "0" to view all the studies.	You are required to restart the application for changes to take effect.

Auto Delete		Notes
<i>If enabled, a certain number of oldest studies (depending on next settings) are automatically deleted.</i>		
On Login / On Exit	The system asks to delete studies at the Login or at the switch-off.	It is possible to enable a single option or both.
Number of studies to keep	Number of studies to keep in the Study List , after deletion.	The sum of these two values is the threshold beyond which the Auto Delete

Minimum number of excess studies	This value, added to the previous one, represents the limit beyond which the Auto Delete function starts to work.	function begins to work. Locked studies do not count.
---	---	---

Language		Notes
Language	Select the language for operator interface	English (UK or US), Spanish, French, Russian, Swedish, Dutch, Deutsch, Italian.

Monitor Settings		Notes
Monitor width (mm)	Set the width of the active area of monitor	Set active area size to use the True Size on monitor function.
Monitor height (mm)	Set the height of the active area of monitor	

Dose Range		After every exposure, the equipment indicates the Deviation Index (DI), indicator of the difference between expected (EIT) and achieved Exposure index (EI).	
		Range	Notes
Max Properly Exposure	Deviation Index value considered optimal.	0,1 - 9,9 (Typ. value: 1)	
Max Acceptable Exposure	Deviation Index value considered acceptable.	0,1 - 9,9 (Typ. value: 3)	This value must be higher than <u>Max Properly Exposure</u> , one.
% ROI Reduction Factor	The ROI for calculation of " Exposure Index " is the ROI of AutoLut set for the exam, reduced in % by this factor.	0 - 80 Typ. Value: 30	The function reduces the dimensions of the ROI by the value set.

Note: see Paragraph 1.1.2.1, Part 2 of the User Manual for further information about DI.

Auto Crop settings		Notes
Centered collimation	Enable / Disable (typically, disabled)	Enable whether the collimator edges on the image are always perfectly parallel to the edges of the FPD.
Collimated images rotated	Enable / Disable (typically, enabled)	Enable whether the collimator edges on the image are NOT always parallel to the edges of the FPD.

W/L Factor settings		Notes
Factor for W/L	Sensitivity of the manual adjustment of Window and Level values by mouse.	The higher this factor is set, the faster the W or L value changes. (Range from 1 to 20).

% HDD Minimum limit		Notes
Hdd space (%) (>10%)	The system warns the user when the percentage of free space on the image storage hard disk is below this value.	The set value must be higher than 10%.

Rejection Reasons		Notes
Show Rejection reasons	Enable / Disable When this function is enabled, the system asks the reason of the rejection (choosing within the proposed list)	<i>It is possible to reject an image immediately after the acquisition, or later during the post processing.</i> The reasons are saved in the data base. You can show the data base statistic of rejected images by pressing the relevant key.  <i>See Paragraph 1.3 in Part 2 of the User manual</i>

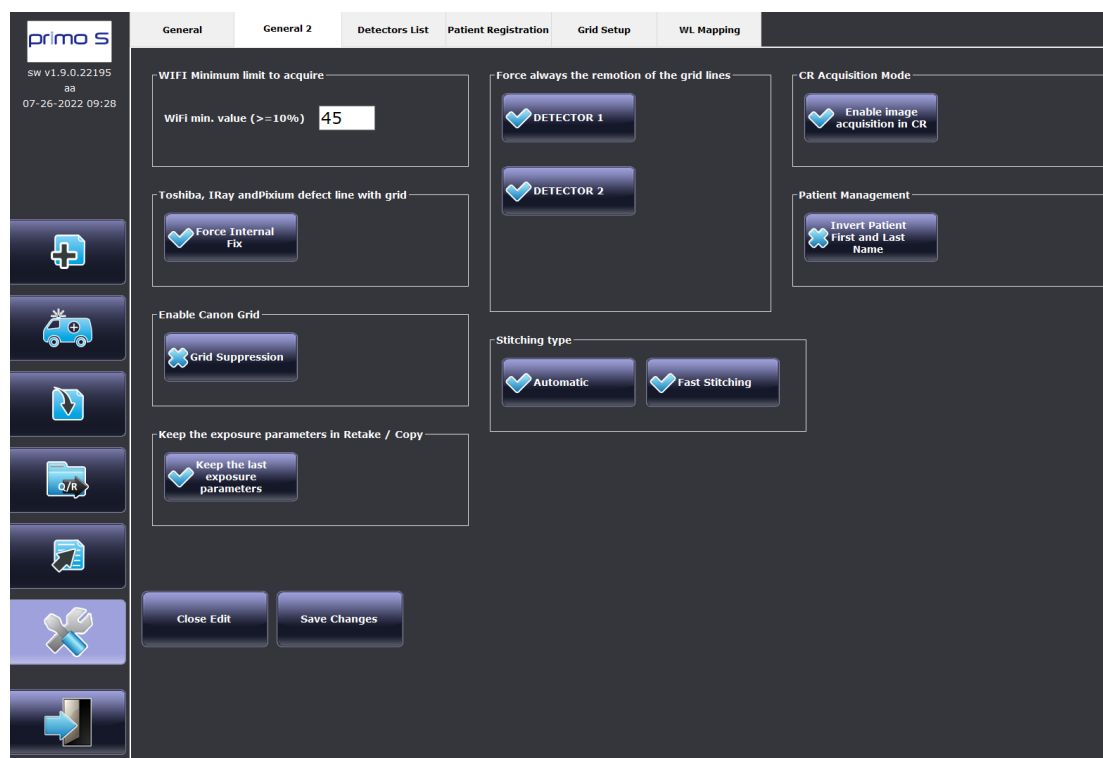
Enable Special Magnifier Glass		Notes
Special Magnifier Glass	Enable / Disable	Enable the function in case the system occurs in troubles using the magnifying glass function.

Detector Battery Management	<i>This function is available only for wireless detector.</i>	
	Settings	Notes
Sleep Timeout (min)	Set the idle time value beyond which the detector will turn in Sleep mode.	
Deep Sleep Timeout (min)	Set the idle time value beyond which the detector will turn in Deep Sleep mode.	
Power off Timeout (min)	Set the idle time value beyond which the detector will turn off.	

Save changes: to save all the setup settings.

Close Edit: to quit the General Setup menu, without saving, and return to the SETUP frame.

1.5.1.1 GENERAL 2



Warning: if the Wi-Fi signal is too low, transmission of an image just acquired from FPD to video-processor should be interrupted, leading to loss of the image.

WiFi minimum limit to acquire	This function is available for wireless detector, only.	
	Settings	Notes
WiFi min. value ($\geq 10\%$)	Set the value, under which the system will not acquire new images.	The set value cannot be lower than 10%.

Toshiba and iRay defect line with grid	This function is available on Toshiba and iRay detector.	
	Settings	Notes
Force Internal Fix	Enable / Disable	If enabled, it performs the correction of columns/bands of defective pixels.

Enable Canon Grid	This function is available on Canon detector.	
	Settings	Notes
Grid Suppression	Enable / Disable	If enabled, the visibility of the fixed grid is automatically removed.

Force always the removal of the grid lines		
	Settings	Notes
Force removal	Enable / Disable on detector 1	If enabled, the visibility of the fixed grid is automatically removed.

Keep the exposure parameters in Retake / Copy		
	Settings	Notes
Keep the last exposure parameters	If active, when an operator retakes an image, the system sets the parameters of the last exposure; otherwise, it sets the default parameters of the exam. Enable / Disable	

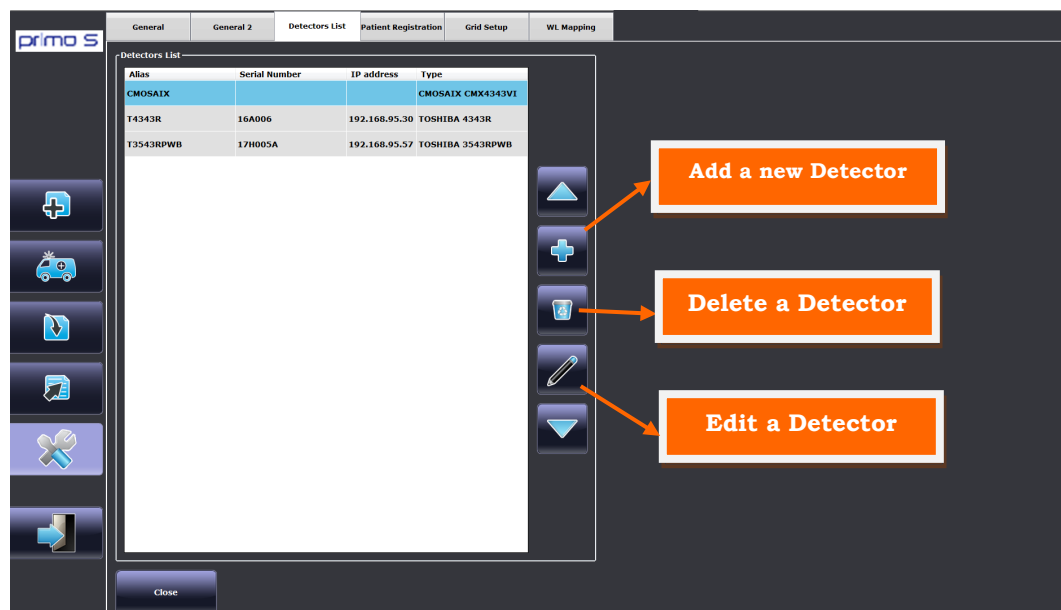
Stitching type		
	Settings	Notes
Automatic	Enable/disable Automatic Stitching type, depending on your positioner features.	
Fast Stitching	When this option is enabled, the stitching image reconstruction procedure is performed only after all the needed images have been acquired: the acquisition phase itself is therefore faster.	

CR Acquisition mode		
	Settings	Notes
Enable image acquisition in CR	When this option is enabled, if an image is acquired in cassette modality, a black image is created in the study and the exposure data are added to the study dose report (RDSR).	

Patient Management		
	Settings	Notes
Invert Patient First and Last name	Enable / Disable to change the order of name and surname presentation in Patient List.	When enabled, patient's name is presented first.

1.5.2 DETECTORS LIST

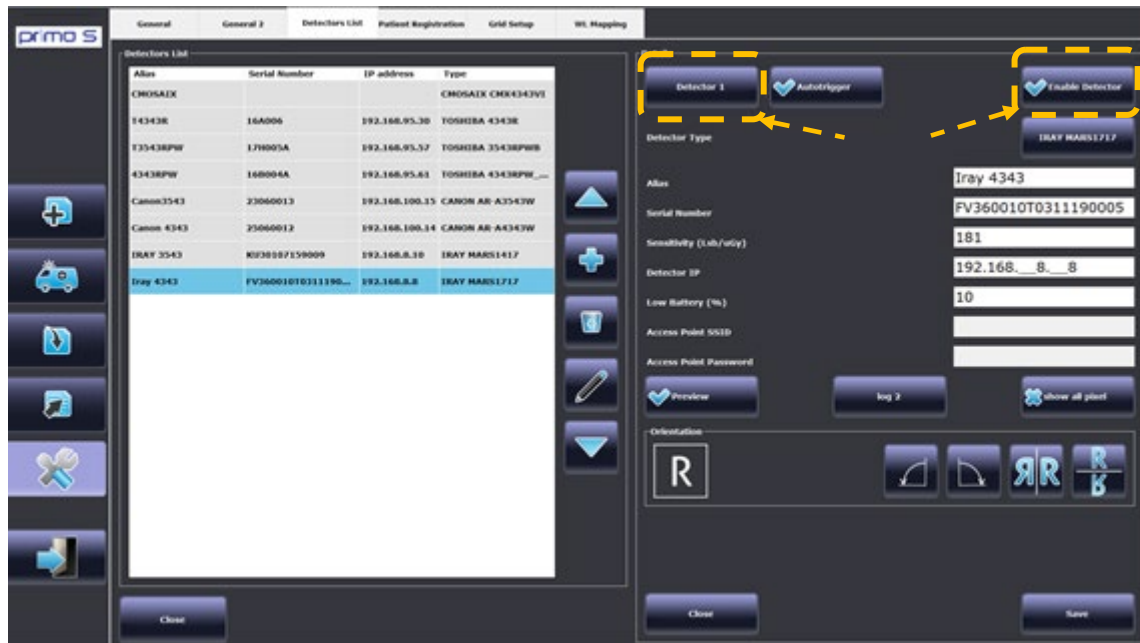
This menu lets you define detectors, and their parameters, used by the equipment.



1.5.2.1 ADD NEW DETECTOR

To add a new detector in the list, you must follow the detector installation procedure first (see chapters 2 and 3 in this part of the Manual).

Press the **Add (+)** key:



To activate the (**first**) detector and associate it to **Primo S**, you have to set **Detector 1** (position) and **Enable** the detector, as in figure above.

Then, the next parameters must be entered:

Detectors		Settings	Notes
Autotrigger	Enable automatic acquisition of an image by the FPD, when this is hit by X-rays.		Available with the Offline Licence, only.
Detector Type	Enter the FPD model (choosing between those provided).		
Alias	The detector name that will appear in the acquisition GUI.		
Serial Number	Enter the serial number of the detector	The serial number is indicated in the detector documents	
Sensitivity	Set the detector sensitivity (levels / uGy)	Value provided by the manufacturer.	If the value is provided as Levels /mR, you need to calculate: $\text{Levels /uGy} = (\text{levels/mR}) * 114 / 1000$ e.g.: Sensitivity provided by manufacturer: 960 levels/mR Sensitivity: $960 * 114 / 1000 = 109$ Levels/uGy
Detector IP	Enter the IP Address for the FPD (see FPD documents).		

Detectors		Settings	Notes
Low Battery (%)	Set the minimum battery % charge level	Typical setting: 20% . Below this value, the battery must be changed.	For wireless detector, only. Attention: if the battery charge falls below 10%, the system will not be able to acquire new images.
Access Point SSID	NOT USED		
Access Point pw	NOT USED		

Other		Notes
FPD pre-equalization curve	Set as: Log2	
Preview	Enable/disable to show an image preview after the acquisition.	
Show all pixel	Enable/disable the function that eliminates the presentation of the border of detector in the image.	Disabled as default

Orientation		Default orientation.
		Notes
Rotate (clockwise or anti-clockwise by 90 degrees)	The rotation achieved with respect to the default orientation is shown by the letter "R" in the square.	For each specific projection, you can change the default orientation of the image in the exam setup.
Flip (horizontal or vertical)	Invert the image with respect to the vertical or horizontal axis.	For each specific projection, you can change the default orientation of the image in the exam setup.

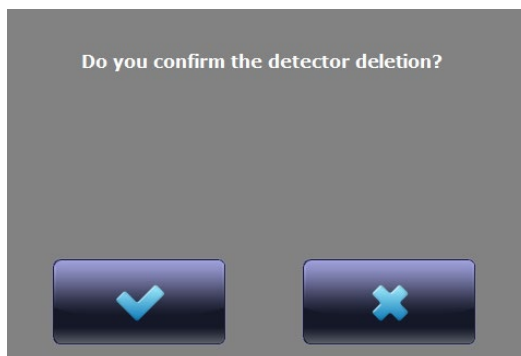
Press **Save** to confirm the settings.

To make these settings effective, you must restart the **Primo S**.

Note: If the system has been configured to work with more than one detector, you must repeat the previous procedure for each FPD available (up to three).

1.5.2.2 DELETE A DETECTOR

If you are required to delete a detector from the Detector List (for instance, to replace it), press the relevant key: a pop up asks to confirm or cancel the procedure.



1.5.2.3 MODIFY A DETECTOR

To change any of the detector parameters, press the relevant key.

It will be opened the menu of the detector parameters, where it is possible to change the needed settings.



Press **Save** to confirm the settings.

To make these settings effective, you must restart the **Primo S**.

1.5.3 PATIENT REGISTRATION

The screenshot shows the 'Patient Registration' tab in the PRIMO S software. The interface includes a sidebar with navigation icons and a main panel with a list of fields. Fields like 'Last name', 'First name', 'Birthdate', 'Sex', 'Accession Number', 'Patient ID', 'Technician', 'Patient comments', and 'Weight' are marked with a thick blue 'X' icon, indicating they are mandatory. Fields like 'Height', 'Study description', and 'Physician' are marked with a thin blue 'X' icon, indicating they are optional. The 'Save Changes' button is located at the bottom right of the main panel.

This menu allows to define the patient data that the operator must enter.

The fields shown in grey are fixed data you are always required to enter (**Patient's Last and first names**).

It is possible to set other fields as mandatory, by clicking on the relevant key (the thick blue means mandatory).

Note: in the **Patient Creation** frame, a mandatory field is shown in yellow, a not mandatory one, in white.

Press **Save Changes** to save the setup changes; otherwise, press **Close Edit**.

1.5.4 GRID SETUP

In this menu, it is possible to set the anti-scattering grids lines/mm value. Depending on the radiological system configuration, up to 3 grids can be defined.

The screenshot shows the 'Grid Setup' tab in the PRIMO S software. The interface includes a sidebar with navigation icons and a main panel with a table of grid settings. The table has three rows: 'Grid 1', 'Grid 2', and 'Grid 3'. Each row has a text input field for the 'lines/mm' value. The values entered are 4.5 for Grid 1, 4.33 for Grid 2, and 4.33 for Grid 3. The 'Save Changes' button is located at the bottom right of the main panel.

Enter the grid **number of lines per mm**.

Press **Save Changes** to make your choice effective.

1.5.5 WORKLIST MAPPING

Original Dicom Element ...	... to map on this element	Used
(0008,0050) AccessionNumber	(0008,0050) AccessionNumber	YES
(0010,2180) AdditionalPatientHistory	(0010,2180) AdditionalPatientHistory	YES
(0038,0010) AdmissionID	(0038,0010) AdmissionID	YES
(0038,0020) AdmittingDate	(0038,0020) AdmittingDate	YES
(0038,0021) AdmittingTime	(0038,0021) AdmittingTime	YES
(0010,2110) ContrastAllergies	(0010,2110) ContrastAllergies	YES
(0010,2100) LastMenstrualDate	(0010,2100) LastMenstrualDate	YES
(0010,2000) MedicalAlerts	(0010,2000) MedicalAlerts	YES
(0010,2180) Occupation	(0010,2180) Occupation	YES
(0010,1000) OtherPatientIDs	(0010,1000) OtherPatientIDs	YES
(0010,1001) OtherPatientNames	(0010,1001) OtherPatientNames	YES
(0010,1010) PatientAge	(0010,1010) PatientAge	YES
(0010,0030) PatientBirthDate	(0010,0030) PatientBirthDate	YES
(0010,4000) PatientComments	(0010,4000) PatientComments	YES
(0010,0020) PatientID	(0010,0020) PatientID	YES

Close Edit Save Changes

This function allows the code of DICOM tags received from the WorkList to be remapped.

To remap the tags:

- Select from the table on the left side (**Original Dicom Element** row) the tag to be remapped: it will be highlighted in blue (see figure below).
- Then, select the new tag in the table on the right side.

Original Dicom Element ...	... to map on this element	Used
(0008,0050) AccessionNumber	(0008,0050) AccessionNumber	YES
(0010,2180) AdditionalPatientHistory	(0010,2180) AdditionalPatientHistory	YES
(0038,0010) AdmissionID	(0038,0010) AdmissionID	YES
(0038,0020) AdmittingDate	(0038,0020) AdmittingDate	YES
(0038,0021) AdmittingTime	(0038,0021) AdmittingTime	YES
(0010,2110) ContrastAllergies	(0010,2000) MedicalAlerts	YES

Worklist elements mapping

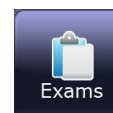
WL dicom element
(0038,0010) AdmissionID
(0010,2110) ContrastAllergies
(0010,2000) MedicalAlerts
(0010,1000) OtherPatientIDs
(0010,0020) PatientID
(0038,0500) PatientState

- The new tag is shown in the table on the left side (**to map on this Element** row): the original Dicom element has been successfully remapped.

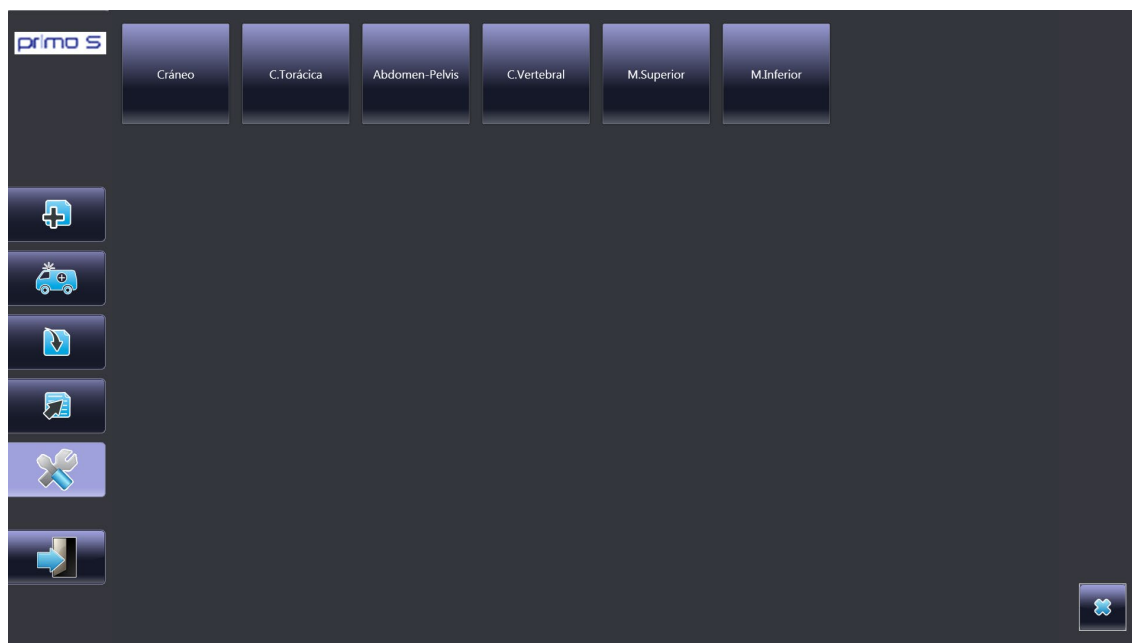
1.6 EXAM SETUP

All the acquiring parameters are pre-set, for each exam, to get the proper quality image.

These parameters are saved in the **Exam Setup** menu and can be changed to suit the customer requirements.



When you open the **Exam Setup**, it appears the following screen; here you can choose the exam to set the parameters of.



Pick up the needed anatomical region and then the view; tap on the view to set the exam parameters.

The menu is divided in four categories:



1. X-ray generator,
2. Image presentation,
3. DICOM,
4. Exam label preset
5. Positioner Data

Each screen is provided with:



- **Close Edit:** to quit the Exam Setup menu without saving any changes.
- **Save Changes:** to save the changes made in the screen.

1.6.1 X-RAY GENERATOR

X-Ray Generator

Image Presentation

Dicom

Exam Labels Preset

Tórax PA

Reference	Grande/WB	Mediano/WB	Pequeño/WB	Pediatría/WB
Kvp	125	120	110	90
mA	80	80	80	80
ms	320	320	320	200
Max Kv	150	150	150	150
Focus				
Target Exposure Index	0	0	0	0
Grid required				
AEC				
Dose % [-4,+4]	3	3	3	3
Technique Mode				

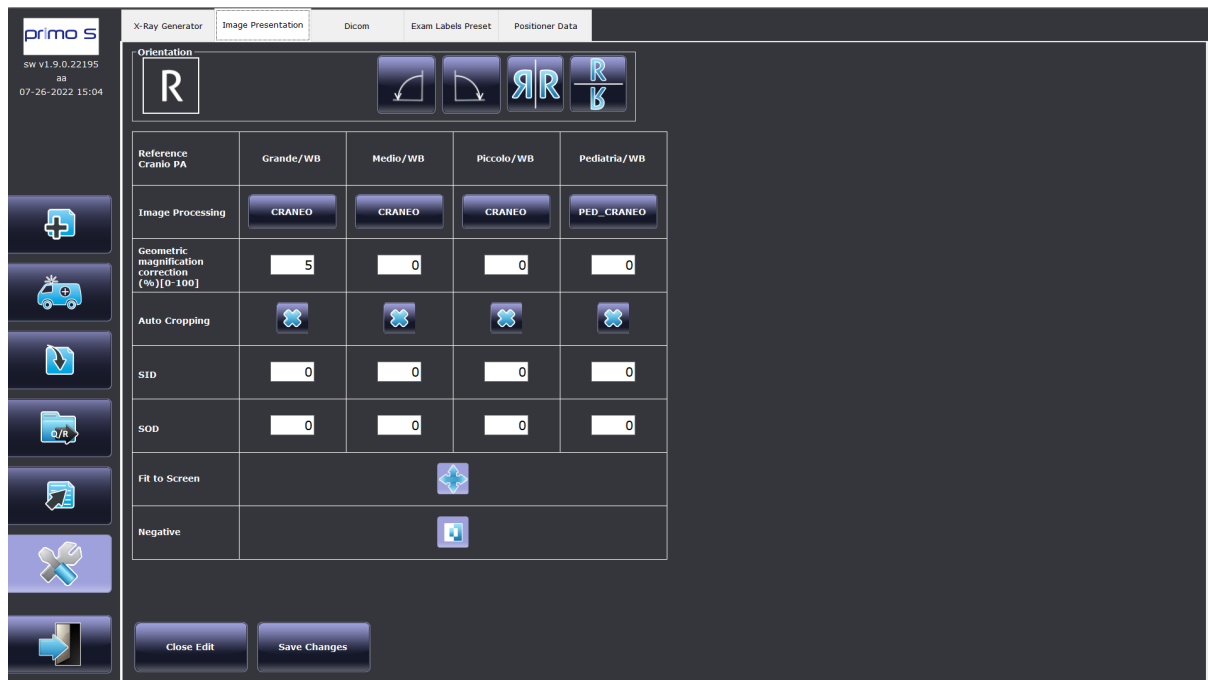
Close Edit

Save Changes

Parameter	Description	Range	Notes
<i>Name of the Exam you are setting.</i>			
Reference	You can set different parameters for the different references (size), available for the APR projection.		References change depending on the projection.
kVp	kV value	40 – 150 kV	<i>These parameters will be displayed on the console while you are performing an exam; anyway, you can adjust the values (within the range you set) to better fit different situations.</i>
mA	mA value Active in 3-point technique.	10 – 1000 mA	
ms	ms value Active in 3-point technique.	1 – 10000 ms	
mAs	mAs value Active if in 2-point technique.	0,1 – 1000 mAs	
Max kV	The max kV value you can set for the exam; if you try to set a higher value a warning message appears.		
Focus	X-ray tube focus. Small  or Large 		
Target Exposure Index	Reference exposure value of an optimally exposed image. This value is compared to the image Exposure Index (EI) to calculate the Deviation Index (DI).	50 – 1000	The Exposure Index (EI) is calculated using the LSB mean value in the image ROI and the FPD sensibility.
Grid Required	You can set if the anti-scatter grid is required or not.	Yes / No	A message, in the acquisition frame, will warn you to insert or remove the grid.
AEC	To choose AEC technique and the areas of the ion chamber.		
Dose %	To change the target dose in step of xx%	-4 / +4	0 = nominal dose
Technique Mode	Exposure technique if no AEC chamber is selected 2-point technique: kV + mAs 3-point technique: kV + mA + ms	 	Depending on the chosen technique, the proper fields will be shown.

1.6.2 IMAGE PRESENTATION

This screen in the **Exam Setup** menu lets you set the image processing parameters automatically applied to the acquired image.



Parameter	Description	Range	Notes
Orientation	To set the default orientation of the acquired image.	Use the 90° anti-clockwise or clockwise rotation, H flip and V flip commands.	The letter "R" in the square shows the set orientation.
Reference	Indication of the sizes available for the selected exam.		It is possible to set different parameters for the different references (sizes), available for the selected exam.
Image Processing	To set the image processing parameters for the specific exam.	Use the relevant button to access the setting panel.	<i>See next Paragraph.</i>
Geometric Magnification Correction	To set the estimated radiological magnification factor.	0 – 100 % (0% = no magnification) (100% = magnification x2)	Parameter used for measurements on the image and for "true size" functions.
Autocropping	Enable or disable the Autocropping function	See also: Auto Crop settings. Centered collimation	The system automatically applies the electronic shutters, looking to position of the x-ray collimators on the image.
SID	Source Image Distance (Focal Distance)		
SOD	Source Object Distance		
Fit to Screen	This function automatically set the zoom factor to show the whole image on the monitor.	Enabled / Disabled	If disabled, the image is presented in True Size .
Negative	To set the positive/negative grey scale presentation of the image.	Typically, negative	

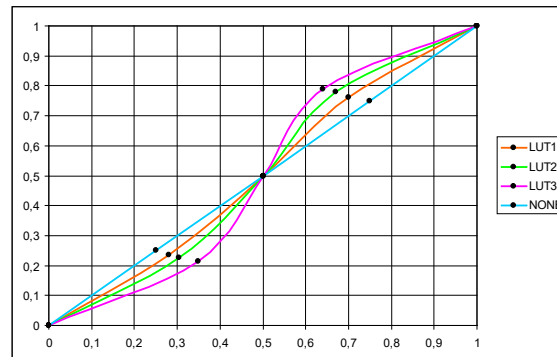
1.6.2.1 IMAGE PROCESSING

The **Image Processing** function defines the overall digital processing parameters automatically applied to the image.

This set of parameters is basically:

PARAMETER	DESCRIPTION	RANGE	NOTES
Image Processing Name	Enter the name to label a set of processing parameters.		Choose between those suggested in the list or enter the required name in the relevant field.
Equalization Pre-Set	To select the processing to be applied to the image.	Options: - Custom : ATH with customized parameters is applied - No ATH : no ATH applied - List of default ATH (1-2-3-4-5)	
Contrast	Contrast variation factor.	0,5 – 1 (0,5 = max variation) (1 = no variation)	
Edge	Edge variation factor. If the value is less than 1, the contours are reduced proportionally. If the value is more than 1, the contours are enhanced proportionally.	0,6 – 5 (0,6 – 1 = edge reduction) (1 - 5 = edge enhancement)	Excessive increase can lead to increased image noise or artifacts.
Latitude	Latitude variation factor. If the value is less than 1, the image latitude is magnified. If the value is more than 1, the image latitude is reduced.	0,6 – 5 (0,6 – 1 = latitude increase) (1 - 5 = latitude reduction)	

PARAMETER	DESCRIPTION	RANGE	NOTES
Spatial Filter	To select the spatial filter applied.	-4 = Smooth > Kernel:5x5 Weight:3 -3 = Smooth > Kernel:3x3 Weight:3 -2 = Smooth > Kernel:3x3 Weight:2 -1 = Smooth > Kernel:3x3 Weight:1 0 = Disabled ; 1 = Sharp > Kernel:5x5 Weight:1 2 = Sharp > Kernel:5x5 Weight:2 3 = Sharp > Kernel:5x5 Weight:3 4 = Sharp > Kernel:7x7 Weight:2	
ROI type	To select the calculation ROI for the Auto LUT function.	Options: - NONE : no AUTOLUT calculation; W and L values can still be set manually. - ROI 1 : dim. 640x768 pixels - ROI 2 : dim. 1120x1344 pixels - ROI 3 : dim. 1600x1920 pixels - ROI 4 : dim. 2080x2496 pixels - ROI 5 : dim. 2750x2800 pixels - ROI 6 : dim. 800x2000 pixels - ROI 7 : dim. 2000x800 pixels - ROI 8 : dim. 1500x2800 pixels - AUTO COLLIMATOR	Auto collimator : the ROI is the X-ray collimated area
W / L	W and L settings	W: 255 to 65535 L: -255 to 65535	These values can only be set if ROI type selected is NONE.
LUT Curve	To select the LUT curve used to show the image on the monitor.	Options: - NONE : no curve - LUT 1 - LUT 2 - LUT 3	See graph below.



- Press **Save** to save the parameters of the selected image processing

Save

- Press **Save and Assign** to associate the selected image processing with the exam

Save and assign

- Press **Cancel** to close the menu without saving.



1.6.3 DICOM

This part of the **Exam Setup** menu contains the exam parameters used by the DICOM services. It is required to set a value for each field (Body part, Laterality, View).

primo S

X-Ray Generator Image Presentation Dicom Exam Labels Preset

CURRENT PROJECTION NAME: Silla Turca

Protocol

Body Part: 1 - 7 / 26

Laterality: 1 - 5 / 5

View: 1 - 7 / 8

UNDEFINED

SKULL

CSPINE

TSPINE

LSPINE

SSPINE

COCCYX

Undefined

R = Right

L = Left

U = Unpaired

B = Both L&R

Undefined

AP

PA

LL

RL

RLD

LLD

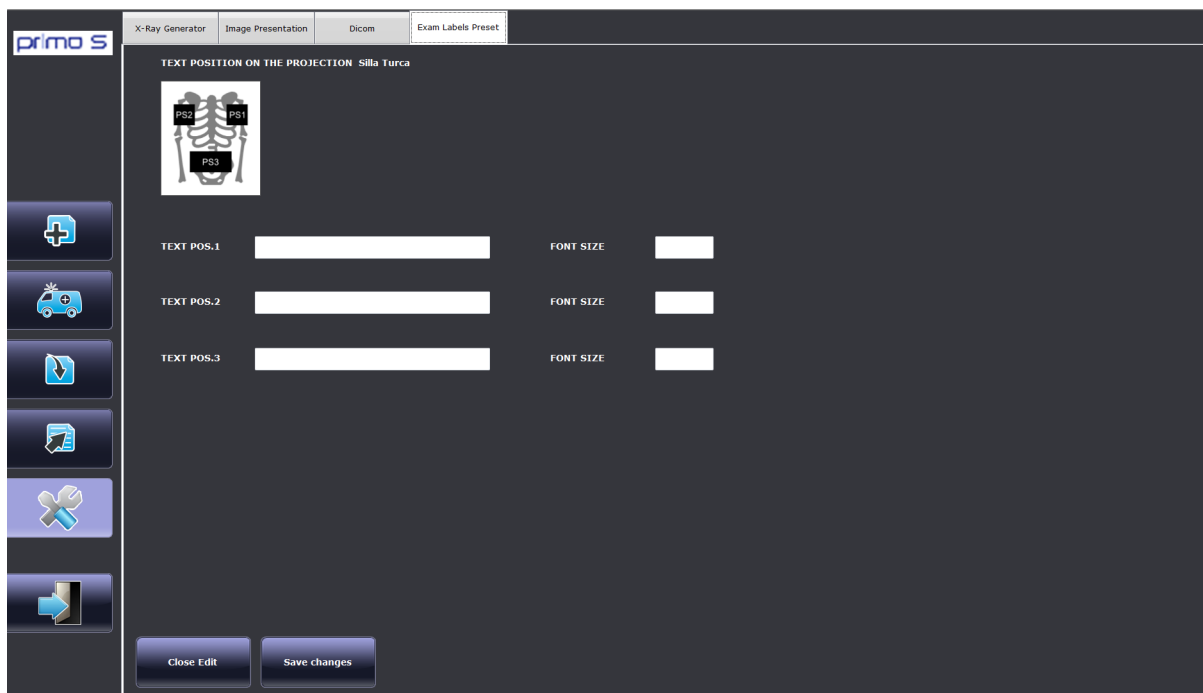
Close Edit

Save Changes

The following parameters can be set:

Parameter	Description	Range	Notes
Protocol	Alphanumerical code identifying the study: max 30 characters.	Typically set to suit the protocol used for the hospital network.	
Body Part	Select one of the given fields		
Laterality	Select one of the given fields		
View	Select one of the given fields		

1.6.4 EXAM LABEL PRESET



You can create up to 3 default labels that will appear automatically on the image.

The label positions are fixed, as shown in the menu (PS1, PS2, PS3).

You can enter the text (max 27 characters) and the font size,

Press SAVE CHANGES to close the menu and save the setup changes; otherwise, press CLOSE EDIT.

1.6.5 POSITIONER DATA

X-Ray Generator	Image Presentation	Dicom	Exam Labels Preset	Positioner Data
Reference Cráneo PA	Grande/WB	Mediano/WB	Pequeño/WB	Pediatría/WB
Auto-position number [0-99]	3	3	3	3
Panel orientation [degrees]	0	0	0	0
Transv. collimators aperture [0-432] mm	240	240	240	240
Long. collimators aperture [0-432] mm	200	430	200	200
Automatic filter	NO FILTER	NO FILTER	NO FILTER	NO FILTER

Parameter	Description	Range	Notes
Reference	Indication of the sizes available for the selected exam.		It is possible to set different parameters for the different references (size), available for the selected exam.
Auto position number	Numeric code associated to the position required for the exam.	0 - 99	Depending on the positioner.
Panel Orientation	FPD orientation respect to the positioner.	0° – 90° - 180° - 270°	
Transv. Collimator Aperture	Collimator blades transversal aperture.	0 – 432 mm	
Long. Collimators Aperture	Collimator blades longitudinal aperture.	0 – 432 mm	
Automatic filter	Additional collimator filtration	- No filter - 2 mm Al - 1 mm Al + 0,1 mm Cu - 1 mm Al + 0,2 mm Cu	

1.7 PROCEDURE SETUP

A procedure is a **combination of exams** needed for a study.
The procedure may involve 1 or more exams.

The procedure is normally sent by the RIS via the **Worklist** function.
(It is also possible to manually select the exams required during the creation of a study or during the acquisition).

To receive the procedure through Worklist, it is required to associate the proper code (used by the RIS) to each procedure.

