

Technical manual (EN)

Acquisition software for X-ray images from flat panel or CR systems



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Creation date: 20. February 2023

dicomPACS®DX-R version: 8.0

Document: OR003925-001

Revision	Date	Reason / Chapter
1	20. February 2023	First version

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Chapter 1. Introduction

Thank you very much for choosing *dicomPACS®DX-R* our X-ray acquisition software for DR (direct radiography/flat panels) and CR (computed radiography) systems.

The dicomPACS®DX-R software is an independent product for the acquisition, processing and optimization of X-ray images (raw images) provided by flat panel (DR) systems or CR systems. In principle, the brand of the particular DR or CR device makes no difference to the operation of the software. The open architecture of the software allows the integration independent of the producer.

The technical manual provides detailed information on the configuration of and the use of the range of *dicomPACS*[®]*DX-R* facilities included in the software to make the processing and administration of your medical X-ray images as efficient as possible.

Quality management

The product development process of OR Technology is subject to a quality management system in accordance with DIN EN ISO 13485.

Safety instruction

To ensure the safety of patients, staff and other persons, any changes to the software and hardware delivered by OR Technology may only be extended with prior written permission from OR Technology

Liability

If unauthorised changes have been made to the delivered software and hardware components, the warranty by OR Technology becomes void. OR Technology will not accept any responsibility or liability for the accurate functioning of the product in such a case.



PRACTICAL HINT

Please read the technical manual before starting to use the software. Our support team will be glad to help you if you have any queries.

Enjoy reading this manual as well as working with dicomPACS®DX-R

Your OR Technology team

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Chapter 2. Abbreviations

AE	Application Entity (see DICOM-standard), corresponds to a DICOM appliance
AE-Title	Name of an AE
API	Application Programming Interfaces
DICOM	Digital Imaging and Communications in Medicine
PACS	Picture Archiving and Communication System
PMS	Practice Management System
SCP	Service Class Provider
SCU	Service Class User
SMB	Storage Message Blocks - the SMB protocol is used during transfer between Windows computers
UID	Unique Identifier
UNC	Uniform Naming Convention
WA	Work Around - a problem was not solved but is circumvented

Table 1. Abbreviations

Warnings and advisory symbols

To ensure the safety of patients, staff and other persons, any changes to the software and hardware delivered by Oehm und Rehbein GmbH (OR Technology) may only be made with prior written permission from OR Technology.

Please read the respective manuals of the connected devices, such as of the X-ray generator, sensor / detector or scanner, before using dicomPACS®DX-R.

The warning signs "Danger" and "Caution" used throughout this manual are written in English and French. The following symbols will be used throughout this manual.

DANGER!



EN: The "Danger" icon advises of conditions or situations that if not heeded or avoided will cause serious malfunction to the software. The functionality of the software can be destroyed in the case of incorrect use.

If unauthorized changes have been made to the delivered software and hardware components, the warranty by OR Technology becomes void. OR Technology will not accept any responsibility or liability for the correct functioning of the product in such a case.

FR: L'icône «Danger» informe des conditions ou des situations qui, si elles ne sont pas prises en compte ou évitées, causeront un sérieux défaut de fonctionnement au logiciel. La fonctionnalité du logiciel peut être détruite en cas d'utilisation incorrecte.

Si des changements non autorisés ont été effectués sur les composants du logiciel et du matériel livrés, la garantie d'OR Technology s'éteint. OR Technology n'acceptera aucune responsabilité pour le fonctionnement correct du produit dans un tel cas.

/! CAUTION/ATTENTION!



EN: The "Caution" icon points out areas that require special attention to ensure the accurate function of the product. The functionality of the software can be limited in the case of incorrect use.

FR: L'icône «Attention» indique les zones qui requièrent une attention spéciale pour assurer le bon fonctionnement du produit. La fonctionnalité du logiciel peut être limitée en cas d'utilisation incorrecte.



The "Note" icon gives information that is important to know but which do not affect the functionality of the software.



PRACTICAL HINT

The "Practical Hint" icon gives useful information on how the can be simplified. A hint is a suggestion on how the workflow could be made easier within the software.

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Chapter 3. Installation of dicomPACS®DX-R

The dicomPACS®DX-R software is an independent product for the acquisition, processing and optimization of X-ray images (raw images) provided by flat panel (DR) systems or CR systems. In principle, the brand of the particular DR or CR device makes no difference to the operation of the software. The open architecture of the software allows the integration independent of the producer.

dicomPACS®DX-R carries out the image processing of the raw images provided by the particular device and provides the radiographer/X-ray assistant with an optimum workflow.

3.1 Operating requirements

CPU	Intel Core i5 or comparable processor	
Memory	16 GB RAM	
Hard drive	80 GB of free disk space on C:\ for software and operating system For D:\ (for acquired data) a minimum capacity of 1 TB should be provided (NAS recommended)	
Network	100 MBit (1 GBit recommended)	
Graphics hardware	Colour screen with resolution of minimum 1.280 x 1.024 pixel, using the true- colour mode, higher resolution recommended For embedded systems a resolution of at least 1.024 x 768 pixel must be assured	
Operating system	Windows 10 Windows 11 64-bit	
Flat panel detectors	Please note the requirements for the different flat panel detectors and generators, e.g. additional network cards or serial ports!	
SQL server	2019	

Table 2. Operating requirements

3.1.1 Windows support of panels and scanners

The Windows support is dependant from the SDK of the panel manufacturer. Here you will find a list of the currently supported detectors and scanner types:

Panel/scanner	Windows 10	Windows 11	Comment
Biosenstech	Yes	Yes	
CanonETD (former Toshiba)	Yes	No	Not supported for Windows 11.

Panel/scanner	Windows 10	Windows 11	Comment
CareRay	Yes	Yes	
Carestream Vita	No	No	Not supported for Windows 11. Will not be supported anymore.
Carestream Vita flex	Yes	No	Not supported for Windows 11. Last updated on February 2023.
Divario CR Dental	Yes	Yes	According to our assessment, it runs on Win 11. However, we have no information from original equipment manufacturer.
Divario CR-Flash	Yes	No	Not supported for Windows 11. Last updated on February 2023. This also applies to the original equipment from 3Disc
Divario CR T2/Tm	Yes	Yes	
DRTech	Yes	Yes	
Hamamatsu	Yes	No	New version for Win 11 is expected to come
iRay	Yes	Yes	
LG	Yes	No	Not supported for Windows 11. Last updated on February 2023.
Thales Pixium	Yes	No	Not supported for Windows 11. Last updated on February 2023.
PZ Medical	Yes	Yes	
Radmedix (Acuity)	Yes	Yes	
Rayence (Xmaru)	Yes	No	Not supported for Windows 11. Last updated on February 2023.
Varex PaxScan (Varex VSP)	Yes	No	Not supported for Windows 11. Last updated on February 2023.
Varex XRpad2	Yes	No	Not supported for Windows 11. Last updated on February 2023.
Vieworks	Yes	No	Not supported for Windows 11. Last updated on February 2023.
XenOR Gen 1 (CW, CL, CWe, CLe models)	Yes	Yes	
XenOR Gen 2 (W-flex, WF, F models)	Yes	Yes	

Table 3. List of supported detectors and scanners

Cybersecurity

Following services and processes use these ports:

Process/Service	Port	Description
jDicomCC	freely configurable; standard: 104, 2900, 3000, 3344, 4333, 5001, 8082, 9092, 22550, 44444, 44445, 50023,	The jDicomCC deals with the reception, storage and distribution of DICOM files, as well as the administration of the image databases.
ORLicense	3602, 3601	Monitors and configures the license service.
WorklistServer	105	Takes care of querying worklist entries.
PrintSCP	5040	Receives DICOM printing instructions and executes them on a printer.
MSSQL dicomPACS instance	1753	Connects the database to the MMSQL server
ORBackup	2014	Handles backups of the image database.
WEB service for ORCA	80, 443	Connects <i>dicomPACS</i> ® to the ORCA Cloud.

Table 4. Cybersecurity - used ports

3.1.2 Monitor requirements

The acquisition software is primarily designed for viewing monitors to overview the acquisition process and must thus only be used on colour monitors.



↑ CAUTION / ATTENTION!



EN: dicomPACS®DX-R is not designed for b/w monitors!

FR: dicomPACS®DX-R est exclusivement conçu pour les écrans en couleur!

A viewing monitor should satisfy the following requirements:

- VGA and / or DVI connection
- Resolution of at least 1,280 x 1,024 pixels
- TFT-colour from 17" with high contrast ratio (450:1)
- High fidelity of grey tones and good luminance distribution
- Optional pre-set DICOM LUT

For diagnostic purposes, we recommend separate workstations, where qualified, diagnostic monitors are available. The minimum requirements for monitors that are used for diagnosis are described in the country respective directives regarding diagnosis on monitors and medical products laws. All monitors must conform to the requirements of the IEC 61223-2-5:1994 and pass the acceptance and display test.

The size of the screen depends on the type of images.

We recommend that a diagnostic monitor should satisfy the following requirements:

- DVI connection (no VGA)
- Resolution of at least 1,280 x 1,024 pixels for embedded systems
- Special b/w monitors from 18,1" TFT with high luminance and contrast for embedded systems
- High fidelity of grey tones and optimal luminance distribution
- Preset DICOM LUT

Note



A b/w monitor can only be used as an additional diagnostic monitor, not for primary use!

3.2 Installation

The *dicomPACS*[®]*DX-R* acquires and processes images provided by DR and CR systems. For the functionality it is important to know that *dicomPACS*[®]*DX-R* supports different image sources, e.g. panels.

\triangle

CAUTION/ATTENTION!



EN: If one of this image source should be used, install first the according software and afterwards install $dicomPACS^{\circledR}DX-R$. Otherwise the functionality of the software can not be guaranteed.

FR: Si l'une de ces sources d'image devait être utilisée, installez d'abord le logiciel correspondant et installez ensuite *dicomPACS®DX-R*, sans quoi la fonctionnalité du logiciel ne peut être garantie.

The installation of *dicomPACS®DX-R* is started by running the dicomPACS_DX_R_setup.exe. Installation files can be downloaded from ftp://ORftp:SU44dP@ftp.orhro.com/DXR. The password may be changed. Then visit the forum, the new password is published there. The update files can be downloaded from ftp://update:public@ftp.orhro.com/DXR_update.

More details can be found in the forum http://www.dicomPACS-forum.de and additionally on http://help.orhro.com.

The setup will install all needed software elements. The main *dicomPACS*®*DX-R* program files will be installed to the folder "C:\dicomPACS\".

18 / 372 3.2 Installation

In all cases, except for the demo installation, all image files produced by the system will be stored on "D:\dicomPACS\". That is the reason why the setup is cancelled, when there is not at least 25GB free disk space on the hard drive "D:\". It is possible to switch off the disk space check by running the setup with the option "dicomPACS® DX R setup.exe /disablediskspacecheck".

Note



It is in your own responsibility when changing the configuration to store the images in a different location. The database and the image files for the *dicomPACS®DX-R* software have to be on the local system. A connection by network drive and database to another database server is not supported.

The location can be configured in the databaseConfig.xml which is located in the "C:\dicomPACS\Console\" folder.

According tag:

 <ArchivePath class="de.or.console.database.io.ConsoleArchiveData" device="D:" root="dicomPACS" />

Note



In case the image archive should not be installed on drive D:\, the path must also be entered in the file C:\dicomPACSConsoleSCU\ConsoleSCU.ini. [dicom-ARCHIV]

...

ArchivPath=C:\dicomPACS

Change the value from the attribute "device" to the favoured location.

The setup of the programme starts by the language selection and the operation mode selection (human / yet).