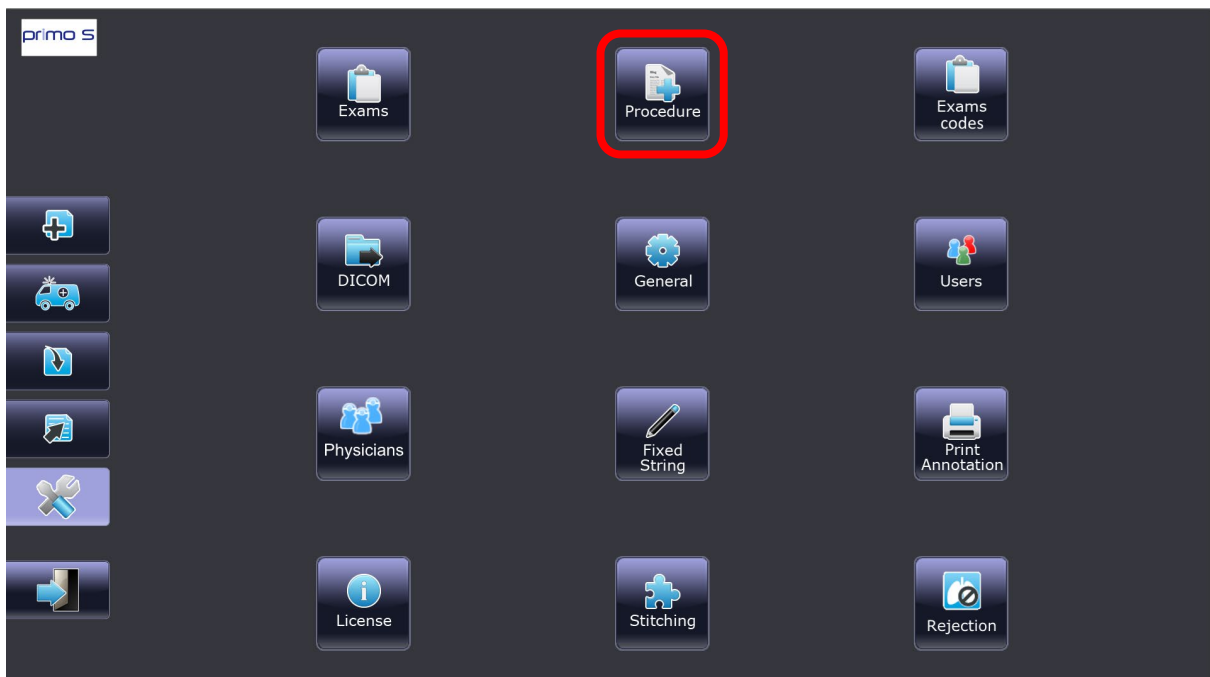
1.7.1 CREATING NEW PROCEDURES

The **Procedure Setup** menu lets you link the procedures required by the hospital to the exams programmed on the equipment.

Each procedure is defined by:

- a univocal code provided by the RIS.
- one or more exams.

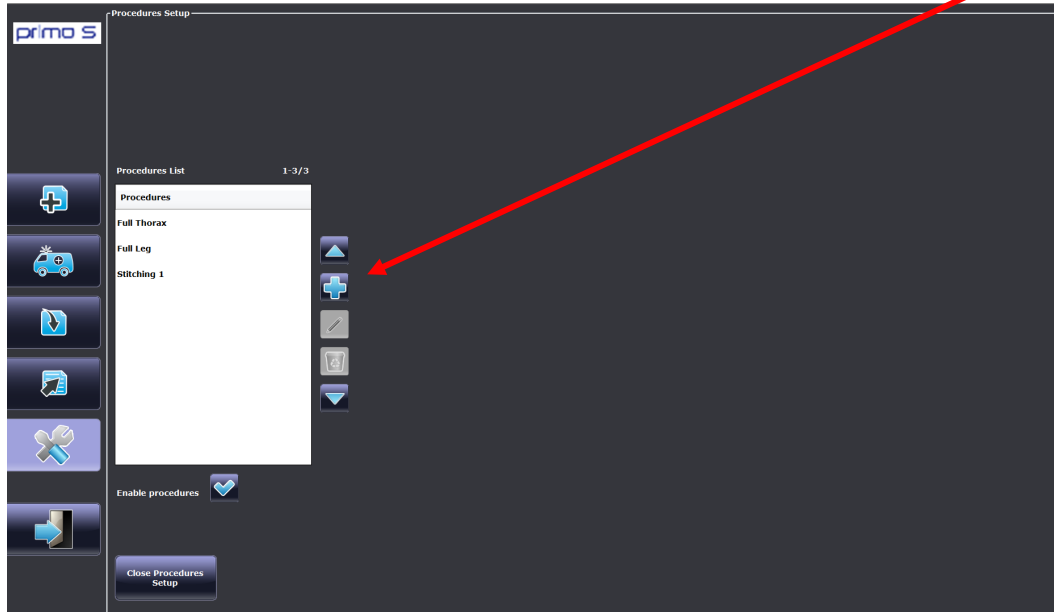
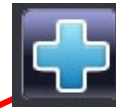
The **Procedure Setup** menu is opened from the SETUP frame, by pressing the relevant button:



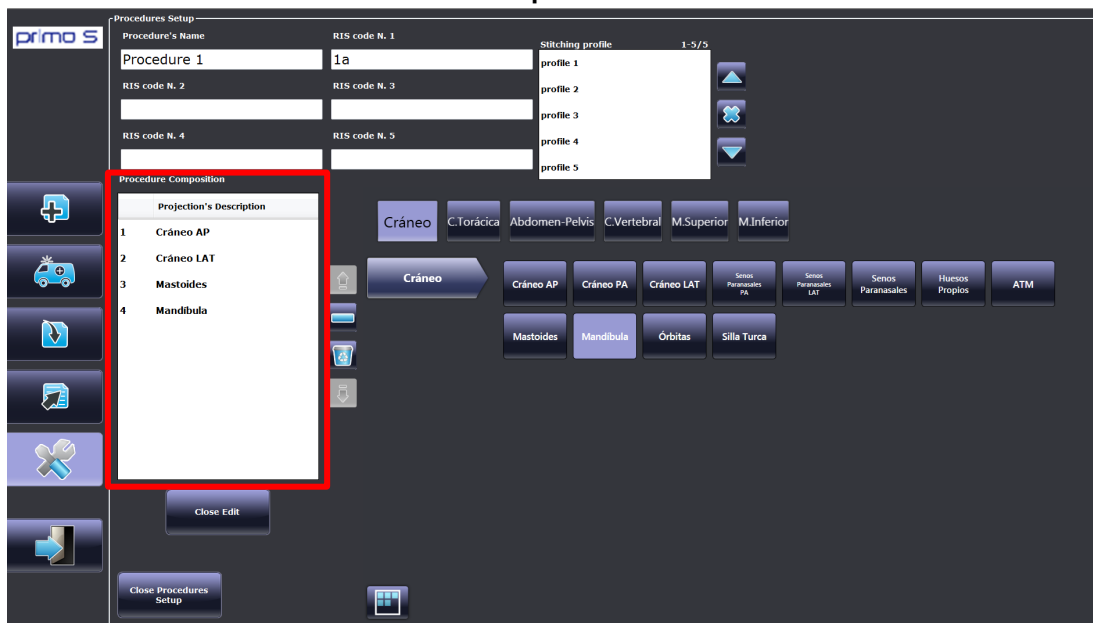
he procedures programmed in the equipment appear in the **Procedure List** table.

To create a procedure:

- press the **New Procedure** key:

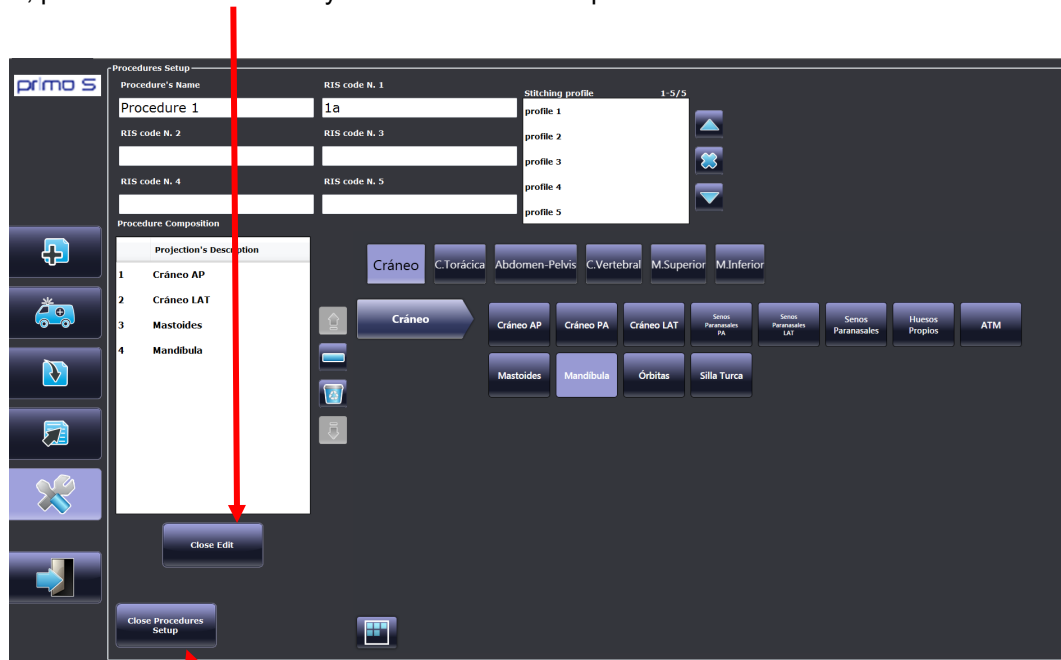


- fill in the **Procedure's Name** and the related RIS codes (one or more).
- Select the exam you want to add by selecting:
 - anatomical part
 - one or more exams for each anatomical part required
- Exams will be added in the **Procedure Composition** box.



- The **Procedure Composition** box shows the list of exams assigned to a procedure.

- If the selected procedure is a Stitching procedure, you will need to associate a STITCHING PROFILE, as shown in the figure below (see *paragraph 1.15* for further details on how to create a STITCHING PROFILE).
- Now, press the **Close Edit** key to add it to the list of procedures.



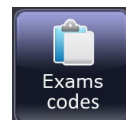
- Finally, press the **Close Procedures Setup** key to quit the Procedure Setup menu.

Note: *Stitching features are NOT available on Mobile and Portable units.*

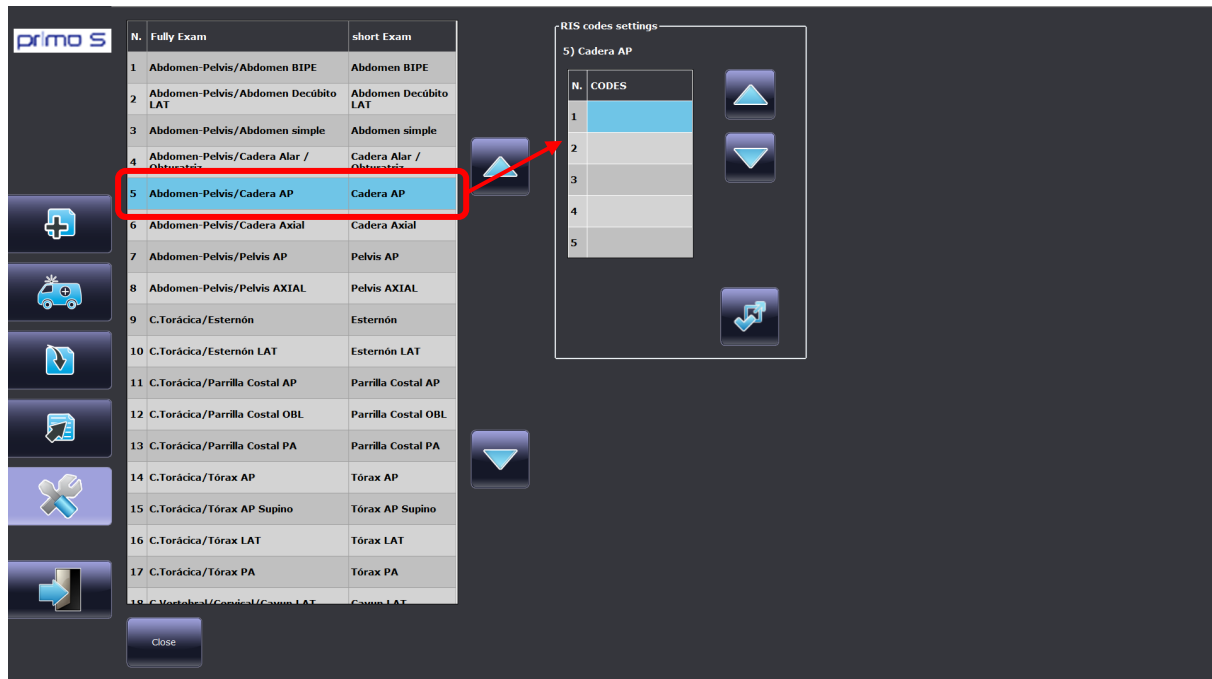
1.8 EXAMS CODES SETUP

It is possible to associate one or more RIS codes (up to thirty) to each exam.

So, when you receive this code from the Work List, the associated exam is automatically loaded.



The **Exams Codes** menu is opened from the SETUP frame, by pressing the relevant button:

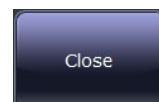


Select the required exam and the **RIS Code Setting** table will be opened. Insert the codes in the table and finally press the **Save** key (shown aside).



If a code has previously been associated to an exam, a pop-up message appears to advise the code is already in use.

Press **Close** key to exit the Exams Code Setup.



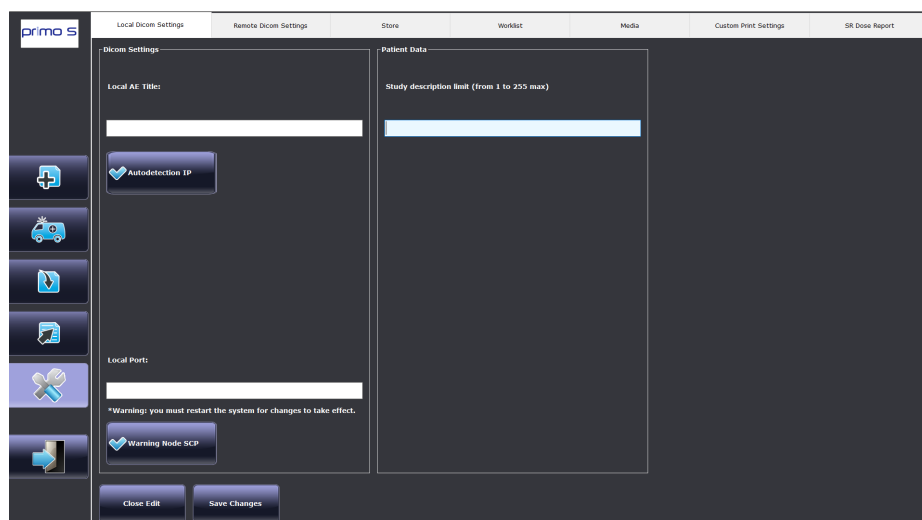
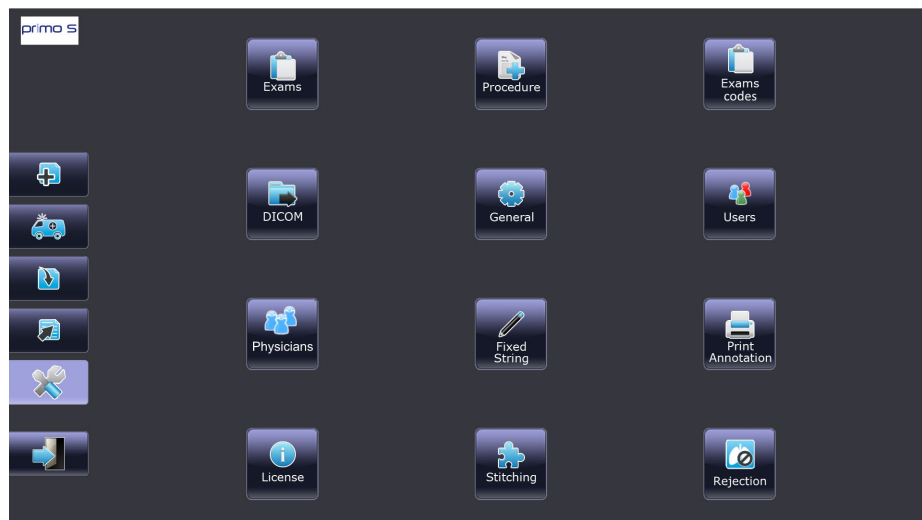
1.9 DICOM SETUP

After making the electrical connections to the DICOM network, the DICOM setup involves the following steps:

- Network settings (*see paragraph 1.9.1 below*)
- Defining the remote DICOM devices (*see paragraph 1.9.3 below*)
- Setup of each DICOM operating mode:
 - **Store** (*see paragraph 1.9.4 below*),
 - **Worklist** (*see paragraph 1.9.5 below*),
 - **Media** (*see paragraph 1.9.6 below*),
 - **Print** (*see paragraph 1.9.7 below*),
 - **RDSR** (*see paragraph 1.9.8 below*),
 - **Query / Retrieve** (*see paragraph 1.9.9 below*).
- Setup of the **Dicom Spooler** application to manage the image transmission (*see paragraph 1.9.10 below*)

Note: Restart **PrimoS** application for changes involving DICOM functions to take effect.

To enter this section, press the relevant key, from the **Setup** frame; the **Dicom** menu will be opened:



1.9.1 NETWORK SETTINGS

This procedure is only needed when the equipment is supplied with DICOM functions.
The video processor PC is supplied with the ETHERNET settings used in the factory.
The Responsible Organization is accountable for changing these to suit the network to which the EM equipment is connected.

Connecting the equipment to the IT-network, the Responsible Organization should also consider that:

- connection of the equipment to an IT-NETWORK that includes other equipment could result in previously unidentified risks to **patients, operators or third parties**;
- Subsequent changes to the IT-network could introduce new risks and require additional analysis; changes to the IT-network include:
 - changes in the IT-network configuration,
 - connection of additional items to the IT-network,
 - disconnecting items from the IT-network,
 - update of equipment connected to the IT-network,
 - upgrade of equipment connected to the IT-network.

Warning: The Responsible Organization should identify, analyze, evaluate and control these risks in compliance with **IEC 80001-1:2010** standard.

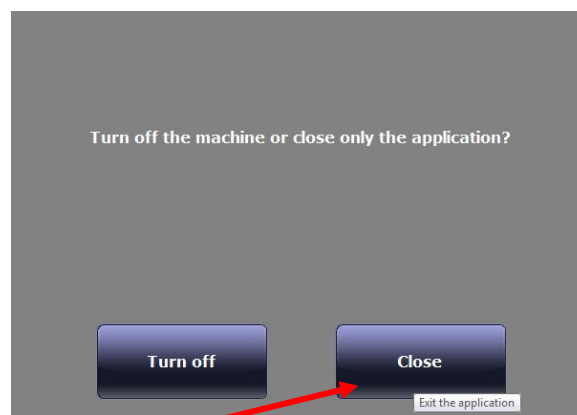
1.9.1.1 PHYSICAL DICOM NETWORK CONNECTIONS

Connection type in the system:

- Type: Ethernet using connector RJ45.
- Rate: Autosensing 10Mbit /100Mbit

1.9.1.2 WINDOWS SETTINGS FOR NETWORK CONNECTIONS

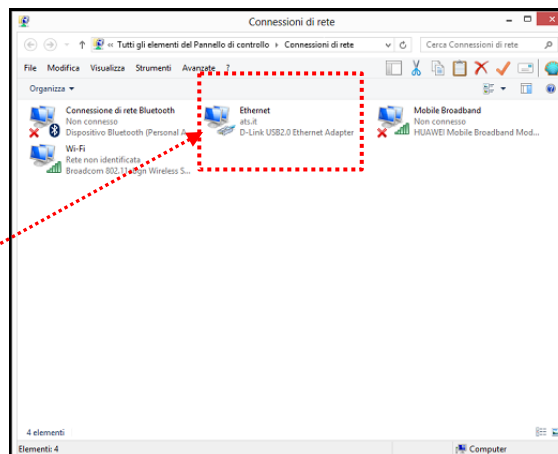
- You must first exit the **Primo S** application: from the Login frame press the Switch off button.
- The following message appears:



- Press the **Close** key. From the **Windows Control Panel**, open **Network and Internet** and finally **Network Connections**.

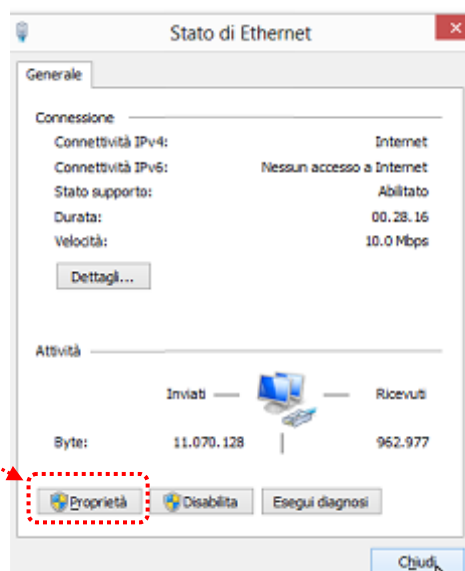
- The following page appears:

Select **Ethernet**
(Dicom)



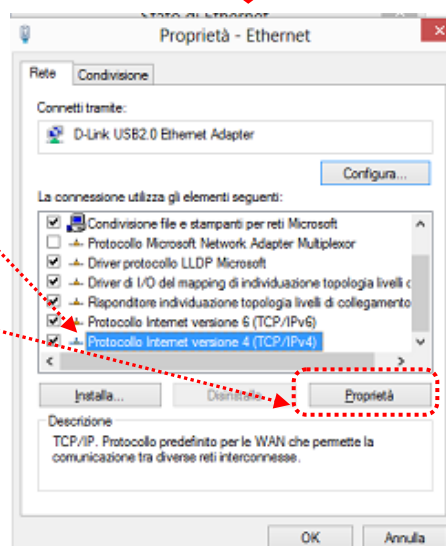
- The following page appears:

1. Select **Properties**



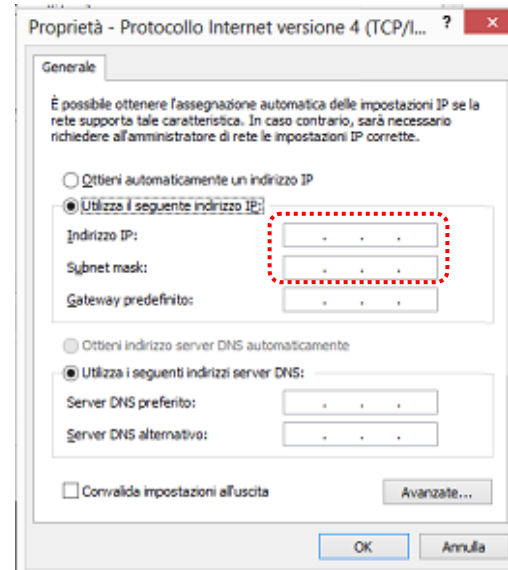
2. Select **Internet Protocol**
(TCP/IP)

3. click on **Properties**



- The following page appears:

Enter the **IP Address** and **Subnet Mask** for the PRIMO workstation, as specified by the administrator of the hospital network.

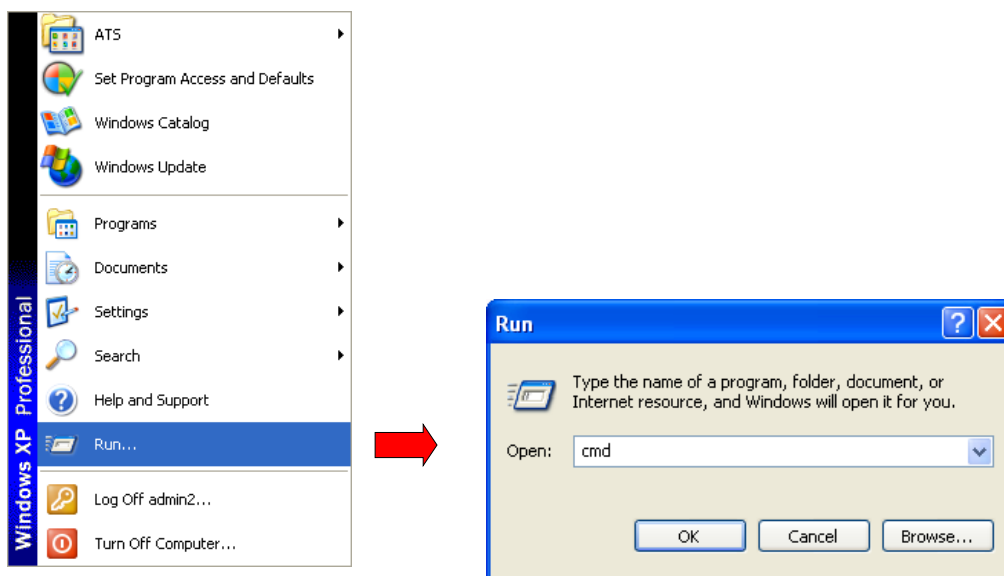


1.9.1.3 NETWORK CONNECTION TEST

After entering the network settings, you need to test the connection:

- Select **START / Run...** in the Windows task-bar.

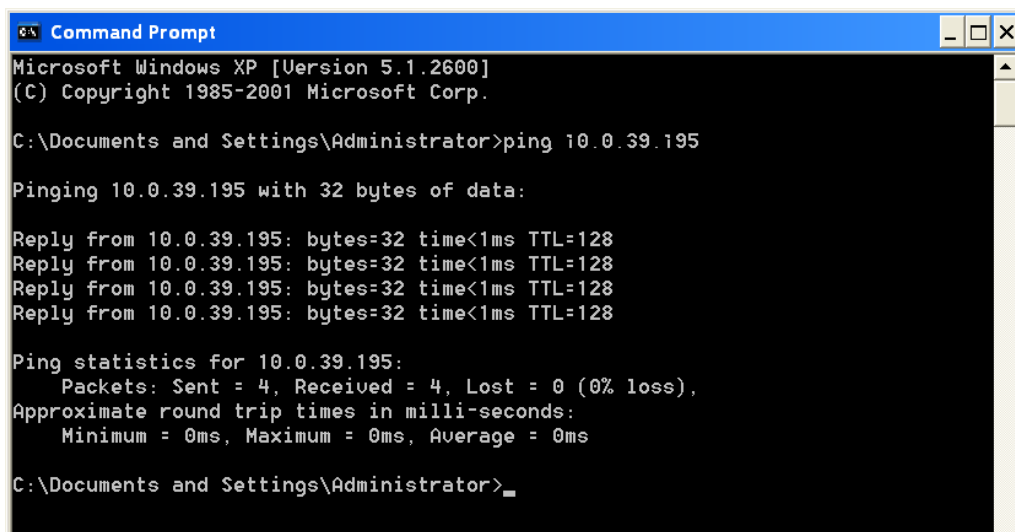
Then enter the command **cmd** in the search window ("Open:") and select **OK**.



- Enter **PING** followed by the **IP Address** for one of the devices connected to the equipment (specified by the hospital network administrator) at the DOS prompt and press **Enter**:

e.g.: **ping 10.0.39.195**

- The network connections are correct if the following page appears.



```
Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Administrator>ping 10.0.39.195

Pinging 10.0.39.195 with 32 bytes of data:

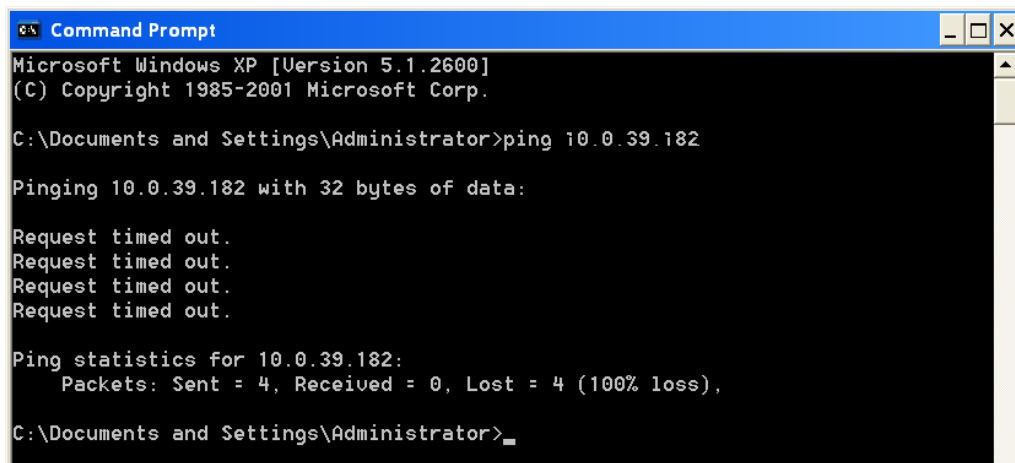
Reply from 10.0.39.195: bytes=32 time<1ms TTL=128
Reply from 10.0.39.195: bytes=32 time<1ms TTL=128
Reply from 10.0.39.195: bytes=32 time<1ms TTL=128
Reply from 10.0.39.195: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.39.195:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Documents and Settings\Administrator>
```

We recommend sending other PING commands to other network devices to check that the entire network is read properly by the equipment.

- If, on the other hand, the following page appears, it means that one of the settings is incorrect. You then need to check both the cable and the network settings.



```
Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Administrator>ping 10.0.39.182

Pinging 10.0.39.182 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.39.182:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Documents and Settings\Administrator>
```

- Close the DOS window after completing the test.

1.9.2 LOCAL DICOM SETTINGS

In the LOCAL DICOM SETTINGS page of the **DICOM Setup** menu, you can set the local DICOM settings:

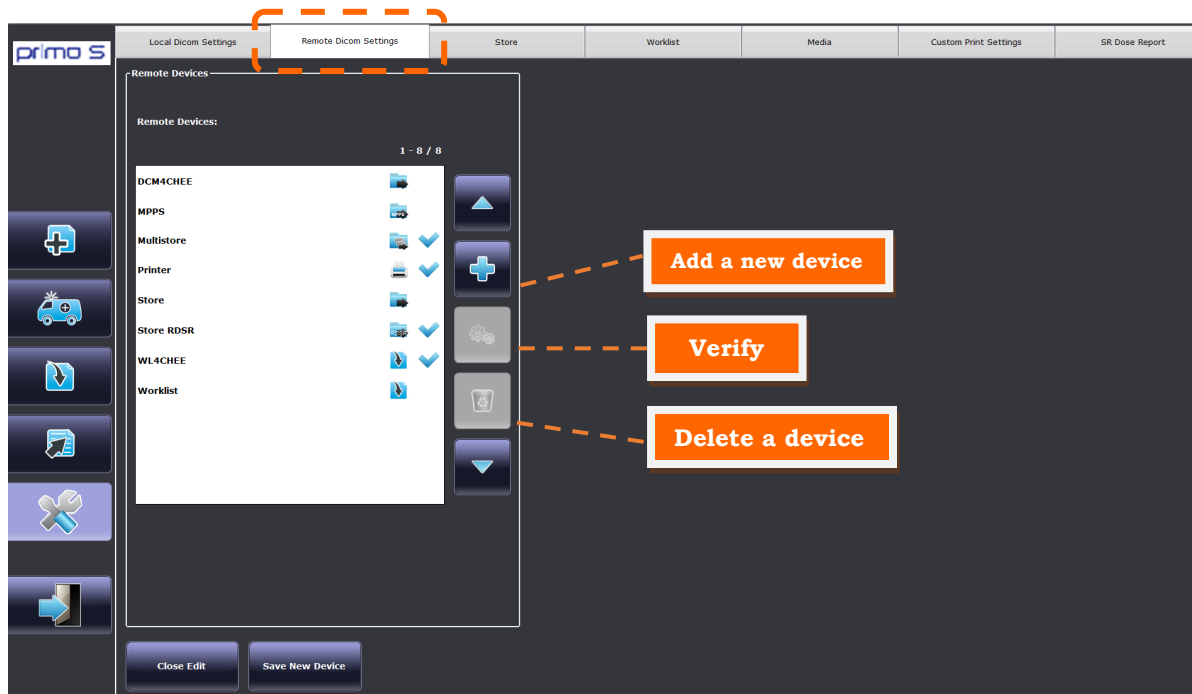
These parameters must be agreed with the hospital network administrator.

Local DICOM Settings		Notes
Local AE Title	Conventional name of the equipment used in the hospital DICOM network.	<i>Typically: PrimoS</i>
Local IP Address	Fixed IP address set to the equipment.	<i>Available only if Autodetection IP function is disabled.</i>
Autodetection IP	If a fixed address has not been set, the device automatically creates an address compatible with the network (based on IP address and Net Mask).	
Local Port	The TCP port code used by the equipment.	<i>Typically: 104</i>
Warning Node SCP	Enable or disable the warnings by the system if the Local IP Address is not set.	
Study description limit	Set the max length for a study description.	<i>Max 255 characters.</i>

Press **Save Changes** to save the setup changes; otherwise, press **Close Edit**.

1.9.3 REMOTE DICOM SETTINGS

The remote DICOM devices are defined using the REMOTE DICOM SETTINGS page of the **DICOM Setup** menu:



The **Remote Devices** box shows a list of the set devices.

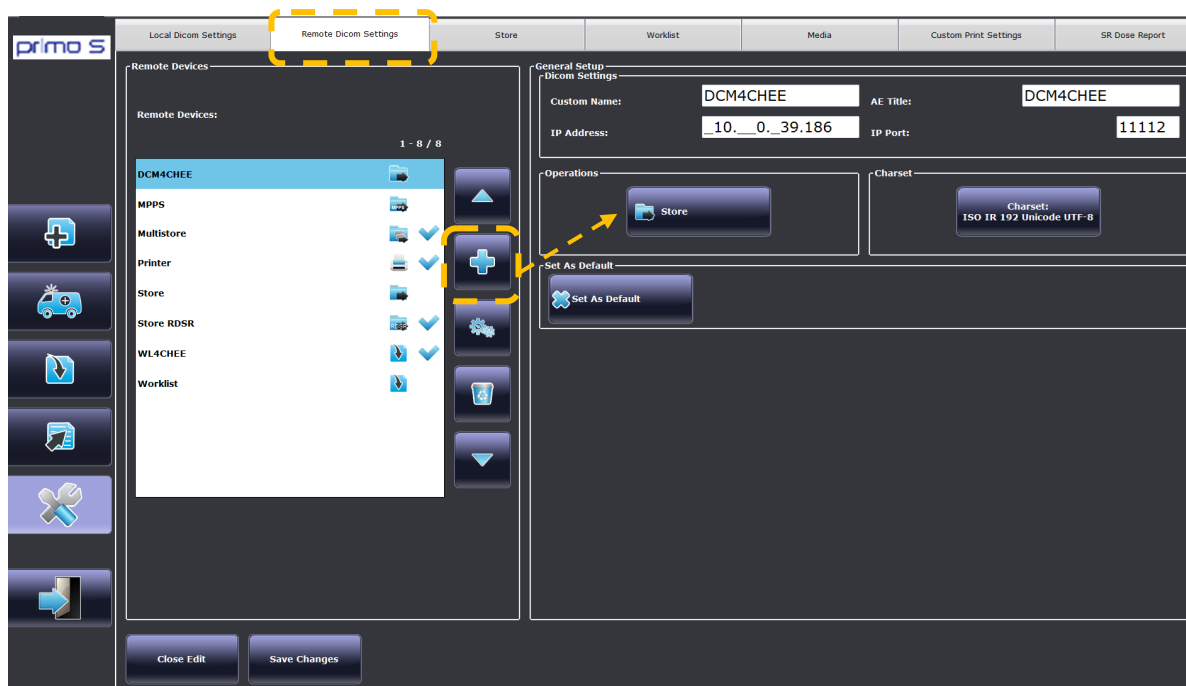
The relevant commands are:

- **Add Remote Devices:** *To add a new remote device.*
- **Verify:** *To check the DICOM communication with the selected remote device.*
- **Delete:** *To remove the selected remote device.*

The **Remote DICOM Settings** menu also lets you modify an existing device (select the relevant device and modify the required parameters).

1.9.3.1 ADDING A REMOTE DICOM DEVICE

When you press the **Add** key, or select a remote device from the list, it opens the **General Setup** frame of the device:



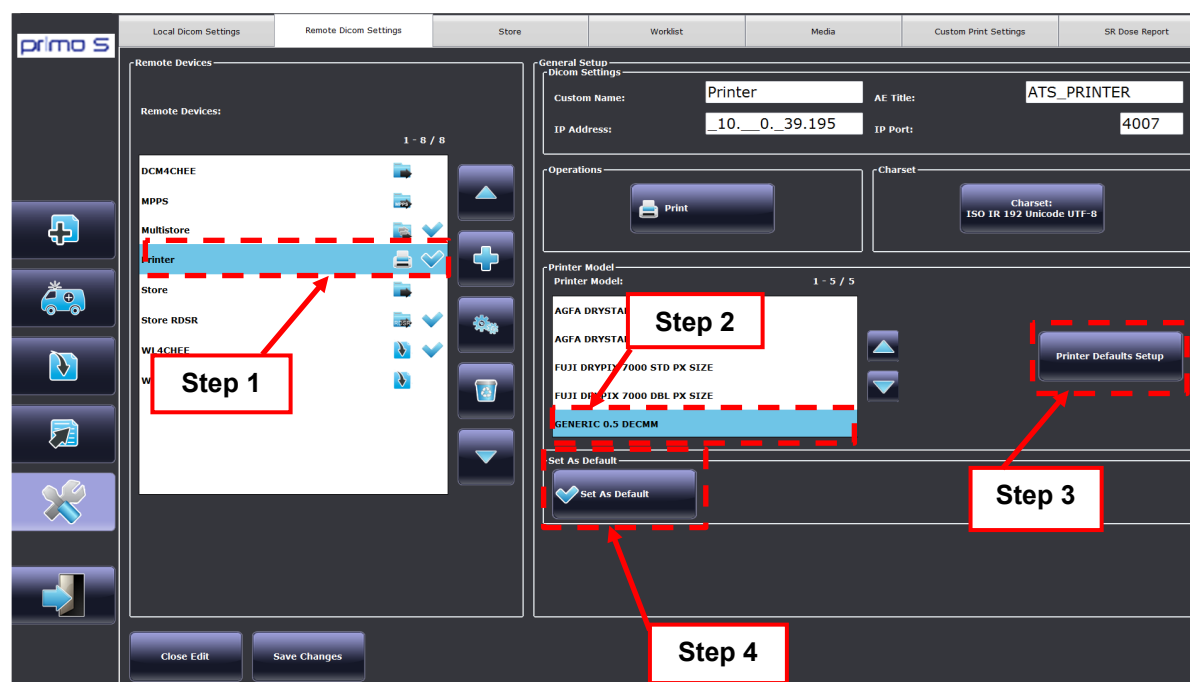
DICOM Settings		Notes
Custom Name	Conventional name of the remote DICOM device in the hospital network.	
AE Title	AE Title of the remote DICOM device.	Assigned by the hospital network administrator.
IP Address	IP address of the remote DICOM device in the ETHERNET network.	Assigned by the hospital network administrator.
IP Port	TCP port of the remote DICOM device for this service.	Assigned by the hospital network administrator.

Operations		Used to set the DICOM functions performed by the remote device.
		Notes
Store	Select if the remote device is to act as the DICOM SERVER (archiving).	
Print	Select if the remote device is to act as the DICOM PRINTER SERVER (printing). You are required to: first select Model within those suggested, and then open the Printer Default Setup .	See paragraph 1.9.3.2 below.
Worklist	Select if the remote device is to act as the WORKLIST SERVER.	See paragraph 1.9.5 below.
MPPS	Select to activate the MPPS service on the remote device.	
Storage Commitment	Select if the remote device is to provide confirmation that studies have been archived correctly (by the DICOM server).	