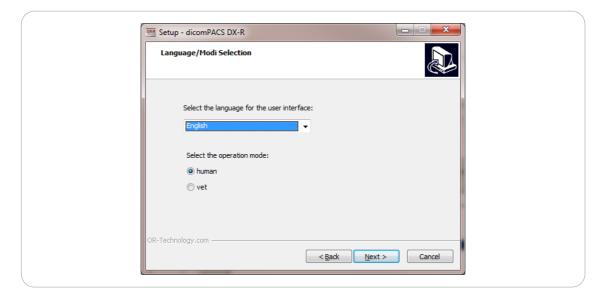


Figure 1. Language and operation mode selection *dicomPACS®DX-R*

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All selections, to which the imaging device will be connected and which modules will be installed, are found in the components selection window, which can be seen in the following screen shot.

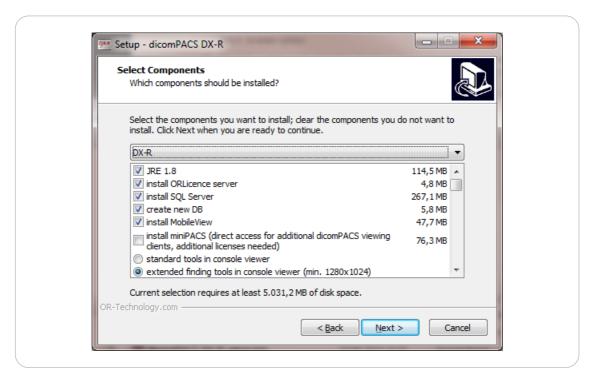


Figure 2. dicomPACS®DX-R components selection

There are three default installation types:

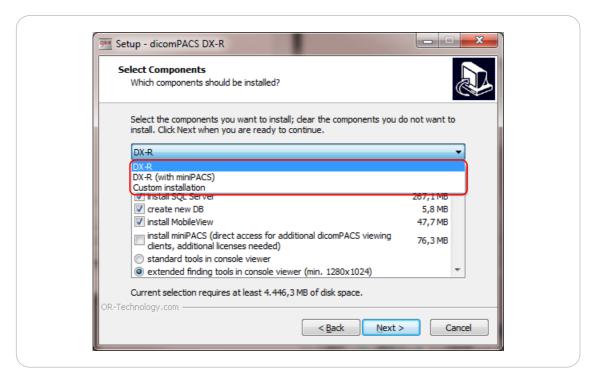


Figure 3. dicomPACS®DX-R components selection

1	dicomPACS [®] DX-R	Installs the console
2	dicomPACS [®] DX-R with miniPACS (archive - network)	Installs the console and a miniPACS archive
3	Custom installation	Performs a custom installation of the console

Table 5. Installation types

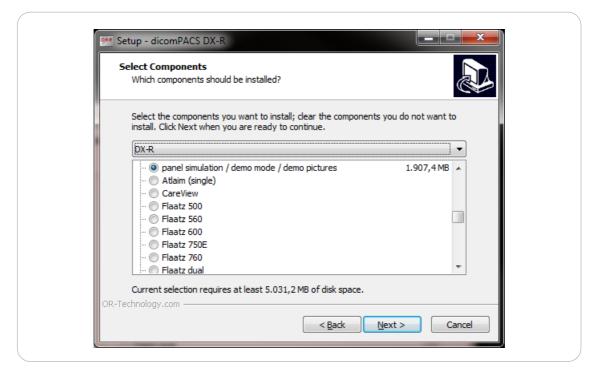


Figure 4. dicomPACS®DX-R installation

Following the explanation for the available options as seen above:

Main Files	Main programme files
install ORlicense server	Installs the ORLicense management software
install dicomPACS archive (miniPACS)	Runs the console_DX-R_network_setup
register panel or CR reader in sensors.xml	Defines which device is / will be connected
	For Varian and PoC, the device software has to be installed before!
enable x-ray generator control	Selects which X-ray generator will be activated

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install X-ray helper human/ vet	Installs the X-ray helper. The human version can be equipped with videos, which can be installed afterwards
JRE	Installs the OR java runtime environment
install SQL Server	Installs the dicomPACS connect SQL Server 2012, with the instance dicomPACS
create new DB	Attaches an empty <i>dicomPACS®DX-R</i> database into the instance dicomPACS
install MobileView	Installs MobileView, additional license necessary
install miniPACS	Installs the OR java runtime environment
standard tools in console viewer	Installs standard tools of the viewer in the console
extended finding tools in console viewer	Installs extended tools of the viewer in the console

Table 6. Available options

By default the system is set up to store images as long as hard disk space is available. When the storage is full, it will give a warning message and later stop working.

In case you would like to install detectors after you have performed a full installation, start the Set2(detector).exe and select "full installation".

In case you have installed a detector and the software is to be updated, please select "update installation". An update is performed but the configuration remains the same.

Note



In case a Windows restart is requested during the installation, please cancel and restart only after the installation.

Note



The sensor setups can also perform updates (only Ctrl, no *.xml, *.ini). The Sensors.xml and the workstation configuration are not changed.

Available tools

Note



The tools available in the toolbar are dependent on the setup selection. "Standard tools" are recommended for touch screen operation, "extended tools" for all other.

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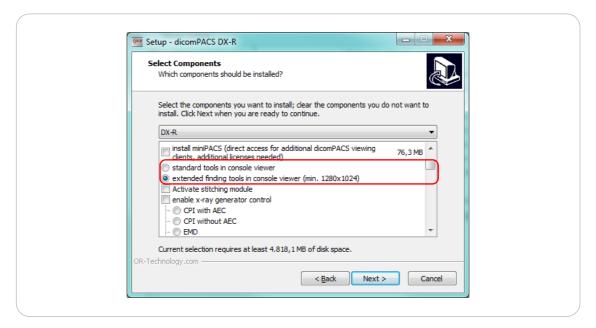


Figure 5. Default selection with extended tools

3.2.1 Configuration of the autodelete function

For applications in which the console database is not intended as a long term archive, one can activate the auto delete option, whereby the oldest studies can automatically be deleted, so that the hard disk will not be full over time. The autodelete function automatically deletes the oldest studies in the "ArchivPath" and also removes these entries from the SQL database. The activation of this function is performed by the parameter

'MinDiskSpaceAutodeleteStudys = 8700MB'

in section [dicom-ARCHIV] of the consoleSCU.ini. This parameter is uncommented by a hash key ('#') in the .ini-file. This character may simply be removed for the activation. This deletion process continues until a free storage capacity of at least 8700 MB is reached on the archive drive.

The value of 'MinDiskSpaceAutodeleteStudys = 8700MB' can be adjusted according to your own needs

In C:\dicompacs\console\dicomPACS.properties change or add the parameters with the standard values

- ConsoleDatabase.WarnDiscFreeMB=1000
- ConsoleDatabase.MinDiscFreeMB=500

to receive a warning when the hard disk has reached a certain limit. Please note that the parameter of ConsoleDatabase.WarnDiscFreeMB has to be lower than in MinDiskSpaceAutodeleteStudys. The user interface gives an indication when the autodelete function is enabled.

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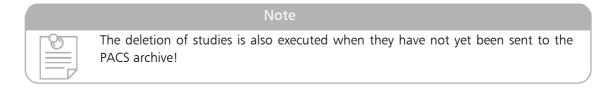


Figure 6. ConsoleSCU with warning

Even when the function is activated and regardless of free storage space on the archive drive, the value of at least ten studies will never be undercut. The logging of the deletion of the studies is carried out in the 'event.log' in the folder C:\dicompacs\consoleSCU\.

For example it is logged as follows:

04.05.2010?08:44: autodelete is ON! - delete path: N:\dicomPACS\ORconsoleDB\VOL000000\188_20100921 delete from dicomstudys where autoincrement = 188



3.3 Reset database

3.3.1 Reset configuration database

Proceeding with setup:

- 1. create ConsoleDB.exe
- 2. gen *.exe
- 3. Set2*.exe

create_ConsoleDB.exe:

Creates a new ORxrayDB

gen *.exe:

• Sets the corresponding generator in the database

Set2*.exe:

- Configures the corresponding sensor
- Configures a workstation with the sensor and generator

3.3.2 Reset of the image database

delete_ImageData.exe:

- Tool to reset the ORConsoleDB
- Double security check
- Delete from ORConsoleDB archive and delete from the database
- Create a new database



CAUTION/ATTENTION!



EN: All images and configurations are deleted respectively reset.

FR: Toutes les images et configurations sont effacées et réinitialisées respectivement.

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ett blank intentionally

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Chapter 4. Installation of the sensor

The following chapter describes the installation, configuration and calibration of the different sensors.

The "Installation of the sensor" for the following detectors is already excluded from this manual and will be available as extra instructions:

- AcuityDRe
- Atlaim
- Biosenstech
- CanonETD
- CareView
- DRTech
- Hamamatsu
- HDR
- LG
- PZMedical
- Rayence
- Thales
- Toshiba (former Toshiba sensors and now CanonETD)
- Varex VSP (PaxScan)
- Varex XRpad and XRpad2
- Vieworks
- VieworksNDT
- XenOR

In case a active generator control is set, a separate window pops up after clicking on the button "Calibration" in the sensor definition to set the generator values for the calibration.

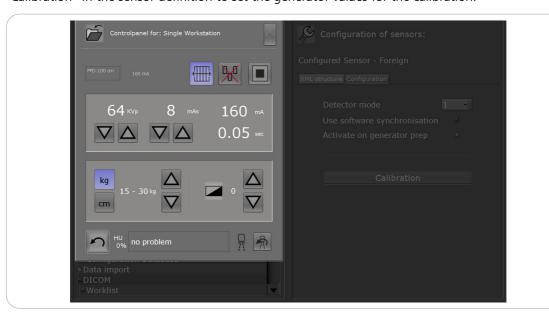


Figure 7. Set generator values for active generator control

Note



The grid filter for the processing is designed for stationary grids with 60 LP/cm. The grid filter functions optimal only for these and finer grids.

4.1 Digital image

It is possible to import images from cameras or scanned documents and archive them. A setup "AddPhotoWorkstation.exe" in the "Modules" folder is available in the installation sources that adds a workstation to import photos.

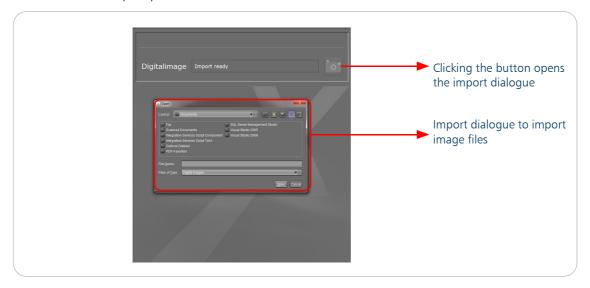


Figure 8. digital image sensor

In the support mode in the section Sensor, the configuration of the digital image sensor allows to set a standard directory from where the images should be imported. You can, however, import from any other directory when you select the path manually. Furthermore, it is possible to select to automatically delete the imported image from the directory, so that it is no longer available in the import directory but archived in *dicomPACS®DX-R*. The selection "Compress image data" imports any data material from the import directory as a .jpg file in DICOM. The data size of the imported images can thus be minimized. Uncompressed data in RGB format have the advantage that any PACS can display it guaranteed.

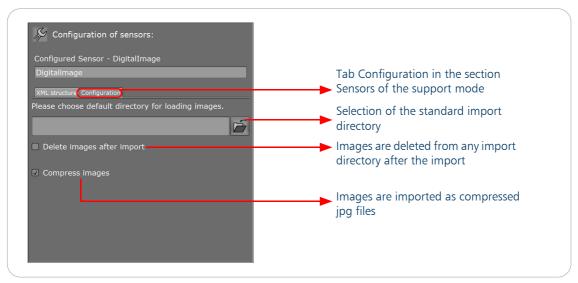


Figure 9. Sensor configuration

4.1 Digital image 29 / 372

4.2 Installation of Dürr

4.2.1 Installation

During the setup of the Dürr software, the connection is requested. Select USB, which is already preselected, when you have VistaRay or VistaScan. The use of VistaNet does not apply. The software is installed on C drive to C:\Duerr. The drivers for the sensors are located in the subdirectory C:\Duerr\VistaScan\install\USB\. In the configuration programme

C:\Duerr\VistaScan\VistaScanConfig.exe you can select the operation mode (normal mode or demo mode). (To save the changes, the best is to change the tab).



!\ CAUTION/ATTENTION!



EN: While running the VistaScanConfig application Dürr enters with the wrong IP address (192.168.6.14). This has to be deactivated manually in the following tab. Type in the correct IP address which is 192.168.3.125. Then the device will be recognized and can be used in dicomPACS®DX-R.

FR: En démarrant l'application VistaScanConfig de Dürr, une adresse IP erronée est enregistrée dans le logiciel de radiographie (192.168.6.14). Cela doit être désactivé manuellement dans l'onglet suivant. Saisissez l'adresse IP correcte qui est 192.168.3.125. L'appareil sera ensuite reconnu et pourra être utilisé dans $dicomPACS^{\mathbb{R}}DX-R$.

4.2.2 Configuration

In the file Sensors.xml the use of the scanner is defined as follows:

```
<Sensor type="Duerr" id="duerr" start="true" maxValue="65535" name="Dürr" serialNumber="0815"</p>
width="2304" height="3200" calibrationTime="
 flip="none" invert="false" rotate="none" sensitivityFactor="120" offset="0" >
  <Jobbir useRegDir="true"/>
  <Application startLocalApp="true" closeApp="false"/>
  <targetDir>c:/Duerr/Images</targetDir>
  <configDir>c:/Duerr/vistascan</configDir>
  <demoDir>C:/Duerr/vistascan/Demo/Images</demoDir>
  <PollingDir>c:/Duerr/Images</PollingDir>
  <TagMapping>
   <tag group="0008" element="0022">
    <value section="imageinfo" parameter="ScanDate"/>
   <tag group="0008" element="0032">
    <value section="imageinfo" parameter="ScanTime"/>
   </tag>
   <tag group="0018" element="6020">
    <value section="imageinfo" parameter="Pixel X" />
   <tag group="0018" element="6022">
    <value section="imageinfo" parameter="Pixel_Y" />
   </tag>
   <tag group="0018" element="1164">
    <value section="imageinfo" parameter="Pixelsize" />
    <value section="imageinfo" parameter="Used projection factor"/>
   </tag>
   <tag group="0028" element="0100">
    <value section="imageinfo" parameter="BitsPerPixel"/>
   <tag group="0028" element="0004">
    <value section="imageinfo" parameter="PhotometricInterpretation" />
   <tag group="0018" element="1000">
    <value section="imageinfo" parameter="ScannerSerial" />
   </tag>
   <tag group="0070" element="0042">
    <value section="RawImageParamset" parameter="Rotation" />
   <tag group="0008" element="0008">
    <value section="RawImageParamset" parameter="ImgTypes" />
   <tag group="0018" element="1400">
    <value section="RawImageParamset" parameter="ParamName"/>
   </tag>
   <tag group="0020" element="4000">
    <value>Beispielkommentar fuer ein Bild</value>
   </tag>
  </TagMapping>
 </Sensor>
```

TagMapping determines which data is transferred to the DICOM objects. The directories may be configured in the software in the support mode.

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The data for the TagMapping is read from the dat-file that is created during the scanning process with the xyz-image in the directory C:\Duerr\Images.

```
[imageinfo]
Pixel_X=2960
Pixel_Y=1158
Res X = 100885
Res Y=100885
Pixelsize=100885
Used projection factor=1
BitsPerPixel=16
SystemType=VistaScan
ScanmodeNr=6
time year=2009
time month=01
time day=29
time h=09
time m=41
time s=24
ScanDate=20090129
ScanTime=094124
ScannerSerial=41539-2008-0543
Slot=31
Start_Slot=399
MaxPix=18400
AvgPix=1543
ExtraInfo=
PhotometricInterpretation=MONOCHROME2
LowPixelValueMeansLowDose=0
DDI=1386
IdentifierString=1.2.826.0.1.3680043.2.876.7101913.20090128143219.2.7:332
[AdditionalInformation]
PatientID=1001
PatientName=Alpwarth, Mathias ^ Che Pasa
AccessionNumber=11f1dab5d6d
PerformingPhysician=Radiologist
[RawImageParamset]
ParamName=PANO optimal 5LP/mm (250dpi)
ParamNameL1 = PANO optimal 5LP/mm (250dpi)
ParamNameL2=PANO optimal 5LP/mm (250dpi)
ParamNameL3=PANO optimal 5LP/mm (250dpi)
ParamNameL4=PANO ottimale 5LP/mm (250dpi)
ParamNameL5=PANO óptimo 5LP/mm (250dpi)
ModeFlags=0x00000010
Max X=300
Max_Y=170
Res_X=100
Res_Y=100
PMT_HV=1000
Pentaspd=4000
Schwellwert=0x0000012C
Laser=8
ImgTypes=Pano
Flag=0
Mirror=0
Range=AutoGrayRange lo=0 up=0 htyp=0
Binning=1
Brightness=50
```

```
Contrast=45
Gamma=14
Script=
Scale=1
DDIPBrightness=50
DDIPContrast=50
DDIPGamma=1
Rotation=0
LampOnTime=12
EraseEnable=1
ID=201
ParamName=PANO optimal 5LP/mm (250dpi)
ParamNameL1 = PANO optimal 5LP/mm (250dpi)
ParamNameL2=PANO optimal 5LP/mm (250dpi)
ParamNameL3=PANO optimal 5LP/mm (250dpi)
ParamNameL4=PANO ottimale 5LP/mm (250dpi)
ParamNameL5=PANO óptimo 5LP/mm (250dpi)
ModeFlags=0x00000010
Max X=300
Max Y=170
Res X=100
Res Y = 100
PMT HV=1000
Pentaspd=4000
Schwellwert=0x0000012C
Laser=8
ImgTypes=Pano
Flag=0
Mirror=0
Range=AutoGrayRange lo=0 up=0 htyp=0
Binning=1
Briahtness=50
Contrast=45
Gamma=14
Script=
Scale=1
DDIPBrightness=50
DDIPContrast=50
DDIPGamma=1
Rotation=0
LampOnTime=12
EraseEnable=1
ID=201
```

4.2.3 Configuration in the support mode

When selecting the menu item Sensor, the Dürr scanner can be entered in the field Please enter name on the right. One field below it can be selected if the above-mentioned elements are integrated in the Sensors.xml. When the Dürr sensor is selected on the left, the configuration may take place. Here it can be specified, whether the Dürr software should be started with the software and whether it should be exited with it. The start of the Dürr software together with the start of dicomPACS®DX-R only works if the Dürr software runs on the local PC. The selection is stored in the application element of the sensor:

4.2 Installation of Dürr 33 / 372

It can also be indicated whether the jobs directory from the registry (C:\Duerr\VistaScan\vsjobs\) should be read or whether a different directory, e.g. on another PC should be used.

- < <JobDir useRegDir="true"/>
 or e.g.:
- <JobDir useRegDir="false">F:\Duerr\VistaScan\vsjobs</JobDir>

4.2.4 Settings in the Configuration mode

In the configuration mode, a standard scanner and scan mode, e.g. Dürr, can be selected, which is set for all selected examinations. This however only works if the Dürr software (VistaEasy) is started. Alternatively, the following OSQL script can be used:

```
osql -S localhost\dicomPACS -d ORXrayDB -U sa -P or18057 -Q "Update Exam set ScanDevice='%DeviceID_fromRunning.dat%', ScanModeID= %ScanModeID_fromModeFile %"
```

4.2.4.1 %DeviceID fromRunning.dat%

The DeviceID is read from the running.dat. The running.dat is located in the jobs directory of the Dürr software (on the local PC under C:\Duerr\VistaScan\vsjobs\).

Note



Please make sure that the Dürr software is running during the process!

The running.dat includes all the available scanners:

```
[VSCAN 1]
Active=0
DeviceName=VistaScan - Dbswin11-XP
Connection=USB
DeviceType=VSCAN
ModeListFileName=c:\duerr\VistaScan\vsjobs\VSCAN 1 Modes.ini
ErrorText=
ErrorNo=0
[VRAY 1]
Active=0
DeviceName=VistaRayCCD - Dbswin11-XP
DeviceID=0
Connection=USB
DeviceType=VRAY
ModeListFileName=c:\duerr\VistaScan\vsjobs\VRAY_1_Modes.ini
ErrorText=
ErrorNo=0
[419430469]
Active=1
DeviceName=VistaScan PERIO NET - im Testcenter 01
Connection=TCP:10.2.242.252
DeviceType=IMDA
ModeListFileName=c:\duerr\VistaScan\vsjobs\419430469 Modes.ini
```

```
ErrorText=
ErrorNo=0
```

The section names are the respective DeviceIDs, which can be used to update the ORxrayDB.

4.2.4.2 %ScanModeID fromModeFile%

The scan-mode ID is read from the respective mode file, which is also located in the job directory of the Dürr software. If, e.g. the DeviceID VSCAN_1 was selected as a scanner, the associated mode file is named VSCAN_1 Modes.ini.

```
[0]
ModeName=INTRA super 40LP/mm (2000dpi)
ModeFlags=0x00000001
ImgTypes=intra
Resolution=12,5
...

[4]
ModeName=PANO super 6,7LP/mm (290dpi)
ModeFlags=0x00000010
ImgTypes=pano
Resolution=74,9996

[5]
ModeName=PANO optimal 5LP/mm (250dpi)
ModeFlags=0x00000010
ImgTypes=pano
Resolution=100
```

The relevant section name is used as the ScanModeID for the update of ORxrayDB.

An example of the update, the scanner VScan is used in the PANO optimal 5LP/mm (250dpi) mode: osql -S localhost\dicomPACS -d ORXrayDB -U sa -P or18057 -Q "Update Exam set ScanDevice='VSCAN 1', ScanModelD=5"

4.2.5 Operation of the Dürr software in the application

For a planned examination, a CassetteID can be entered in the DAP-input dialogue (small Edit button on the SeriesComponent), which will also be passed on in the job file.

After clicking on the shutter release button in the , the Dürr-user interface appears on the generator control panel. A job file with all relevant data is written in the job directory (C:\duerr\VistaScan\vsjobs\) by the Dürr software. In demo mode of the Dürr software, a demo image can be created by simultaneously pressing the keys Shift + Ctrl. The demo image is always created by the Dürr software and cannot be adjusted by *dicomPACS®DX-R*. In the normal mode, the scanner starts reading the film and the image. After the reading, the Dürr-user interface disappears and the image is displayed in the *dicomPACS®DX-R* software.

When scanning with the Dürr software, it may happen that false images are created. These are added as rejected images to the study.

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Note



In this case, no new, empty study is created.

In addition to the preview window of the Dürr software, there is a "lamp" button. If this button is clicked, a crossed out lamp appears, which means that the film is not cleared when scanning.

If the examination is changed before the scan was started (e.g. if the film was not loaded correctly), the job file is deleted and the Dürr–user interface disappears.

When scanning or in the demo mode, three files are created (dat., txt., and xyz.-file) in the directory:

C:\Duerr\Images\, and shortly thereafter, they are transferred to C:\dicomPACS\temp\duerr\images \% id of the sensor (see Sensors.xml)%. After that they are moved into the archive in the raw directory and are renamed.

- the xyz. file is the raw image of Dürr
- the txt. file is an internal file for Dürr and
- the dat. file includes information about the image, some of which are incorporated in the DICOM object (via the TagMapping of the Sensors.xml)

4.2.5.1 The scanning process and the acquisition of images

- 1. The images are stored in the Dürr PollingDir: usually C:\duerr\Images\ (see Sensors.xml)
- 2. If all the image data (e.g. VS000001.txt, VS000001.dat, VS000001.xyz) are available, moves the data to C:\dicomPACS\temp\duerr\images\%id of the sensor (see Sensor.xml)%

Note



This directory is fixed in the source code and cannot be adjusted!