Store Multiple	It transfers images to more servers at the same time. You are required to select the stores to which simultaneously send the images.	Store servers must be already set, in order to be associated to a multiple send.
Store RDSR	Select if the remote device is to act as the DICOM SERVER to store the dose report.	
Store Multiple RDSR	It transfers the dose report to more servers at the same time. You are required to select the stores to which simultaneously send the dose report.	Store servers must be already set, in order to be associated to a multiple send.
RDSR Storage Commitment	Select if the remote device is to provide confirmation that dose report images have been archived correctly (by the DICOM server).	
Query Retrieve	The DICOM QUERY / RETRIEVE functions let you view digital images generated by other image diagnostics programs on the equipment (e.g. CT, MR, ECHO, etc.).	

1.9.3.2 DICOM PRINT SETTINGS

Use the **Remote Dicom Settings** menu to set the default parameters for automatic printing:



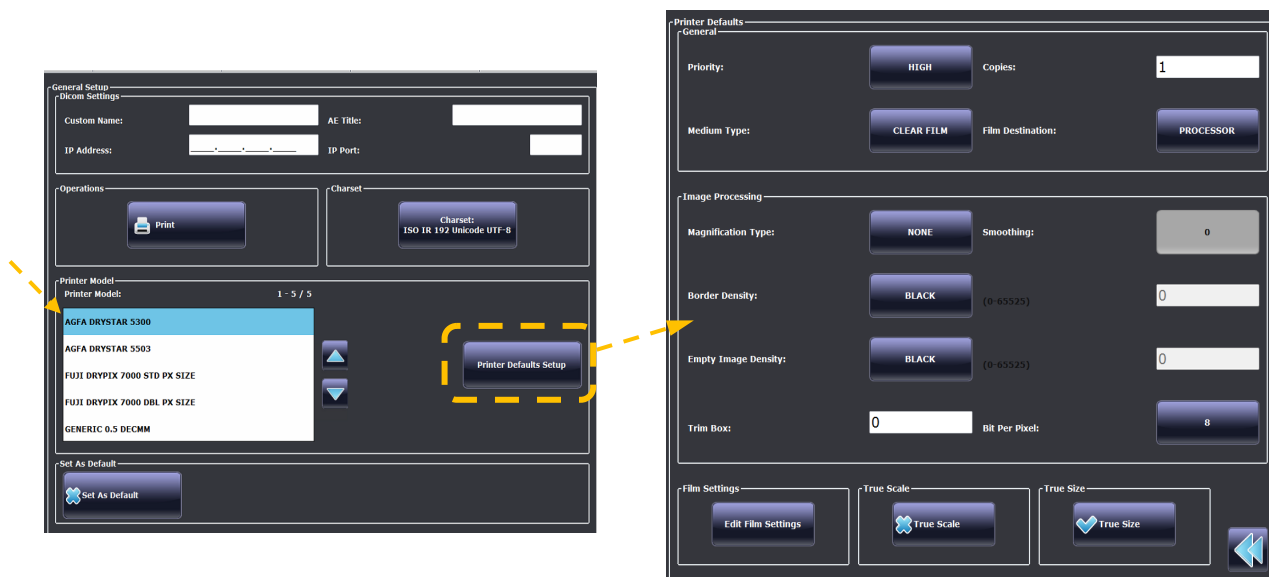
How to set a DICOM Printer:

- **Step 1:** Select the “DICOM print” remote device.
- **Step 2:** Select the printer from the PRINTER MODEL list.
- **Step 3:** Access the setup menu by pressing the PRINTER DEFAULT SETUP button.

Printer Model		Settings enabled when the remote device provides the Print function.
		Notes
Printer Model	Identification (type / model) and selection of the DICOM printer from among those foreseen by the equipment.	
Printer Default Setup	After selecting the printer, this key opens the default printer settings page (see tab below).	

- **Step 4:** Optionally, it is possible to set a printer as the DEFAULT printer, by pressing the “**Set as Default**” key (this printer will be tagged, in the devices list, with a blue thick).

Press the relevant key to open the **Printer default setup** menu, which is split into the following sections:



- General
 - Image Processing
 - Film Settings:
 - True scale
 - True size
- Follow the instructions in the specific printer manual when setting these parameters.
- Print layout settings, described in the paragraphs below.

Printer Default settings		
General		Notes
Priority level	Low, or Medium, or High	
Medium type	Clear film or Blue film	
Number of copies	Enter a default number of copies; you can change it during the printing procedure, if required.	
Film Destination	Video Processor, BIN-I, etc.	
Image Processing		Notes
Magnification type	None, Replicate, Bilinear, Cubic	The Cubic type requires you to set the smoothing level.
Border density	Black, White, Grey scale	Set the grey density value, in hundreds of OD.
Empty image density	Black, White, Grey scale	Set the grey density value, in hundreds of OD.
Trim box	Thickness of a box frame	
Bits per pixel	8, 12, 16	

➤ FILM SETTINGS

All the film sizes/formats supported by each printer are presented.

Use the EDIT FILM SETTINGS menu to set the default film size/format.

This will be:

- used in automatic print mode,
- proposed in manual print mode.

Press the EDIT FILM SETTINGS button to access the following menu:

Film

Orientation: Annotation: Measure:

Film Size: 1 - 6 / 16

Name	Orientation	Annotation	True Size Correction
☐ 8INX10IN	PORTRAIT	OFF	100
☐ 8INX10IN	LANDSCAPE	OFF	100
☒ 10INX12IN	PORTRAIT	OFF	100
☐ 10INX12IN	LANDSCAPE	OFF	100
☐ 10INX14IN	PORTRAIT	OFF	100
☐ 10INX14IN	LANDSCAPE	OFF	100

Format: 1 - 6 / 15

Name	1	2	3	4
☐ STANDARD	1	1	0	0
☒ STANDARD	1	2	0	0
☐ STANDARD	1	3	0	0
☐ STANDARD	2	1	0	0
☐ STANDARD	2	2	0	0
☐ STANDARD	2	3	0	0

This menu allows to:

- enable (or disable) the film sizes/formats to be managed by the equipment,
- select the default size/format in automatic print mode from among those enabled.
- Select each parameter by simply touching its line: the parameter is highlighted in "blue",
- Double click to enable or disable a parameter,
- Select a **Film Size** and a **Format** and then press **Default Format** to set these as the **default settings in automatic print mode**.

Default parameters are indicated by the default symbol.



Film		
Parameter	Description	Notes
Orientation	Select DON'T FILTER to view all the possible film sizes in the FILM SIZE field (PORTRAIT and LANDSCAPE). Select PORTRAIT to view only the PORTRAIT film sizes in the FILM SIZE field. Select LANDSCAPE to view only the LANDSCAPE film sizes in the FILM SIZE field.	This is not a printer setting: it is simply a function that makes it easier to find a given film size.
Annotation	This filter is always off, annotations are not activated.	
Measure	To view the dimensions of the printer film size in either cm or inches.	e.g. cassette size 20 x 25cm = 8 x 10in
Default Format	To set the selected Film Size and Format as the default settings.	
Film size	To view all the film sizes possible with the selected printer. The grey circle indicates that the film size is disabled. The blue circle indicates that the film size is enabled.	Double click on the name of a film size to enable/disable it. Depending on the Film Size status, the corresponding formats (divisions) are automatically shown in the FORMAT window.
Format	To view all the formats available with the selected film size. The grey circle indicates that the format is disabled. The blue circle indicates that the format is enabled.	Double click on the name of a format to enable/disable it.

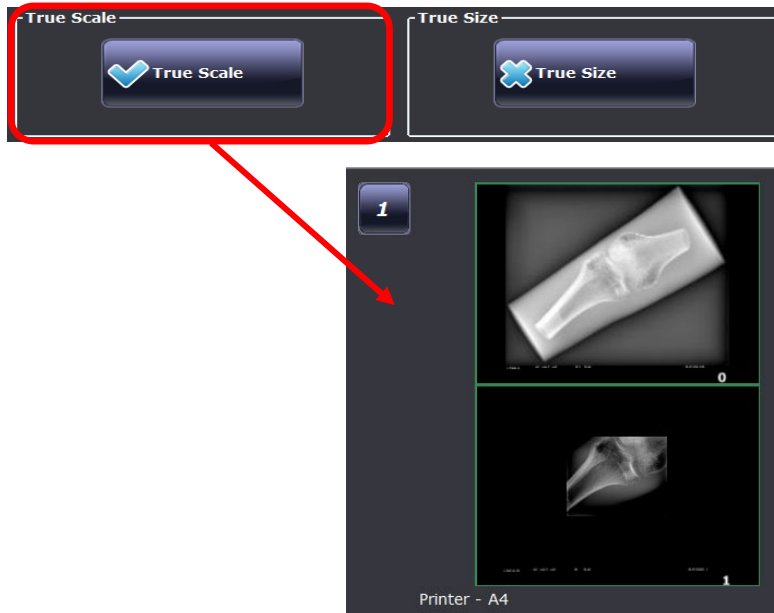


Press this key to return to the previous menu.

➤ TRUE SCALE FUNCTION

You can set the printer so that the images (normally shown on the monitor in different zoom factors to suit the exposed area) are all printed at the same zoom factor.

Enable this function by pressing **True Scale**.



➤ TRUE SIZE FUNCTION

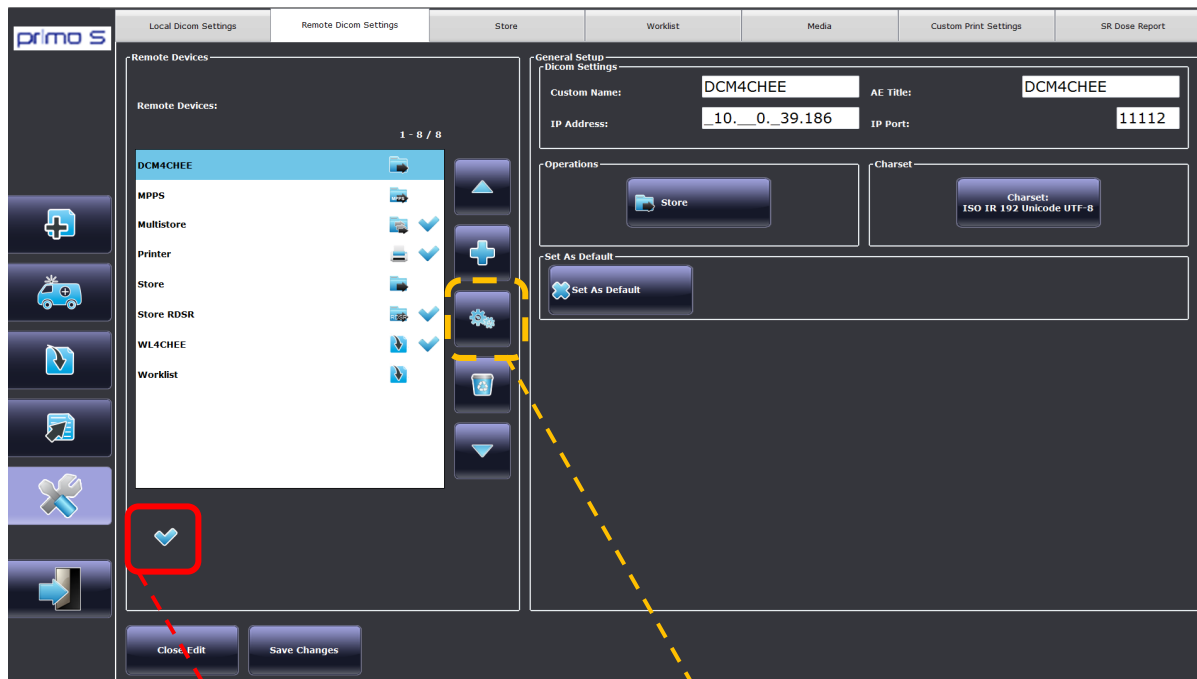
You can set the printer so that the image on the film is the same size as the real subject. Before the print, you can pan each image within its box, to select the part to print. Press **True Size** to enable this function.



You need to follow a calibration procedure for each film size used with the True Size function: this will adjust the size of the image to the actual size of the irradiated object (see *Paragraph 2.16.2.1 in Part 2 of the User Manual*).

1.9.3.3 CHECKING THE CONNECTION OF REMOTE DEVICES

Use the REMOTE DICOM SETTINGS menu to check the DICOM communication between the EM equipment and the remote DICOM node.

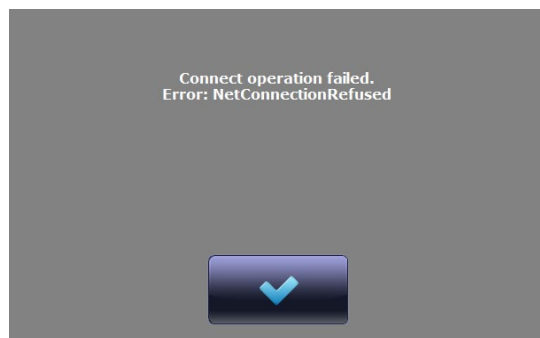


Select a device in the **Remote Devices** list and then press **Verify**.

This test tells you whether the device is present and active in the DICOM network or not. Press the relevant key and the test result appear:



VERIFY = OK



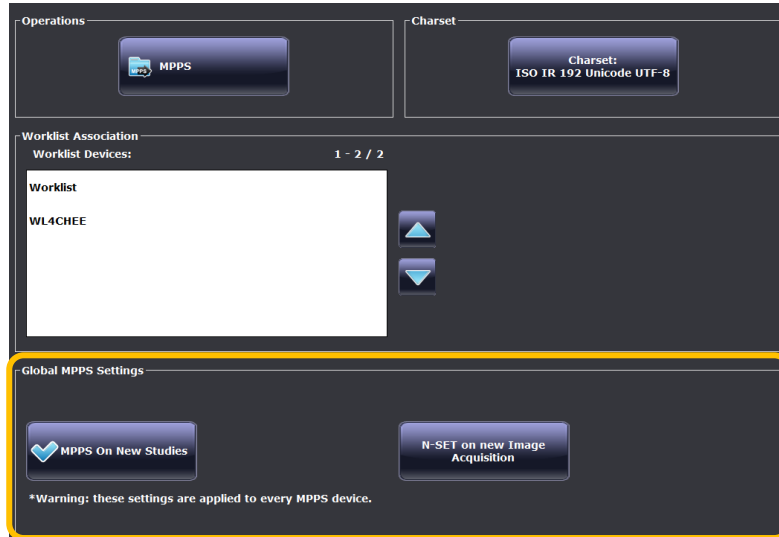
VERIFY = FAULT
(an error message appears)

Note: The test only checks a connection availability. For example, you might get a positive verify result, but no transmission of the image to the printer: in this instance check the Remote Device parameters.

1.9.3.4 DICOM MPPS FUNCTION

The **MPPS** service allows to send to the PACS the status of the studies (study in progress, study completed, study archived).

Press the **MPPS** key and the list of the available worklist devices is shown. Select in the list the devices to link to the **MPPS** service.



In the **Global MPPS Setting** it is possible to enable or disable the **MPPS** service on new studies.

You can also set:

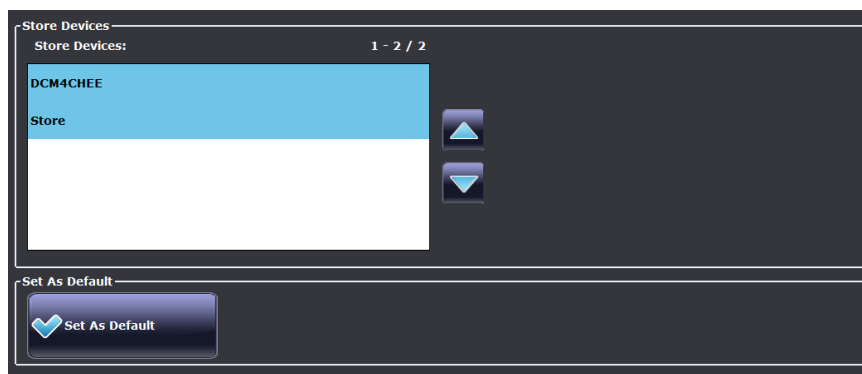
- **N-SET on new image acquisition:** it orders to the server the creation of the MPPS after the first image acquisition. It is then updated after each new image acquisition.
- **N-SET on a close study:** it orders to the server the creation of the MPPS after the first image acquisition. When the study is closed, the MPPS is completely updated with all the images acquired.

1.9.3.5 STORE MULTIPLE AND STORE MULTIPLE RDSR FUNCTIONS

The **Dicom Store Multiple** and **Store Multiple RDSR** functions transfers images and report to different DICOM node at the same time.

Press the **Store Multiple** key or the **Store Multiple RDSR** key in the **Remote Dicom Setting** card and the list of the available Store Devices is shown.

Select in the list the devices to link to this function:



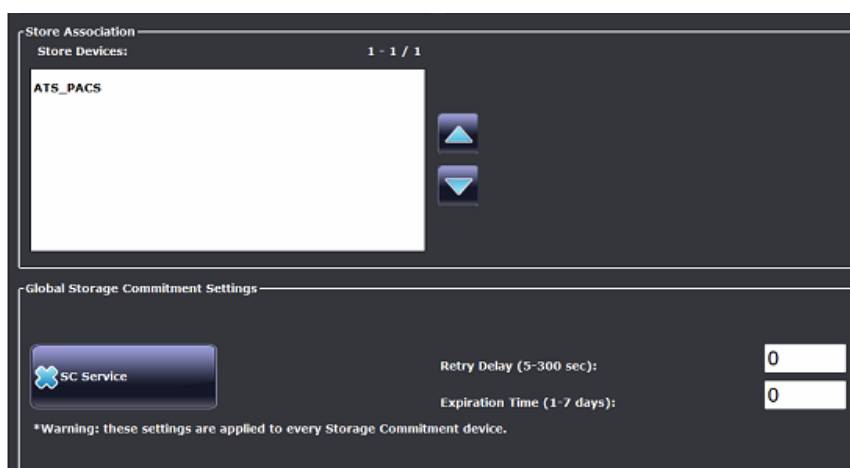
Confirm the selection by **Save Changes** key.

Note: The **Verify** key does not work with the *Dicom Store Multiple* function.

1.9.3.6 STORAGE COMMITMENT AND RDSR STORAGE COMMITMENT FUNCTIONS

The **Storage Commitment** and the **RDSR Storage Commitment** functions provide a confirmation service for the storage of images and related RDSR sent to the PACS.

The **Remote Dicom Settings** card in the **DICOM Setup** menu lets you set the parameters.



Store Association		Notes
Store Device	Set the name of the Store server for the SC by selecting one of those in the list.	

Global Storage Commitment Settings		Settings applied to Storage Commitment device.
		Notes
SC Service	Enable / disable the Storage Commitment service.	
Retry Delay	To set the delay time before a new Storage Commitment request, after a failed attempt.	
Expiration Time	To set the timeout for confirmation of the SC service from the Storage Commitment server.	If not confirmed within this time, the service is considered "failed".

1.9.4 DICOM STORE FUNCTION

The **Dicom Store** function is used to transfer the images to a server.

You can set the relevant parameters in the **Store** card. These depend on the specific receiving server features.

Store Modality		Notes
Modality	To set the identifying DICOM code for the mode in which images are transferred to the server: CR = Computed Radiography DX = Digital X-ray	Recommended: DX
Override Study Modality	If active, when images are sent via DICOM, the code set in the Modality field overrides that saved for the image at the time of acquisition.	Otherwise, the images keep the original default code, set in the General Setup menu.

Modality Options		Notes
Presentation LUT (DX)	Only available if the Modality option set is DX . Select this to get "linear" transfer of the image, followed by the individual LUT correction parameters.	
Lut expansion 0-30%	Only active if the Presentation LUT (DX) option is disabled. To set the expansion of the LUT to be sent together with image to increase the range of the levels that could be shown. Accepted range: 0 to 30% , towards black (B) and towards white (W).	This function lets you include in the image to be sent, parts that fall outside the levels you can see on the monitor.
Bits per pixel	To set the number of bits / pixel for the transferred image. Accepted values: 8-12-16 bits/pixel.	It depends on the store server features.

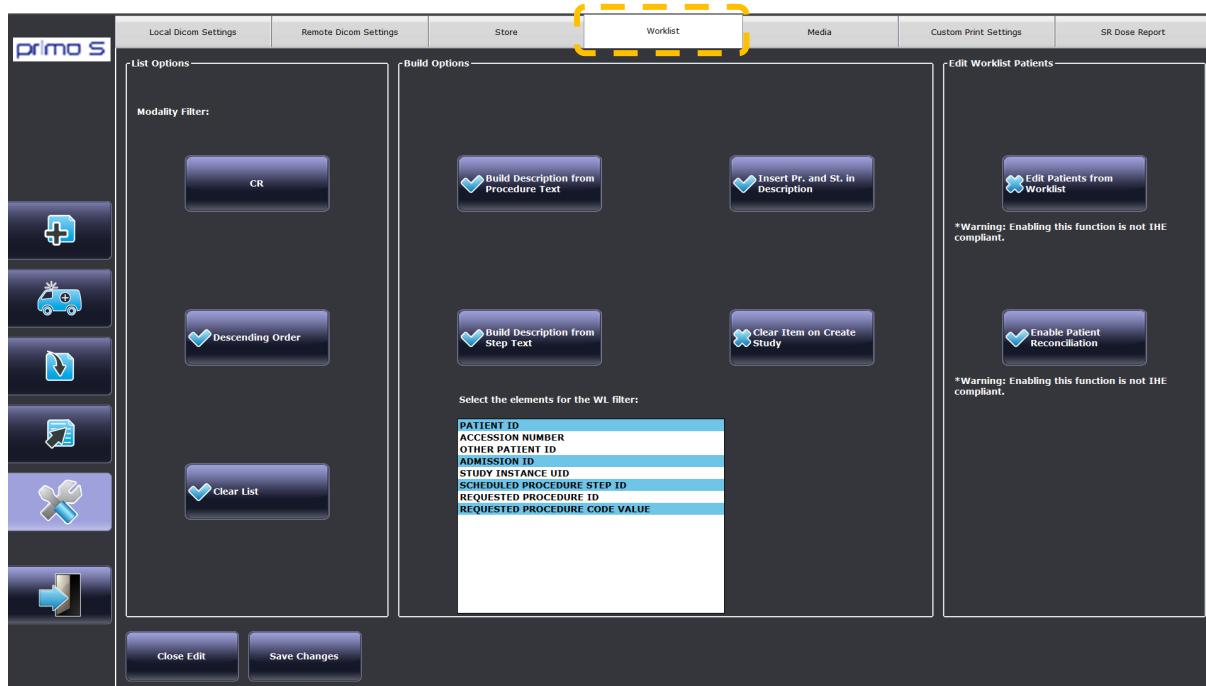
Image Options		Notes
Writings on Image	Enable this option if you want to transfer the image together with its indications (patient name, image number ...), as displayed on the monitor.	If not selected, the image will be sent without the indications. These will, however, be sent to the server via the relevant DICOM fields.
Graphics on Image	Enable this option to transfer any operator overlay (text or measurements) together with the image.	If not enabled, the image will be sent without overlays.
Send Image Number	Enable this option to send the Image Number , together with the image. This parameter may be used by some PACS servers if the same image is to be received with different processing. In this case, the PACS will overwrite the existing image with the new one.	

Tag Options		Notes
If Patient ID is empty	Transfer options if the "Patient Data" ID field has not been filled in. Options: • Send nothing: the exam is sent with the ID field empty. • Use patient name: the exam is sent with the patient name in the ID field. • Use "Patient ID": the exam is sent with the words "PATIENT ID" in the ID field.	
If Study ID is empty	Transfer options if the "Study Data" ID field has not been filled in. Options: - Send nothing: the exam is sent with the ID field empty. - Use Study UID: the exam is sent with the DICOM UID in the ID field. - Use "Study ID": the exam is sent with the words "STUDY ID" in the ID field.	
Auto Store	To enable the automatic transfer of the images on closing a study to the default DICOM archive device .	

1.9.5 DICOM WORKLIST

You need to set the options for the DICOM WORKLIST function:

- in the relevant page in **DICOM Setup** menu:



List Options		Notes
Modality Filter	To set the DICOM reception mode for the Worklist. Options: CR or DX	
Descending Order	If selected, the Worklist will be sorted by date in the Date-Time field (newest to oldest). If not selected, the order shown will be that of receipt.	
Clear list	If selected, the current Worklist is deleted before the new "Get List" request. If not selected, the new list will be added to the existing one.	

Build Options		Notes
Build Description from Procedure Text	Enable this to get the contents of the DICOM Procedure field in the Description of the study.	Typically, all enabled.
Build Description from Step Text	Enable this to get the contents of the DICOM Procedure step field in the Description of the study.	
Insert Pr. and St. in Description	Enable this to add the prefixes Pr. and St. to the two previous fields: Procedure Description and Procedure Step in the Description field.	
Clear Item on Create Study	Enable this function to remove the study from the Worklist when is created.	

Select the elements for the WL filter	It is possible to set a series of parameters that will be used to filter the WorkList you are receiving. The parameters selected will be compared to those of studies already received from the WorkList. If selected parameters match with those of a study present in the WorkList you are receiving, this study will not be shown. <u>Parameters available:</u> • <i>Patient ID</i> • <i>Accession number</i> • <i>Other Patient ID</i> • <i>Admission ID</i> • <i>Study Instance UID</i> • <i>Scheduled Procedure Step ID</i> • <i>Requested Procedure ID</i> • <i>Requested Procedure code value.</i>	
---	--	--

Edit Worklist patient		Notes
Edit patients from worklist	Enabling this function, you can modify the study data received via the Worklist.	Enabling this function is not IHE compliant.
Enable Patient Reconciliation	Enabling this function, you can modify the study data received via the Worklist over an exam already taken.	Enabling this function is not IHE compliant.

1.9.6 DICOM MEDIA FUNCTION

The DICOM MEDIA function is meant to transfer the images in DICOM format onto a CD or a Usb memory device.

The function settings are found in the **CD** card in the **DICOM Setup** menu:

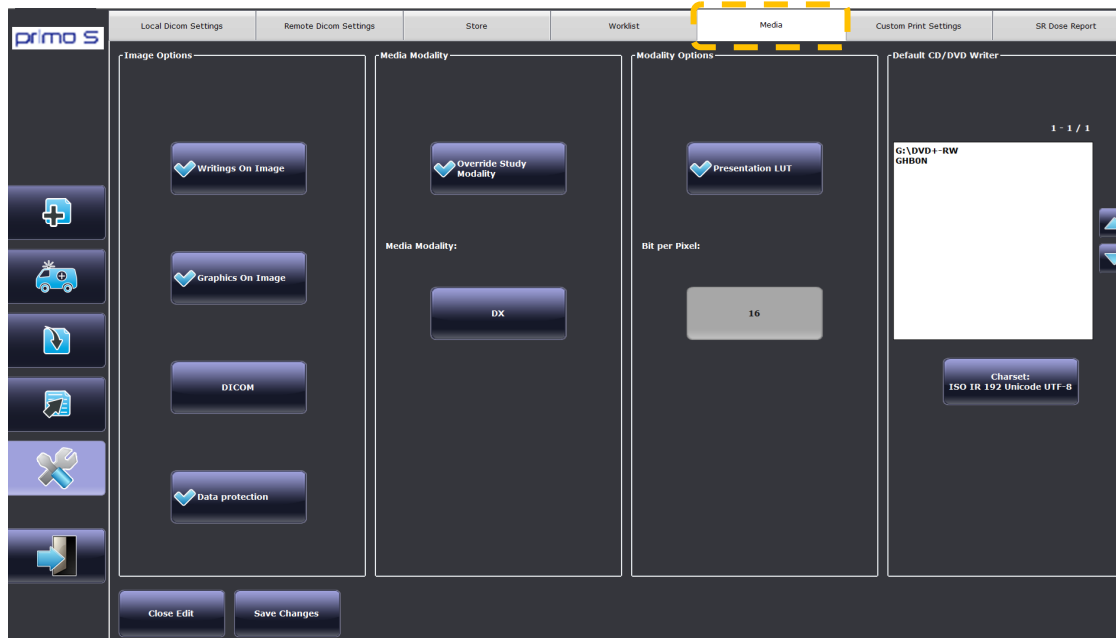


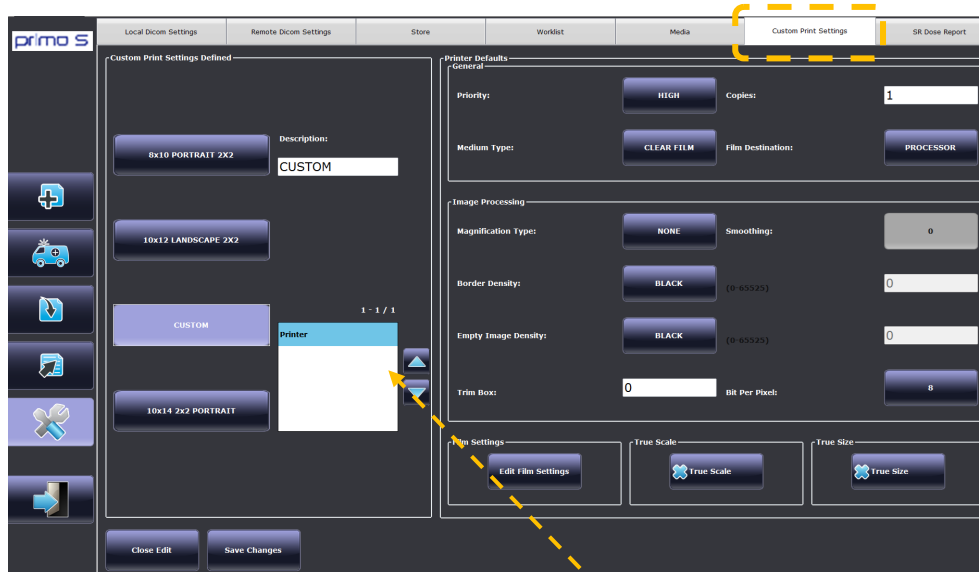
Image Options		Notes
Writings on Image	Enable this option if you want to transfer the image together with its indications (patient name, image number ...), as displayed on the monitor.	
Graphics on Image	Enable this option to transfer any operator overlay (text or measurements) together with the image.	
Image extension	You can set the format the images will be sent with.	Available format: DICOM, JPG, BMP, PNG.
Data Protection	Enable this option if you want to anonymize patient data and protect the image with a password.	Enable or disable.

CD Modality		Notes
Override Study Modality	Enable this option to change the DICOM modality (CR or DX) for the images to be saved.	
Modality	This option can <u>only</u> be set if the previous option - Override study modality - has been enabled Options: CR = Computed Radiography DX = Digital X-ray	

Modality Options		Notes
Presentation LUT	Enabling this option, the image data and the LUT correction parameters are kept separated.	<i>This function can only be selected if the CD Modality set is DX.</i>
Bits per pixel	To set the number of bits / pixel for the image to be saved to CD/DVD.	Typically: 16 bits/pixel

1.9.7 CUSTOM PRINT SETTINGS

In this card, you can customize up to four different printing layouts.



DICOM Printer List

Select one of four defined layouts to custom:

- 8x10 portrait 2x2
- 10x12 landscape 2x2
- 10x14 landscape 2x1
- 10x14 portrait 2x2

If required, you can change the layout name by clicking on the relevant layout key and writing a new name in the **Description** field.

For each layout, choose the printer within the list and the Printer Defaults menu opens. The features you can set in this menu are divided in: **General, Image Processing, Film Settings, True Size or True Scale.**

Printer Defaults		
General		Notes
Priority	Low, Medium, High,	
Medium Type	Clear film or Blue film,	It depends on your printer features.
Number of copies	Select the number of copies to print as default	
Film destination	Video Processor, BIN_i, etc.	
Image Processing		Notes
Magnification type	None, Replicate, Bilinear, Cubic	The last one requires you to set the smoothing level.
Border Density	Black, White or set the density value	Expressed in hundredths of ODs
Empty image Density	Black, White or set the density value	Expressed in hundredths of ODs
Trim Box	Thickness of a box frame	
Bit per Pixel	8,12, 16	

Film

Orientation: **DON'T FILTER** Annotation: **OFF** Measure: **cm**

Film Size: 1 - 1 / 1

Name	Orientation	Annotation	True Size Correction
☒ A4	PORTRAIT	OFF	100

Format: 1 - 6 / 15

STANDARD	1	1	0	0
☒ STANDARD	1	2	0	0
☒ STANDARD	1	3	0	0
☒ STANDARD	2	1	0	0
☒ STANDARD	2	2	0	0
☒ STANDARD	2	3	0	0

Film Settings		Notes
Orientation	Filter to select the orientation you would set (portrait, landscape, don't filter for both)	
Annotation	It is always off.	
Measure	Select the length unit of measurement (Cm / Inches).	
Film Size	Select the film size to set	
Format	Select which format to make available (blue point) or not available (grey point).	

True Scale

☒ True Scale

True Size

☒ True Size

True Scale or True Size functions		Notes
True Scale	The images, normally shown on the monitor in different zoom factors, are now printed on the film with the same zoom.	The image with the largest zoom factor on the monitor is scaled down using the smallest zoom factor.
True Size	You can set the printer so that the image on the film is printed at the same size as the real subject.	

1.9.8 RDSR (RADIATION DOSE STRUCTURED REPORT)

This menu lets you set the DICOM RDSR service:

General info

☒ Dose SR Auto Store on Close Study

Reference Point Definition: 1 - 5 / 7

- 15cm from Isocenter toward Source
- 30cm in Front of Image Input Surface
- 1cm above Tabletop
- 30cm above Tabletop
- 15cm from Table Centerline

Dose source and calibration history

Source of Dose Information: Dosimeter

Calibration history:

Calibration Date	ID
12-12-2019 09:46	6
12-06-2019 15:09	5
09-12-2019 10:18	4
04-05-2018 09:48	3
01-19-2018 12:22	2
01-19-2018 12:19	1

Calibration detail

Responsible Party: Hospital

Protocol: 00

Calibration Factor: 1.00

Calibration Uncertainty (%): 0

Recording device and irradiation device

Recording Device:

Device UID: 1.3.6.1.4.1.34656.01.012.86

Device Name: primo S

Device Manufacturer: ATS Srl

Device Model Name: PRIMO R

Device Serial Number: 01 012 86 13

Device Physical Location: sala raggi prg

Irradiating Device:

Device UID: 1.3.6.1.4.1.123456.1.12.86

Device Name: sedecal

Device Manufacturer: toshiba tube

Device Model Name: thsdf

Device Serial Number: 097855

Device Physical Location: sala raggi prg

Close RDSR Save RDSR

These are the parameters to be set:

General Info		Notes
Dose SR Auto Store on close study	Enabled / Disabled	
Reference point definition	To set the Reference Point used to calculate the Kerma. Select from: - 15 cm from isocenter toward source - 30 cm in front of image input surface - 1 cm above tabletop - 30 cm above tabletop - 15 cm from table centerline - Entrance exposure at 4.2 cm - In detector plane	Reference point definition

Dose source and calibration history		Notes
Source of dose information		Fixed setting: Dosimeter
Calibration history		The party responsible for the system must enter the following parameters each time the DAP is calibrated.
	Responsible Party	- Person responsible for calibration
	Protocol	- Calibration protocol
	Calibration Factor	- Calibration factor used by the dosimeter to calculate the real value. The real dose can then be calculated by multiplying this parameter with the value provided by the DAP.
	Calibration Uncertainty	- Percentage of uncertainty in the measuring device ($\pm$ 0-100%)

Recording device and irradiation device		Notes
Recording Device		
	Device UID	Recording device and irradiation device
	Device name	To set the name of the imaging device
	Device Manufacturer	To set the manufacturer's name
	Device Model name	To set the model of the imaging device
	Device Serial number	Serial number of the device (set automatically)
	Device Physical Location	To set the location of the equipment within the Hospital.
Irradiating Device		Parameter settings for the X-ray emission device
	Device UID	UID set by the system integrator
	Device name	To set the name of the X-ray emission device
	Device Manufacturer	To set the name of the manufacturer of the X-ray emission device
	Device Model name	To set the model of the X-ray emission device
	Device Serial number	To set the serial number of the X-ray emission device
	Device Physical location	To set the location of the X-ray emission device

Note: When you save the new settings, you are asked to restart the **PrimoS** software for changes to become effective.

1.9.9 QUERY / RETRIEVE

The DICOM QUERY / RETRIEVE functions let you view digital images generated by other image diagnostics programs on the equipment (e.g. CT, MR, ECHO, etc.).

General Settings		Notes
Query Retrieve folder	Indication of the path where the retrieved images has been saved.	
Viewer Executable	Indication of the path where the QR viewer has been saved.	
Change directory	In case you want to use a different viewer, select the path the new viewer is saved by pressing this key.	
Use Wildcard	This option makes easier the search by Patient's name , allowing to enter even a partial text.	For example, entering "John", all patients containing "John" will be recalled and shown in the list.

Dicom Settings		Notes
Calling AE title	AE Title of the remote device providing the Query / Retrieve service.	
Port	TCP Port used by the remote device providing the Query / Retrieve service.	

1.9.10 DICOM SPOOLER

The **DICOM Spooler** function manages the transmission of images to the DICOM network via a buffer memory (on the Hard Disk) where the images to be transmitted are stored in a queue.

You can access this function by touching the relevant command in the Study List frame:



List of the images in the queue

Patient name	Study description	Sr/Img	Mod	From	To	Sv	Rt	St	Pr	Scheduled date
TEST ROBERTO		1/1	DX	SEDECAL	ATS_PACS	0		▶	3	
TEST ROBERTO		3/1	DX	SEDECAL	ATS_PACS	0			3	
TEST ROBERTO		4/1	DX	SEDECAL	ATS_PACS	0			3	
TEST ROBERTO		5/1	DX	SEDECAL	ATS_PACS	0			3	

Warning message area

Spooler status legend

Settings

1.9.10.1 TRANSMISSION QUEUE MANAGEMENT

You can manage any images left in the transmission queue by using the **DicomSpooler** application.

Operations

Status

Patient name	Study description	Sr/Img	Mod	From	To	Sv	Rt	St	Pr	Scheduled date
KNEE LAT 1		1/1	DX	PRIMO	ATS_PACS	3		✖	3	21-07-2011 08:56
THORAX 1		1/1	DX	PRIMO	ATS_PACS	2		▶	3	21-07-2011 08:57
PELVIS HIP 1		1/1	DX	PRIMO	ATS_PACS	1			3	21-07-2011 08:57
PELVIS HIP 1		2/1	DX	PRIMO	ATS_PACS	1			3	21-07-2011 08:57

The **Status** panel shows the status of the images and their transmission in real time. It provides the following details:

Spool : Active

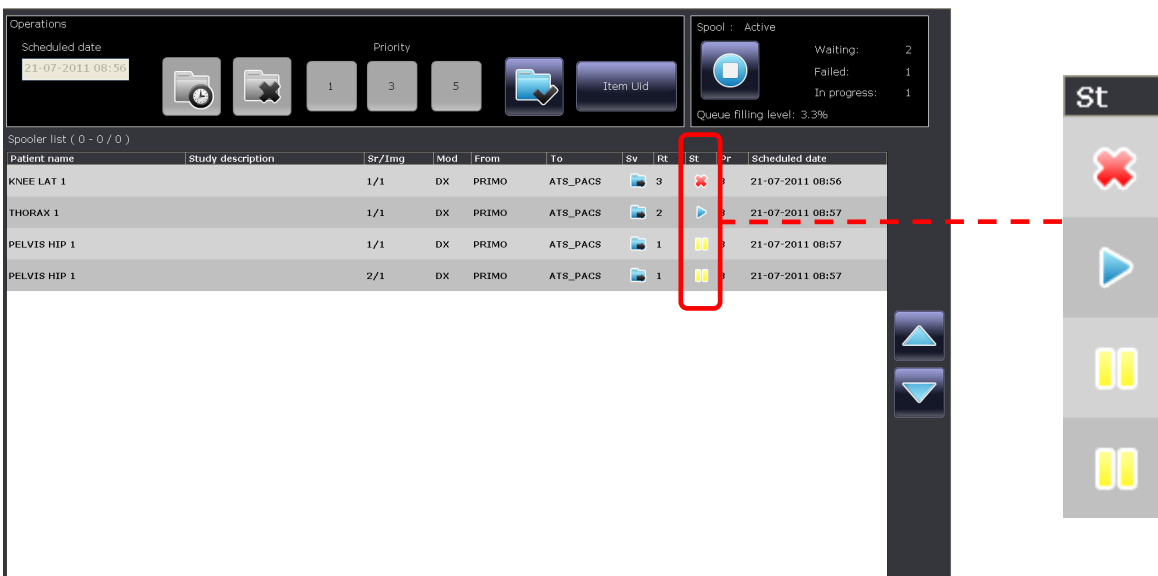


Waiting: 2
Failed: 0
In progress: 1

Queue filling level: 0.9%

Spool	Spooler status (active / disabled)
Waiting	Number of images in the queue
Failed	Number of images not sent (error or system malfunction)
In progress	Number of images currently being sent
Queue filling level	Filling level (in %) of the transmission queue

The status of each image in the transmission queue is also indicated in the **St** (Status) column in the main window:



Operations

Scheduled date: 21-07-2011 08:56

Priority: 1 3 5

Item Uid

Spooler list (0 - 0 / 0)

Patient name	Study description	Sr/Img	Mod	From	To	Sv	Rt	St	Pr	Scheduled date
KNEE LAT 1		1/1	DX	PRIMO	ATS_PACS	3		✖		21-07-2011 08:56
THORAX 1		1/1	DX	PRIMO	ATS_PACS	2		▶		21-07-2011 08:57
PELVIS HIP 1		1/1	DX	PRIMO	ATS_PACS	1		◻		21-07-2011 08:57
PELVIS HIP 1		2/1	DX	PRIMO	ATS_PACS	1		◻		21-07-2011 08:57

St

✖

▶

◻

◻

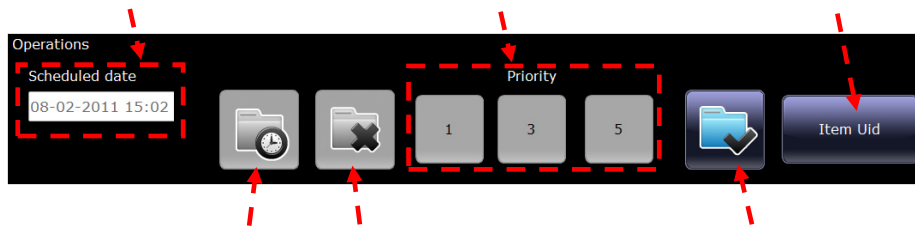


This key shows a legend about the symbol you could see near the images in queue.

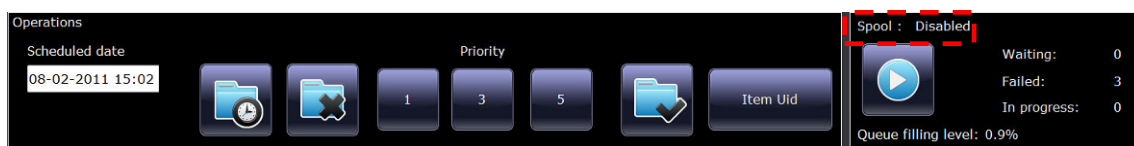
STATES OF SPOOLER

- ◻ Waiting the first send.
- ◻ Waiting the re-send (the previous has failed).
- ▶ Sending.
- ✖ Sending failed (3 attempts).
- 🖨 Creating the DICOM object to be printed.
- ⚠ Problems in the creation of the DICOM object.
- 🖨 Printing done.
Problems deleting images:
cancel them manually.
- 🖨 Store done.
Problems deleting images:
cancel them manually.

The commands in the **Operations** panel are used to manage the images still in the queue:

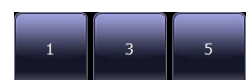


Use the **Stop** button to stop any further filling of the transmission queue (**Spool: Disabled**). This also enables the **Operations** commands:

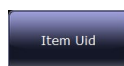


Now you can:

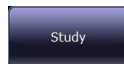
- **select** all the images in the transmission queue using the **Select All** command
- **delete** one or more selected images in the transmission queue with the **Delete** command
- **set the re-transmission date** for a selected image using the **Scheduled date** command and then order the new transmission request by using the **Reschedule** command
- **set the transmission priority** for the selected image using these commands:
 - 1 = low priority, 3 = normal priority, 5 = top priority
- change the display of the description field of an image in the Spooler. The options are:



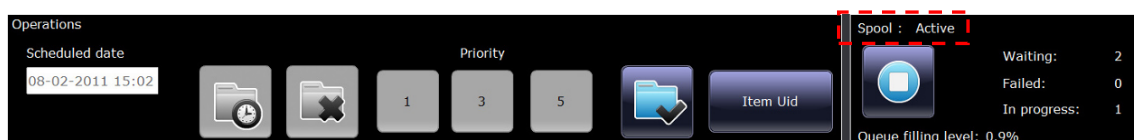
- **Item Uid**



- **Study description**



Now, the transmission queue can be normally restarted (**Spool: Active**). The commands in the Operations panel are **disabled**.



1.9.10.2 SPOOLER SETTINGS

Path: d:\spooler_store

Size: 1000 MB

After 180 sec

Warn if spooldir filling level greater than 80 %

Warn if there are in list items older than 3 days

Warn if there are in list more than 5 failed items

Buttons: [X] [Checkmark]

This menu lets you set up the transmission queue using the parameters in the following fields:

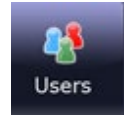
Spool Directory		Notes
Path	The path used for the data transmission queue (d:\spooler_store)	Not editable
Size	The size in MB of the transmission queue (size of the Spooler). Typically: 1000 MB .	Not editable

Retry		Settings	Notes
Parameter	Description		
After	If the transmission of an image goes wrong, this is the time for its retransmission.	Typically: 180 sec	Transmission is “ failed ” if not successfully accomplished within three attempts.

Warning setup		Settings	Notes
Parameter	Description		
Warn if spooldir filling level greater than xx %	To set the alarm threshold for excessive filling of the transmission queue.	Typically: 80 % .	
Warn if there are in list items older than xx days	To set the alarm threshold for images remaining in the spooler for more than xx days.	Typically: 3 days .	
Warn if there are in list more than xx failed items	To set the alarm threshold for more than xx failed images in the spooler.	Typically: 5 images .	

1.10 USER ACCOUNT

This menu lets you manage the users' profiles: you can create a new user and enable, disable, or delete existing ones.



There are three user levels:

- **Administrator**
- **Advanced**
- **User**

The privileges for these 3 types of users are:

- **Administrator:** full access to the equipment; this account cannot be deleted (the system allows to have only one Administrator).
- **Advanced:** technical purpose and routine operations plus access to SETUP pages (unless DICOM setup, License, and Detector List in the General Setup page).
- **User** Only routine operation functions.

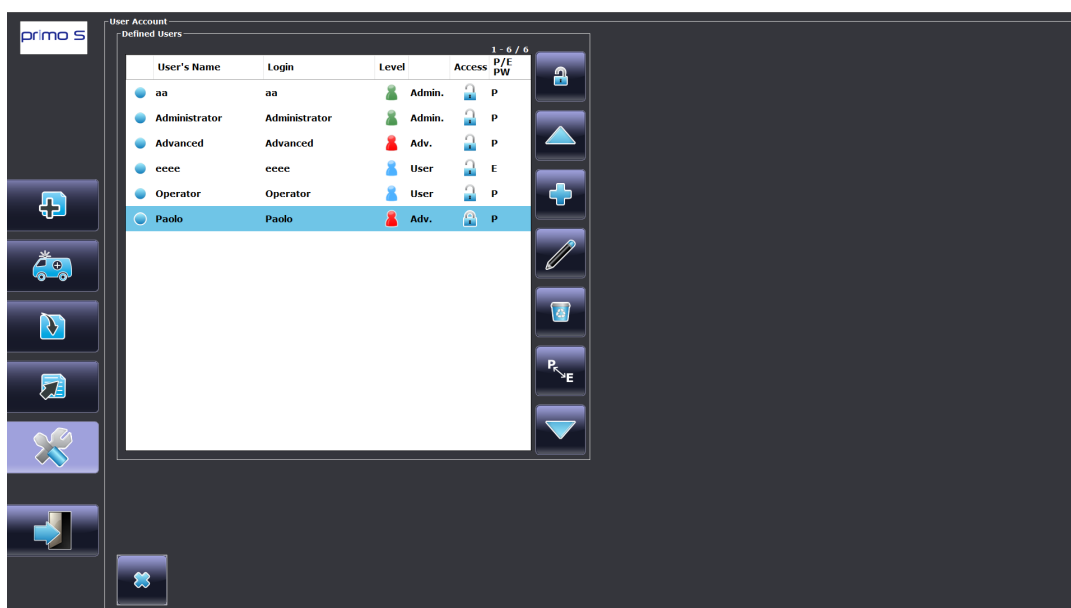
Each user has a personal login name and a password.

The system allows to set a user's password as permanent or with an expiration date (60 days): after this time, the user is asked to update his password. A warning message appears at the LOGIN, from 15 days before the password expires.

The **User Account** menu lets you manage and update system users list. This can only be accessed by the **Administrator** and **Advanced** users.

The Administrator can add new users and edit existing ones (change data or delete a user), while Advanced user can add new users to the list but cannot edit existing ones.

The relevant button in the SETUP frame opens the following window:

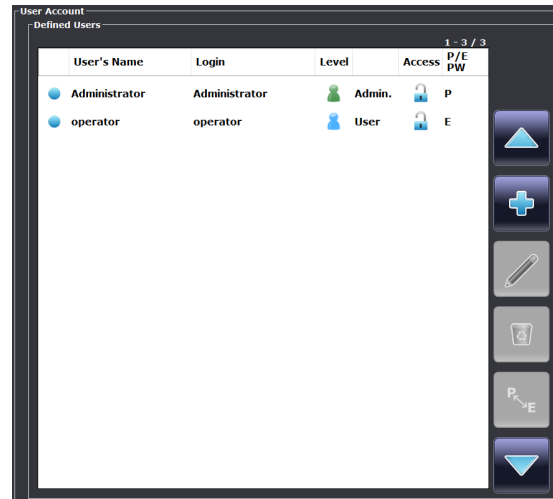


In this menu, they are shown all the users account and their level. Every user is identified with:

- User's Name (normally: Name and Surname)
- Login (name used by user during Login)
- User level:



- Access: *Active* or *Locked*.
- Password type:
Permanent (P) or *Expiring (E)*.



Use the up or down arrow to browse within the users list.



To add a new account, you must press this button. It opens the following window:

- Enter the **User's name** (usually the operator's name and surname) and a **Login** name (name to be used at the login).
- For the new user, it is possible to set a **permanent password** and/or a **default password** (temporary): depending on the choice an explanation message is shown (see table below).
- Select the level (**user** or **advanced**).
- Confirm or cancel the creation.

It is possible to enable none, one or both the Password options (**Default Password / Permanent**). The table explains the different cases:

DEFAULT	PERMANENT	MESSAGE
Disabled	Disabled	The password must be set manually. Every 60 days the operator is asked to update the password: the new one must be different from those used in the previous two years.
Enabled	Disabled	The password is set automatically as the Login field, and it must be changed at the first authentication. Every 60 days the operator is asked to update the password: the new one must be different from those used in the previous two years.
Disabled	Enabled	The password must be set manually and does NOT expire . The operator could still change it, if needed.
Enabled	Enabled	The password is set automatically as the "login" field and does NOT expire . The operator could still change it, if needed.



Once you selected an account, press this key **to edit the related password**.

It opens the following window:

- See table above to refer to the different cases of password options (**Default / Permanent**).
- If you choose to set a permanent password, enter the password in the first field and again in the second one.
The password must be at least 8-characters length.
- Confirm or cancel the change.



Select a user and press this key to change its password option:
Permanent (P) or **Expiring (E)**.



At the LOGIN, a user gets blocked if he enters a wrong password for five consecutive attempts. Access the **User Account** menu, select the blocked user and press this key to restore his profile.

Note: *Advanced users can unlock only Operator users, while Administrator can unlock both Advanced and Operator users. Call the Technical Service to unlock Administrator user.*



To **Delete** an account, select it and press this key. It appears the following message:

- You are asked to confirm the deletion because, once you delete an account, it cannot be restored. (unrecoverable operation).

Note: *The Administrator account cannot be deleted.*

- Confirm or cancel the deletion.

Use **Save** to complete and save the changes accomplished.



Use **Close** to close the window without saving any changes.

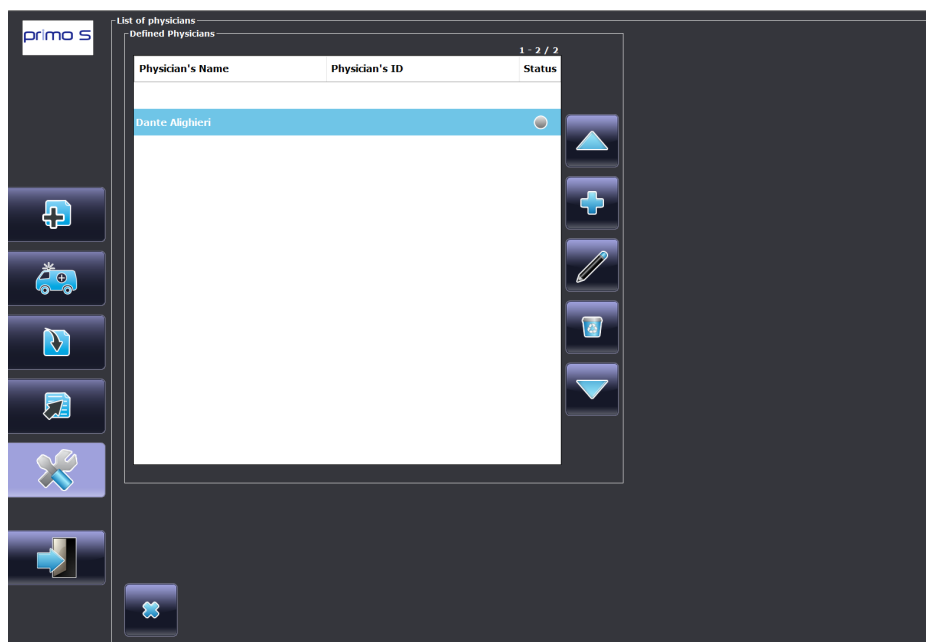


1.11 PHYSICIANS SETUP

Selecting the relevant button in the SETUP frame, you can insert the complete name of the physicians that typically make the examinations.



The **Physicians Setup** menu is used to create, modify or cancel these names:



Use the up or down tip to browse within the physicians list.



Press this key to add a new physician.



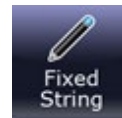
Use this key to modify the selected physician.



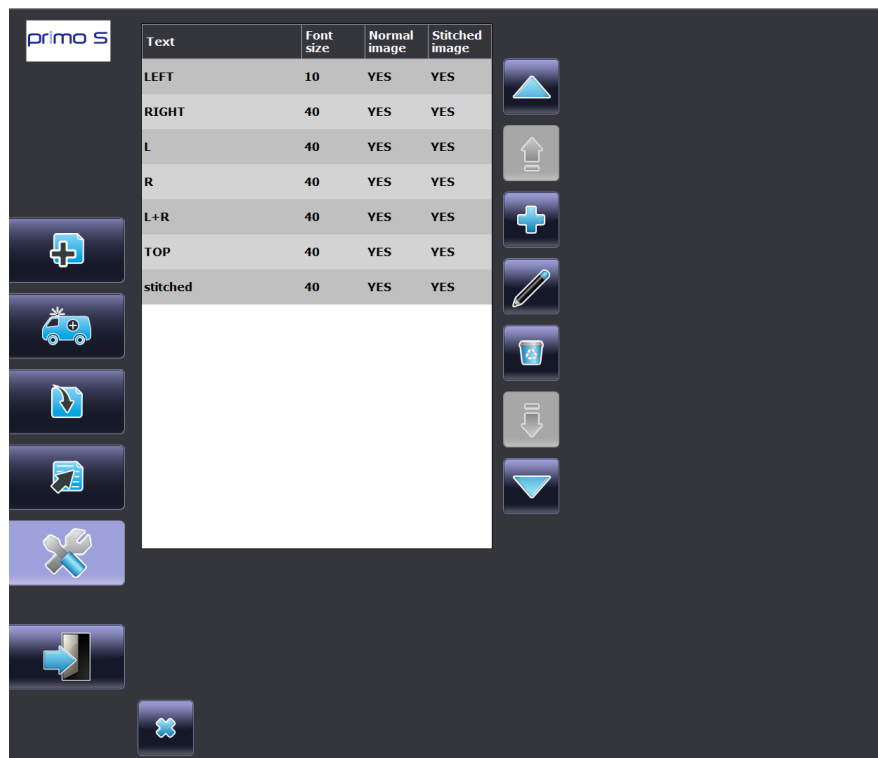
Press this key to cancel a physician from the list.

1.12 FIXED STRING SETUP

The **Primo S** lets you set a series of commonly used texts (“fixed strings”) to speed up the entry of comments on acquired images during post-processing.



The **Fixed String Setup** menu is used to create and update these strings. Select the relevant button in the SETUP frame and the following window appears:



Any number of strings can be added. The max length for each string is 20 characters.



Use the up or down tip to browse within the fixed string list.



Use the up or down arrow to change a fixed string position in the list.



To add a new fixed string, press this key. It opens the following window:

- Enable/disable the insertion of a **fixed string** on a normal image;
- Enable/disable the insertion of a **fixed string** on a stitched image;
- Enter the required text;
- Enter the text size;
- Confirm or cancel.



To edit an existing string, select the string to change and then press the relevant key; it opens the window below:

- Change the application of a fixed string on normal and/or stitched images
- Change the text and/or the font size, as required
- Confirm or cancel the editing.



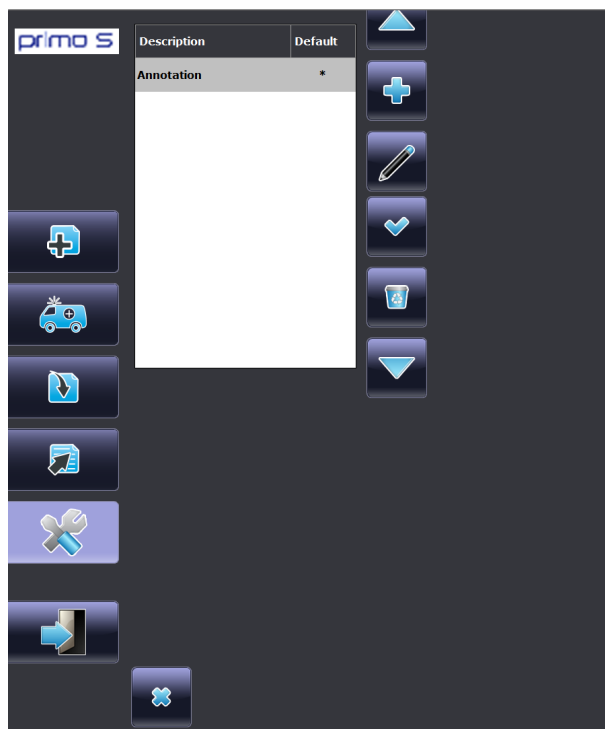
To delete an existing string, select the string and then press the relevant key. The function immediately deletes the selected string (you are not required to confirm your choice).

1.13 PRINT ANNOTATION SETUP

In this menu, you can create the standard annotations to be added to the print film, and set the default one, that will be print on the images. These annotations will be applied to each image, whatever layout and printer you select.

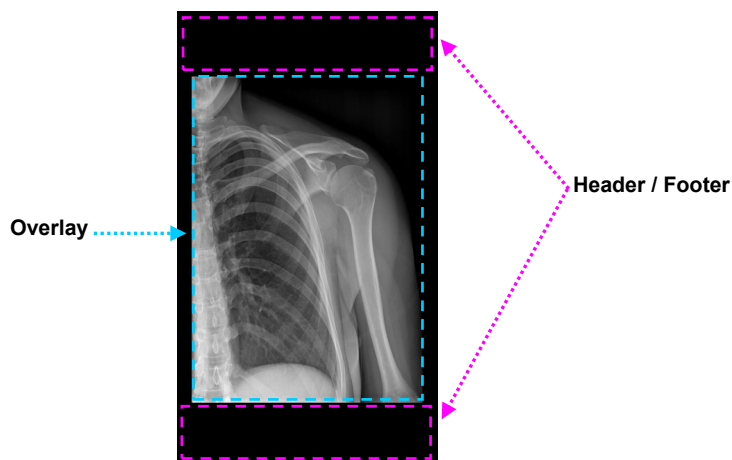


Press the relevant key in the Setup menu to open:

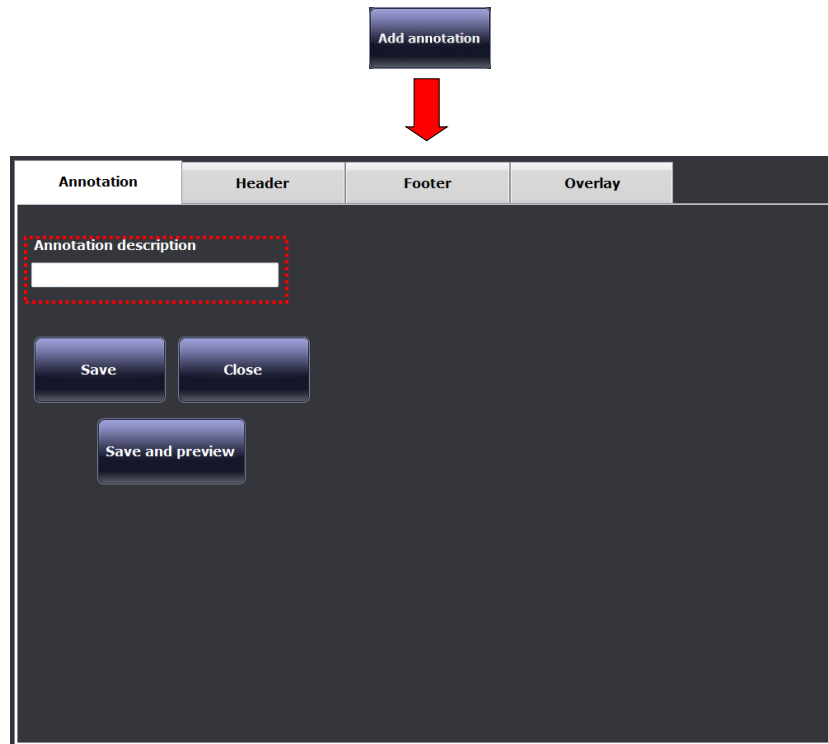


Annotations are typically split into the following components:

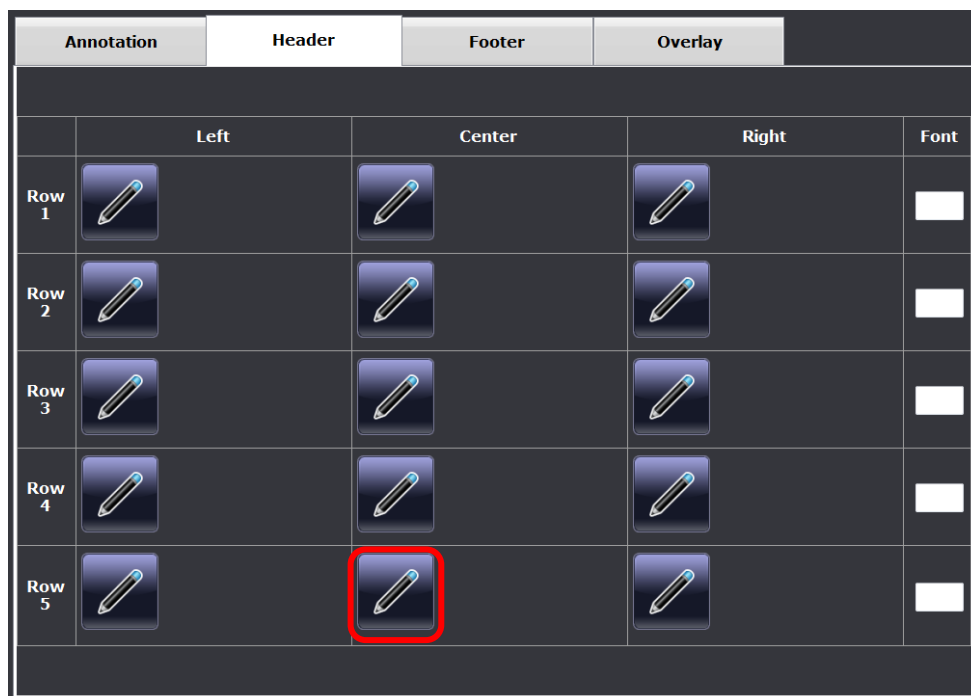
- **Header/ footer:** typically, with the basic study data (hospital name, patient name, etc.).
- **Overlay:** typically, with the image data (image n°, acquisition date/time, etc.).



- Select **Add annotation** to add a new annotation:



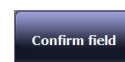
- Fill the new annotation title in the **Annotation description** field.
- The HEADER and FOOTER fields are both split in grids. These have:
 - 5 rows (**Row 1, 2, 3, 4, 5**) and 3 columns (**Left, Center, Right**).
- You are required to set the **Font** size for each row containing at least one field.



	Left	Center	Right	Font
Row 1				
Row 2				
Row 3				
Row 4				
Row 5				

- Select an element in the previous grid to open a window with the fields that can be entered:

- Select the field you want to use and then touch the **Confirm field** command:



- The grid in the previous page is updated with the new field; now you need to set the font (text size):

	Left	Center	Right	Font
Row 1				

- Repeat these steps for each field you want to add an annotation in, using both the **HEADER** and **FOOTER** menus as required.
- Use the **OVERLAY** menu to add image data using the **Add element** command:

- Select the element you want to add and set:
 - a pre-text, if required
 - font size
 - position (using the relevant buttons; you can even set X and Y offsets)

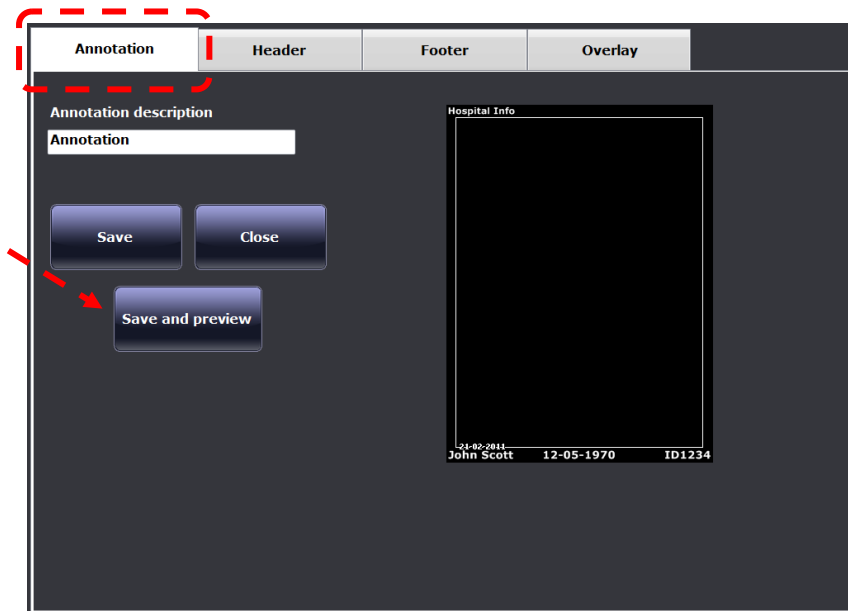
- Confirm with the **Confirm field** key:

Confirm field

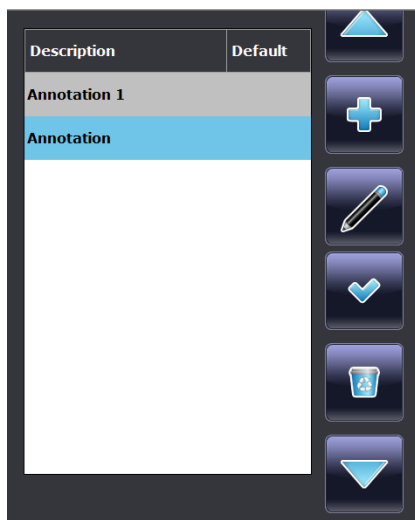
The OVERLAY table is now updated with the new element:

Pre. text	Text	Font size	X offset	Y offset	Position
	Image datetime	8	0	0	

- Repeat these steps for each element you want to add.
- After setting Header, Footer and Overlay (as you require), click again on the ANNOTATION page. Use the **Save and preview** command to save the new annotation and get a preview of how the text will appear on the image:



- After saving, the new annotation will appear in the annotation list.



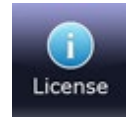
Now it is possible:

- To add a new annotation by using the **Add annotation** command,
- To change the selected annotation by using the **Edit annotation** command,
- To set the selected annotation as the default one by using the **Set default** command,
- To delete the selected annotation by using the **Remove annotation** command.

1.14 LICENSE SETUP

The optional license can be upgraded if an optional device is purchased after the installation of the equipment.

To verify the purchased optional features, it is possible to look them up in the **License Setup**.



The relevant button in the SETUP frame opens the following window:



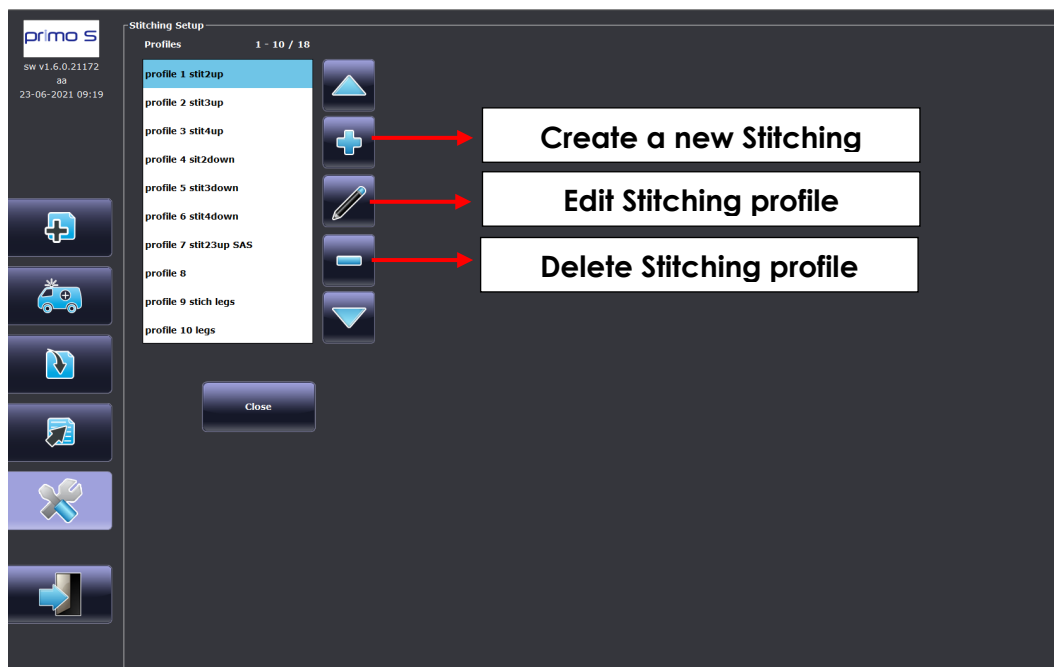
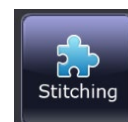
- The **License setup** menu shows:
 - the **optional features list** and their **status**: *active (Yes)* or *not active (No)*.

1.15 STITCHING SETUP

Note: *Stitching features are **NOT** available on Mobile and Portable units.*

Open this menu from the SETUP frame by selecting the relevant button:

The following menu appears letting you enter a new profile or edit an existing one.



The meaning of each STITCHING profile setup parameter is described in the table below:

Stitching profile:	profile 1 stit2up	Area ROI %:	X: 100 Y: 100
Stitching profile:	430		
Delta Step (mm):	x: 15 y: 10		
Initial Height/Position (mm):	1200	Window %:	W: 0.01 B: 0.01
Overlap (mm):	95	Use elaborated raws:	☒
Band of Interest cm [0 no effect]:	5	Positive/Negative:	☒
SID [1000-2000]mm:	1800	Reduction Factor:	1.00
PID [0-400]mm / PID Offset (mm):	220 / 40		
Threshold (typical 15000):	15000		
Equalization Pre-Set:	☐ No ATH ☐ Default ATH 1 ☐ Default ATH 2 ☐ Default ATH 3 ☐ Default ATH 4 ☐ Default ATH 5	Tolerance type:	HIGH
		Movement direction:	UP-DOWN
Contrast:	☐ 1.00	Latitude:	☐ 2.12
Edge:	☐ 2.82	Spatial Filter:	☐ 4

PARAMETER	DESCRIPTION	RANGE	NOTES
Stitching Profile	Name of the Profile		
Panel Length (mm)	Longitudinal length of the FPD with respect to the stitching direction.		Available with AUTOMATIC STITCHING ON, only.
Step (mm)	This value represents the physical distance (in mm) between a same anatomical point in two consecutive images.	300 mm	Available with AUTOMATIC STITCHING OFF, only.
DELTA STEP (mm)	X= Max acceptable horizontal error Y= Max acceptable vertical error	X=50 mm Y=50 mm	
Initial Height / Position (mm)	Initial position of the FPD centre, expressed in mm.	/	Value must be consistent with the <i>Movement Direction</i> set.
Overlap (mm)	Percentage of the images used to look for possible "common" points. This value must be consistent with the STEP and COLLIMATOR ones.	0 – 425 mm	Example: The overlap of the images will be 35 mm if you set these values: COLLIMATOR Y= 35cm STEP = 300mm OVERLAP = 10% Available with AUTOMATIC STITCHING ON, only.
BAND OF INTEREST (cm) 0 = no effect	It represents the width of the central strip of the image in which the common points are sought for the stitching image reconstruction.		
SID	Focal distance set on the positioner.	1000 - 2000 mm	
PID	Distance between the anatomical part of interest and the table surface.	0 – 400 mm	
PID Offset (mm)	Distance between table surface detector surface.	/	
THRESHOLD	Stitching precision/speed factor. The lower the factor is (<15000), the more precise the image will be presented in terms of reconstruction (more points in the image are analyzed): therefore, the reconstruction procedure will be slower. The higher the factor is (>15000), the less precise the image will be presented in terms of reconstruction (fewer points in the image are analyzed): in this case, the reconstruction procedure will be quicker.	15000	

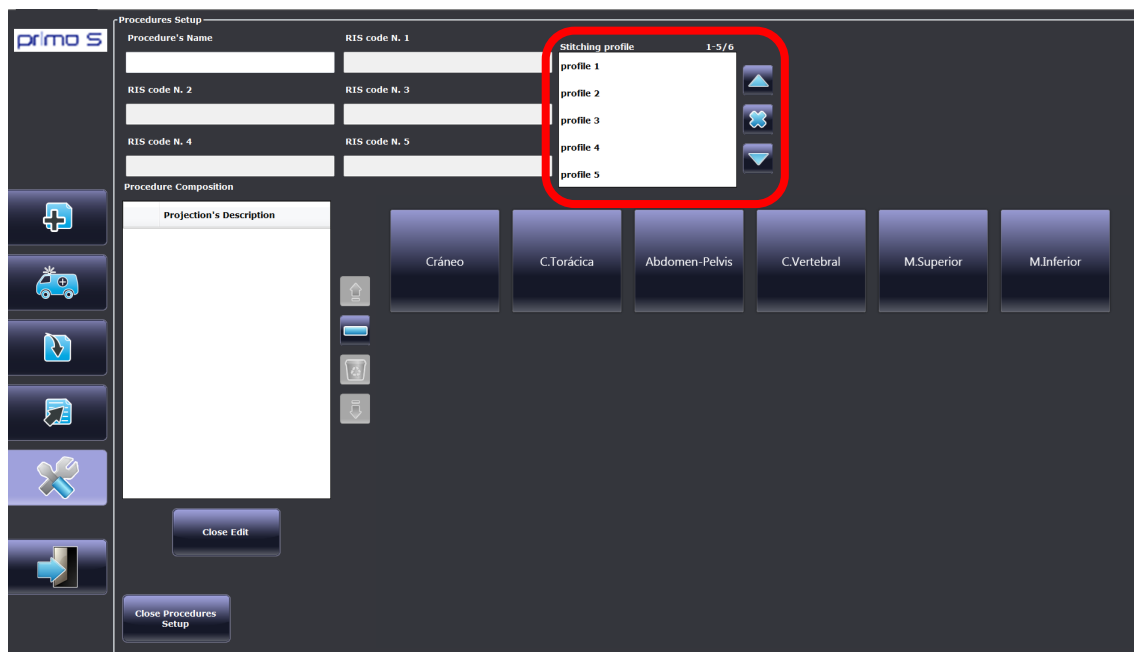
PARAMETER	DESCRIPTION	RANGE	NOTES
Equalization Pre-Set	Select the preferred parameter.	No ATH ATH 1, 2, 3, 4, 5	
Contrast	Contrast variation factor. By reducing the value, the latitude is reduced and Contrast increases.	0,5 – 1 (1= no variation)	
Edge	Edge variation factor. By increasing the value, the contours are enhanced.	0,6 - 5	Excessive increase can lead to increased image noise or artifacts.
Latitude	Latitude variation factor. By increasing the value, the contours are enhanced.	0,6 – 5	
Spatial Filter	To select the spatial filter applied.	-4 = <i>Smooth</i> > Kernel:5x5 Weight:3 -3 = <i>Smooth</i> > Kernel:3x3 Weight:3 -2 = <i>Smooth</i> > Kernel:3x3 Weight:2 -1 = <i>Smooth</i> > Kernel:3x3 Weight:1 0 = Disabled; 1 = <i>Sharp</i> > Kernel:5x5 Weight:1 2 = <i>Sharp</i> > Kernel:5x5 Weight:2 3 = <i>Sharp</i> > Kernel:5x5 Weight:3 4 = <i>Sharp</i> > Kernel:7x7 Weight:2	
Area ROI %	Percentage of ROI reduction compared to the stitched image, used to calculate the W and L.	X=50 % Y=50 %	
Invert Stitching Orientation	The function switches the order of the images: the last one will be considered the first one and so on.	ON / OFF	Available with AUTOMATIC STITCHING OFF, only.
WINDOW %	Percentage by which the histogram is cropped to calculate the W and L.	W= 0.01 B= 0.01	
Use Elaborated raws	To each image acquired within the Stitching procedure will be applied the image processing parameters set for the projection instead of those set for the Stitching procedure.	Enabled / Disabled	
Positive / Negative	To set the positive/negative grey scale presentation of the image.	Typically, negative.	
Reduction Factor	Reduction in the displayed size of the image.	1.00	
Image Orientation	Select the correct parameter.	Portrait or Landscape	Available with AUTOMATIC STITCHING OFF, only.
Tolerance type	Tolerance in the selection of possible common points in contiguous images.	Low Medium High	Suggested value: LOW
LUT Curve	Select the preferred parameter.	LUT 1, 2, 3 NO LUT.	Available with AUTOMATIC STITCHING OFF, only.
Movement direction	Direction of the image acquisition.	Up-Down Down-Up Right-Left Left-Right	

1.15.1 CREATING A STITCHING PROCEDURE

Once you created a Stitching profile, it is possible to bind this profile to a specific procedure (existing or a new one).