- 3. The data is renamed with a sequential number e.g.: 1.txt, 1.dat, 1.xyz
- 4. From here, the images are loaded, moved into the archive and displayed in the software
- 5. Moving the data to the directory C:\dicomPACS\temp\duerr\images\%id of the sensor (see Sensor.xml)% is executed, because it is possible that multiple images are created for a scan by Dürr. When the first image (VS000001. *) is still moved or edited by , the Dürr software writes another image with the same file name in the polling directory. This may lead to errors in reading the images and it can happen that images remain undone. By moving the data before the processing, all images are always read correctly.
- 6. Only images are read, belonging to the software, images from other applications are not being read.
 - Therefore, the IdentifierString is read from the *. dat file of the image (C:\Duerr\Images). The IdentifierString consists of the SeriesUI: ExamID, e.g.IdentifierString
 - =1.2.826.0.1.3680043.2.876.474.1.1.9.20100315101901.1.1:15

7. In case *dicomPACS®DX-R* shuts down and images are undone, the images are read after the restart of *dicomPACS®DX-R* and logging into the software. In case the license of *dicomPACS®DX-R* has been modified, it may be possible that the ManageUID does not match in the SerieUID of the *. dat file. In this case, the image will not be read because the software does not regard the image as its own image.

\bigwedge

CAUTION/ATTENTION!



EN: The IdentifierString is dependent on the license server. The SeriesUID is generated by the license server. If one is planning in a demo license mode, and then enters a proper license, and one scans only then, the images will not be read for this planning because the SeriesUID is not correct! It is necessary to delete the planning delete and replan the examination.

FR: L'IdentifierString dépend du serveur de licence. Le SeriesUID est généré par le serveur de licence. Si l'on programme dans un mode de licence démo puis que l'on entre une véritable licence et que l'on scanne seulement ensuite, les images ne seront pas lues pour cette programmation car le SeriesUID n'est pas correct! Il est nécessaire d'effacer la programmation. Supprimez et reprogrammez l'examen.

4.2 Installation of Dürr 37 / 372

4.3 Configuration of the GeR-interface

In the file Sensors.xml the use of the GeR-interface is defined as follows:

Within the GeR element sensor, an additional sensor has to be defined.



Both start attributes must be set true, so that the GeR interface works.

The GeR sensor cannot be set in the support mode of *dicomPACS*®*DX-R*! The configuration takes place exclusively in the Sensors.xml.

In the pollingDir attribute of the GeR sensor elements, the path for the "DernierCas.ini" and "Preview.png" files are specified.

The "DernierCas.ini" is created by GeR and placed in this directory. The file includes information about the examination, such as the study name and the generator values. The examination names of GeR can be connected via procedure codes.

The files ProcedureCodes.cmd and ProcedureCodes.qry must be copied to C:\dicomPACS\console directory and cmd file has to be started. The procedure codes are then written to the ORxrayDB.

The "Preview.png" file is a thumbnail of the last shot image. This image uses GeR in your software.

4.3.1 Testing the GeR interface

The GeR interface can easily be tested with the demo sensor:

- 1. A valid "DernierCas.ini" must be available in the pollingDir of the GeR sensor
- 2. Start dicomPACS®DX-R
- 3. Create a patient
- 4. Change to the X-ray view
- 5. Copy a dcm image in the pollingDir of the demo sensor
- 6. A study is created in and the image is read and displayed
- 7. In the directory, in which the "DernierCas.ini" file is located, the image that is read is stored as a "Preview.png" file

4.4 Installation of the Imix detector

Note



The Imix detector is integrated with the same software as the Stadler generator.

Installation requirements:

- Installation of the .NET Framework version 3.5 (Setup dotnetfx35.exe)
- Installation of the detector software and the image processing (C:\xray)
- Calibration data of the generator must be available

The controll pc (AQL PC) of the detector is connected via a separate network card and a x-or-y cable. The detector is connected via a separate network card. On the network connection to the detector, the NetBEUI protocol is used. The protocol must be installed separately manually on Windows XP. In Windows Vista it is no longer available; the Windows XP driver can be installed. The setup installs all necessary files. The setup will configure the file Sensors.xml:

The detector software itself is configured with a connect string. This is entered in the field ConfigDir:

```
<Sensor start="true" type="Imix" id="imix" maxValue="65535" name="demo 1.0"
serialNumber="0815" flip="none" postProcessing="true" invert="true" rotate="none"
sensitivityFactor="10">
```

<targetDir>c:\dicomPACS\console\acq</targetDir>

 $<\!configDir\!>\!Feature=ImixCcd4k;ImixCcdDetectorSimulationMode=true;ImixCcdDetectorCvlFilesLocation=c:\\\c mix\\\c vl</configDir>$

</Sensor>

Parameter	Description
imixProcessing	true: the Imix processing will be used false: the <i>dicomPACS®DX-R</i>

dicomPACS®DX-R uses the image processing of the context vision library. The image processing requires a USB dongle (in older versions a dongle for the LPT port), as well as additional configuration files. The location of the files is specified in the ConnectString (ImixCcdDetectorCvIFilesLocation).

The following files must be available:

- CVLicense.txt: The file includes the license key corresponding to the dongle.
- CVParameterMapping.txt: The file allows the allocation of an examination to an image processing. In *dicomPACS®DX-R* the name of the image processing is transferred. This name must be mapped to the corresponding Imix-processing. The mapping between the examination and the processing is executed with the file C:\dicomPACS\Console\ExamMap.csv
- *.par: The files include the parameters of the respective processings

In the ConnectString, the following parameters may be used:

Parameter	Description
Feature	Mandatory. Specifies the detector type to use. The following values are supported: "ImixCcd3k" for IMIX CCD 3K detector "ImixCcd4k" for IMIX CCD 4K detector
ImixCcdDetector XRayIniFile	Mandatory. The full path to the XRay.ini file of the already installed IMIX CS SW.
ImixCcdDetector LicenseFile	Mandatory if ContextVision enhancement is used. The full path to the ContextVision license file of the already installed IMIX CS SW.
ImixCcdDetector ImageHistory Directory	Optional. The full path to a directory which receives a copy of each acquired image in raw format. There will be two images for each exposure: one for the raw image (before preprocessing) and one after pre-processing (but before image enhancement). The files are saved with a timestamp which corresponds to the time the image was acquired. Empty by default, which means "not used".
ImixCcdDetector MaxImageHistory Age	Optional. If raw copies of images are generated (as specified by the ImixCcdDetectorImageHistoryDirectory), the images will be deleted after the time specified in this parameter (value represents whole days). The default value is 5 (so they are deleted on the 6 th day).
ImixCcdDetector IncludeImageSize InImageHistory	Optional. "True" to write the image size to the image history file as specified with the ImixCcdDetectorImageHistoryDirectory parameter, "False" to write raw data only. If "True", the image size will be written to the image file as follows: [WIDTH: 4 bytes] [HEIGHT:4 bytes] [raw pixel data, line-by-line]. The default value is "False".
ImixCcdDetector LocalName	Optional. The local NetBIOS computer name where the detector instance is created. The default value is "WORKSTAT".
ImixCcdDetector CameraName	Optional. The NetBIOS computer name of the Acquisition Computer. The default value is "CAMERA".
ImixCcdDetector LanaNumber	Optional. The LANA number for use with the NetBIOS protocol. The default value is -1.
ImixCcdDetector SimulationMode	Optional. "True" to enable the simulation mode, "False" to disable it. Allows the use of the entire Detector API for the IMIX CCD detector in simulation mode. This means, that the API behaves as normal but without using the detector. This is for development purpose only. The default value is "False".
ImixCcdDetector TestImageDirectory	Optional. The directory where test images (used in simulation mode) are stored. Must be stored in the same way as images generated through the ImixCcdDetectorImageHistoryDirect ory parameter. Empty by default, which means "not used".

Parameter	Description				
ImixCcdDetector SimulationError Delay	Optional. Only used in simulation mode. Specifies the delay between prepare and the occurrence of the simulated error number specified by ImixCcdDetectorSimulationErrorNumber. The default value is 0, which means "not used".				
ImixCcdDetector SimulationError Number	Optional. Only used in simulation mode. Specifies the error number of the detector to simulate during the acquisition (after prepare is done) The default value is 0, which means "not used".				
ImixCcdDetecto rDominanceOver ride	Optional. Allows the override of the used dominance to pre-process the image after acquisition. For each available processing, one or more dominance regions (also called "area of interest") are defined in the corresponding *.cvl file. It is also possible to not use that default value and provide custom dominance regions through the API. This parameter defines which dominance is used. The default value is 2.				
	Supported values are:				
	1 = Always use the default value, as specified in the *.cvl file, regardless of the values provided through the API.				
	2 = Use the value provided through the API or the default values from the *.cvl files if no values are provided.				
	3 = Only use the values provided through the API. Do not use dominances at all if no values are provided through the API.				

Table 7. Parameters for the connection

4.5 Installation of the Kodak PoC

$\hat{}$

CAUTION/ATTENTION!



EN: For the installation of Kodak QC use the version 3.2 or higher provided on installation CDs.

FR: Pour l'installation de Kodak QC, utilisez la version 3.2 ou une version plus récente fournie sur les CD d'installation.

Different configuration dialogues will appear during the installation process of the PoC with QC.

To use QC map the examinations from *dicomPACS*®*DX-R* to the organ tree of Kodak. The mapping can be executed with the file KodakMap.csv. The file is loaded into the database when starting the Kodak interface.

The mapping can be changed in the configuration of examinations. Is no mapping available, the default processing is used. The default processing can be selected in the sensor configuration in the support mode.

Please accept the default settings except for the following dialogue box.

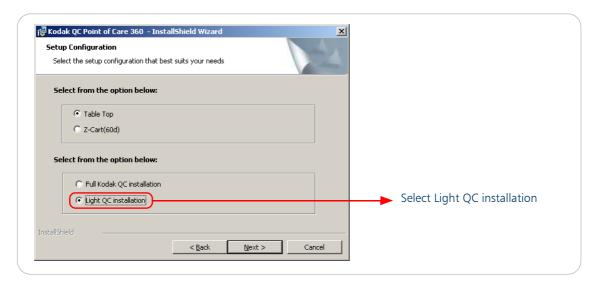


Figure 10. Setup dialogue Kodak QC

When the installation routine has been finished, a special link to the "KodakQC.exe" has to be created on the desktop.

Before starting the QC for the first time, edit the target of the created link to get a login to the administrator panel of the Kodak software. Open the properties of the Kodak link and change the target as shown below.

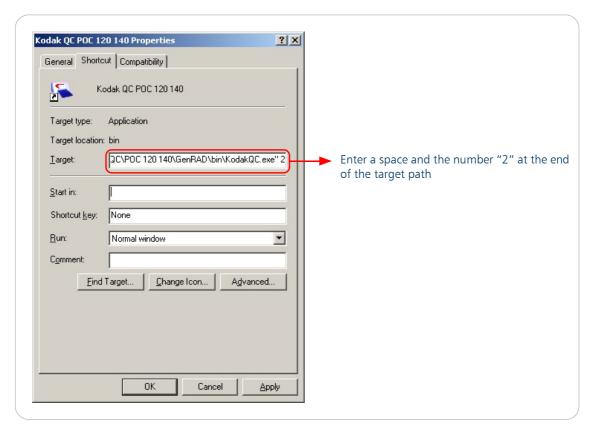


Figure 11. Target of the Kodak QC link

After changing the target of the Kodak QC link, connect the PoC and the USB dongle (if Kodak processing is required) to your PC. Start the QC software by a double click on the created icon and login using the following login data:

Username: admin Password: admin

After logging in, switch to the "Setup" tab.