Enter the **Procedure Setup** menu and select the preferred procedure.

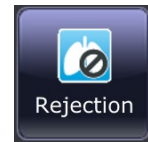
Set the procedure parameters and exams and bind the required Stitching Profile, selecting from the relevant menu.



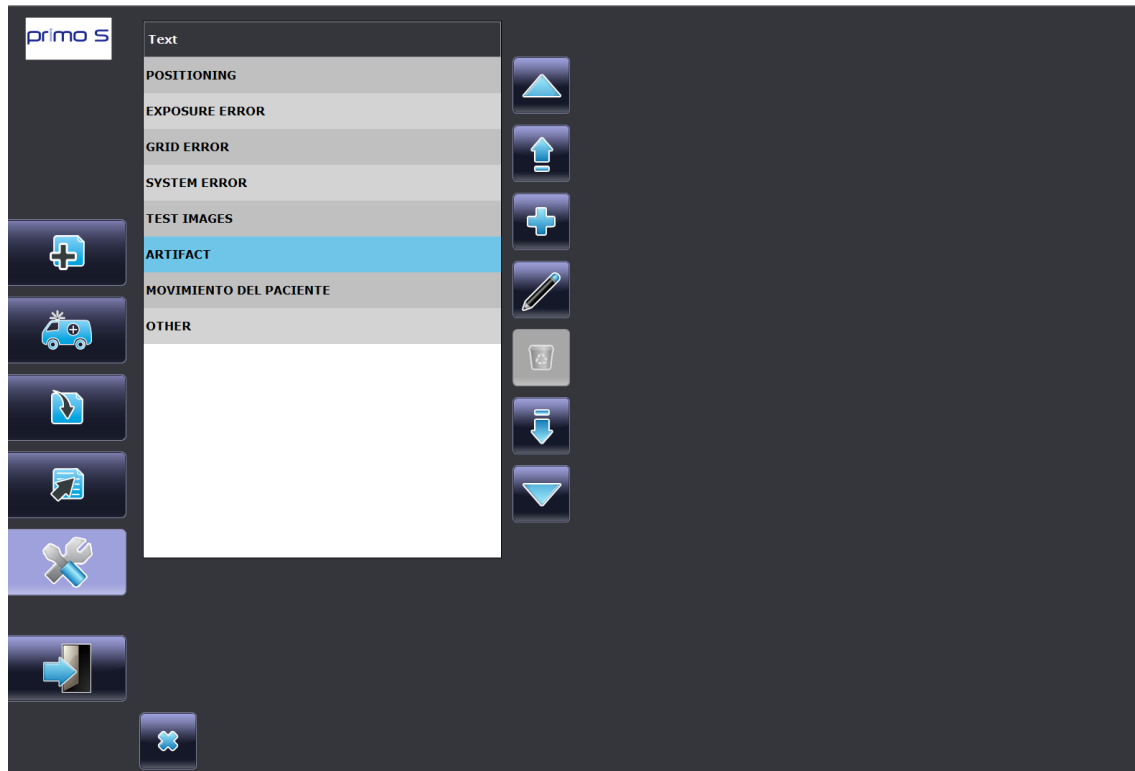
Changes are automatically saved.

1.16 REJECTION SETUP

Selecting the relevant button in the SETUP frame, you can create a list of rejection reasons.



The **Rejection Setup** menu is used to create and update these texts:



Use the up or down tip to browse within the rejection list.



Use the up or down arrow to change a text position in the list.



Press this key to add a new rejection cause.



Use this key to modify the selected text.



Press this key to delete a text from the list.

1.17 END OF THE INSTALLATION

After completing the installation procedures of the EM equipment, we suggest to save the setup and calibration data by making a **copy of the system HD** and save it in a special back-up folder on the Archive disk.

By saving these data you are ensuring a fast recovery of the proper functioning of the EM equipment and its settings if there should be a problem with the system disk or if the data become corrupted.

2 DETECTOR INSTALLATION AND REPLACE

In order to install a new detector, you need to:

- plug a keyboard and a mouse,
- switch on the equipment,
- log in as **Windows Administrator**.

2.1 INSTALLING THE CANON FDXW DETECTOR

Follow these steps if you need to install, add or replace a Canon FDXW detector.

- 1) *Installation of the detector using the application **SetupToshiba**;*
- 2) *Association of the detector to the Access Point (AP) (only required for wireless FPD);*
- 3) *Configure the new detector in the **Primo S** Detector list.*

Below, it is reported the installation procedure of the **FDX3543RPW** Wi-Fi detector: it is an example suitable for all **CANON FDXW FPD** available. Any differences in the procedures will be specified.

2.1.1 INSTALL THE CONFIGURATION FILES OF THE CANON FDXW DETECTOR

- Every **Canon FDXW Wi-Fi** detector is provided with a CD/DVD containing the detector documents and its defective pixel map. Launch it on your device to configure the new detector.

Note: *there is no need to use the cd with the **FDX4343R** detector.*

- The new detector is going to be configured by using the **SETUP TOSHIBA** program (press the relevant icon on the desktop to open it).
- The following page opens; enter the new FPD features.



Enter your FPD Serial number and IP address.

Select the FPD model.

- Enter the **Serial Number** indicated on the FPD serial plate or in the relevant file onto the CD provided.
- Enter the FPD IP address. For the **FDX3543RPW** Wi-Fi detector: **192.168.95.57**

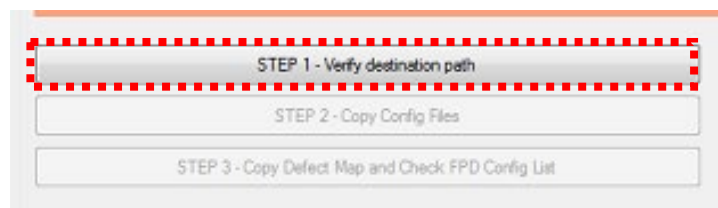
In the table below is reported the full list of the default **Ip Address** for each FPD available.

IP ADDRESS for CANON FDXW FPD			
FPD model and IP address	CONFIGURATION	PC Host IP	WI-FI access Point
FDX3543RPW with AED 192.168.95.57	PC HOST connected to the detector by means of the WI-FI access Point	192.168.95.YY	192.168.95.XX
FDX3543RPW without AED 192.168.95.57	PC HOST connected to the detector by means of the WI-FI access Point	192.168.95.YY	192.168.95.XX
FDX3543RPWB 192.168.95.57	PC HOST connected to the detector by means of the WI-FI access Point	192.168.95.YY	192.168.95.XX
FDX4343RPW with AED 192.168.95.61	PC HOST connected to the detector by means of the WI-FI access Point	192.168.95.YY	192.168.95.XX
FDX4343RPW without AED 192.168.95.61	PC HOST connected to the detector by means of the WI-FI access Point	192.168.95.YY	192.168.95.XX
FDX2530RPW 192.168.95.63	PC HOST connected to the detector by means of the WI-FI access Point	192.168.95.YY	192.168.95.XX
FDX4343R 192.168.95.30 (ip0 – default in use) or 192.168.95.31 (ip1)	PC HOST connected to the detector by LAN cable.	192.168.95.YY	/

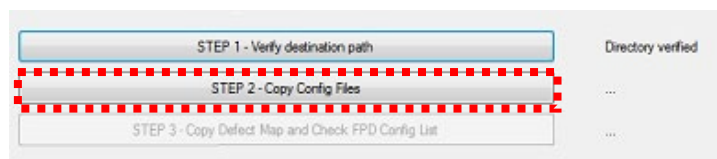
- Select the correct FPD model from those in the list:
 - ☐ **FDX3543RPW with AED (WiFi, portable, with Autotriggering)**

Note: if the serial number of the detector ends with “A”, the detector is “WITH_AED” otherwise it is “WITHOUT_AED”.

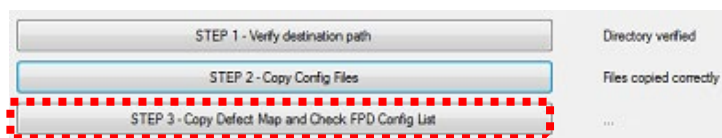
- Press the **STEP 1** key.



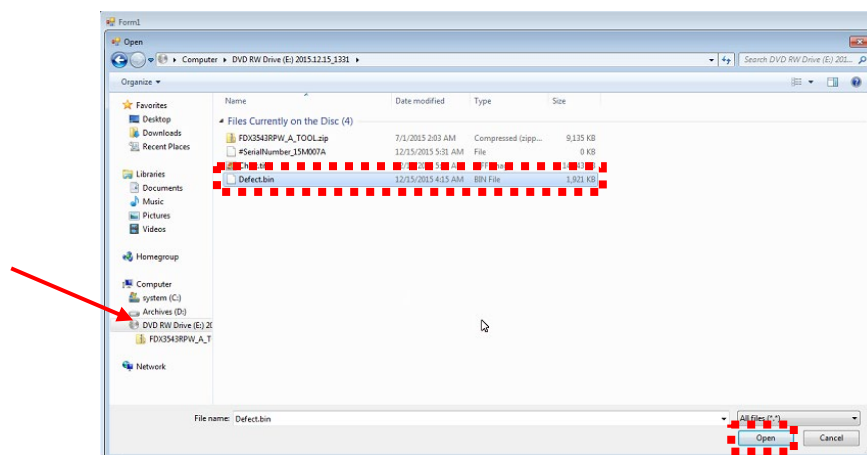
- Press the **STEP 2** key.



- Press the **STEP 3** key.

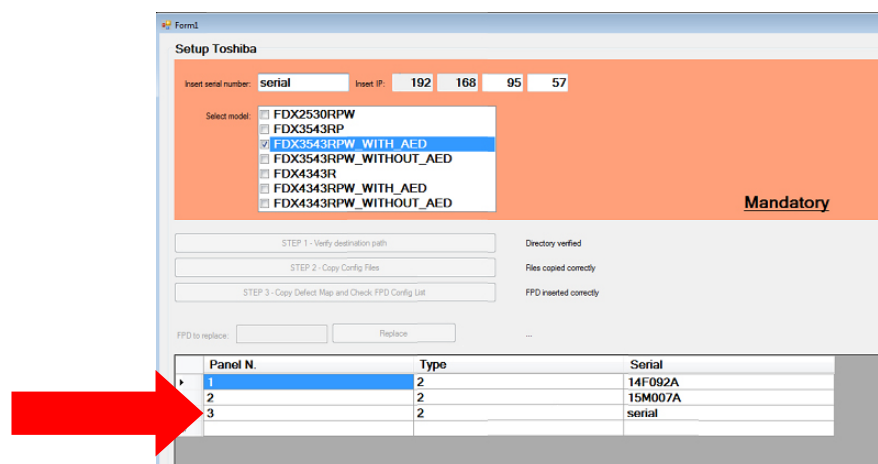


- From the window that has just been opened, select **CD-ROM** and import the file called "**Defect.bin**"



Note: this step is not required for FDX4343R.

After the step 3, the application confirms if the procedure has been successfully accomplished showing the list of the configured detectors:



Now, the installation of the **Detector Configuration Files** has been successfully completed.

2.1.2 ASSOCIATE THE ACCESS POINT TO WI-FI DETECTORS

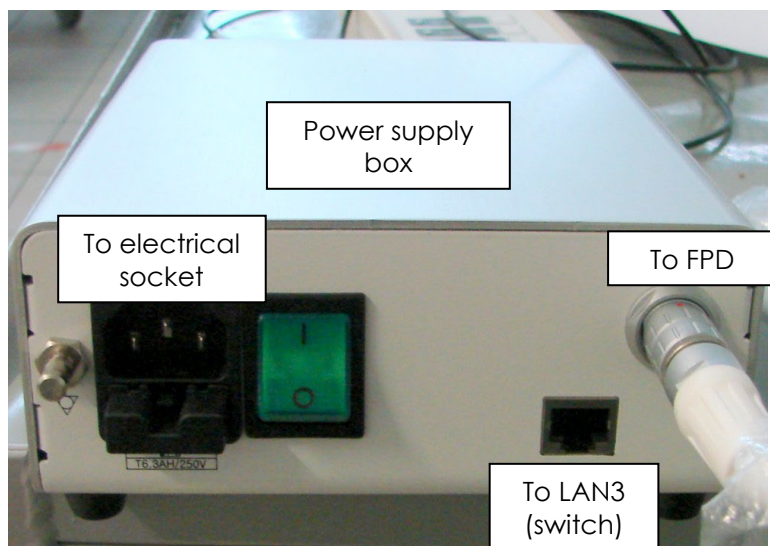
This procedure has the purpose to define the SSID and password of the FPD and their association with the AP.

For the used AP, these requirements are needed:

- Dual band 2.4 / 5 Ghz 802.11N (channel 36 / 40 / 44 / 46 / 48)
- SSID: **GENERIC_FACTORY** (example)
- Password: defined by **Sedecal**
- Wi-Fi Protected Access (WPA)

To set the network SSID “GENERIC_FACTORY” to a FDX3543RPW Wi-Fi detector (IP Address **192.168.95.57**), follow these steps:

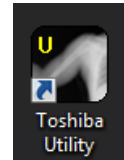
- Connect the FPD to the **Power Supply** box, (provided with the FPD), as in the figure below:



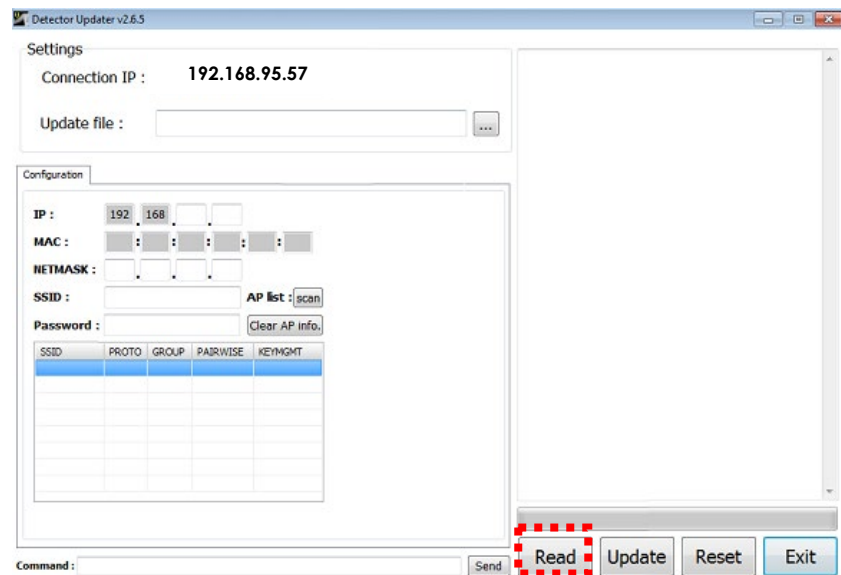
- Connect the FPD and then switch it on.



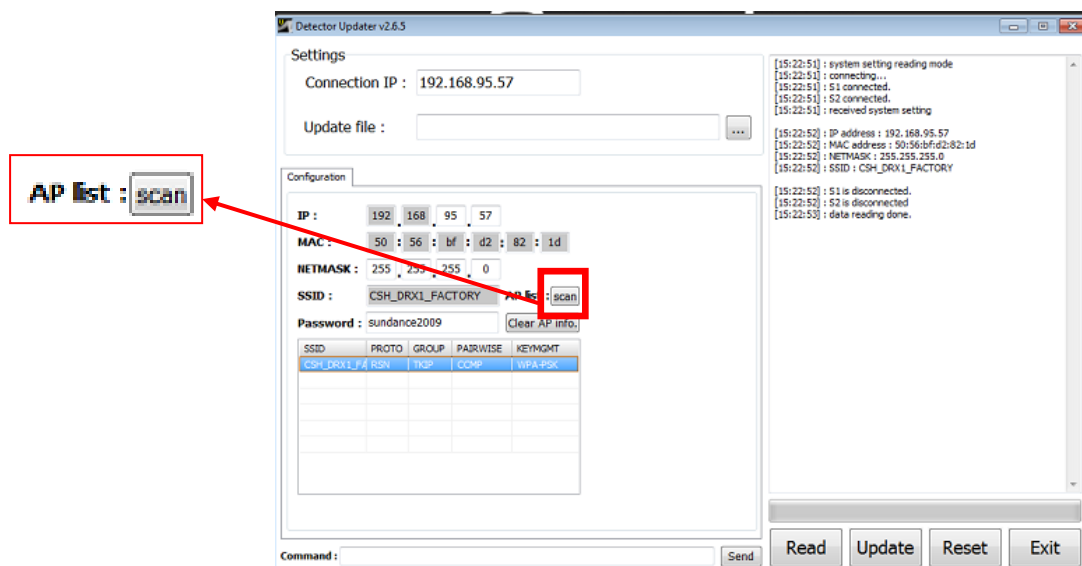
- Run the **TOSHIBA UTILITY** application (using the relevant icon on the desktop).



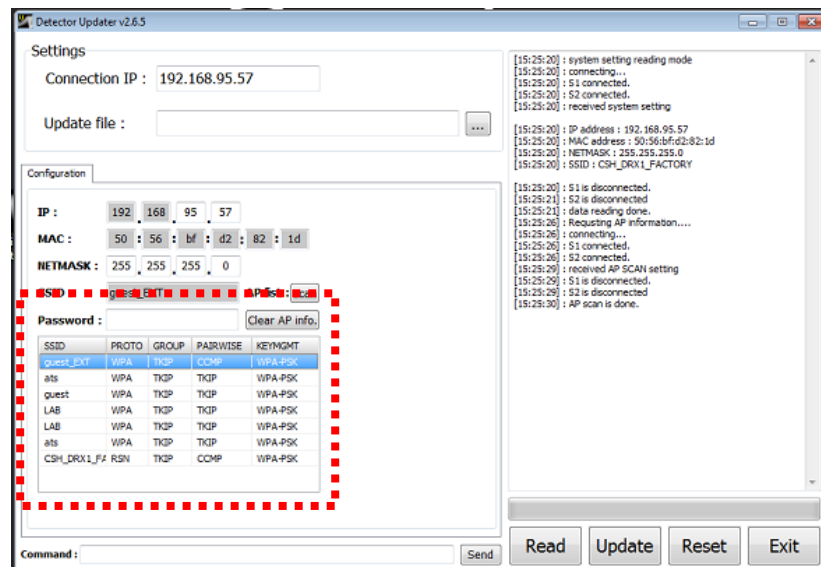
- Enter the correct IP address of the FPD (**192.168.95.57**) and then press READ.



- The following page now appears, showing the data stored in the FPD. Press SCAN to find the correct AP (SSID) to associate to the FPD.



- A list of Wi-Fi networks found by the FPD now appears:

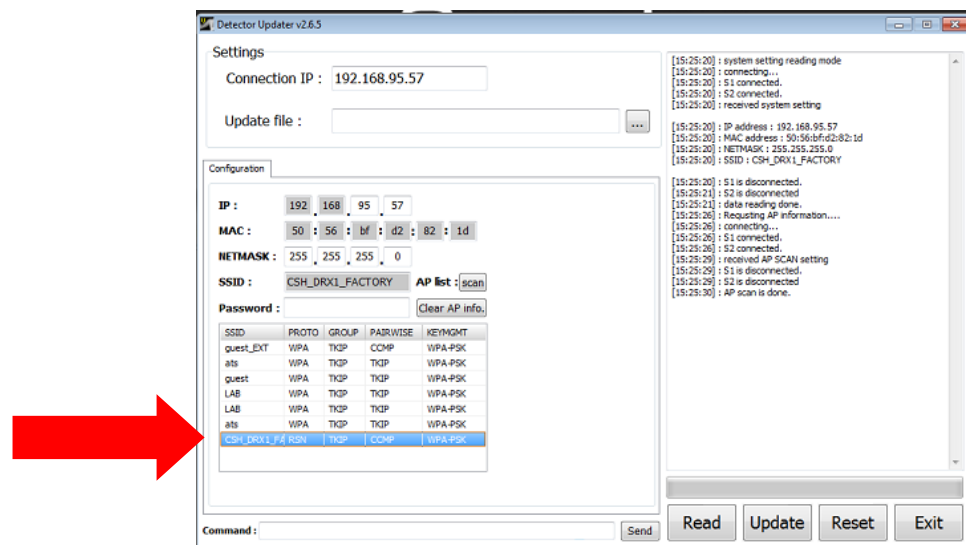


- Select the network “**GENERIC_FACTORY**”.
- Enter the **password of the AP** and then press “**Update**”. Now, the FPD is connected to the AP.

In order to check that the operation has been successfully accomplished:

- switch the FPD off, remove the connection cable and then switch the FPD on.

Wait a few minutes and then check that the FPD is connected to the AP.



Note: to complete the installation procedure, see Paragraph 2.5 below.

2.2 INSTALLING THE PIXIUM DETECTOR

Follow these steps if you need to install, add or replace a PIXIUM detector.

- 1) *Installation of the detector using the **PixiumLib** software.*
- 2) *Configure the new detector in the **Primo S** Detector list.*

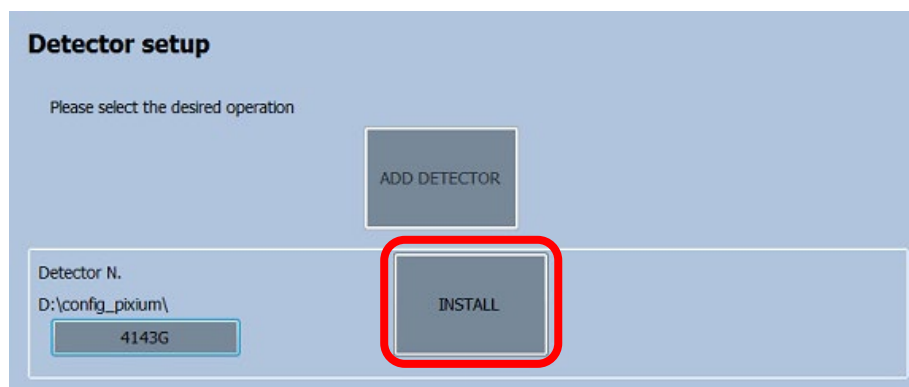
- Install the calibration maps for the new detector: run the **Pixium lib** program pressing the icon on the desktop.



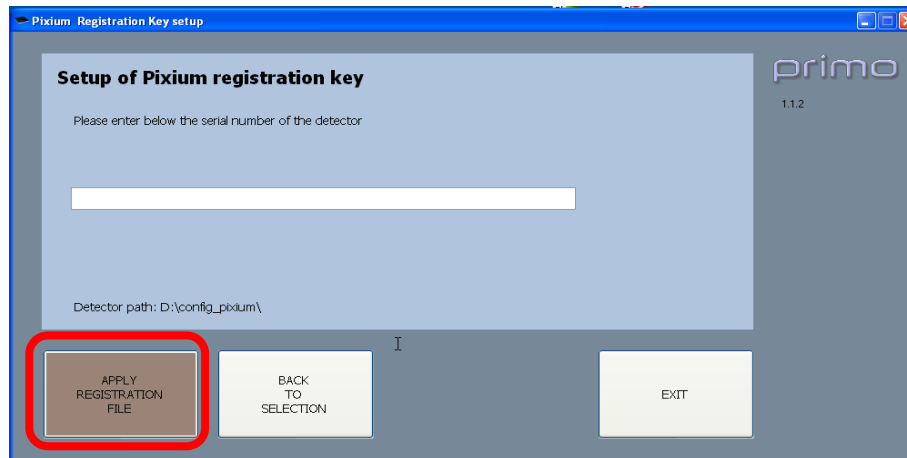
- The following page appears:



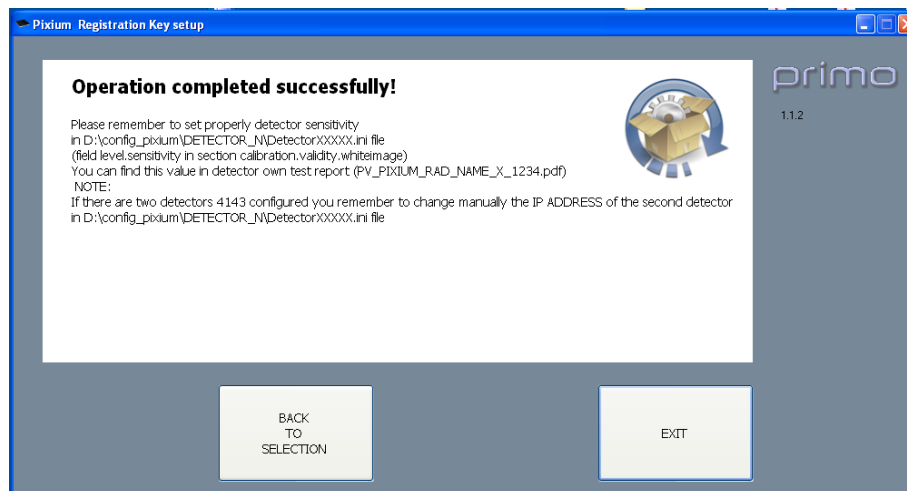
- Press the **Adding Detector** key and select the model you are installing.
- After selecting the correct model, press the **Install** key.



- If you have selected the **PIXIUM 3543EZ/2430EZ** detector, the following window appears, asking you to enter the serial number (you can find it on the detector plate). Enter it and press the **Apply Registration File** key:



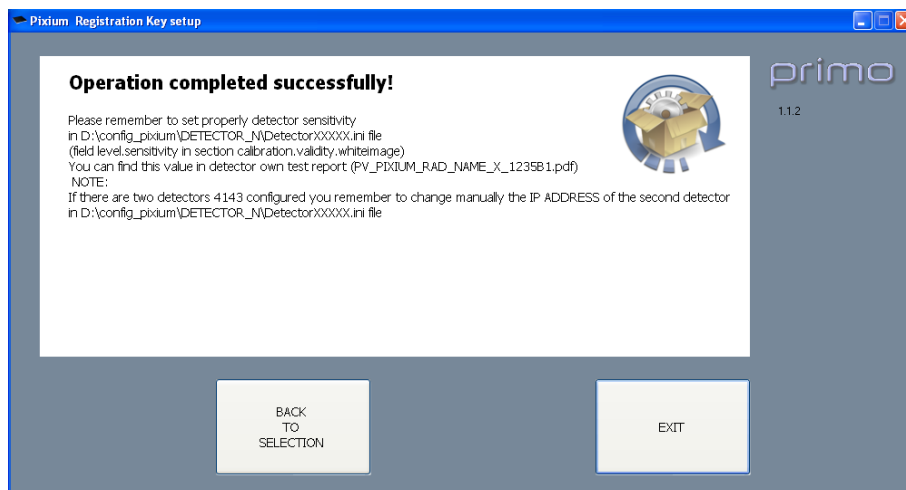
The following window appears after a few seconds, confirming the procedure has been completed successfully:



- If you have selected the **PIXIUM 4143/4343** detector, the following window appears, asking to enter the registration key for the detector (see the CD-ROM accompanying the fpd). Select the registration key file. Enter it and press the **Apply Registration File** key.



The following window appears after a few seconds, confirming the procedure has been completed successfully:



- Now, you need to note down the sensitivity level of the new detector:
 - open file "PV_PIXIUM_RAD_4143_G_*.pdf" on the CD, in **Reference files** folder,
 - check the **Sensitivity** value ($0.372 = 372 \text{ lsb/uGy}$)

The screenshot shows a PDF document titled "PV_PIXIUM_RAD_4143_G_1127H5.pdf" open in Adobe Reader. The document is a "TEST REPORT Certificate of Conformance" from THALES. It contains several tables with technical data and product configuration information. A red rectangle highlights the "X-Ray Performances" section in the "Product parameters" table.

Components & Subsystems		TEST REPORT Certificate of Conformance	Test report form edition	
X-RAY IMAGING SOLUTIONS 460, rue du Pommarin - BP 122 38346 Moirans Cedex - France Tel : + 33 (0)4 76 57 40 00 Fax : + 33 (0)4 76 57 40 85			Product type	PIXIUM RAD 4143 G
		Part number	62481603	
		Serial number	1127H5	
		Thales Spec	62403817 -	
		Test software version	62478523D	
		Waiver request		

Product configuration		
Front end	Frontend_product_sw_version_FT	SW62476675E
SW	Pixrad_install	3.1.2

Product parameters		min	max	val	Status
Defects mitg?	defect_lvl	0	290000	410	Pass
X-Ray Performances	sensitivity	0,27	0,45	0,372	Pass

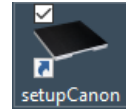
Note: to complete the installation procedure, see Paragraph 2.5 below.

2.3 INSTALLING THE CANON WHITE-LABEL DETECTOR

Follow these steps if you need to install, add or replace a CANON White-Label detector.

- 1) *Installation of the detector using the **Canon Setup** software.*
- 2) *Configure the new detector in the **Primo S** Detector list.*

- Run the **Canon Setup** program pressing the icon on the desktop.
The following page is opened:



- Fill in the required detector parameters and Access Point configuration data.
- Press the **Initialize** key and wait for the procedure to be successfully completed.
- Note down the **Serial Number** and the **Sensibility** value (these parameters are available within the fpd documentation).

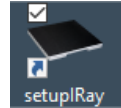
Note: to complete the installation procedure, see Paragraph 2.5 below.

2.4 INSTALLING THE IRAY DETECTOR

Follow these steps if you need to install, add or replace a IRay detector.

- 1) *Installation of the detector using the **IRay Setup** software.*
- 2) *Configure the new detector in the **Primo S** Detector list.*

- Run the **IRay Setup** program, pressing the icon on the desktop. The following page is opened:

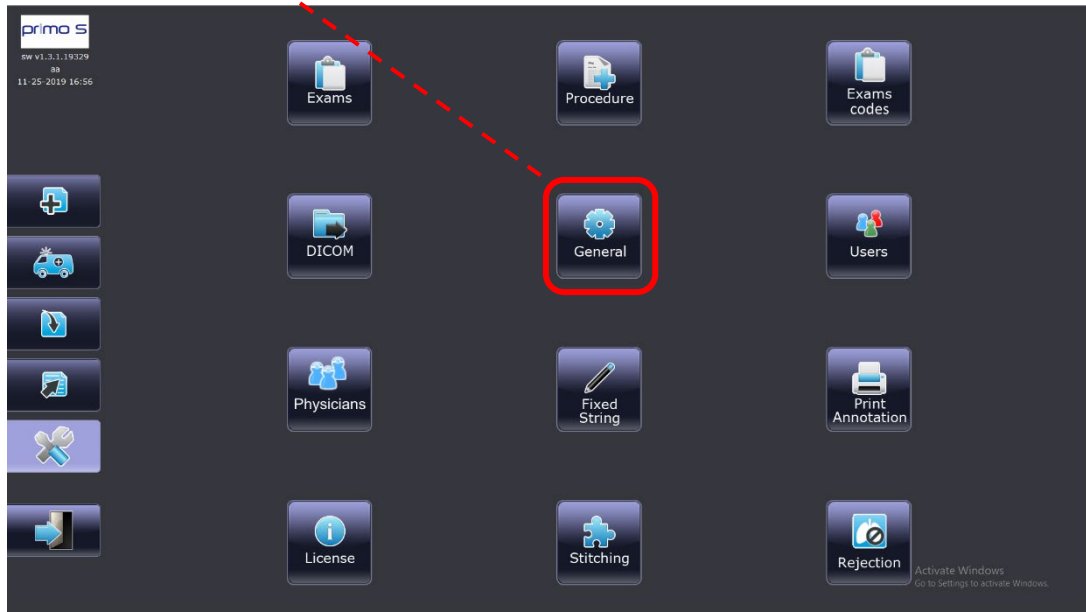


- Enter the required parameters in the indicated area: *Detector address*, *Host address* and *Detector Serial Number* (these parameters are available within the FPD documentation).
- Press **Register New detector**.

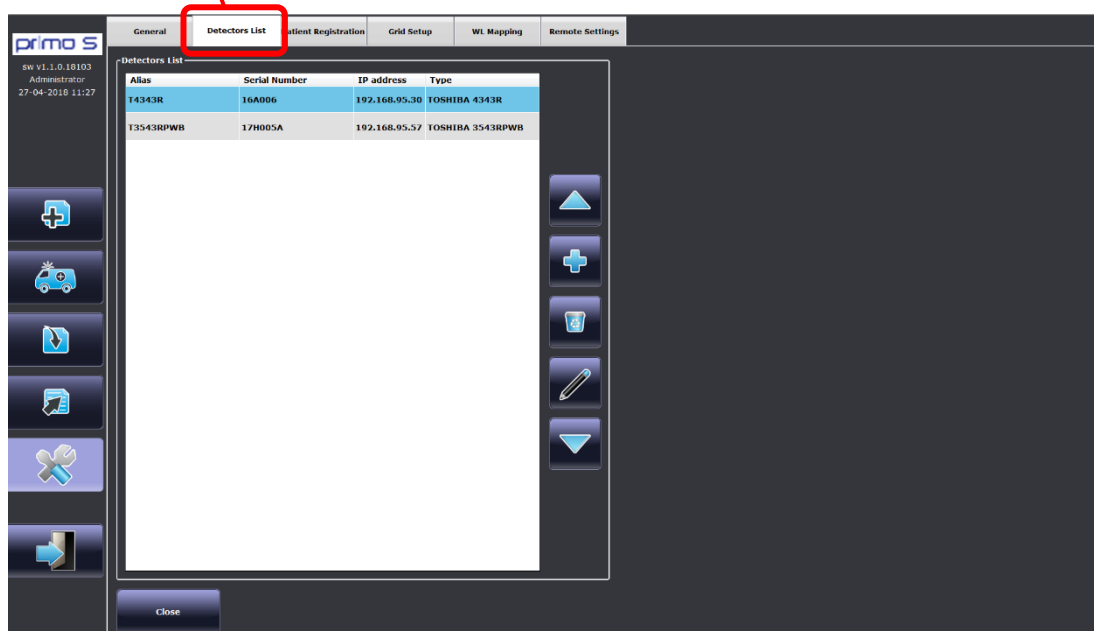
Note: to complete the installation procedure, see Paragraph 2.5 below.

2.5 SET THE FPD IN PRIMO S DETECTORS LIST

- Run **Primo S** application, log in as **Administrator**, enter the **Setup** menu and open the **General Setup** menu pressing the relevant key.



- Select **Detectors List**.

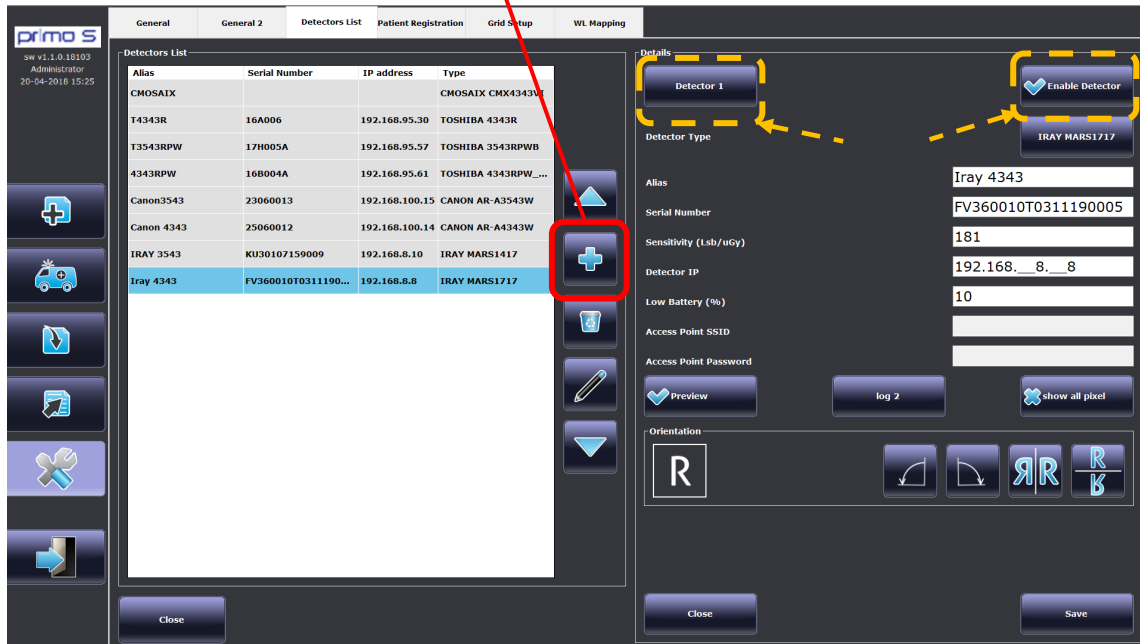


To complete the installation procedure, add the new Detector in the list (see *Paragraph 2.5.1 below*).

In the following paragraphs it is explained how to add a new FPD or edit some parameters of the installed ones.

2.5.1 ADD A NEW DETECTOR

To add a new detector in the list, press the **Add (+)** key:



To activate the **(first)** detector and associate it to **Primo S** software, you have to set **Detector 1** (position) and **Enable** the detector, as in figure above.

Then, the next parameters must be entered:

Detectors			
		Settings	Notes
Detector Type	Enter the FPD model used by the equipment (choosing between those provided).		
Alias	The name that will appear in the acquisition GUI.		
Serial Number	Enter the serial number of the detector	The serial number is indicated in the detector documents	
Sensitivity	Set the detector sensitivity (levels / uGy)	Value provided by the manufacturer.	If the value is provided as Levels /mR, you need to calculate: Levels /uGy = (levels/mR) * 114 / 1000 e.g.: Sensitivity provided by manufacturer: 960 levels/mR Sensitivity: 960 * 114 /1000 =109 Levels/uGy
Detector IP	Enter the IP Address for the FPD (see detector documents).		
Low Battery (%)	Set the minimum battery % charge level	Typical setting: 20% . Below this value, the battery must be changed.	For wireless detector, only.
Access Point SSID	NOT USED		
Access Point password	NOT USED		
Autotrigger option	NOT USED		
Infrared enabled	NOT USED		

Other		
		Notes
FPD pre-equalization curve	Set as: Log2	
Preview	NOT USED	
Show all pixel	Enable/disable the function that eliminates the presentation of the border of detector in the image.	Disabled as default

Orientation		Default orientation.
		Notes
Rotate (clockwise or anti-clockwise by 90 degrees)	The rotation achieved with respect to the default orientation is shown by the letter "R" in the square.	For each specific projection, you can change the default orientation of the image in the exam setup.
Flip (horizontal or vertical)	Invert the image with respect to the vertical or horizontal axis.	For each specific projection, you can change the default orientation of the image in the exam setup.

Press **Save** to confirm the settings.

To make these settings effective, you must restart the **Primo S**.

Note: *If the system has been configured to work with more than one detector, you must repeat the previous procedure for each FPD available (up to three).*

Now, the detector is ready to be correctly calibrated. See Chapter 3 of this Manual.

2.5.2 MODIFY A DETECTOR

To change any of the detector parameters, press the relevant key.

It will be opened the menu of the detector parameters, where it is possible to change the needed settings.

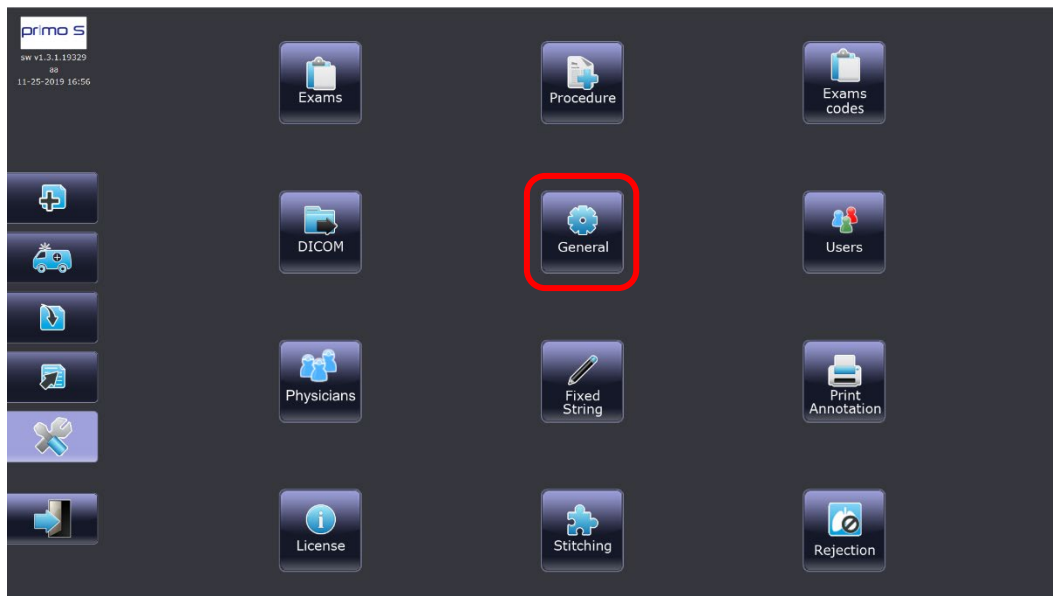


Press **Save** to confirm the settings.

To make these settings effective, you must restart the **Primo S**.

2.6 REPLACE THE FLAT PANEL DETECTOR

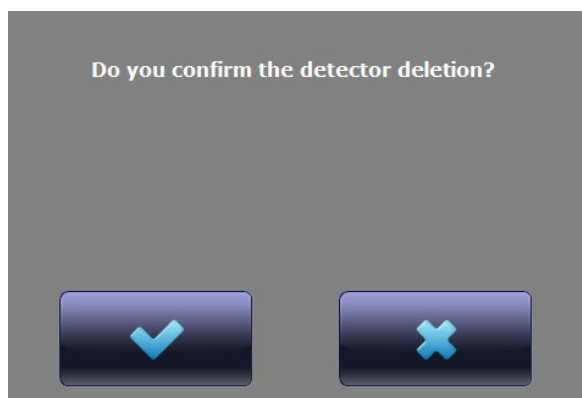
If you need to replace a detector, run the **Primo S** application, log in as **Administrator**, enter the **Setup** menu and open the **General Setup** menu pressing the relevant key.



Open **Detectors List** tab.

2.6.1 DELETE A DETECTOR

To delete a detector from the List, select the needed one and press the relevant key: a pop up asks to confirm the deletion or cancel the procedure.



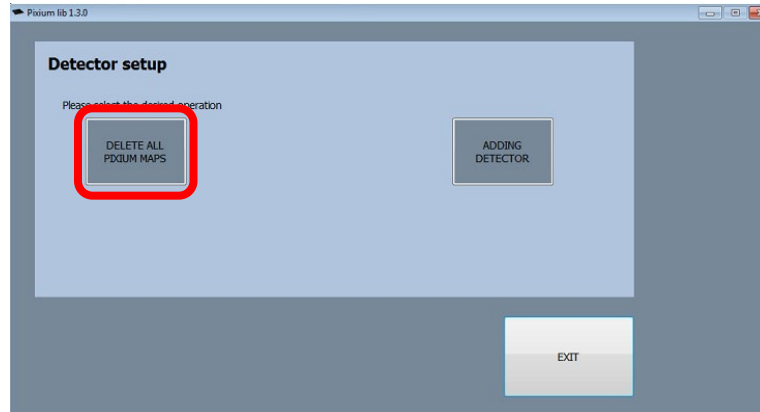
Now, it is possible to replace it with a new FPD.

See the corresponding installation paragraph above, to complete the replacing procedure.

2.6.2 REPLACING THE PIXIUM DETECTOR

Once the old detector has been deleted, close the **Primo S** application.

- Run the **Pixium lib** program pressing the icon on the desktop.
- The following page appears, letting you delete all the PIXIUM FPD maps.

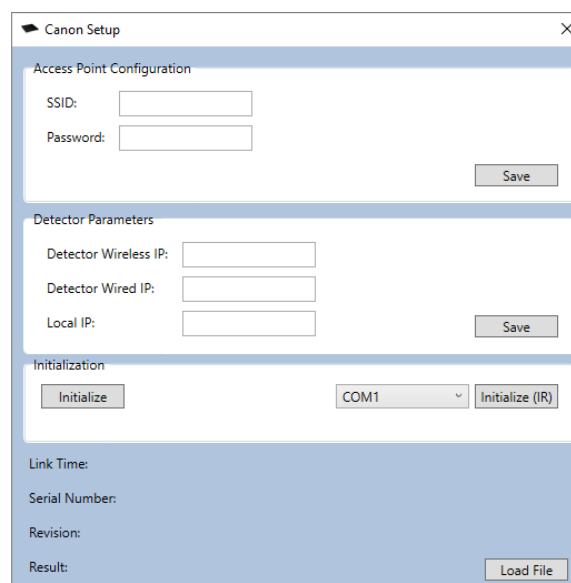
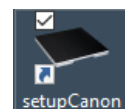


Now, the detector is ready to be correctly calibrated. See Chapter 3 of this Manual.

2.6.3 REPLACING THE CANON WHITE-LABEL DETECTOR

Once the old detector has been deleted, close the **Primo S** application.

- Run the **Canon Setup** program pressing the icon on the desktop. The following page appears:



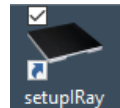
To delete the old detector:

- Press the **Load File** key: the folder related to previous detector is opened.
- Select the file named as the old detector model and confirm.

Now, the detector is ready to be correctly calibrated. See Chapter 3 of this Manual.

2.6.4 REPLACING THE IRAY DETECTOR

Once the old detector has been deleted, close the **Primo S** application.



- Run the **IRay Setup** program pressing the icon on the desktop. The following page appears:

To delete the old detector:

- Select the indicated box that contains the registered detector and automatically its detector address, host address and serial number will appear on the monitor.
- press **Delete Selected Detector**

Now, the detector is ready to be correctly calibrated. See Chapter 3 of this Manual.

3 DETECTORS CALIBRATION

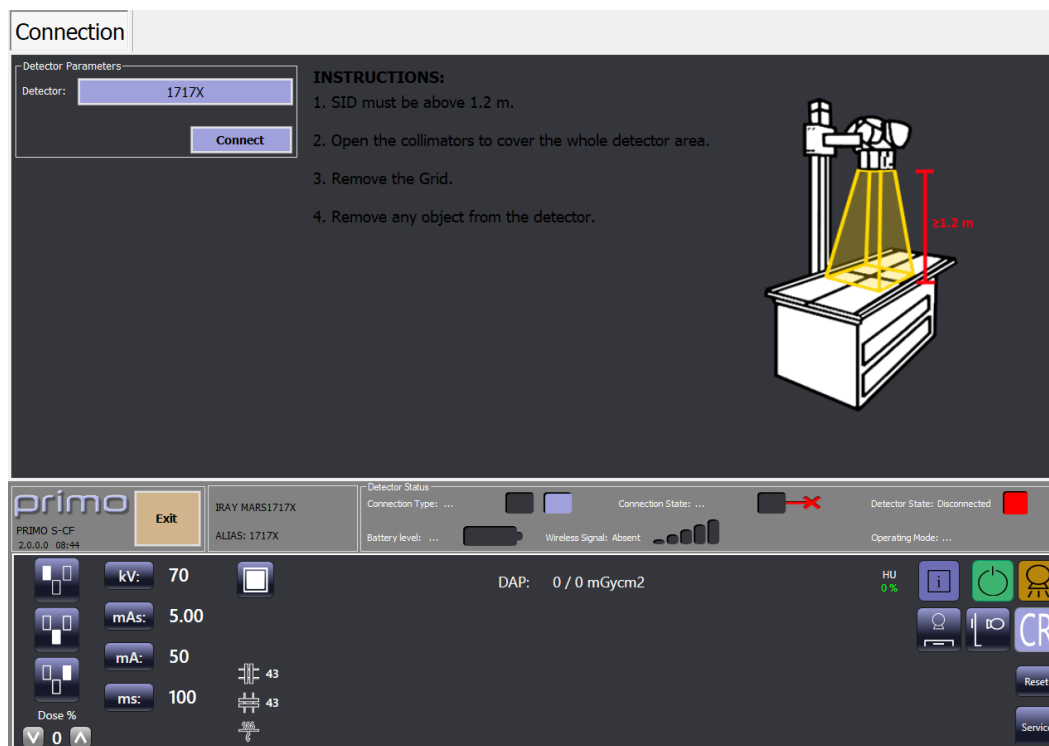
3.1 CALIBRATING DETECTORS

3.1.1 INTRODUCTION

The calibration of the detector must be performed:

- At the system installation or after replacing the detector,
- as a routine maintenance, every 6 months,
- if artefacts appear on the image, mainly due to knocks to the detector (e.g. a fall),
- if the response of the detector deteriorates over time.

Calibration will influence the quality of the images; therefore, it is essential to follow the given instruction accurately when you carry out a calibration procedure.



The X-ray beam must be centred on the detector (orthogonal axis on the surface of the detector).

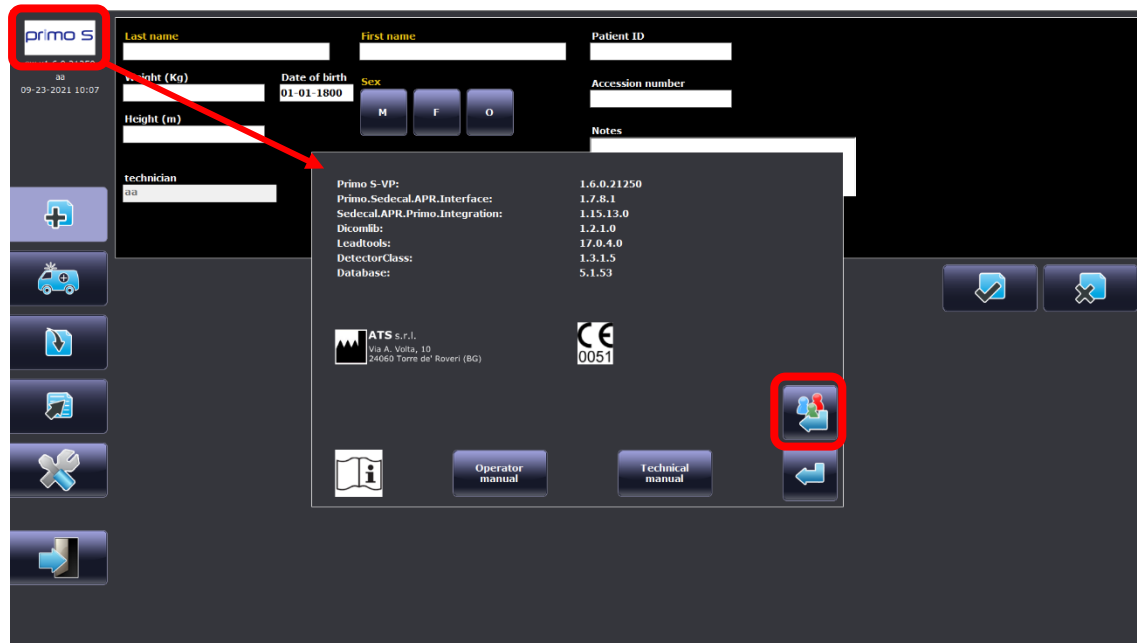
The collimated area is opened at least 5 cm beyond the edges of the detector.

Following table shows the FP detectors foreseen by the **Primo-S** system and related paragraphs for the calibration procedure.

Flat Panel available	See Paragraph
TOSHIBA 4343RPW (With AED/Without AED)	3.2
TOSHIBA 3543RPW (With AED/Without AED)	3.2
TOSHIBA 3543RPWB	3.2
TOSHIBA 2530RPW	3.2
TOSHIBA 4343R	3.2
TOSHIBA FDXA4343R	3.2
PIXIUM 4143	3.3
PIXIUM 4343	3.3
PIXIUM 4343RE	3.3
PIXIUM 3543EZ	3.3
PIXIUM 2430EZ	3.3
PIXIUM 3543EZg	3.3
PIXIUM 3543EZe	3.3
PIXIUM 3543DRcs	3.3
PIXIUM 3543DRgs	3.3
PIXIUM 3543DRcx	3.3
IRAY Mars 1717 V1	3.4
IRAY Mars 1717 V2	3.4
IRAY Mars 1717 V3	3.4
IRAY Mars 1717 X	3.4
IRAY Mars 1417 V1	3.4
IRAY Mars 1417 V2	3.4
IRAY Mars 1417 V3	3.4
IRAY Mars 1417 X	3.4
CANON AR-A3543W	3.5
CANON AR-A4343W	3.5

To access the FPD calibration sw, **PrimoS CF**:

- Log in with Primo S Administrator's privileges.
- Press the Primo S icon, on the top left angle of the screen displayed; the following window is shown.



- Now, press the indicated key: the **Windows User Login** page is opened.



- Enter as **Windows Administrator** (please, contact the manufacturer to provide the access credentials).

- From the desktop, launch the **PrimoS CF** application.



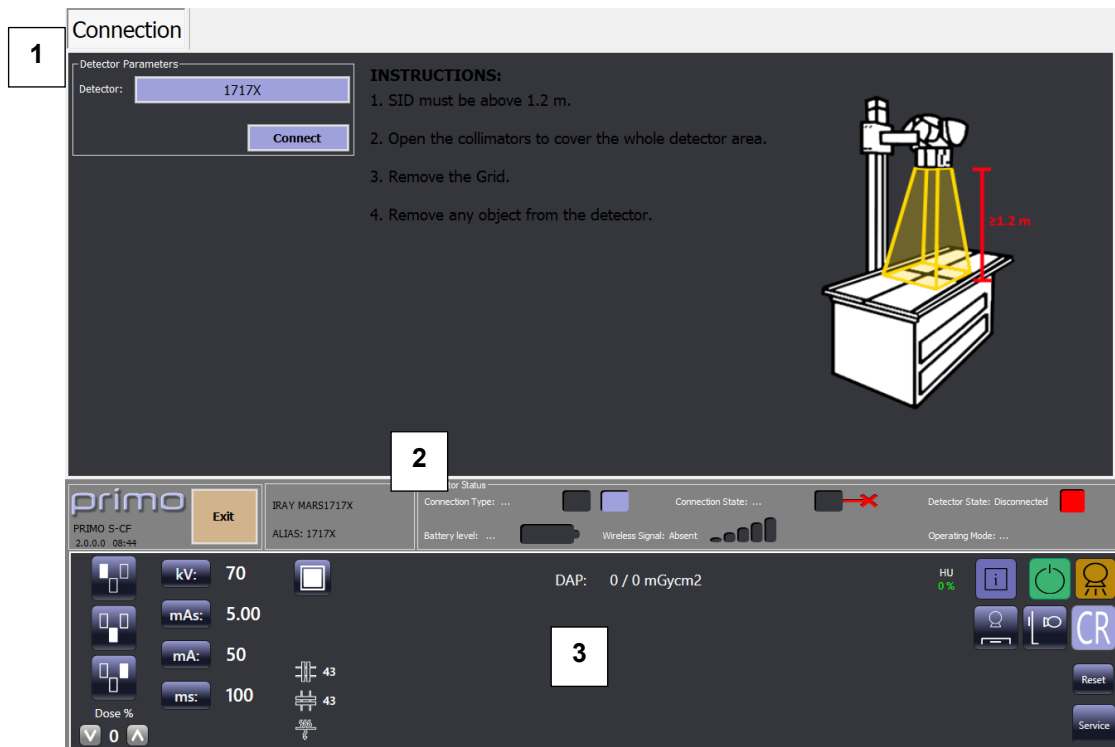
- See following paragraph.

3.1.2 PRIMO S CF

The **PrimoS CF** application is used to calibrate the detector.



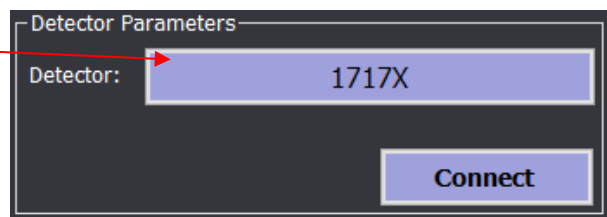
After pressing the relevant icon on the desktop, the following window is displayed:



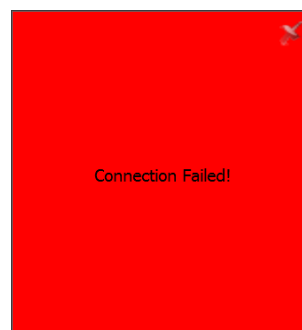
1 The connection tab is automatically opened. Here:

- Select in the **Detector Parameters** window the **Detector** to be calibrated.

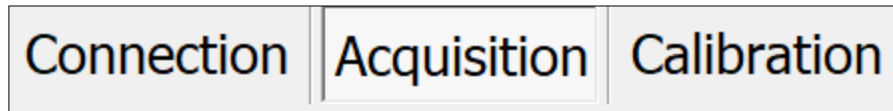
Note: only detectors already saved in Primo S Detector List setup are going to be shown in this drop-down menu.



- Press **Connect** and then wait about 10 seconds for the connection. A Pop-Up showing the connection result appears:



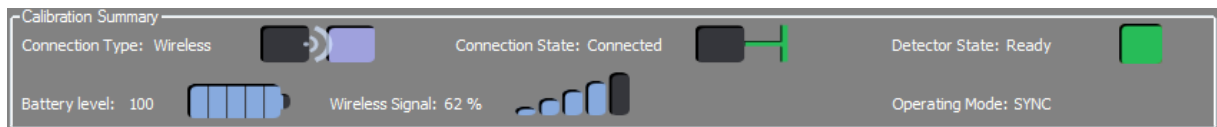
- As the connection has been successfully established, on the top of the window, two new different tabs are displayed:
 - **Acquisition**,
 - **Calibration**.



Note: the Acquisition tab is not available with Canon detectors.

2 Detector Info and Status bar.

- The **Calibration summary** bar reports the detector status and the following information.



Possible Connection Type:

- Wireless,
- Tethered.

Possible Connection State:

- Connected,
- Disconnected.

Detector State:

- Disconnected,
- Unknown,
- Ready,
- Armed,
- Triggered,
- Acquired.

Battery Level [0-100%].

Wireless Signal [0-100%].

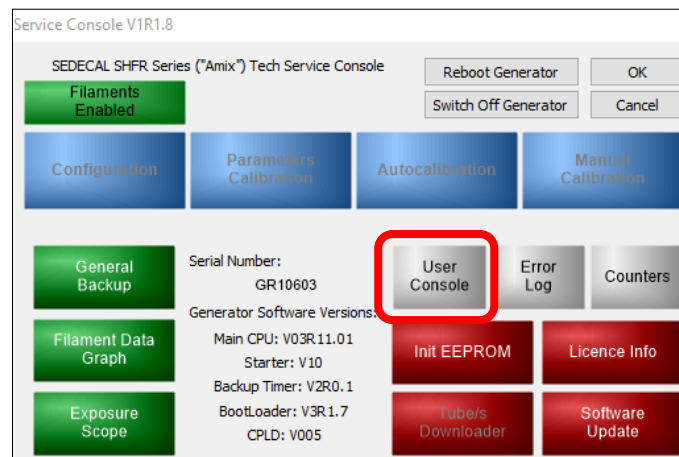
Operating Mode:

- Sync,
- AED.

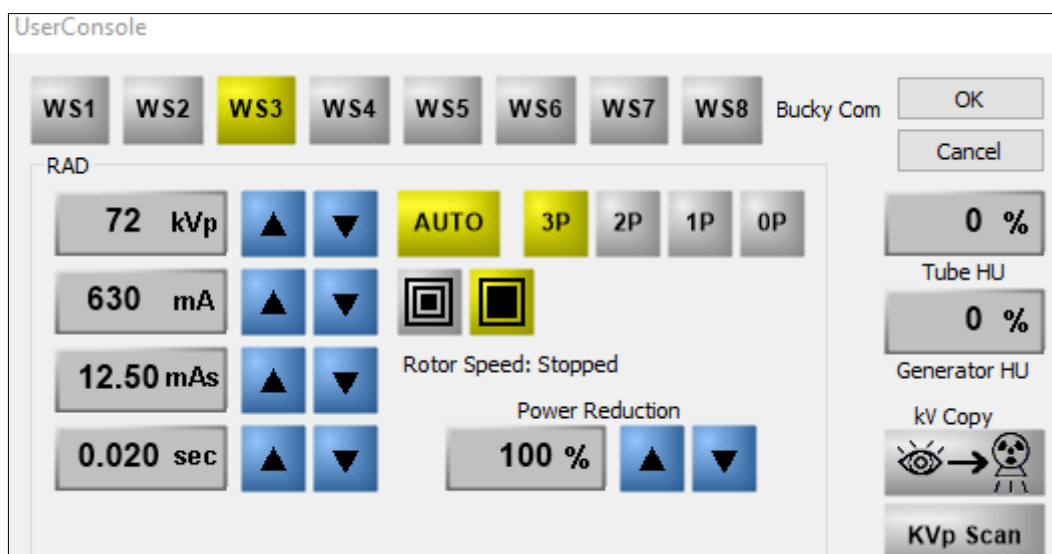
3.1.3 GENERATOR CONSOLE TOOL

If your detector works in AED modality, it is required to use the generator console tool. It can be activated as follows:

- On the desktop, launch the **Service Console** application and enter the password (please, contact the manufacturer to provide the access credentials).
- Press the **User Console** key.



- The **Generator console** is displayed: exposure values for the calibration are to be set here.



3.2 TOSHIBA DETECTORS CALIBRATION

Valid for:

- TOSHIBA 4343RPW With AED
- TOSHIBA 4343RPW Without AED
- TOSHIBA 3543RPW With AED
- TOSHIBA 3543RPW Without AED
- TOSHIBA 3543RPWB
- TOSHIBA 2530RPW
- TOSHIBA 4343R
- TOSHIBA FDXA4343R / TOSHIBA FDXA4343R-HD

3.2.1 EXPOSURE VALUES FOR CALIBRATION

In the factory the parameters used for the calibration are the following:

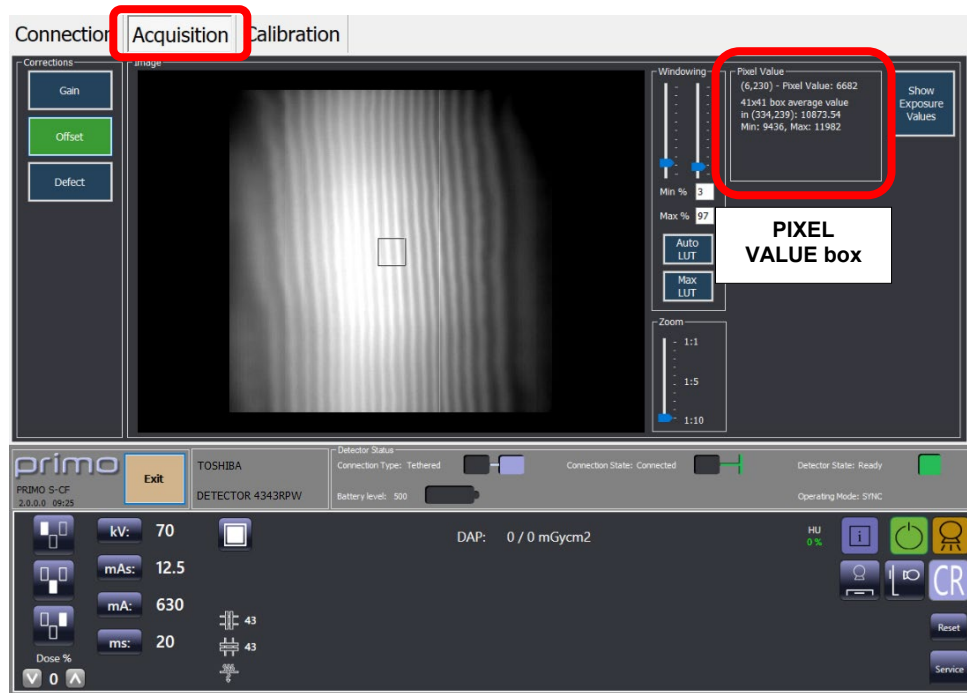
Additional filter	SID (cm)	Number of exposures	Exposure Values	Detector entrance dose (μGy)	Range Image levels (lsb)
21 mm Al	120	8	70kV, 160mA, 100ms (16mAs)	14 μGy	2800 – 3200 (typ. 3000)

For **TOSHIBA FDXA4343R** and **TOSHIBA FDXA4343R-HD**, only:

Additional filter	SID (cm)	Number of exposures	Exposure Values	Detector entrance dose (μGy)		Range Image levels (lsb)
				FDXA4343R	FDXA4343R-HD	
21 mm Al	140	8	73kV, 100mA, 250ms (25mAs)	22,8 μGy	20 μGy	10000 – 14000 (typ. 12000)

If these parameters do not fit (for example, because of a different SID value), it is required to find out the correct exposure values to reach the needed dose.

Select the **Acquisition** tab, set on the generator the exposure parameters and command x-rays.

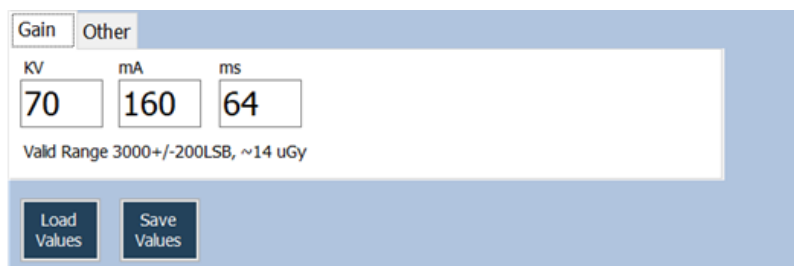


Once the image has been acquired, it is possible to check its levels (LSB) from the *Pixel Value box*; LSB are automatically calculated on a central area of the image (black square) and displayed.

Once the correct exposure values have been found, it is possible to save them as indicated below. Pressing the **Show exposure values** key, aside the *Pixel Value box*, the following window is displayed.



It reports the current default exposure parameters, valid LSB range and dose required. If needed, change the exposure values proportionally with respect to the LSB required.



- **If the detector is meant to work in Sync modality:**

- By pressing **Load Values** key the last exposure values set on the generator console are copied in respective parameter fields.
- By pressing **Save values** key the copied exposure parameters are saved as new default values (to be used for the next calibrations).
- During the calibration procedure, the default exposure parameters will be set automatically by the system.

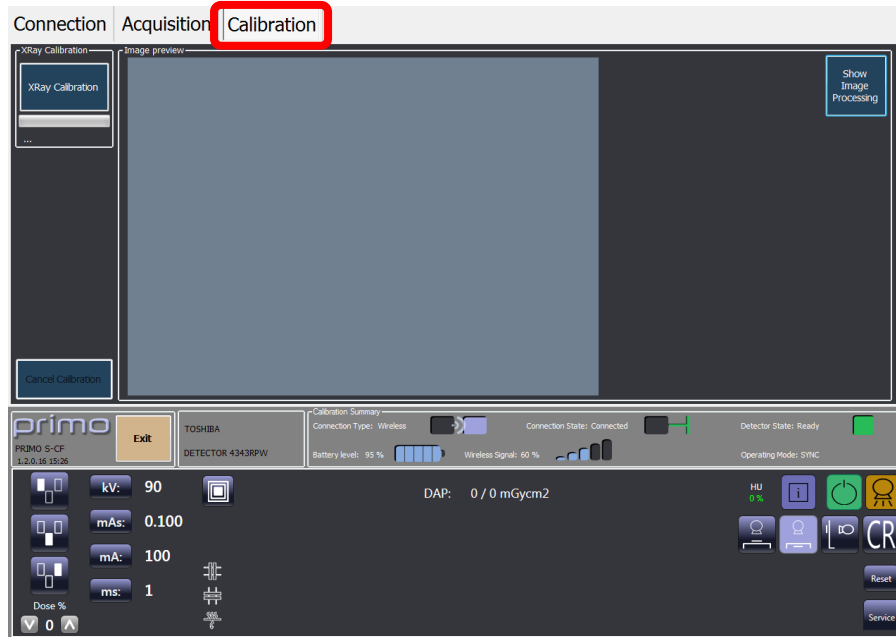
- **If the detector is meant to work in AED modality:**

- By pressing **Save values** key the copied exposure parameters are saved as new default values (to be used for the next calibrations).
During the calibration procedure, the default exposure parameters must be set manually on the **Service Tool** console.

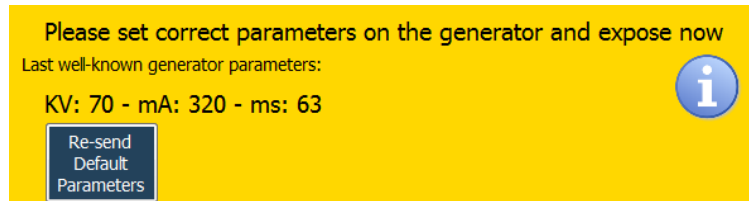
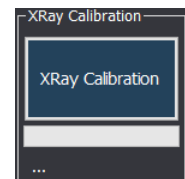
3.2.2 CALIBRATION OF DETECTOR IN SYNC AND AED MODE

The Calibration procedure is the same whether the detector works in Sync or in AED mode.

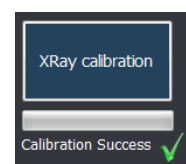
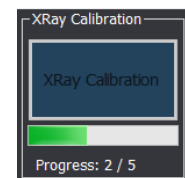
Note: in case of AED calibration, see Paragraph 3.1.2 above



1. Open the **Calibration** tab.
2. Press **XRay Calibration** key and wait for the calibration to start.
3. The default exposure parameters are indicated:



4. Check default exposure parameters have been correctly set on the generator console. Then press the X-ray command.
5. The calibration requires 8 exposures, guided by the software (the progress is reported on the dedicated bar).
5. As the last exposure has been acquired, wait for the calibration procedure to be successfully completed: a confirmation is displayed.



Close the calibration software by pressing the **Exit** key.



3.3 PIXIUM CALIBRATION

Valid for:

- PIXIUM 4143
- PIXIUM 4343
- PIXIUM 4343RE
- PIXIUM 3543EZ
- PIXIUM 2430EZ
- PIXIUM 3543EZg
- PIXIUM 3543ZE
- PIXIUM 3543DRcs
- PIXIUM 3543DRgs
- PIXIUM 3543DRcx

3.3.1 EXPOSURE VALUES FOR CALIBRATION

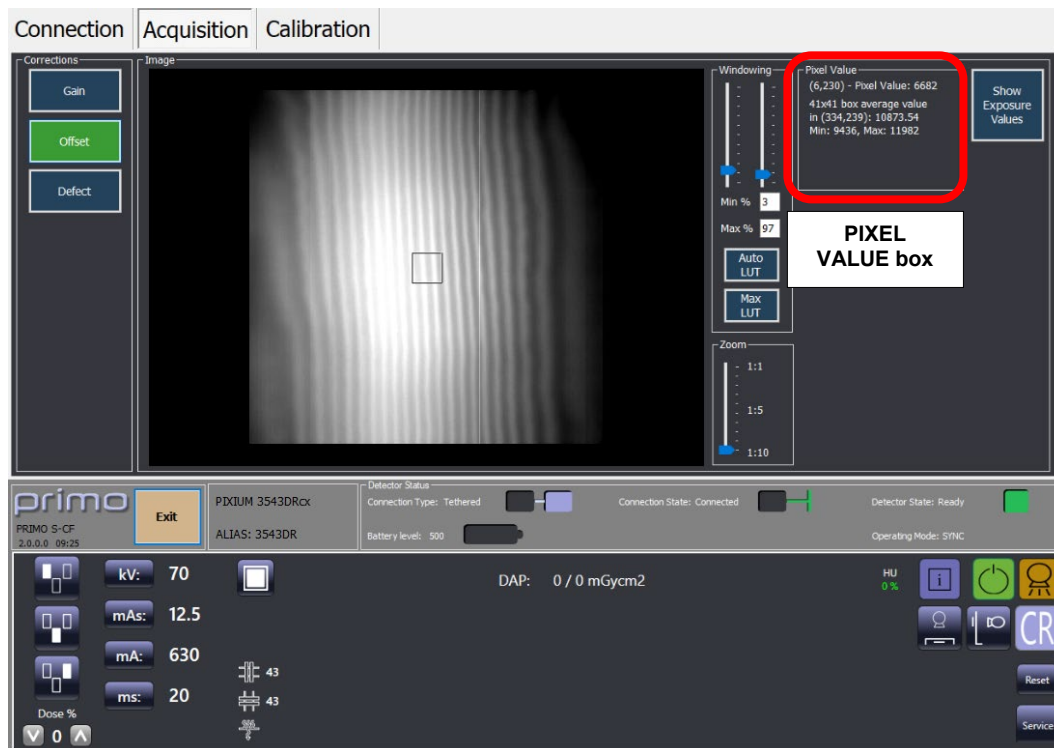
In the factory the parameters used for the calibration are the following:

for PIXIUM 3543EZ, PIXIUM 2430EZ, PIXIUM 3543EZg, PIXIUM 3543ZE, PIXIUM 3543DRcs, PIXIUM 3543DRgs, PIXIUM 3543DRcx						
CALIBRATION PHASE	Additional filter	SID (cm)	Number of exposures	Exposure Values	Detector entrance dose (μGy)	Range Image levels (lsb)
GAIN	21 mm Al	120	10	75kV, 160mA, 100ms (16mAs)	25	11000 – 16500 (typ. 13750)
DEFECT MAP 1	21 mm Al	120	1	75kV, 160mA, 10ms (1,6mAs)	2,5	1045 - 1705 (typ. 1375)
DEFECT MAP 2	21 mm Al	120	1	75kV, 160mA, 20ms (3.2mAs)	5	2035 - 3465 (typ. 2750)
DEFECT MAP 3	21 mm Al	120	1	75kV, 160mA, 200ms (32mAs)	50	20625 - 34375 (typ. 27500)

for PIXIUM 4143, PIXIUM 4343. PIXIUM 4343RE						
CALIBRATION PHASE	Additional filter	SID (cm)	Number of exposures	Exposure Values	Detector entrance dose (μGy)	Range Image levels (lsb)
GAIN	21 mm Al	120	10	75kV, 160mA, 250ms (40mAs)	37,5	10800 – 16200 (typ. 13500)
DEFECT MAP 1	21 mm Al	120	1	75kV, 160mA, 25ms (4mAs)	3,75	1080 - 1620 (typ. 1350)
DEFECT MAP 2	21 mm Al	120	1	75kV, 160mA, 50ms (8mAs)	7,5	2160 - 3240 (typ. 2700)
DEFECT MAP 3	21 mm Al	120	1	75kV, 160mA, 400ms (64mAs)	60	172800 - 25920 (typ. 21600)
DEFECT MAP 4	21 mm Al	120	1	75kV, 160mA, 500ms (80mAs)	75	21600 - 32400 (typ. 27000)

If these parameters do not fit (for example, because of a different SID value), it is required to find out the correct exposure values to reach the needed dose.

Select the **Acquisition** tab, set on the generator new exposure parameters and command x-rays.



Once the image has been acquired, it is possible to check its levels (LSB) from the *Pixel Value box*; LSB are automatically calculated on a central area of the image (black square) and displayed.

Once the correct exposure values have been found, it is possible to save them as indicated below.

Pressing the **Show exposure values** key, aside the *Pixel Value box*, the following window is displayed.



It reports the current default exposure parameters, valid LSB range and dose required. If needed, change the exposure values proportionally with respect to the LSB required.

Gain	Defect Map 1	Defect Map 2	Defect Map 3	Other
KV	mA	ms		
70	160	64		
Valid Range 20÷30 (Typical 25) µGy - 2000÷3000 (Typical 2500) LSB				
Load Values		Save Values		

● If the detector is meant to work in **Sync** modality:

- By pressing **Load Values** key the last exposure values set on the generator console are copied in respective parameter fields.
- By pressing **Save values** key the copied exposure parameters are saved as new default values (to be used for the next calibrations).
- During the calibration procedure, the default exposure parameters will be set automatically by the system.