4.5.1 ClearImages

ClearImages can be configured using the Kodak QC using the setup tab:

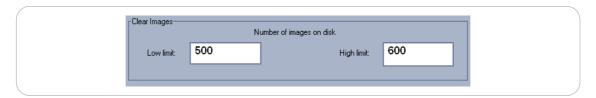


Figure 12. Kodak QC ClearImages

Change the low limit from 500 to 5 and the high limit from 600 to 10.

After changing the entry, please check the functionality. To do that, take a number of images (e.g. 20) and start the task.

DANGER!



EN: If the task ClearImages is not used, the space on the hard disk could be filled up.

FR: Si la tâche Clearlmages n'est pas utilisée, l'espace sur le disque dur pourrait être rempli.

To save space on the hard drive, the application ClearImages should be run once a day.

ClearImages deletes all images on the hard drive, which have no according database entry. All database entries without any images on the hard drive will also be deleted by the application.

Create a shortcut of the application ClearImages.exe which is located in

"C:\Program Files\Kodak\KodakQC\PoC 360\GenRAD\Bin\"

and copy this short cut to Windows "start menu → programs → autostart" to start the application when the workstation is switched on or rebooted.

4.5.2 Deactivation of DicomSend

The management console is located under "Start → Settings → Control Panel → Administrative Tool → Services". There you can find "orexdicomSend".

Open the properties dialogue by a double click on service and change the settings.

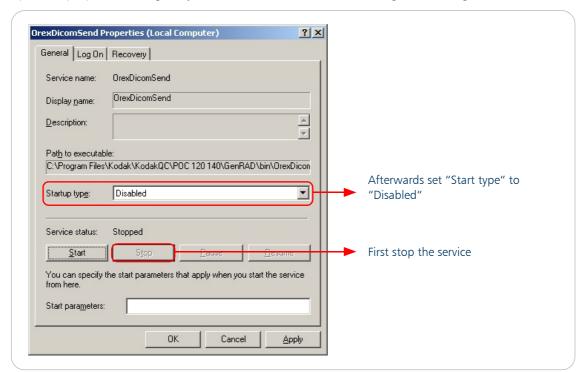


Figure 13. OrexDicomSend Properties

The service OrexDicomSend should be stopped and the automatic start should also be disabled.

4.5.3 Configuration of Sensors.xml

Sensors.xml contains information about the path and the name of the sensor application. This configured programme receives ten parameters which contain patient and scan data (e.g. %Lastname%). Parameter nine specifies the scan resolution of the PoC.

Possible settings for the parameter are the following:

- -1default value which will be set in the setup. It is possible to configure a default value for every cassette size an own
- Ohighest resolution will be used for all scans
- 1lowest resolution will be used for all scans

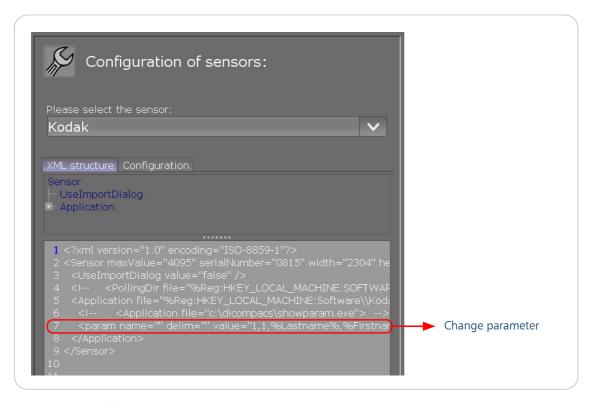


Figure 14. Configure Sensor.xml

4.5.4 Configuration of the image processing

When using the PoC, two kinds of image processing are available. On the one hand it is possible to use the "Kodak image processing"; this requires a dongle. The exposures will be processed by Kodak and *dicomPACS®DX-R* receives the processed images. Additionally *dicomPACS®DX-R* offers the possibility to readjust the default image processing.

On the other hand it is possible to use the "O+R image processing"; no additional hardware is needed. In this case, $dicomPACS^{\textcircled{\tiny{\$}}}DX$ -R receives raw images from the PoC and processes these images by an O+R image processing.

4.5.4.1 Configuration for Kodak processing

Start the application Kodak QC and open the tab "Setup". Inside the "Image" dialogue box the option "Data Format" has to be changed to "Kodak process" and activate the Kodak Image Processing. For the rest of the entire configuration dialogue accept the default settings.

Confirm the changes by clicking to the OK button. The configured settings will be saved and the administration panel is closed.

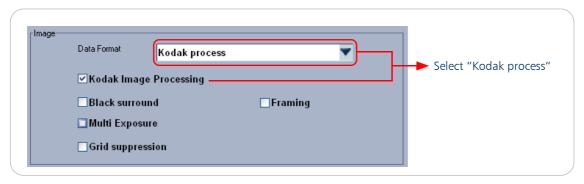


Figure 15. Kodak QC Configuration

Afterwards start *dicomPACS*®*DX-R* and login as the administrator (username: admin / password: setup). Inside the support mode select the sensor "Kodak" and then choose the configuration tab. Please activate the option "Kodak processed image (with dongle)".

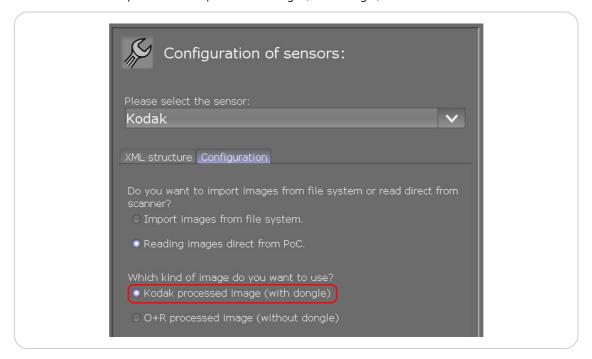


Figure 16. Configuration of sensors

<u>^</u>

CAUTION/ATTENTION!



EN: To use the PoC with the Kodak processing, please configure the Kodak image processing inside the support mode of *dicomPACS®DX-R*.

Otherwise an acceptable image quality cannot be guaranteed.

FR: Pour utiliser le PoC avec le processus Kodak, veuillez configurer le processus d'image de Kodak au sein du mode support de *dicomPACS®DX-R*, sans quoi une qualité d'image acceptable ne peut être garantie.

4.5.4.2 Configuration for O+R processing

Start the application Kodak QC and open the tab "Setup". Inside the "Image" dialogue box the option "Data Format" has to be changed to "No correction" and deactivate the Kodak Image Processing. For the rest of the entire configuration dialogue accept the default settings.

Confirm the changes by clicking to the OK button. The configured settings will be saved and the administration panel is closed.

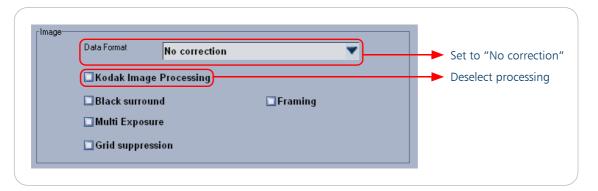


Figure 17. Kodak QC configuration

Thereafter, start *dicomPACS®DX-R* and login as the administrator (username: admin / password: setup). In the support mode select the sensor "Kodak" and then choose "configuration tab". Please activate the option "O+R processed image (without dongle).

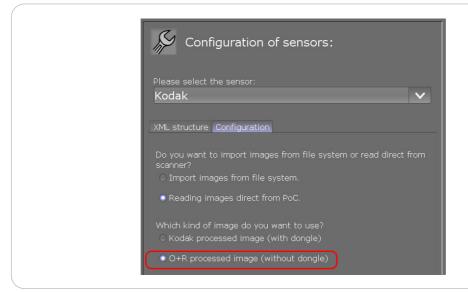


Figure 18. Sensors configuration

Λ

CAUTION/ATTENTION!



EN: When using the PoC with O+R processing, please configure the O+R image processing in the support mode of $dicomPACS^{@}DX$ -R. Otherwise, an acceptable image quality cannot be guaranteed.

FR: En utilisant le PoC avec le processus O+R, veuillez configurer le processus d'image O+R dans le mode support de $dicomPACS^{\textcircled{@}}DX-R$, sans quoi une qualité d'image acceptable ne peut être garantie.

Note



If the O+R image processing is configured, the image tag (0027,9032) has to be empty.

4.6 Installation of Kodak RVG for teeth X-ray

This detector is connected via a twain interface. To install the twain driver, first plug out the detector. The setup does not work if the detector is plugged in.

To verify the installation, the tool IrfanView can be used. Select 5x0, 6x0 and RVG Twain in the installation process.





The setup has some problems with the compatibility and the not found .Net2.0. But these messages have no influence on the functionality.

Plug in the detector and wait until the automatic setup runs.





The Kodak RVG only offers a 32bit driver. It does not operate on 64bit operating systems.

4.6.1 Configuration of Sensors.xml

The optional element "TwainSource" allows to connect other Twain scanner. With each scan, the following values are set in the registry:

[HKEY_CURRENT_USER\Software\TROPHY]	
"TwainBitsPerPixel"=dword:00000010	16Bit images
[HKEY_CURRENT_USER\Software\TROPHY\RVG\SkinLiteGU I]	
"PosX"=dword:00000034	X-position of the GUI,calculated from the x,y- Position of the GeneratorControlPanels
"PosY"=dword:0000001c	Y-position of the GUI

Table 8. Registry settings for twain scanner

The image is temporarily stored in the targetDir in the format 16bit TIFF and is sent to $dicomPACS^{®}DX$ -R.

4.6.2 Known problems

The detector does not work with too low doses. Be sure that the dose is high enough.

The twain interface only appears for 90 seconds. In this time range the exposure has to be taken.

4.7 Installation of Toshiba detector

4.7.1 Hardware

4.7.1.1 FDX 4343R/A, FDX 4343R/B and FDX 4343R/C

The Toshiba DFDX 4343R panel is connected via ethernet-cable to the dicomPACS®DX-R PC.

The synchronization is carried out by the sub-D socket on the detector. A special hardware is required to provide the synchronisation signals. The detector has a fixed IP address 192.168.95.30. At the front of the detector is a small switch, where the address can be changed to 192.168.95.31 for a dual detector solution. The network card in the computer must be set to the IP address of the same subnet: e.g. 192.168.95.1

The Toshiba FDX 3543RP is a detector in cassette size and is connected to the computer via a separate network port. Two or more (up to eight) detectors must be connected via an Ethernet hub with the network interface.

The IP address is programmable with the programme "E9552_IP_ADDR_TOOL.exe"; by default the address is 192.168.95.53.

Once the switch of the IP button is pressed more than five seconds (on the power supply), the detector will start with the alternative IP address 192.168.95.52. The alternative IP address is used only until the next start of the detector.

The network card on the computer must be set to an appropriate IP address, e.g. 192.168.95.1. The synchronisation hardware is connected to the sub-D connector of the AC adapter. The Toshiba FDX 3543RP requires the installation setup "Set2Toshiba.exe" from version 1.3.0. or higher.

4.7.1.2 FDX 3543RPW and FDX 2530RPW

Both detector versions are, besides their size, very much alike. Wi-Fi, battery and configuration work in the same way.

The 2530RPW:

Default IP: 192.168.95.63 Pixel matrix: 1750(H) x 2105(V)

The 3543RPW:

Default IP: 192.168.95.57 Pixel matrix: 2466(H) x 3040(V)

Both have a pixel pitch of $140\mu m$.

By default they are delivered with 2 batteries, a charger, a magnetic connection cable and a CD with the bad pixel map.

The interface to the RPW panels is available since dicomPACS®DX-R 3.0 and ToshibaCTRL 1.9

AED:

The RPW panels are capable of automatic exposure detection (AED). It can be activated instead of software synchronization. To trigger an image with the AED a certain dose rate needs to reach a certain area on the panel. Since this cannot be guaranteed on low power generators or all kind of exposure situations, we recommend to use software synchronization. For the software synchronization an OR-USB SyncBox is required.

Toshiba does not provide an interface for hardware synchronization on the RPW models.

WiFi:

The RPW panels are designed for use with a wireless LAN access point. In both connection modes, LAN and WiFi, the devices use the same IP, which allows a fast and uncomplicated switch. Whenever LAN is connected (link LED: blue) LAN is used. If LAN is interrupted, the detector uses WiFi (link LED: green). Usually a switch from LAN to WiFi takes 2s-4s. If the access point is not found on the same channel as before the search for WiFi takes about 25s.

The RPW panels support 2,4GHz and 5,1GHz WiFi. The only supported mode is IEEE 802.11n. As MIMO 2x2 is supported, access points should use this option because image transfer time and signal stability greatly benefit from it.

Please always mind that the quality of the WiFi signal depends on the orientation of the antennas, distance and objects between access point and flat panel detector. Metal objects like buckys or X-Ray shielding have great influence.

OR tests have shown that 2,4GHz is slightly better than 5.1 GHz. Tested access points are ASUS RT-AC66U, DLink DIR-825 and Cisco (belkin) WPA300N. The RT-AC66U is the default model delivered with OR systems.

OR WiFi settings for Toshiba RPW are:

SSID: Toshiba<serial number> (e.g. ToshibaTS-49A)

Mode: N-only

Channel: < Fixed channel 2-10>

Security: WPA2 AES PSK: orRaute18057

Channels below "2" and above "11" might cause problems on channel width of 40MHz. The usability of 40 MHz channels depend on the access point. If the flat panel detector is able to connect to the access point with 40 MHz channel width, it will result in faster image transfers.

Special characters except "-" are not allowed in SSID and password.

To connect to the WiFi, first connect the PC with the flat panel detector via cable. In $dicomPACS^{®}DX-R$ support mode, go to Sensor \longrightarrow Toshiba \longrightarrow Open WiFi configuration:

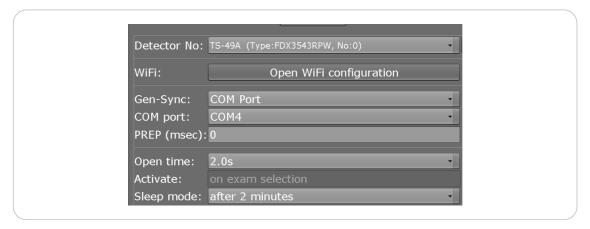


Figure 19. Toshiba sensor's setup - open WiFi configuration

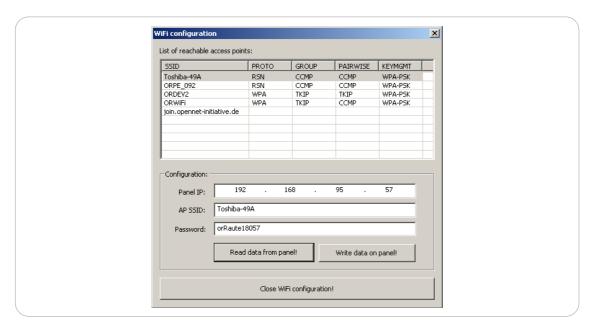


Figure 20. WiFi configuration

With the "read data from panel" button, all suitable networks in the range the flat panel detector are shown. The wanted WiFi SSID can be selected and the PSK (password) needs to be entered. The "write data to panel" button sets the flat panel detector to use that WiFi SSID. Close the dialogue. Now the cable can be disconnected and WiFi will be used.

4.7.2 Software installation

4.7.2.1 Hardware

The detector is connected to a separate network port on the computer. Two or more (up to eight) detectors must be connected via an Ethernet hub with the network interface.

The network card of the computer must be set to the corresponding IP address, e.g. 192.168.95.1.

The synchronisation hardware must be connected to the sub-D connector of the detector (FDX4343R) or AC adapter (FDX3543RP).

4.7.2.2 Software installation - setup version 1.3

The Toshiba interface is implemented from *dicomPACS*®*DX-R* version 2.3.11 on. The installation is to be performed as follows:

- 1. Start the setup "Set2Toshiba.exe" (version 1.3.0 or higher). The setup installs the necessary software in the directory: C:\dicomPACS\Console\Toshiba. In case of updating from the setup version 1.2.x., the old version is renamed to "Toshiba 12".
- 2. The setup opens a configuration window. Enter the data of the detector type, serial number and IP address of all used detectors. The configuration window is also available from *dicomPACS®DX-R* sensor configuration to add further detectors at a later time. The setup programme creates only the first workstation. Further detectors and workstations must be added via the *dicomPACS®DX-R* support mode.
- 3. Copy the defect.bin file from the CD to the C:\dicomPACS\Console\Toshiba\<SerialNumber> folder. If a defect.bin is not available it can be generated by switching C:\dicomPACS\Console\Toshiba\<SerialNumber>\<SerialNumber>_Config.xml <DefectLutGen>0</DefectLutGen> from "0" to "1" If this results in an "Image library error" delete the defect.bin and retry.
- 4. Perform the calibration of the detector.

Note



The version number of the installation setup "Set2Toshiba.exe" can be found out by a right-click on the file name. Click on "Properties", which opens a Windows popup. Select the tab "Details", which amongst others displays the version number of the setup.

4.7.3 Calibration

- 1. Open the sensor configuration in the support mod, select the Toshiba detector and click on the button "Calibration". The calibration window appears and four dark images are acquired.
- 2. Please set collimator to expose complete detector surface. Remove all objects from detector. Then perform exposure with 60kV, 1.2mAs, SID: 1,20m.

 The software will show an error message if dose was too high or too low. Please repeat exposure with corrected parameters. If dose was correct then software will increase the image counter. Repeat exposure 4 times.
- 3. Click on the button "Finish calibration". The software will store new calibration files.
- 4. Restart dicomPACS®DX-R.

4.7.4 Configuration

4.7.4.1 Configuration dialogue

All important settings of the detector can be made in the *dicomPACS*[®]*DX-R* setup from *dicomPACS*[®]*DX-R* version 2.2. For older versions the configuration files must be edited.

4.7.4.2 Configuration files

Sensors.xml

The file Sensors.xml is overwritten by the setup. The sensor definition contains the following data:

"ToshibaCtrl.exe" is started by *dicomPACS*®*DX-R*. It opens port 2024 and waits for the connection with *dicomPACS*®*DX-R*. If the socket connection is closed, the programme exits.

Config.xml

The detector can be configured using the file C:\dicomPACS\console\ Toshiba\<Seriennummer>\<Seriennummer>_Config.xml. Important values are the following:

XML element	Description		
<hwcontrol>1</hwcontrol>	1 = exposure by hardware signal 0 = exposure by software signal		
<xrayappliabletime>3</xrayappliabletime>	The values are depending on the detector type		
<autostandbytimeout></autostandbytimeout>	Timeout (in seconds), in which the detector will switch in standby mode. The value '0', will stop the detector from automatically switching in standby mode. If a timeout is desired, the value (in seconds) must be entered here.		

Table 9. Important values

ToshibaCtrl.ini

Parameters from the file ToshibaCtrl.ini:

Parameter		Description		
[ToshibaCtrl]		Section for general data		
Debug	false	Value "true" offers the operation of the detector for test purposes outside the acquisition software environment		
FileFormat	tiff	File format, in which the images are passed on to acquisition software		
[Detector0] [Detector1]		Section with data for the detector		
DebugStart	false	If "true", the detector is started when the programme is in the debug mode		
MinIdleTime	30	Time in seconds, in which the detector stays in idle mode after the image acquisition		

Table 10. Parameters of the ToshibaCtrl.ini

4.8 Divario CR-T2 and Divario CR-Tm

The Divario CR T series has two devices integrated: The Divario CR-T2 and the Divario CR-Tm. Both devices behave exactly the same regarding the software integration, installation process and error handling. The main difference between Tm and T2 is the Tm's possibility to read high resolution cassettes.



Figure 21. Divario CR-Tm

IP Cassette types					
CC Pb 18x24cm	CC Pb 15x30cm	CC Pb 24x30cm	CC Pb 35.4x43cm	CH 18x24cm (Mammo)	CH 24x30cm (Mammo)
IP type					
ST	ST	ST	ST	HR	HR
resolution					
2370 x 1770	1464 x 2964	2364 x 2964	3520 x 4280	4740 x 3540	5928 x 4728
pixel spacing					
100 μm	100 μm	100 μm	100 μm	50 μm	50 μm

	CC Pb 18x24cm	CC Pb 15x30cm	CC Pb 24x30cm	CC Pb 35.4x43cm	CH 18x24cm (Mammo)	CH 24x30cm (Mammo)	
Divario	which scanner supports which cassette					license	
CR-T2	X	X	X	X			SensorDivario CRT2
CR-Tm	X	X	X	X	X	X	SensorDivario CRTm

4.8.1 Installation

Hardware

The scanner is connected to an Ethernet port of the PC. Therefore the network adapter needs to be configured using the 172.16.1.20 as fixed IP address. The scanners default IP address is 172.16.1.10.

Software

Run the Set2DivarioCRT.exe which installs the CorrectionModule and all required configurations. Insert the serial number of the Divario scanner into the corresponding edit field of the setup dialogue otherwise it will not be included in generated DICOMs.



CAUTION/ATTENTION!



EN: Make sure all ports mentioned in the communication section are open for incoming and outgoing data transfer.

Ports: 18016, 18017, 18018, 18019, 18030

FR: Assurez-vous que tous les ports mentionnés dans la section de communication sont ouverts pour le transfert de données entrantes et sortantes.

Ports: 18016, 18017, 18018, 18019, 18030

Install RuPcTool / FTP server.

The Divario scanners handle log files via FTP server. In addition the RuPcTool provides some advanced tools for administrators like restoring machine data, changing of default configuration. Against the recommendation, it is possible to operate the scanner without setting up the RuPcTool and FTP server. In this case no device log files will be transferred to the PC and administration tools are not available.

For installing the RU PC-Tool, please follow the instructions on the next pages:

[6-5] Correction

[6-5-1] Shading/Sensitivity Correction

[6-5-1-1] Shading/Sensitivity Correction (ST)

■ Function/Purpose

ST shading/sensitivity correction takes place. Using this command, you can carry out "[6-5-2-2] ST (GR)" and "[6-5-3-1] Sensitivity Correction (ST)" at the same time.

♦ INSTRUCTION ♦

- Carry out format adjustment before making corrections. If the image has a white blank portion, an error might result.
- Read the IP for a time interval of 10 to 11 minutes after the IP exposure. Correction cannot take place normally with other timings.
- Use a ST IP of 14" x 14" (35 cm x 35 cm) or 14" x 17" (35 cm x 43 cm). Correction cannot take place normally with other sizes or types.

■ Procedures

◇ REFERENCE <>

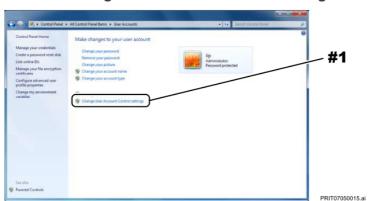
"Shading/Sensitivity Correction" takes place in the procedures from (1) to (9).

- (1) Measure and record the dose.
- (2) Expose the IP under the following conditions.

X-ray tube	Dose (mR)	Tube voltage	Center S value
Tungsten	1	80	200

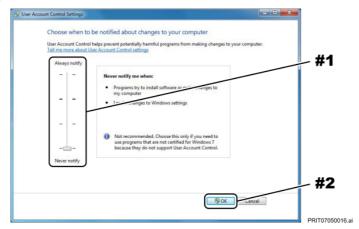
- (3) Start the MUTL.
- (4) Input the X-ray dose measured in the procedure (1) in "[6-5-1-1] Shading/ Sensitivity Correction (ST)".
- (5) [SET]
- (6) The confirmation window appears, and click on [OK].