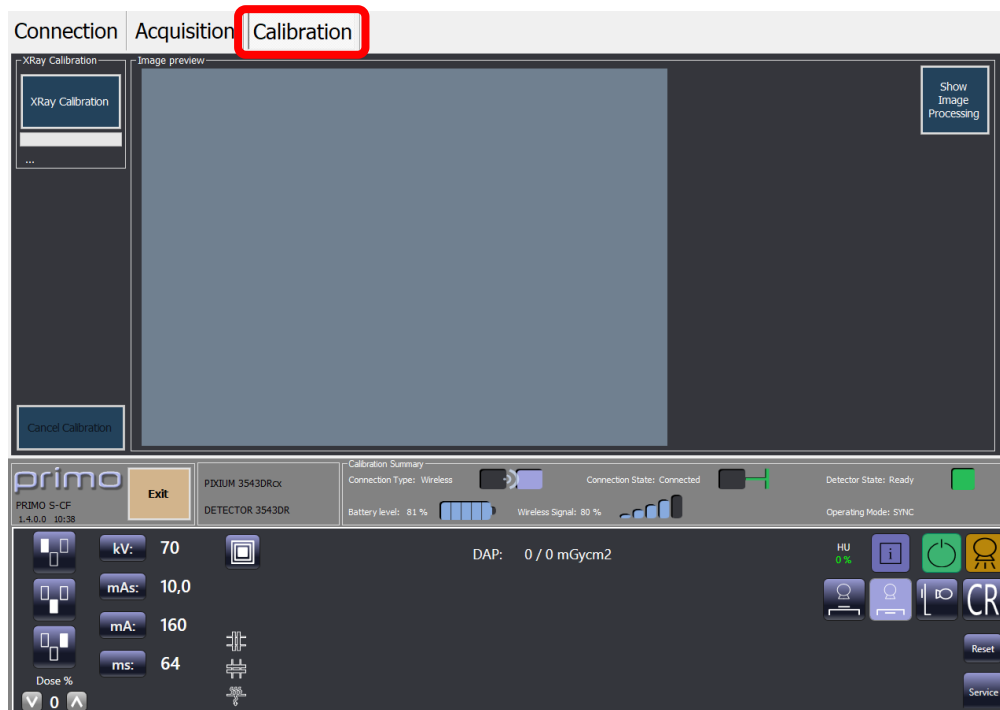
● If the detector is meant to work in **AED** modality:

- By pressing **Save values** key the copied exposure parameters are saved as new default values (to be used for the next calibrations).
- During the calibration procedure, the default exposure parameters must be set manually on the **Service Tool** console.

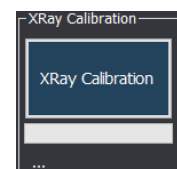
3.3.2 CALIBRATION OF DETECTOR IN SYNC AND AED MODE

The Calibration procedure is the same whether the detector works in Sync or in AED mode.

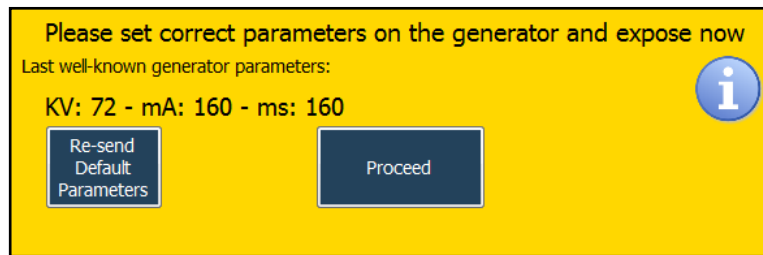
Note: in case of AED calibration, see Paragraph 3.1.2 above



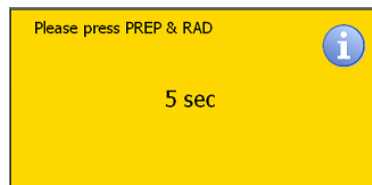
1. Open the **Calibration** tab.
2. Press **XRay Calibration** and wait for the procedure to start.



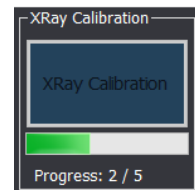
The window below appears when the system is ready for acquisition. The default exposure parameters are indicated:



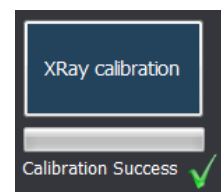
3. Check default exposure parameters have been correctly set on the generator console, and then start the calibration procedure pressing the **Proceed** key. Following steps are guided by the software.
4. Wait for the yellow pop-up, with the message: "**Please press PREP & RAD**" to give the exposure command. Give the exposure command before the count-down is finished.



5. Release the **PREP & RAD** commands after exposure and wait for next count-down to start. Repeat the above steps for the other exposures (10 in total), all at the same exposure values (the calibration progress is reported on the dedicated bar).



6. After the last of the 10 exposures, a message appears to advice the x-ray generator parameters have been changed to create the DEFECT MAP.
7. Check default exposure parameters have been correctly set on the generator console, and then start the calibration procedure pressing the **Proceed** key.
8. Wait for the yellow pop-up, with the message: "**Please press PREP & RAD**" to give the exposure command. Give the exposure command before the count-down is finished.
9. Release the **PREP & RAD** command after exposure and wait for next count-down to start. Repeat the steps 7, 8, and 9 for the next two exposures (in case of **PIXIUM 4143**, **PIXIUM 4343**, **PIXIUM 4343RE** detectors, it will be three exposures).
10. As the last exposure has been acquired, wait for the calibration procedure to be successfully completed: a confirmation message is displayed.



Now, it is possible to close the calibration software by pressing the **Exit** key.



3.4 IRAY CALIBRATION

Valid for:

- IRAY MARS 1417V1
- IRAY MARS 1417V2
- IRAY MARS 1417V3
- IRAY MARS 1717V1
- IRAY MARS 1717V2
- IRAY MARS 1717V3
- IRAY MARS 1717X
- IRAY MARS 1417X

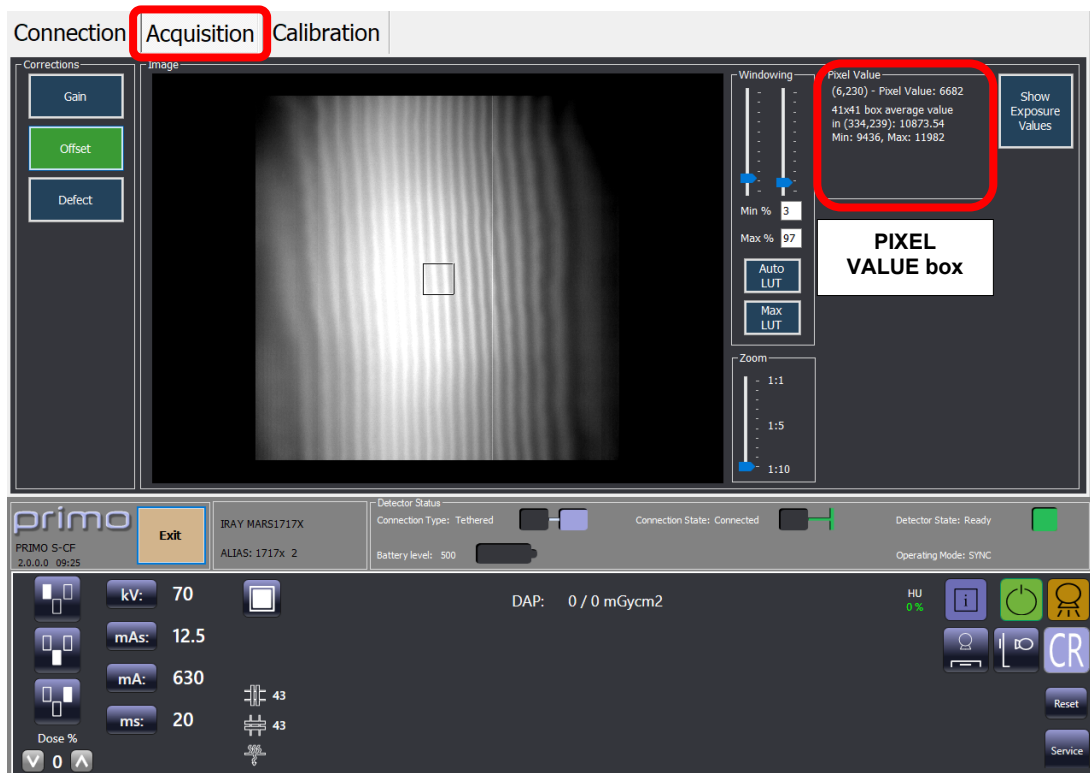
3.4.1 EXPOSURE VALUES FOR CALIBRATION

In the factory the parameters used for the calibration are the following:

CALIBRATION PHASE	Additional filter	SID (cm)	Number of exposures	Exposure Values	Detector entrance dose (μGy)	Range Image levels (lsb)
GAIN	10 mm Al	120	5	72kV, 630mA, 20ms	58	18000 - 22000 (typ. 20000)
DEFECT MAP 1	10 mm Al	120	1	71kV, 630mA, 5ms	12,5	3600 - 4400 (typ. 4000)
DEFECT MAP 2	10 mm Al	120	1	42kV, 500mA, 160ms	28	3600 - 4400 (typ. 2700)
DEFECT MAP 3	10 mm Al	120	1	120kV, 400mA, 6ms	50	14400 - 17600 (typ. 16000)
DEFECT MAP 4	10 mm Al	120	5	72kV, 630mA, 20ms	58	18000 - 22000 (typ. 20000)

If these parameters do not fit (for example, because of a different SID value), it is required to find out the correct exposure values to reach the needed dose.

Select the **Acquisition** tab, set on the generator new exposure parameters and command x-rays.



Once the image has been acquired, it is possible to check its levels (LSB) from the *Pixel Value box*; LSB are automatically calculated on a central area of the image (black square) and displayed.

Once the correct exposure values have been found, it is possible to save them as indicated below.

Pressing the **Show exposure values** key, aside the *Pixel Value box*, the following window is displayed.



It reports the current default exposure parameters, valid LSB range and dose required. If needed, change the exposure values proportionally with respect to the LSB required.

Gain	Defect Map 1	Defect Map 2	Defect Map 3	Defect Map 4	Other
KV	mA	ms			
72	630	20			
Valid Range 20000+/-2000LSB (Suggested KV:70)					
Load Values		Save Values			

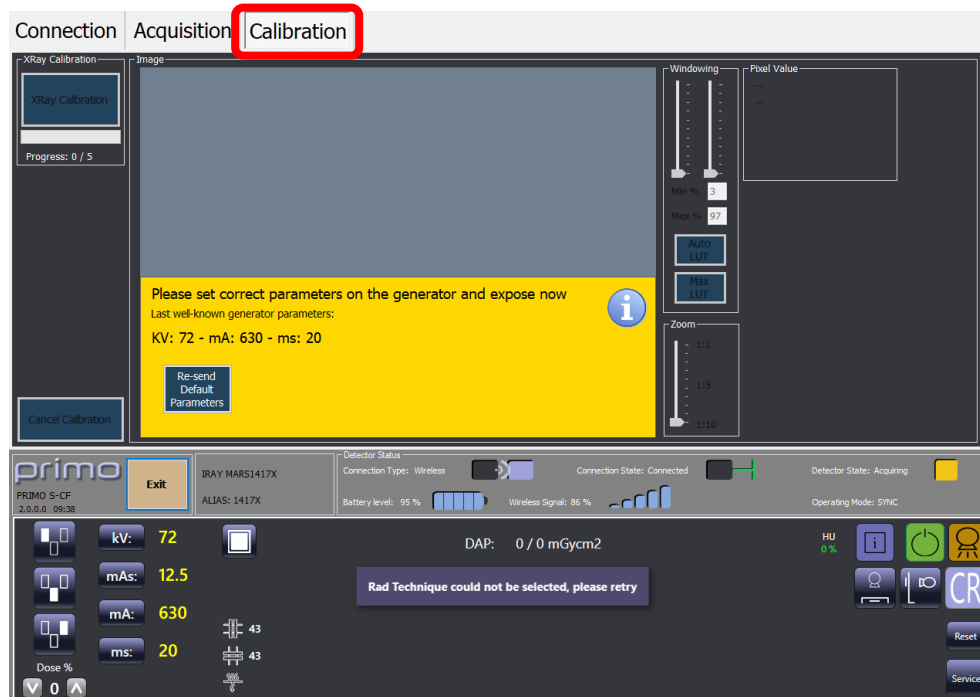
● If the detector is meant to work in **Sync** modality:

- By pressing **Load Values** key the last exposure values set on the generator console are copied in respective parameter fields.
- By pressing **Save values** key the copied exposure parameters are saved as new default values (to be used for the next calibrations).
- During the calibration procedure, the default exposure parameters will be set automatically by the system.

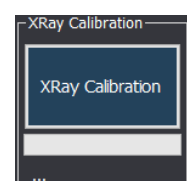
● If the detector is meant to work in **AED** modality:

- By pressing **Save values** key the copied exposure parameters are saved as new default values (to be used for the next calibrations).
- During the calibration procedure, the default exposure parameters must be set manually on the **Service Tool** console.

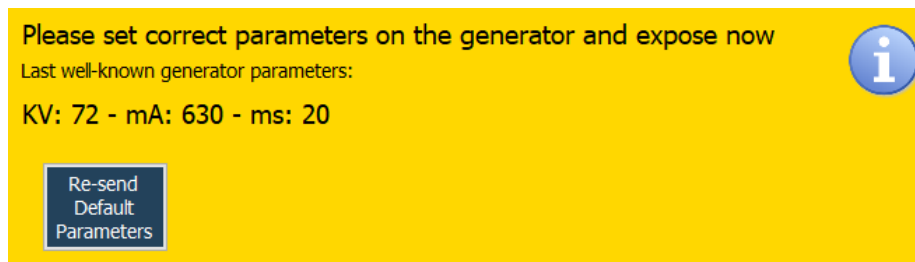
3.4.2 CALIBRATION OF DETECTOR IN SYNC MODE



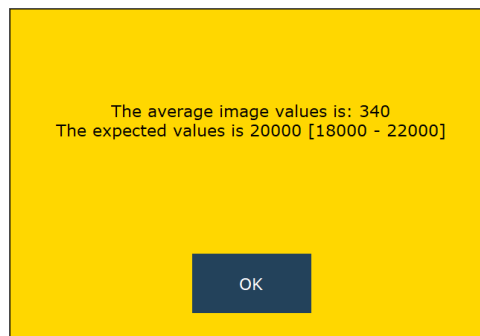
1. Open the **Calibration** tab.
2. Press **XRay Calibration** and wait for the calibration to start.
The window below appears when the system is ready for acquisition.



The default exposure parameters are indicated:

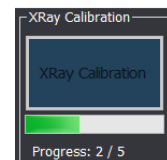


3. The X-ray generator parameters are automatically set on the generator. Check they are correct and then start the calibration procedure, pressing the x-ray command. Following steps are guided by the software.
4. Release the **PREP & RAD** commands after exposure: the calibration progress is reported on the dedicated bar.
If the dose reached falls outside the requested range, a warning is presented, showing the current levels on image and the expected ones. The calibration continues, not considering the last exposure.



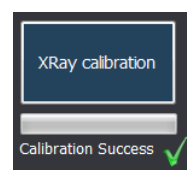
Correct the exposure values proportionally and repeat the exposure.

5. Repeat the above steps for the other exposures (5 in total), all at the same exposure values (the calibration progress is reported on the dedicated bar).



5. After the last of the 5 exposures, a message appears to advice the x-ray generator parameters have been changed to start the calibration 2nd phase, consisting of 8 images (the first three at different exposure values, the last 5 at the same ones).
6. The X-ray generator parameters are automatically set. Check they are correct and then continue the calibration procedure, pressing the x-ray command.
7. Release the **PREP & RAD** commands after exposure: the calibration progress is reported on the dedicated bar.

8. As the last exposure has been acquired, wait for the calibration procedure to be successfully completed: a confirmation message is displayed.

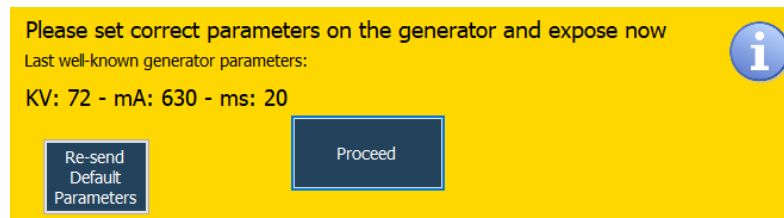
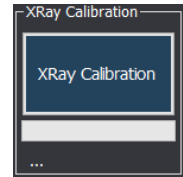


Now, it is possible to close the calibration software by pressing the **Exit** key.



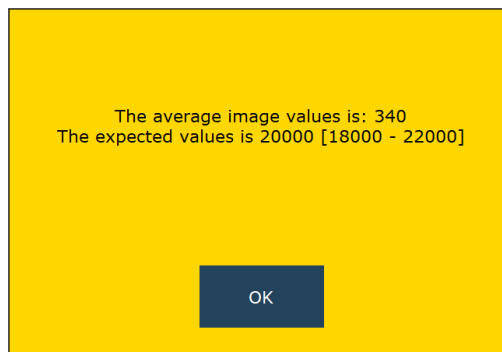
3.4.3 CALIBRATION OF DETECTOR IN AED MODE

1. Open the Generator Console (see Paragraph 3.1.2 above).
2. Open the **Calibration** tab.
3. Press **XRay Calibration** and wait for the calibration to start. The window below appears when the system is ready for acquisition. The default exposure parameters are indicated: set them on the **User Tool console** and press the **Proceed** key.

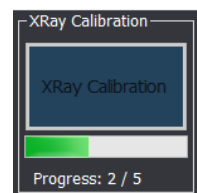


Following steps are guided by the software.

4. When the system is ready to acquire a ten-seconds countdown is displayed, guiding the user to hold **PREP** (First 5 seconds) and **RAD** (Last 5 seconds) commands.
5. If the dose reached falls outside the requested range, a warning is presented, showing the current levels on image and the expected ones.
The calibration continues, not considering the last exposure.



6. If the dose reached is correct, no warning appears and it is possible to proceed with the calibration, acquiring a new image (the calibration progress is reported on the dedicated bar).



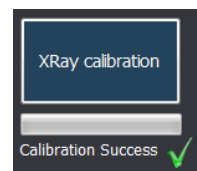
7. Repeat the above steps for the next 4 exposures (5 in total), all at the same values.

8. After the last of the 5 exposures, it starts the 2nd phase of the calibration, consisting of 8 images (the first three at different exposure values, the last 5 at the same ones).

A message appears to advice to change the x-ray generator parameters.

Repeat the acquisition as explained in step 4 for all the needed exposures.

As the last one has been acquired, the system finalizes the calibration, and a success message is displayed.



Now, it is possible to close the calibration software by pressing the **Exit** key.



3.5 CANON DETECTORS CALIBRATION

Valid for:

- **CANON AR-A4343W**
- **CANON AR-A3543W**

3.5.1 CALIBRATION OF DETECTOR IN SYNC MODE

In the factory the parameters used for the calibration are the following:

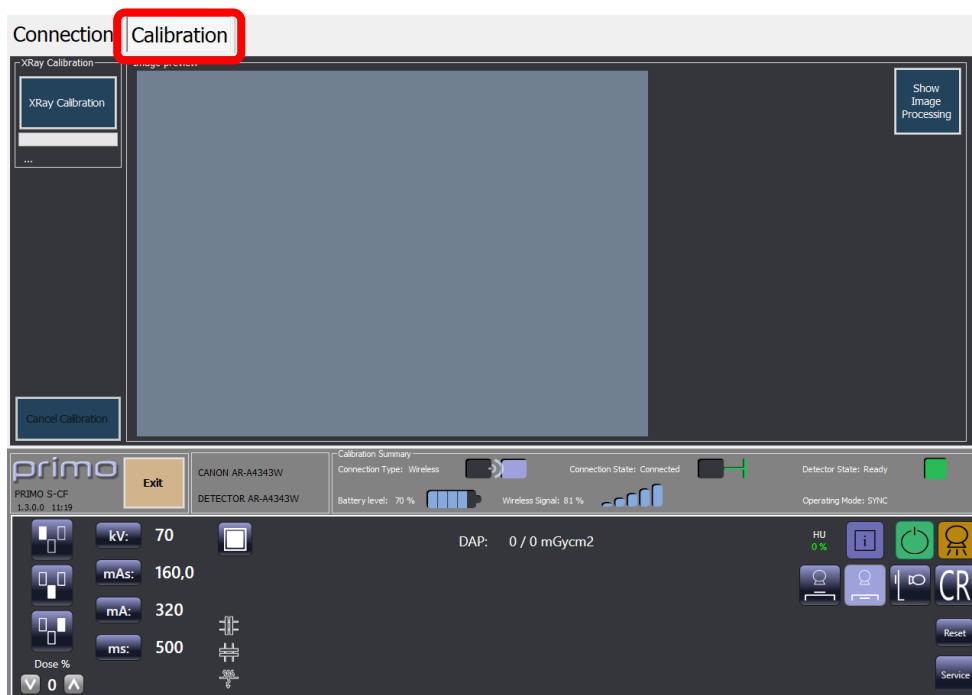
X-ray tube filter	SID	Exposure values	Exposures
21 mm Al	120 cm	70kV, 10mAs	4

The exposure dose must be that adequate to generate image levels within the needed range. Otherwise, the calibration may not be reliable.

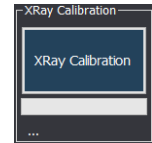
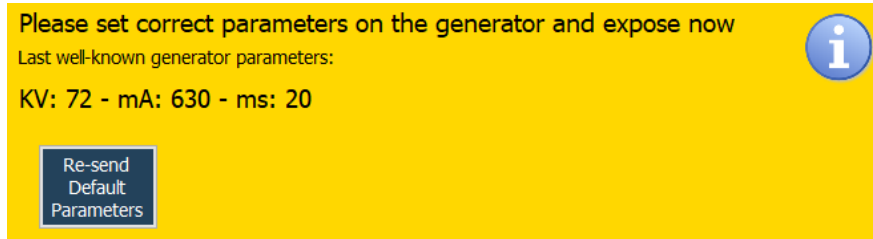
For this reason, during the calibration phase, the system indicates the percentage of required dose reached with the current exposure parameters.

To calibrate the detector:

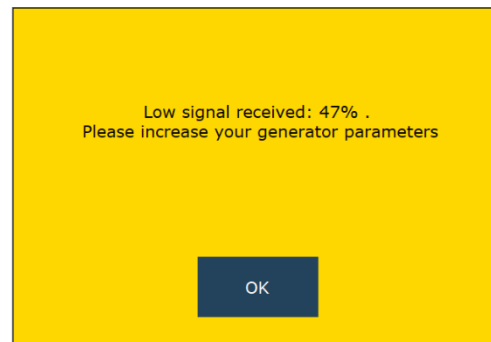
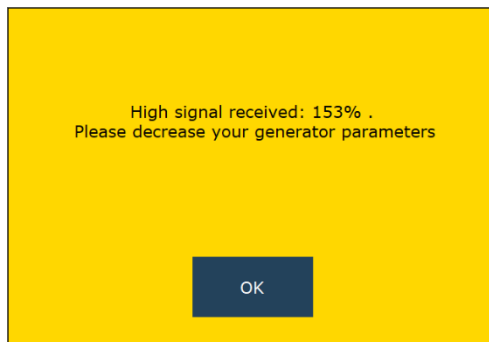
1. Open the **Calibration** tab.



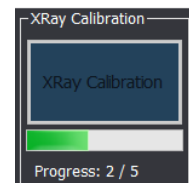
- Click the **XRay Calibration** key: when the system is ready to acquire a window that shows the suggested parameters is displayed.



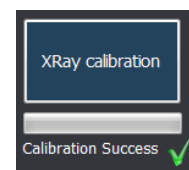
- The X-ray parameters are automatically set on the generator. Check they are correct and then start the calibration procedure, pressing the x-ray command. Following steps are guided by the software.
- If the dose reached falls outside the requested range, a warning is presented: it shows the current percentage (it should be higher or lower than requested: change exposure values proportionally).



- If the dose reached is correct, it is shown the window for next acquisition (the calibration progress is reported on the dedicated bar).



- The system needs 4 images for the calibration to be completed. As the last one has been acquired, the system finalizes the calibration, and a success message is displayed.

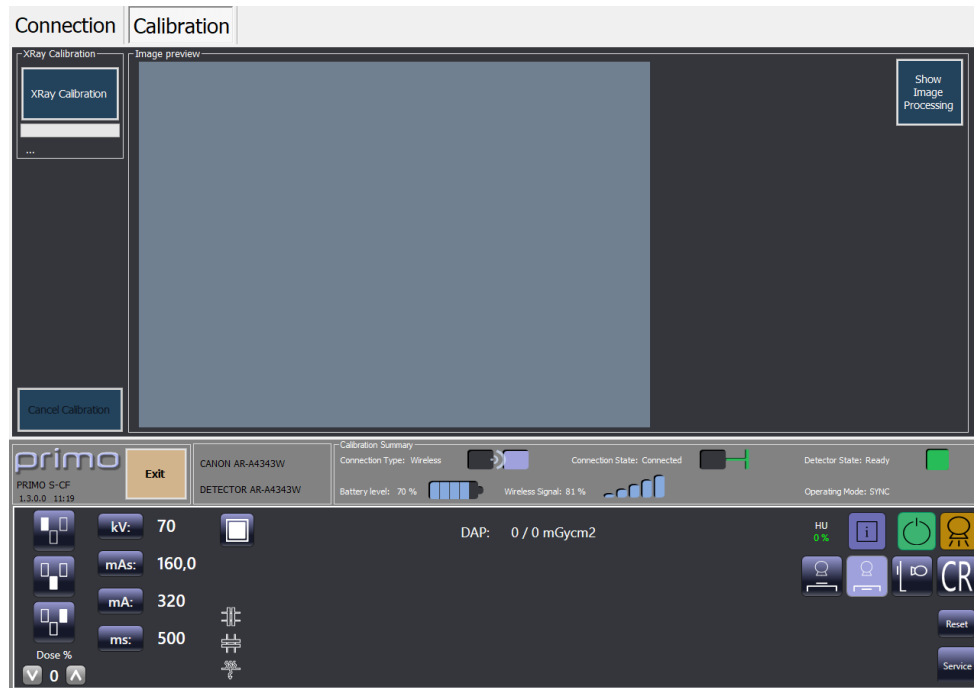


Now, it is possible to close the calibration program by pressing the **Exit** key.

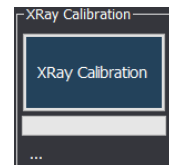
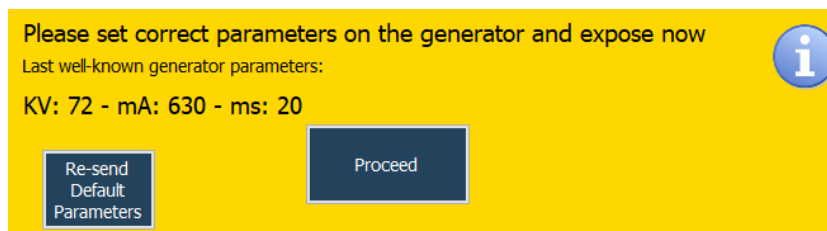


3.5.2 CALIBRATION OF DETECTOR IN AED MODE

1. Open the Generator console (see Paragraph 3.1.2 above).
2. Select the **Calibration** tab.

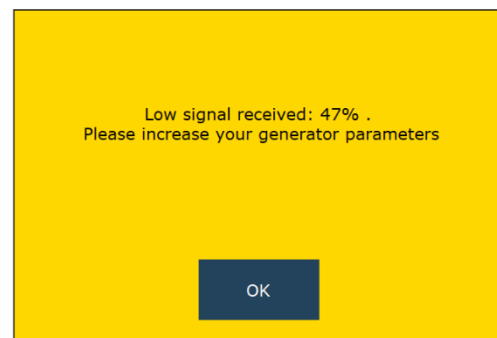
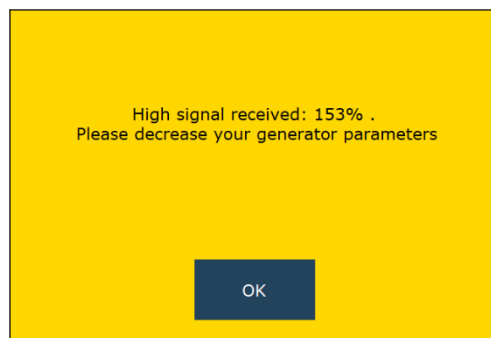


3. To start the procedure, click the **XRay Calibration** key: when the system is ready to acquire the following window is displayed.

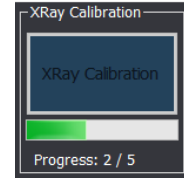


It shows the default exposure values. Set them on the **Generator console** and press the **Proceed** key.

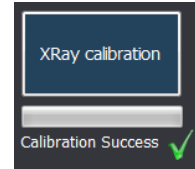
4. When the system is ready to acquire, a ten-seconds countdown is displayed, guiding the user to hold **PREP** (First 5 seconds) and **RAD** (Last 5 seconds) commands.
5. If the dose reached falls outside the requested range, a warning is presented, showing the current percentage.



7. If the dose reached is correct, it is shown the window for next acquisition (the calibration progress is reported on the dedicated bar).



8. The system needs 4 images for the calibration to be completed. As the last one has been acquired, the system finalizes the calibration, and a success message is displayed.



Now, it is possible to close the calibration software by pressing the **Exit** key.



4 SAFETY

4.1 **WARNINGS**

4.1.1 SYMBOLS USED

Other symbols are used on the EM equipment, on the serial n° plate and in this manual, as follows:



Follow the instructions for use (ISO 7010-M002)



Operating instructions (ISO 7000-1641)



Name and address of manufacturer



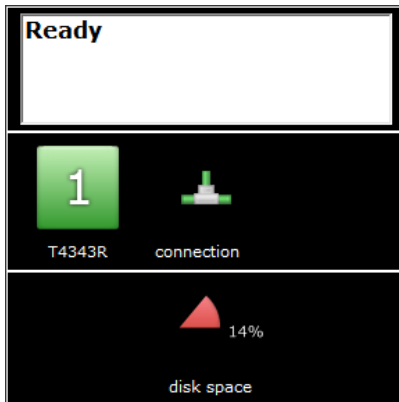
Radio wave emitting device



Device compliant with the relevant European Directive, with certain operating restrictions concerning radio wave transmission

4.1.2 WARNINGS IN THE MESSAGE AREA

The message area in the Working frame provides you with information on EM equipment status and alarm messages, detector connection status and the amount of free space on the video processor archive hard disk:



EM equipment status and alarms

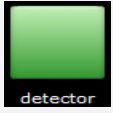
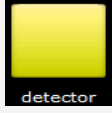
(see Table 1)

Detector and Connection status messages

(see Tables 2)

Percentage of free space on archive disk for image archiving

Table 1	
<u>EM Status message</u>	Meaning
READY	The equipment is ready to acquire images. You can give the X-ray emission command.
ACQUISITION PREP	Preparing for acquisition. This occurs after giving the X-ray preparation.
READY FOR ACQUISITION	Preparation completed. The system waits to receive an acquisition request.
IMAGE ACQUISITION	Transferring images from the detector.
DETECTOR NOT CONNECTED	The detector is not correctly connected.
LOW BATTERY, RECOMMENDED TO CHANGE BATTERY	It is recommended to change the battery of the Wi-Fi Detector. Attention: if the battery charge falls below 10% , the system will not be able to acquire new images . Change the battery to restore the complete functionality of the equipment.

Table 2			
<u>Detector status messages</u>			
	READY	NOT READY	NOT CONNECTED
Detector status			
Wired Detector	 The detector is connected.		
Wi-Fi Detector	 The power of the Wi-Fi signal is shown aside the icon.		

Attention: When the Wi-Fi signal value falls below a set value, the system **will not be able to acquire new images** (see paragraph 1.5.1.1 in Part 1 of the Technical Manual).

Check your connection to restore the complete functionality of the equipment.

4.2 DETECTORS LIST

Flat Panel available	See Paragraph
CANON AR-A3543W	2.2.1
CANON AR-A4343W	2.2.1
CANON FDXA3543RPW	2.2.2
CANON FDXA4343RPW	2.2.2
IRAY Mars 1717 V1	2.2.3
IRAY Mars 1717 V2	2.2.3
IRAY Mars 1717 V3	2.2.3
IRAY Mars 1717 X	2.2.3
IRAY Mars 1417 V1	2.2.3
IRAY Mars 1417 V2	2.2.3
IRAY Mars 1417 V3	2.2.3
IRAY Mars 1417 X	2.2.3
PIXIUM 4143	2.2.4
PIXIUM 4343	2.2.4
PIXIUM 4343RE	2.2.4
PIXIUM 3543EZ	2.2.5
PIXIUM 2430EZ	2.2.5
PIXIUM 3543EZg	2.2.5
PIXIUM 3543EZe	2.2.5
PIXIUM 3543DRcs	2.2.6
PIXIUM 3543DRgs	2.2.6
PIXIUM 3543DRcx	2.2.6
TOSHIBA 4343RPW (With AED/Without AED)	2.2.7
TOSHIBA 3543RPW (With AED/Without AED)	2.2.7
TOSHIBA 3543RPWB	2.2.7
TOSHIBA 2530RPW	2.2.7
TOSHIBA 4343R	2.2.8
TOSHIBA FDXA4343R	2.2.8

4.2.1 CANON AR SERIES WI-FI DETECTOR

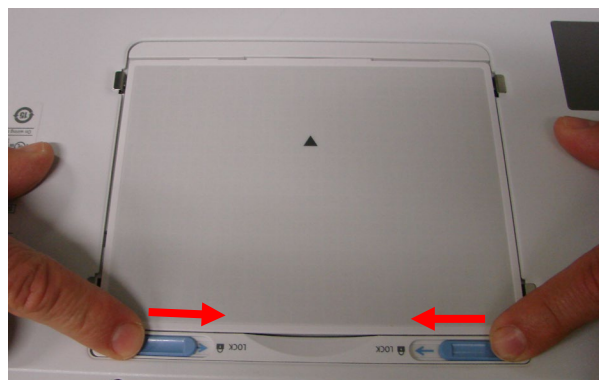


Item	Colour	Description
1	--	On/Off button (keep the button pressed for at least 3 seconds)
2	Blue	Led: the detector is on Blinking if the battery level is low or if there is an error during acquisition
3	Green	Led: detector is ready to perform an exposition Blinking during exposure preparation
4	Blue green	Led: the detector is connected Blinking during detector registration or image transmission

Insert the battery in its compartment as shown in the figure below:



Lock the battery in position, moving the two levers in the direction shown in the figure:



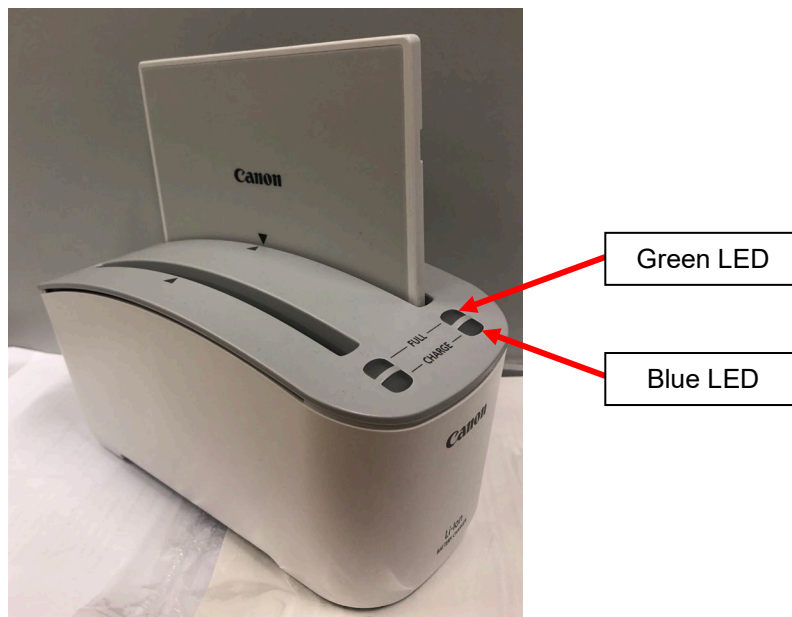
Press the ON/OFF button for 3 seconds to switch the detector off.



Attention: ONLY remove the battery after switching off the detector (ON/OFF button).

4.2.1.1 BATTERY CHARGER

The battery charger is provided with two compartments for the batteries and with LEDs that indicate the charging status.



LED	COLOUR	DESCRIPTION
Charging	Blue	Battery charging
	Green	Battery fully charged

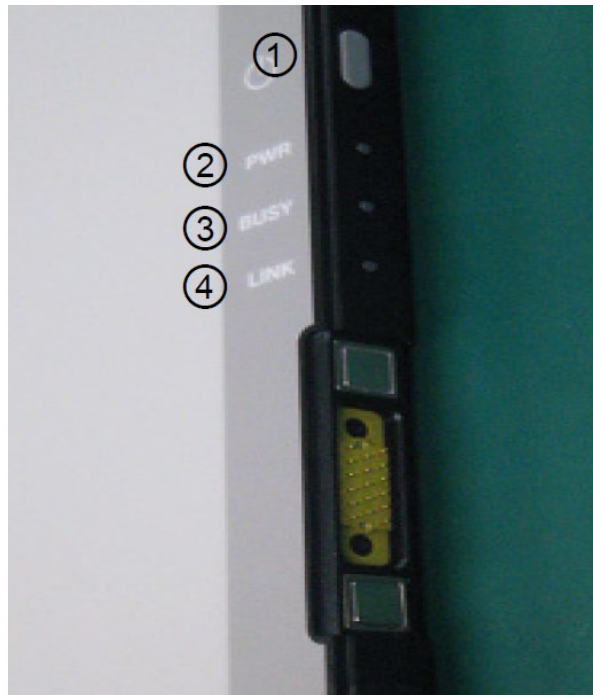


The life of a battery may be compromised if you remove it from the charger before the battery is fully charged.



Place the battery charger in a well-ventilated position.

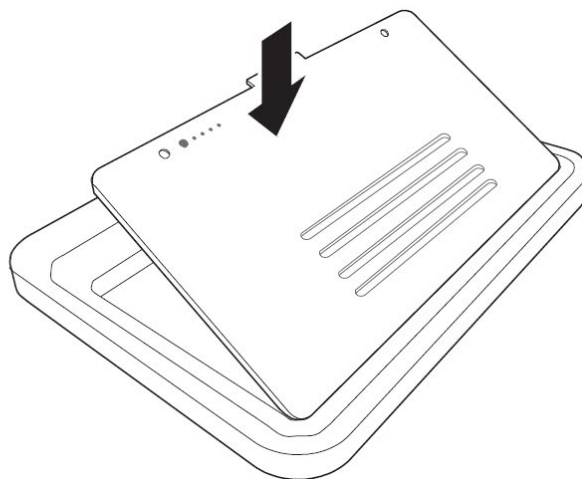
4.2.2 CANON FDXW WI-FI DETECTOR



The maximum load the entire surface of the FPD could tolerate is approximately 1471N (150 kg), while the central area (diameter: 40 mm) could tolerate approximately 981N (100 kg).

Item	Colour	Description
1	--	Button for turning on and off the detector (keep the button pressed for at least 2s)
2 PWR led	Blue	Led: the detector is on
3	Green	Led: it is lit when the detector is busy (usually when turning on)
4	Blue / Green	Led: Blinking blue when the detector is connected via cable. Green when it is connected via WiFi

- Insert the battery in its compartment, as shown in the figure below.

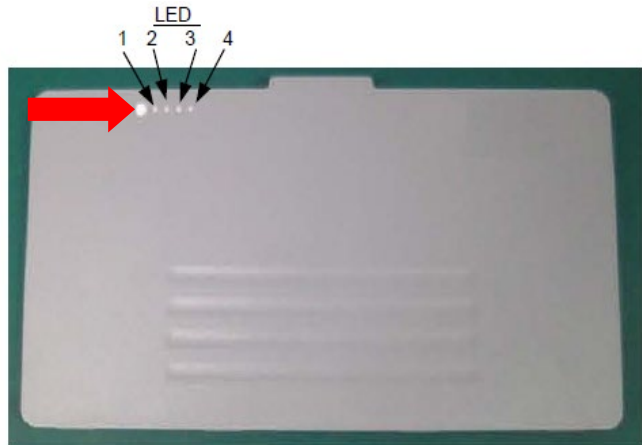


- Make sure that the battery is safely fixed and the two levers, marked with arrows, are in the position shown.



- The battery charge level can be verified by pressing the button shown in the following picture. The LEDs 1 - 4 will light up for a short moment, according to the battery charge level.

LED	CHARGE LEVEL
LED 1,2,3,4 light on	76 ÷ 100%
LED 1,2,3 light on	51 ÷ 75%
LED 1,2 light on	26 ÷ 50%
LED 1 light on	11 ÷ 25%
LED 1 Dimming (about 0.5sec interval)	< 10%



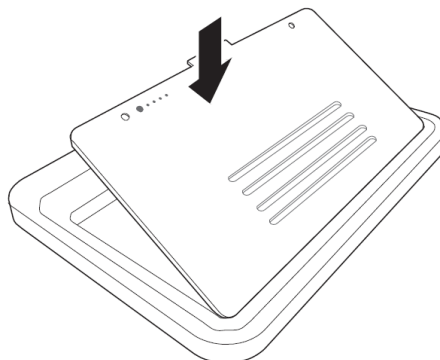
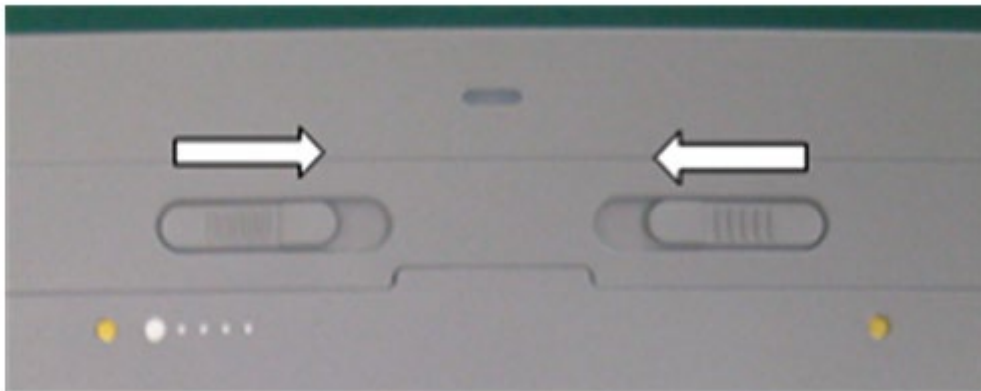
- Turn ON** the detector by pressing for 2 seconds the power button and wait for the PWR LED to turn on; after then, the BUSY and LINK LEDs will turn on, respectively. After about 1 minute, the detector will be ready to be used.



- Turn OFF** the detector by pressing the button until the PWR LED turns off.



Remove the battery, only if the detector is OFF, moving the levers as shown in the figure below (follow the direction of the arrows) and place it in the **battery charger**.



4.2.2.1 BATTERY CHARGER

The status LED can light up in 2 colours:

- **Red:** battery charging
- **Green:** charging completed.



“Full Charge” LED

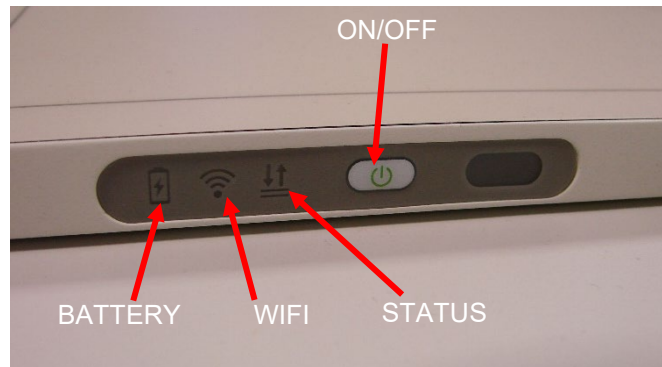


The life of a battery may be compromised if you remove it from the charger before the battery has been fully charged.

A fully charged battery allows the detectors to work for 1300 shots (cycle time: 8 seconds, capturing time 0,5 seconds); in sleep mode, the battery lasts for 4 hours.

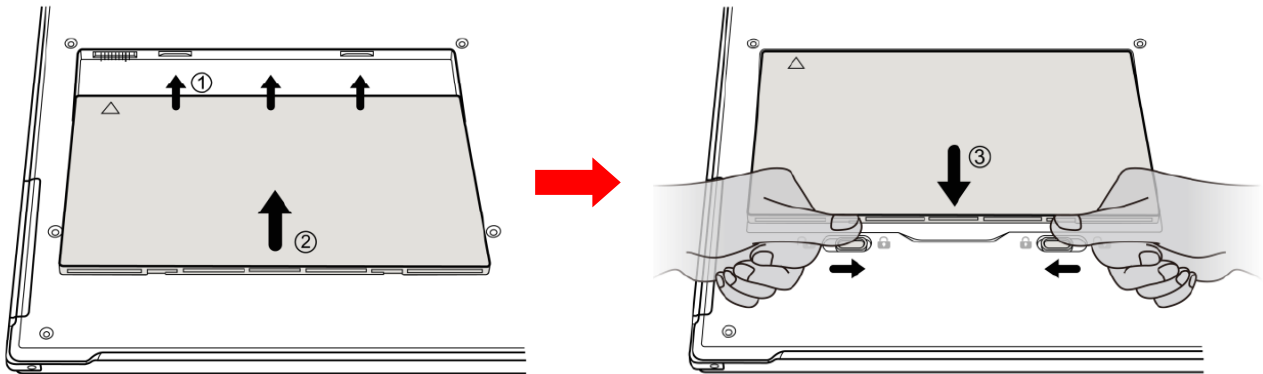
The battery gets fully charged in 2.5 hours. It is possible to charge only one battery at time.

4.2.3 IRAY DETECTOR



LED NAME	LOGO	COLOUR	DESCRIPTION
ON/OFF		/	On/Off button (keep the button pressed for at least 3 seconds)
Battery		Off	No battery Power off
		Orange: blinking	Battery charge level lower than 10% DC input
		Orange	Battery charge level lower than 10% No DC input
		Green: blinking	Battery level higher than 10% DC input
		Green	Battery level higher than 10% No DC input
WIFI		Off	WIFI disabled Detector switched off Detector starting up
		Blue: blinking	Wireless connection ready Detector not connected to the Access Point
		Blue	Wireless connection ready Wireless Access Point is ready
		Green	Detector connected to the Access Point
		Green: blinking	Detector initialization
Status		Off	Detector switched off
		Orange: blinking	Internal error (to reset this error <i>see Paragraph 4.1.8.2 in Part 1 of the Technical Manual</i>)
		Orange	Operating mode: initialization
		Green	Operating mode: ready

Insert the battery in its compartment and then slide the battery lock lever, as shown in the figure below:



Press the ON/OFF button for about 4 seconds until the STATUS LED starts flashing (green). Wait until LEDs light up.

Press the ON/OFF button for 4 seconds to switch the detector off.



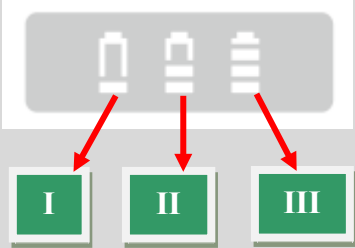
Attention: ONLY remove the battery after switching off the detector (ON/OFF button).

4.2.3.1 BATTERY CHARGER

The battery charger is provided with two compartments for the batteries of the detector.



On the battery charger **power and status LEDs** are present:

LED NAME	LOGO	COLOUR	DESCRIPTION
Power		Off	No external DC adaptor input
		Green	External DC adaptor input
Status		I, II and III off	No battery insert
		I blinking, II and III off	Battery charging ≤ 30%
		II blinking, I and III off	Battery charging between 30% and 60%
		III blinking, I and II off	Battery charging between 60% and 95%
		I and II off, III on	Battery charging > 95%
		I, II and III on	Full charge



The life of a battery may be compromised if you remove it from the charger before the battery is fully charged.



Place the battery charger in a well-ventilated position.

4.2.4 PIXIUM 4143 / 4343 DETECTOR

There are 5 LEDs on the PIXIUM 4x43 detector, as described in Table 6:

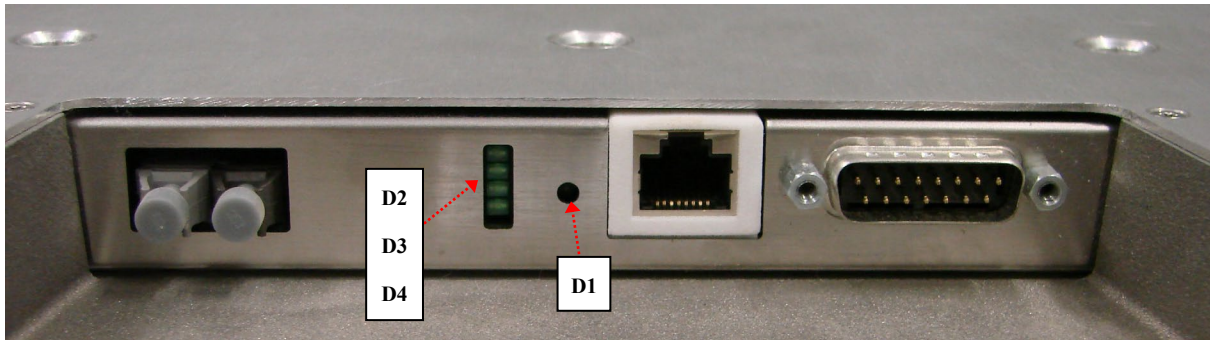
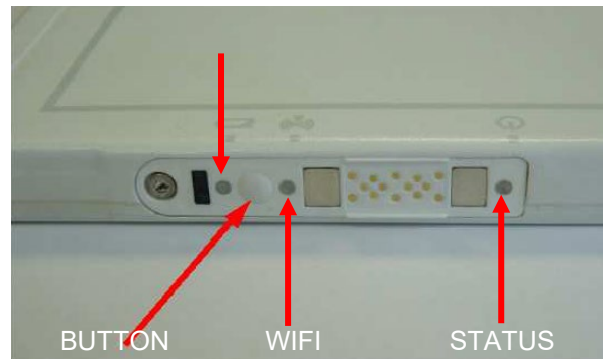


table 6

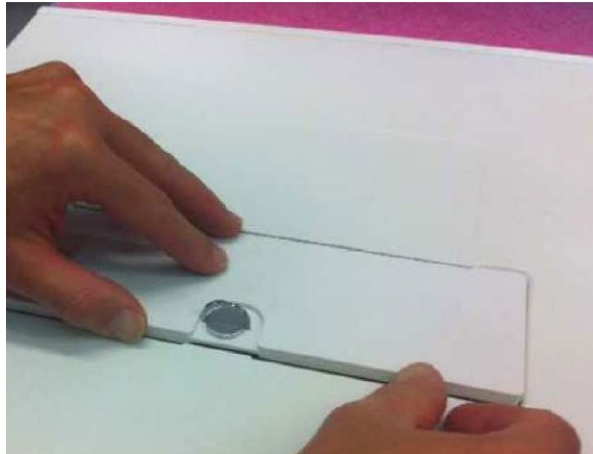
LED	NAME	DESCRIPTION
D1	POW_OK	ON = Detector powered up. OFF = Error in external power supply for the detector.
D2	DET_OK	ON = Microcontroller initialising successful. OFF = Microcontroller initialising failed.
D3	COM_OK	ON = Communication between video processor and detector established. OFF = Communication problem found.
D4	FREQ_OK	ON = In standby. OFF = During the acquisition of an image.
D5	XRAY_OK	ON = During appearance of the X-ray window. OFF = Between two X-ray windows.

4.2.5 PIXIUM EZ WIRELESS DETECTOR



LED NAME	LOGO	COLOUR	DESCRIPTION
ON/OFF		/	On/Off button (keep the button pressed for at least 3 seconds)
Battery		Off	No battery FPD off Detector starting up
		Orange: fast flashing	Battery level less than 5% its full charge
		Orange	Battery level less between 5% and 10% its full charge
		Green	Battery level more than 10% its full charge
WIFI		Off	WIFI disabled Detector switched off Detector starting up
		Orange	Detector not connected to the Access Point
		Green	Detector connected to the Access Point
Status		Off	Detector switched off
		Orange: slow flashing	Internal error
		Orange	Operating mode: OFFLINE
		Green: slow flashing	Operating mode: LISTEN
		Green	Operating mode: READY

Insert the battery in its compartment, as shown in the figure below.
Turn the battery lock clockwise (lock):

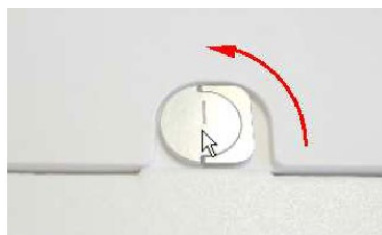


Press the ON/OFF button shown below (for about 1s) until the STATUS LED starts flashing (orange).



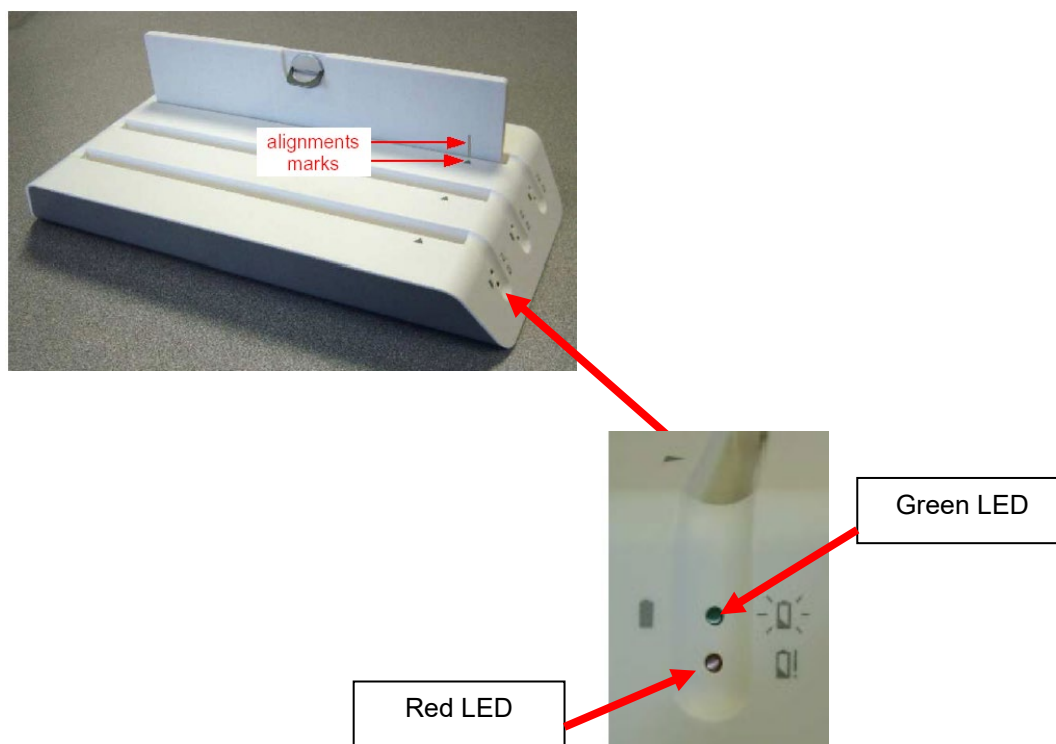
Wait until all 3 LEDs light up.

Press the ON/OFF button until the STATUS LED starts flashing orange (after about 5s) to switch the detector off.



Attention: ONLY remove the battery after switching off the detector (ON/OFF button).

4.2.5.1 BATTERY CHARGER



LED NAME	COLOUR	DESCRIPTION
Charging	Green, flashing	Battery charging
	Green	Battery fully charged
Charging status	Red	Battery charging not possible

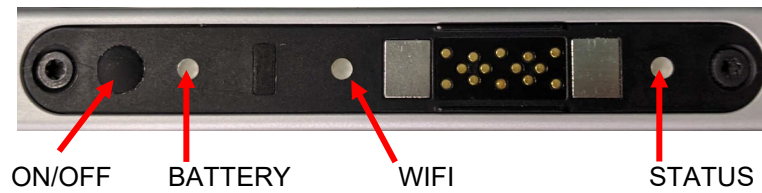


The life of a battery may be compromised if you remove it from the charger before the battery is fully charged.



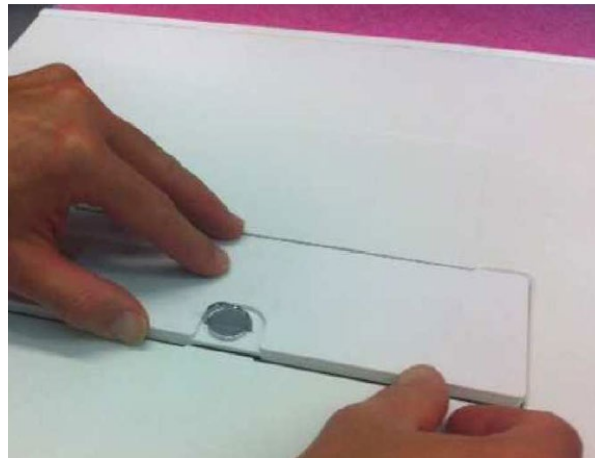
Place the battery charger in a well-ventilated position.

4.2.6 PIXIUM DR WIRELESS DETECTOR



LED NAME	LOGO	COLOUR	DESCRIPTION
ON/OFF		/	On/Off button (keep the button pressed for about 1 second)
Battery		Off	No battery FPD off Detector starting up
		Orange: fast flashing	Battery level less than 5% its full charge
		Orange	Battery level less between 5% and 10% its full charge
		Green	Battery level more than 10% its full charge
WIFI		Off	WIFI disabled Detector switched off Detector starting up
		Orange	Detector not connected to the Access Point
		Green	Detector connected to the Access Point
Status		Off	Detector switched off
		Orange: slow flashing	Internal error
		Orange	Operating mode: OFFLINE
		Green: slow flashing	Operating mode: LISTEN
		Green	Operating mode: READY

Insert the battery in its compartment, as shown in the figure below.
Turn the battery lock clockwise (lock):

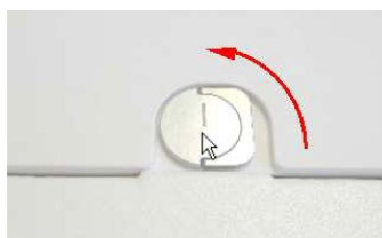


Press the ON/OFF button shown below (for about 1s) until the STATUS LED starts flashing (orange).



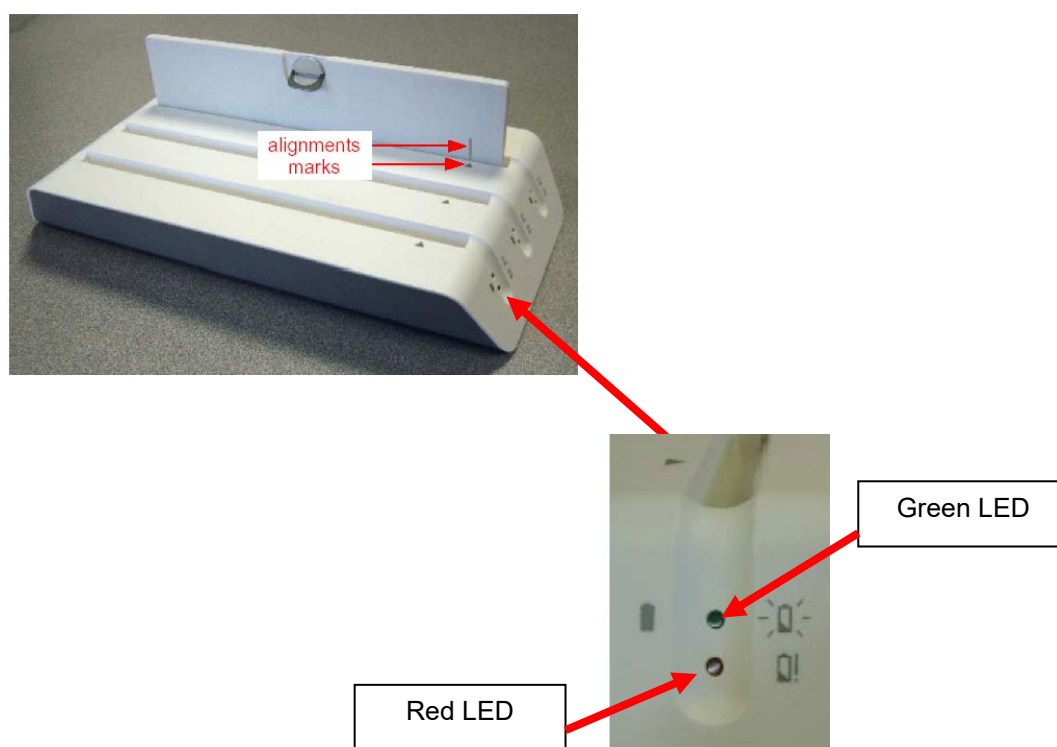
Wait until all 3 LEDs light up.

Press the ON/OFF button until the STATUS LED starts flashing orange (after about 5s) to switch the detector off.



Attention: ONLY remove the battery after switching off the detector (ON/OFF button).

4.2.6.1 BATTERY CHARGER



LED NAME	COLOUR	DESCRIPTION
Charging	Green, flashing	Battery charging
	Green	Battery fully charged
Charging status	Red	Battery charging not possible

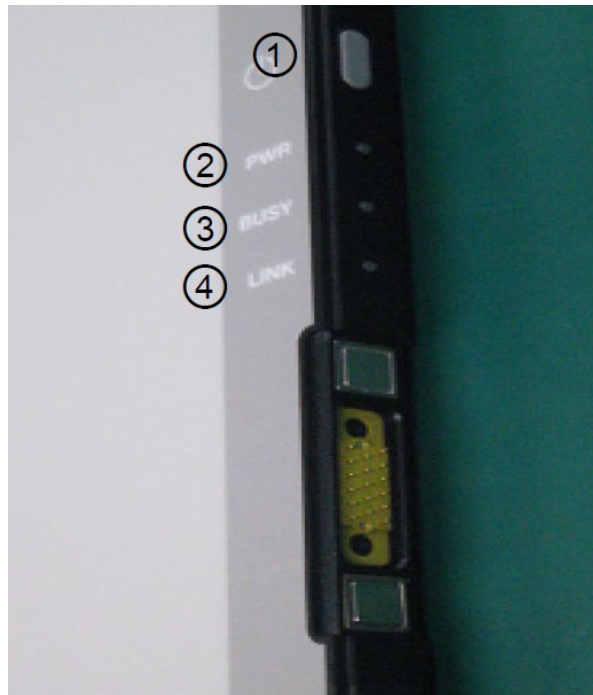


The life of a battery may be compromised if you remove it from the charger before the battery is fully charged.



Place the battery charger in a well-ventilated position.

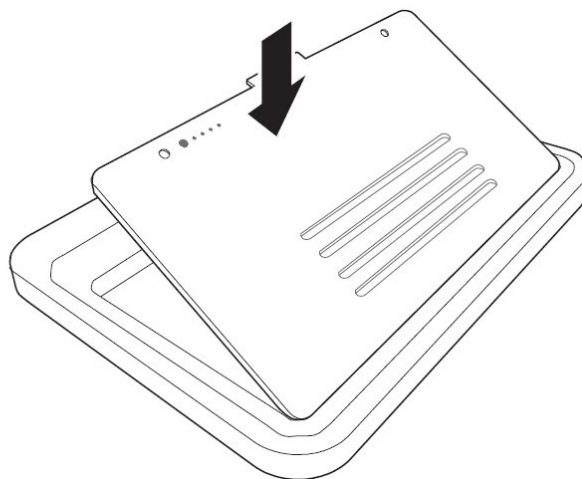
4.2.7 TOSHIBA FDXW WI-FI DETECTOR



The maximum load the entire surface of the FPD could tolerate is approximately 1471N (150 kg), while the central area (diameter: 40 mm) could tolerate approximately 981N (100 kg).

Item	Colour	Description
1	--	Button for turning on and off the detector (keep the button pressed for at least 2s)
2 PWR led	Blue	Led: the detector is on
3	Green	Led: it is lit when the detector is busy (usually when turning on)
4	Blue / Green	Led: Blinking blue when the detector is connected via cable. Green when it is connected via WiFi

- Insert the battery in its compartment, as shown in the figure below.

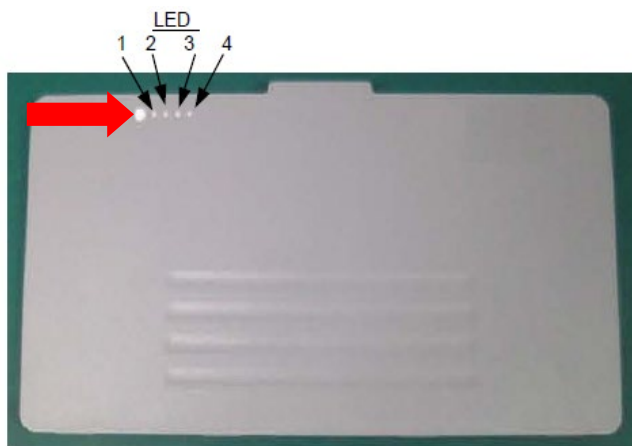


- Make sure that the battery is safely fixed and the two levers, marked with arrows, are in the position shown.



- The battery charge level can be verified by pressing the button shown in the following picture. The LEDs 1 - 4 will light up for a short moment, according to the battery charge level.

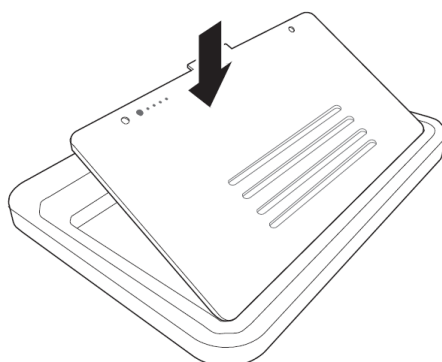
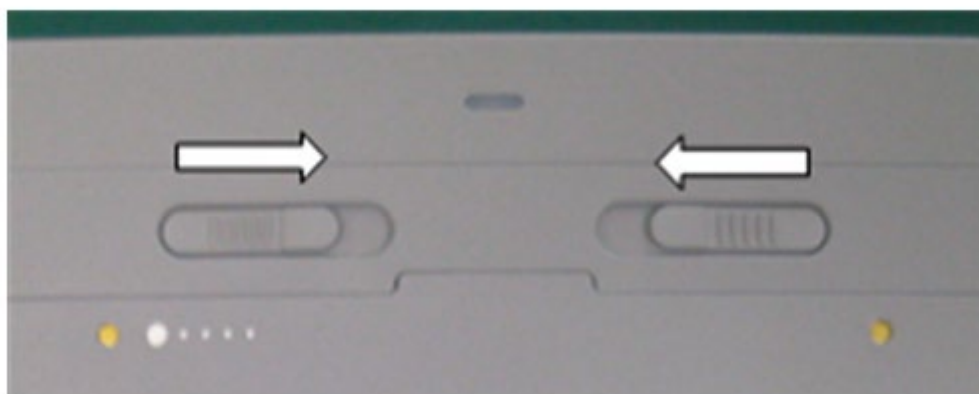
LED	CHARGE LEVEL
LED 1,2,3,4 light on	76 ÷ 100%
LED 1,2,3 light on	51 ÷ 75%
LED 1,2 light on	26 ÷ 50%
LED 1 light on	11 ÷ 25%
LED 1 Dimming (about 0.5sec interval)	< 10%



- Turn ON** the detector by pressing for 2 seconds the power button and wait for the PWR LED to turn on; after then, the BUSY and LINK LEDs will turn on, respectively. After about 1 minute, the detector will be ready to be used.
- Turn OFF** the detector by pressing the button until the PWR LED turns off.



Remove the battery, only if the detector is OFF, moving the levers as shown in the figure below (follow the direction of the arrows) and place it in the **battery charger**.



4.2.7.1 BATTERY CHARGER

The status LED can light up in 2 colours:

- **Red:** battery charging
- **Green:** charging completed.



“Full Charge” LED



The life of a battery may be compromised if you remove it from the charger before the battery has been fully charged.

A fully charged battery allows the detectors to work for 1300 shots (cycle time: 8 seconds, capturing time 0,5 seconds); in sleep mode, the battery lasts for 4 hours.

The battery gets fully charged in 2.5 hours. It is possible to charge only one battery at time.

4.2.8 TOSHIBA FDX4343R DETECTOR



LED	Colour	Description
1	Green	POWER: When +24V is input
2	Green	HEALTHY: FPD retains the normal status
3	Green	NETWORK: Normal communication status
4	Green	IMAGING: - Radiography status, EXP_OK output period; - READOUT

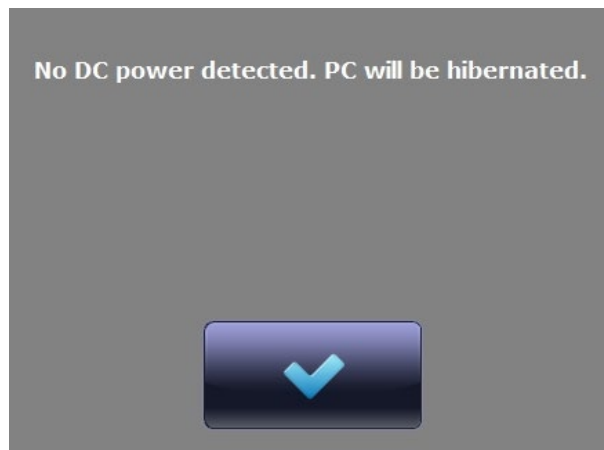
For preparation and connection stages, see *Chapter 2 in Part 1 of the Technical manual*.

4.3 MESSAGES ON MOVING UNITS

The following messages are **only** present on Mobile units or Portable Units.

4.3.1 MESSAGE ON PORTABLE UNIT

Status message	Meaning
No DC power detected. PC will be hibernated	Every time the device is not connected to the mains, it automatically turns to hibernation state.



4.3.2 MESSAGES ON MOBILE UNIT

Status message	Meaning
LOW BATTERY LEVEL. Operation is allowed. For better battery usage, it is recommended to connect the unit to a power source.	Battery level is 10%. Please, plug the device to mains power supply.
VERY LOW BATTERY LEVEL. Operation is allowed although it is urgent to connect the unit to a power source.	Battery level is 5%. It is required to plug the device to mains power supply.
The X ray unit has not been used for 30 minutes and will be shut down in 15 minutes unless you connect it to the power source or you click here.	After 30 minutes of inactivity, the device prepares to shut down in 15 minutes. To avoid the automatic shutdown, plug the device to the mains or press the Confirm key.

CRITICAL BATTERY LEVEL. Operation is not allowed. Connect the unit to a power source. Time remaining before shutdown:30:00



The X ray unit has not been used for 30 minutes and will shutdown in 15 minutes unless you connect it to the power source or you click here.



4.4 ETHERNET SETUP

This procedure is only needed when the equipment is supplied with DICOM functions (optional).

The Responsible Organization is accountable for changing settings to suit the network to which the EM equipment is connected.

Connecting the equipment to the IT-network, the Responsible Organization should also consider that:

- connection of the equipment to an IT-NETWORK that includes other equipment could result in previously unidentified risks to **patients, operators or third parties**;
- Subsequent changes to the IT-network could introduce new risks and require additional analysis; changes to the IT-network include:
 - changes in the IT-network configuration,
 - connection of additional items to the IT-network,
 - disconnecting items from the IT-network,
 - update of equipment connected to the IT-network,
 - upgrade of equipment connected to the IT-network.

Warning: *The Responsible Organization should identify, analyze, evaluate, and control these risks in compliance with IEC 80001-1:2010 standard.*

4.5 NETWORK SAFETY

The manufacturer provides the Software free of malwares and viruses; this is assured by the continuous updating of an antivirus that check the software.



The Installer shall configure the system to be protected by a Firewall.



The Installer shall create a backup copy of the system when the installation procedure has been completed to restore it in case of problems.

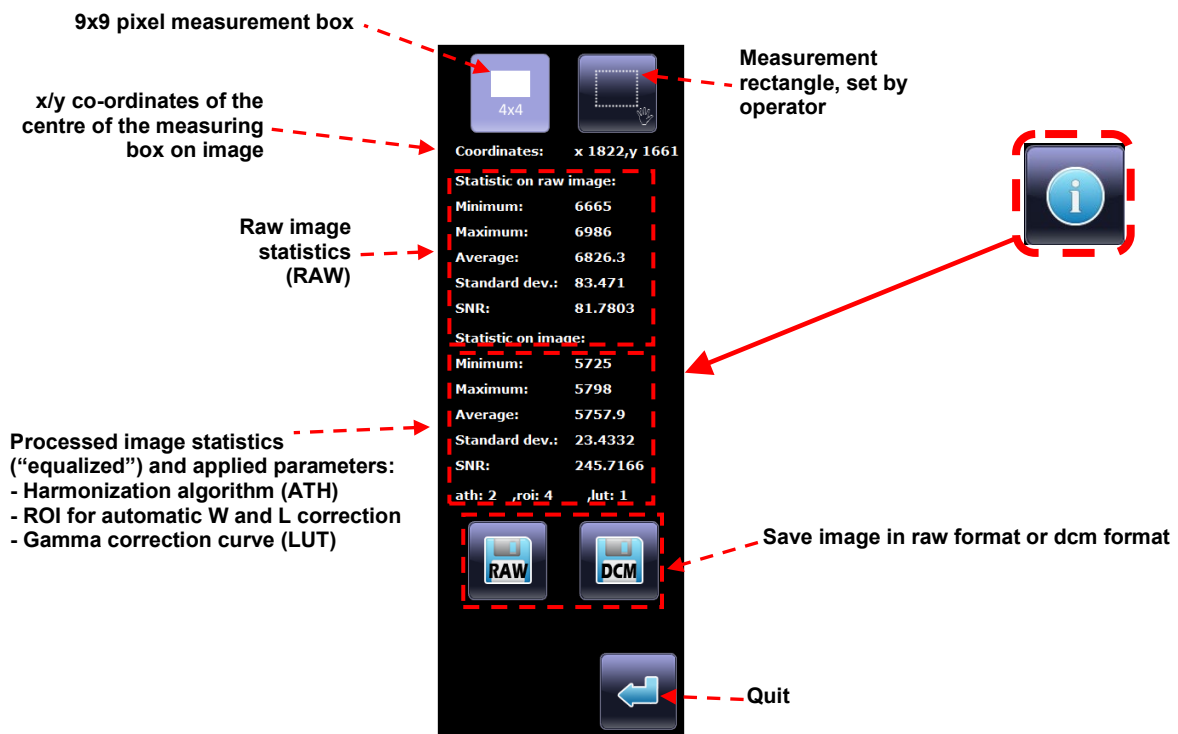
5 ANNEXES

5.1 STATISTICS

Typically, this function is used by the Technical Service when checking the system. It can only be accessed by Administrator and Advanced users.

It shows image statistics about grey levels (lsb) on both raw and equalized image.

The Statistics menu is accessed by selecting the relevant button in the post-processing frame:



- Select the reading area required:

- a fixed 9x9 pixels square
- a variable rectangle to be drawn on the image



- Once the reading area has been placed on the image, the relevant values automatically appear in the specific fields:
 - Minimum, Maximum, and Average LSB levels.
 - Standard deviation.
 - SNR (Signal Noise Ratio).
 - Processing parameters applied (for processed image, only).
- The values are calculated:
 - on the **RAW** image (clean image provided by the detector)
 - on the **Equalized** image (processed image).

5.2 SAVE IMAGES TO LOCAL ARCHIVES

The Save to Local Archive functions are used by the Technical Service when checking the system and can only be used by an Advanced user or by the Administrator.

These functions let you save the selected image in DICOM or RAW format on the Archive Disk.



To save an image, open the Statistics tool (the same tool described in the previous paragraph, as shown in the figure above), and then use the relevant key:

- **SAVE RAW**  : to save the image shown, in **.raw** format.
- **SAVE DICOM**  : to save the image shown, in **.dcm** format.

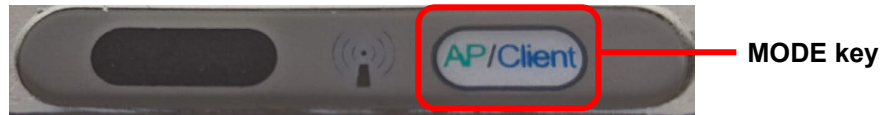
The **Administrator** can save images on local disc or on external drive: the system asks to select a folder to save the images in.

The **Advanced** user can save images on an external memory device, only (USB PEN DRIVE).

5.3 IRAY INTERNAL ERROR: RESET PROCEDURE

If the **Status LED** becomes orange and starts flashing, it means that an internal error has occurred; it is necessary to perform the following **reset procedure**:

- Press and hold the Mode button (shown in the figure below) for at least 7 seconds, until the **WiFi LED** starts blinking.



- Within 7 seconds triple click the ON/OFF button: the **Battery LED** starts blinking.
- Hold the ON/OFF button for at least 4 seconds, until the detector powers off.
- After the reboot the detector is reset: the detector must be reconfigured and the calibration procedure must be performed.



To prevent this error from occurring again, it is necessary to replace the battery of the detector with a new one.