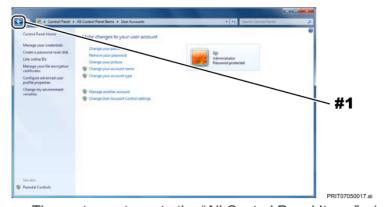


(4) Select "Change User Account Control settings".

- → The "User Account Control Settings" window opens.
- (5) Lower the slide bar to the bottom and click "OK".

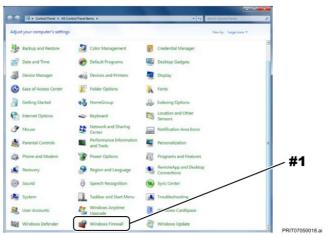


- → The system returns to the "User Accounts" window.
- (6) Click "← (retune)".

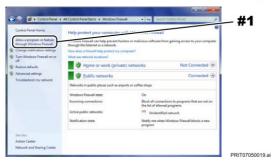


→ The system returns to the "All Control Panel Items" window.

(7) Click "Windows Firewall".



- $\,\rightarrow\,$ The "Windows Firewall" window opens.
- (8) Select "Allow a program or featurethrough Windows Firewall".



 \rightarrow The "Allowed program" window opens.

(9) Make sure that "FTP Server" and "inetinfo" are displayed in the "Allowed programs and features:" column and that their boxes are checked. If they are not checked, check them. If "FTP Server" and "inetinfo" are not displayed, click on [Allow another program...] and add "FTP Server" and "inetinfo". Upon completion of the addition, make sure that their boxes are checked.



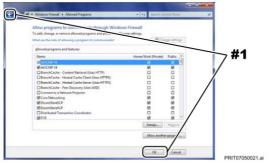
♦ REFERENCE ♦

The "FTP Server" and "inetinfo" paths are as follows:

C:\Windows\SYSTEM32\FTP.exe

C:\Windows\SYSTEM32\inetsrv\inetinfo.exe

(10) Click "OK" if settings under "Allowed programs and features" are changed; or, click "← (Back)" if not.

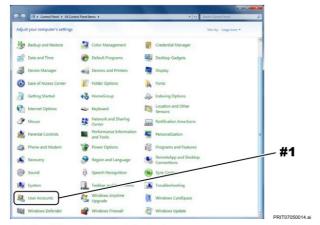


- → The system returns to the "Windows Firewall" window.
- (11) Close the "Windows Firewall" window.
- (12) Restart the Console.
- (13) Close all the windows which are open.
- (14) Insert the RU-APL CD-ROM into the Console.
 - → The startup window appears.

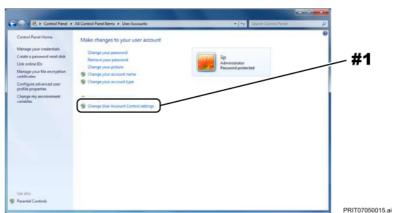
- (15) Confirm the startup window appearing on the Console, and check that the RU PC-TOOL has been installed.
 - When the [INSTALL] button is active:
 - \rightarrow The RU PC-TOOL is not installed. Install the RU PC-TOOL according to the procedures below.
 - [IN:8.1_Installing the RU PC-TOOL]
 - When the [INSTALL] button is not active:
 - ightarrow The RU PC-TOOL is installed. As the version may be not up to date, once uninstall the RU PC-TOOL, and again install it.
 - [IN:8.2_Uninstalling the RU PC-TOOL]
- (16) Select "Control Panel" from the Windows start menu.



- → The "All Control Panel Items" window opens.
- (17) Click "User Accounts".

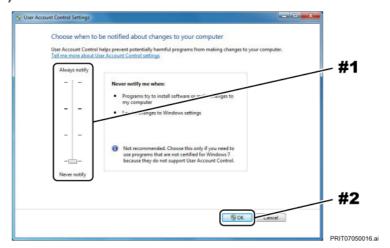


→ The "User Accounts" window opens.



(18) Select "Change User Account Control settings".

- → The "User Account Control Settings" window opens.
- (19) Lower the slide bar to the bottom and click "OK".



- → The system returns to the "User Accounts" window.
- (20) Close the "User Account Control Settings" window.
- (21) Restart the Console.
- (22) Start the RU PC-TOOL.

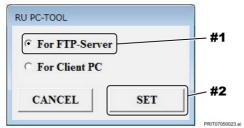
8.1 Installing the RU PC-TOOL

- (1) Insert the RU-APL CD-ROM into the Console.
 - → The "Set Up PC-TOOL" window automatically appears.

 If the "Set Up PC-TOOL" window does not automatically appear, click on "Start" and "My computer (Computer)", and the double-click on the RU-APL CD-ROM icon.
- (2) Click on [INSTALL].

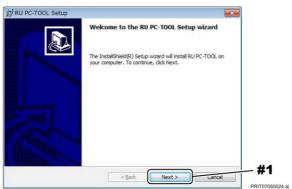


(3) Select "For FTP Server" and click on [SET].

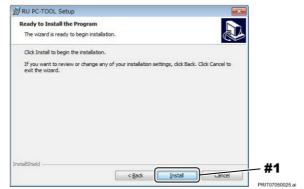


→ Installation starts.

(4) Click on [NEXT].



(5) Click on [Install].



→ Installation starts.

♦ NOTE ♦

When the windows of "Info Host Server", "Bmp Server" or the like appear during the installation, click on [OK] for all items and close the windows.

As they sometimes appear behind other windows, minimize the other windows in such a case, and close the windows of "Info Host Server", "Bmp Server" or the like.





- → The command prompt window appears, and the file is copied.
- (7) Press the key according to the instruction on the window.
 - → The command prompt window appears, and the file is copied.
- (8) Press the key according to the instruction on the window.
- (9) As the "Windows Security Alert" window appears, click on [Unblock].

1.11 INSTALL



CAUTION

Never turn OFF the RU power during installation. If you turn OFF the RU power, the RU fails to start up because the contents of the FLASH ROM are corrupted.



Restart the Console PC if "errCode=421" appears on the command prompt window during installation.

■ Function

Used to install the RU software into the RU entered in the "RU NAME" and "RU IP ADDR" fields. Upon installation, an RU folder is created in the FTP server.

♦ REFERENCE ♦

The RU with the IP address described in the "RU IP ADDR" field is accessed before the installation is started, to automatically recognize the type of the RU. RU PC-TOOL reads the settings of the DIP switches mounted on the CPU board of the RU to identify the type.

■ Procedures

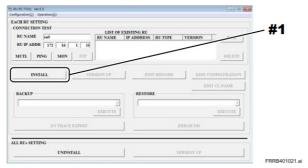
- (1) Insert the RU-APL CD-ROM into the Console.
- (2) Click on [NEW], and input "RU NAME" and "RU IP ADDR" of the RU to be installed.

(MU:1.5_NEW)

(3) Use the [PING] command to check the connection of the machine.

(MU:1.8_PING)

(4) Click on [INSTALL].

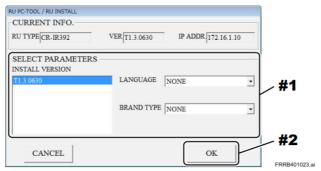


- → The confirmation window appears.
- (5) Click on [OK].

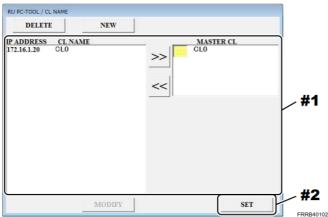


→ The setting window for the installation conditions appears.

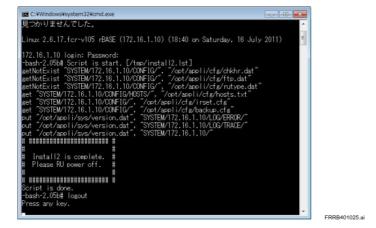
(6) Set the installation conditions, and click on [OK].



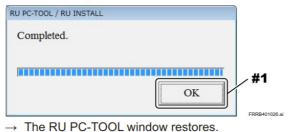
- → Installation starts.
- (7) Set "CONFIGURATION", and click on [SET].
 - (MU:1.14_EDIT CONFIGURATION)
- (8) Set the master CL, and click on [SET].
 - (MU:1.15_EDIT CL NAME)



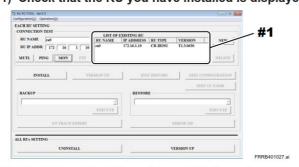
- → The command prompt window appears, and the file is copied.
- (9) Press the key according to the instruction on the window.



(10) Click on [OK].



(11) Check that the RU you have installed is displayed in the "LIST OF EXISTING RU".



- (12) Shut down the RU, and turn OFF the main power switch.
- (13) Turn ON the main power switch to restart the RU.

Preparation

Be sure Windows Internet Information Services (IIS) is activated. (In Windows, access the Control Panel and click Add or Remove Programs. In the Add or Remove Programs window, click Add/ Remove Windows Components. Select the Internet Information Services (IIS) check box, click Next, then click Finish.)

RuPcTool

Follow the instructions IN-16 - IN-20 in the following ru-pc-tool-install-instructions.pdf to install the RuPcTool main component and automatically setting up the windows ftp server.

RuSoftware

Follow the instructions MU-8 and MU-9 in the following ru-pc-tool-install-instructions.pdf to install the device dependent part of RuPcTool.

4.8.2 Communication

The whole communication of Divario CR-T scanners and *dicomPACS®DX-R* is based on TCP connections. *dicomPACS®DX-R* opens 4 different TCP server connections for general communication tasks. The Scanner tries to connect with them as client. If a raw image is ready for transmission,

dicomPACS®DX-R connects as a client to the scanner which will send the raw data. Beside these communication connections the CR scanner tries to upload a log file to a FTP server which needs to be setup on the operating PC.

In *dicomPACS*®*DX-R* it is possible to monitor all connections in a special TCP window. Therefore the user must be logged in as admin. The TCP button Fuji-tcp-btn.png, which opens the TCP window appears on the device panel.

The following figure gives a schematic overview of all connections.

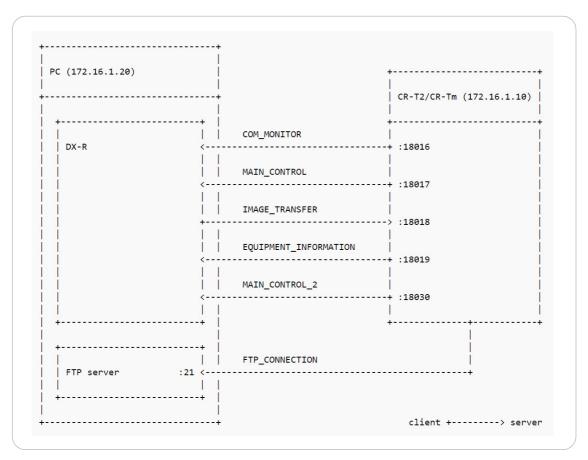


Figure 22. connections

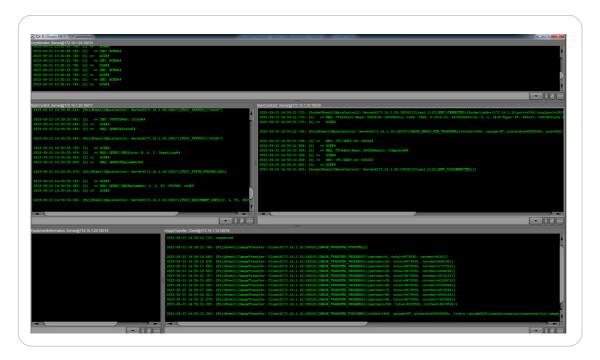


Figure 23. TCP window for live connection monitoring

4.8.3 Calibration

In general a calibration of DivarioCRT scanners is not required. The devices are supplied with already created and installed individual machine data. However in some cases it might be necessary to recalibrate the scanner e.g. when images have big uneven areas.

Calibration with aid of machine data CD

If pre-installed machine data got corrupted, it may be sufficient to just recover them from supplied machine data CD. Therefore, start the RuPcTool and choose SCN ALL DATA from the RESTORE select box and push EXECUTE. A file chooser dialogue opens. Specify a directory / the CD drive and click OK. Machine data will be transferred to the scanner. After a restart of the scanner restored machine data will be applied.

Calibration by Hand

In case restoring the machine data doesn't solves image quality problems, it possible to calibrate the scanner by hand. This calibration is called Shading/Sensitivity Correction.

- dicomPACS[®]DX-R running for image acquisition
- RuPcTool running for actual calibration
- For ST use 35x43 cassette for HR use 24x30 cassette
- one shot required with 1mR dose for ST and 20??mR dose for HR
- 80 kV fixed for ST and 25??kV fixed for HR
- detailed step by step instructions:

[6-5] Correction

[6-5-1] Shading/Sensitivity Correction

[6-5-1-1] Shading/Sensitivity Correction (ST)

■ Function/Purpose

ST shading/sensitivity correction takes place. Using this command, you can carry out "[6-5-2-2] ST (GR)" and "[6-5-3-1] Sensitivity Correction (ST)" at the same time.

♦ INSTRUCTION ◆

- Carry out format adjustment before making corrections. If the image has a white blank portion, an error might result.
- Read the IP for a time interval of 10 to 11 minutes after the IP exposure. Correction cannot take place normally with other timings.
- Use a ST IP of 14" x 14" (35 cm x 35 cm) or 14" x 17" (35 cm x 43 cm). Correction cannot take place normally with other sizes or types.

■ Procedures

♦ REFERENCE ♦

"Shading/Sensitivity Correction" takes place in the procedures from (1) to (9).

- (1) Measure and record the dose.
- (2) Expose the IP under the following conditions.

X-ray tube	Dose (mR)	Tube voltage	Center S value
Tungsten	1	80	200

- (3) Start the MUTL.
- (4) Input the X-ray dose measured in the procedure (1) in "[6-5-1-1] Shading/ Sensitivity Correction (ST)".
- (5) [SET]
- (6) The confirmation window appears, and click on [OK].



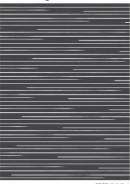
(7) Cancel the RU maintenance mode.

(MU:1.3_Maintenance Mode)

(8) Read the IP prepared in the procedure (2) for a time interval of 10 to 11 minutes after the exposure. Use the "Sensitivity" menu in the "QC/TEST".



If an image as shown below appears after the reading, it is not an error.



(9) Check that "RESULT: OK" appears on the MUTL.

"Checking the Sensitivity Correction" takes place in the procedures from (10) to (12).

- (10) With a tungsten X-ray tube, expose a 14" x 14" (35 cm x 35 cm) or 14" x 17" (35 cm x 43 cm) IP to about 1 mR of radiation.
- (11) Read the IP obtained in step (9) during a 1-minute period between 10 and 11 minutes after the exposure by using the "QC/TEST," "Image Format" or "Image Format 1," and "SINGLE" menus, and then output the read image.
- (12) Confirm the S value.

(IN:13._Confirming the S Value)

(13) Back up "CONFIGURATION" and "SCN ALL DATA".

(MU:1.16_BACKUP)

■ Exiting Procedures

- (1) Exit the MUTL.
- (2) Shut down the RU, and turn OFF the main power switch.
- (3) Turn ON the main power switch to restart the RU.

[6-5-1-2] Shading/Sensitivity Correction (HR)

■ Function/Purpose

HR shading/sensitivity correction takes place. Using this command, you can carry out "[6-5-2-1] HR" and "[6-5-3-2] Sensitivity Correction (HR)" at the same time.

♦ INSTRUCTION **♦**

- Carry out format adjustment before making corrections. If the image has a white blank portion, an error might result.
- Read the IP for a time interval of 10 to 11 minutes after the IP exposure. Correction cannot take place normally with other timings.
- Use a HR IP of 24cm x 30 cm or 18 cm x 24 cm. Correction cannot take place normally with other sizes or types.

■ Procedures

♦ REFERENCE ♦

"Shading/Sensitivity Correction" takes place in the procedures from (1) to (9).

- (1) Measure and record the dose.
- (2) Expose the IP under the following conditions.

X-ray tube	Dose (mR)	Tube voltage	Center S value
Molybdenum	20	25	120

- (3) Start the MUTL.
- (4) Input the X-ray dose measured in the procedure 1 in "[6-5-1-2] Shading/Sensitivity Correction (HR)".
- (5) [SET]
- (6) The confirmation window appears, and click on [OK].



(7) Cancel the RU maintenance mode.

(MU:1.3_Maintenance Mode)

(8) Read the IP prepared in the procedure 2 for a time interval of 10 to 11 minutes after the exposure. Use the "Sensitivity" menu in the "QC/TEST".

♦ NOTE **♦**

If an image as shown below appears after the reading, it is not an error.



(9) Check that "RESULT: OK" appears on the MUTL.

♦ REFERENCE ♦

"Checking the Sensitivity Correction" takes place in the procedures from 10 to 12.

- (10) With a molybdenum X-ray tube, expose a 24 cm x 30 cm or 18 cm x 24 cm IP to about 20 mR of radiation.
- (11) Read the IP obtained in step (9) during a 1-minute period between 10 and 11 minutes after the exposure by using the "QC/TEST," "Image Format" or "Image Format 1," and "SINGLE" menus, and then output the read image.
- (12) Confirm the S value.

(IN:13._Confirming the S Value)

(13) Back up "CONFIGURATION" and "SCN ALL DATA".

(MU:1.16_BACKUP)

■ Exiting Procedures

- (1) Exit the MUTL.
- (2) Shut down the RU, and turn OFF the main power switch.
- (3) Turn ON the main power switch to restart the RU.

4.8.4 Correction module

The Divario CR-T scanner generates logarithmic 16 bit raw images with a 12 bit value range. Since these raw images could contain scan line stripes which need a correction, the CorrectionModule.exe is supplied by Set2DivarioCRT. This command line tool is automatically invoked by *dicomPACS®DX-R* and takes a raw image and puts out a corrected version of the raw image. Furthermore *dicomPACS®DX-R* is expecting linearised raw images therefore a linearisation is applied by *dicomPACS®DX-R* to the corrected logarithmic raw images. Also see configuration section for correction module options.

4.8.5 Configuration

Explanation of special parameters:

4.8.6 FAQ

No connection to scanner despite correct IP addresses:

The scanner is reachable via ping but *dicomPACS®DX-R* remains in no connection state. As the console mainly works as TCP server and not as TCP client (only for image transfer) confirm that following ports are open for incoming and outgoing requests:

```
ports: 18016, 18017, 18018, 18019, 18030
```

Normally the scanner starts communicating immediately when starting *dicomPACS*[®]*DX-R*. However it could take up-to 30 seconds until the CR scanner starts communication after *dicomPACS*[®]*DX-R* was started.

No image has been transferred:

dicomPACS®DX-R is running and becomes ready for scanning. When inserting a cassette the read out process is starting correctly but no image is transferred. Check if the Scanner is configured to the right IP address. The ImageTransferConnection is the only connection, where the scanner is working as server and the PC is the client.

Stripes in raw images:

Specifically the Divario T2 generates raw images containing stripes. The raw images needs to be corrected by the CorrectionModule. So make sure it is configured correctly in the corresponding Sensors.xml element.

Big uneven areas in raw image:

Try to restore the machine data from supplied CD. In case this doesn't solve the problem consider a calibration by hand. Also see calibration section.

Scanner does not become ready:

When the scanner is shut down by holding the small power button for 10 seconds or by software command without also pushing the main power button, the scanner never indicates it is ready for scanning. When inserting a cassette while the scanner is in this state, the normal processing of the image plate will work and after this process the scanner becomes ready again. To avoid this state always push the main power switch when shutting the scanner down. (This is a bug of the FRUP protocol)

Image recovery on connection loss:

When $dicomPACS^{\circledR}DX-R$ is shut down or the Ethernet cable is removed while raw image transmission, the scanner recovers the not completely transmitted raw image and sends it to $dicomPACS^{\circledR}DX-R$ as soon as $dicomPACS^{\circledR}DX-R$ and scanner is connected again. It is important not to switch of the scanner before reconnection. In case the scanner is switched off before image recovery the image is lost.

4.9 Installation of Varian detector

4.9.1 Hardware

Three different models are integrated:

- 1. PS 2025 small panel with I/O box.
- 2. PS 4030 is usually delivered without I/O box. There is an I/O box for the detector which allows triggering by software. The synchronization takes place via an interface on the panel.
- 3. PS 4336 and 4343. The 4343 is delivered without I/O box, the 4336 with I/O box. Both are operated with the same software version. Several panels can be operated on one computer. Model PS 4336 is available in different several versions: PS 4336R, PS 4336X and PS 4336W (wireless).

4.9.2 Installation

4.9.2.1 Hardware

PS4336W - Wireless:

The Gigabit network card is not configured as a frame grabber, but the Pleora ebus Universal driver must be installed.

4.9.2.2 Varian software

Two CDs are delivered with the Varian panel:

- 1. driver and software
- 2. calibration data of the panel

First of all install the Varian Viva (Varian Image Viewing and Acquisition) software, from the first CD. Keep all the default settings during the installation.

If the installation of the Viva software has been successful, the setup from the "Receptor installation disk" should be started.

The panel specific information are on the CD with the calibration data of the panel. The information is saved to "C:\IMAGERs\" after its installation.

After the Varian installation, it is necessary to install the Varian driver for the Intel Pro 1000 network card. The driver is located at the hard disk "C:\Program Files\Varian\PaxscanL04\Pleora\Drivers\Intel".

Open the Pleora Driver Tool by "Start -> programs -> Viva" and activate the frame grabber driver. To do that, switch to the tab "Pro1000Adapters". The device class should be a "PRO/1000 Grabber Device".

If that is not the case, select the according entry and choose the option "Install High Performance IP Device Driver" by a right mouse click.

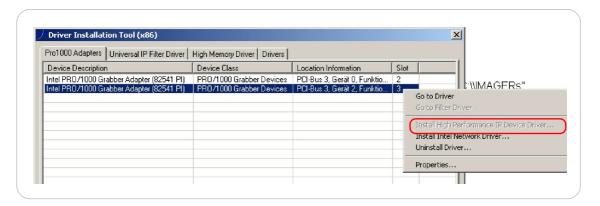


Figure 24. Pleora Driver Tool

For additional information, please read the Varian installation manual; all of the previous steps are described in more detail.

PS4336W: On the "System software" you can find images for the Pleora ebus Universal driver installation. Varian includes a manual "VcpInstallGuide.pdf", where the installation process is explained in detail.

4.9.3 Test panel connection

Start the Viva software by "Start -> Programs -> Varian -> Viva". The detector should be recognised after a few seconds and will be shown in the dropdown field at the left side.

When the detector is added to the link list, start the calibration. Choose "Acquisition -> Offset Calibration" from the main menu bar, then the calibration sequence starts taking two empty images. This does not require any user action. When the calibration is finished, no error messages should appear.

4.9.4 Analogue offset calibration

The analogue offset calibration has to be executed only after changing the opening time of the detector. Otherwise do not change the factory calibration here.

4.9.5 Gain calibration

For the Gain Calibration two empty images are taken. Afterwards the system requests to take flat field exposures. To achieve a good result, five to seven exposures should be taken.

The flat field exposures should be taken with a typical tube/panel position configuration. Choose the dose in a range to get a gain median between 1600 and 2100. You might have to run the gain calibration multiple times to determine the dose to use. As a rule of thumb this resembles a dose of 70-80kVp (recommended is 70kVp) on the detector.

Choose the dose in a range to get a gain median between 2000 \pm 40% for 14bit images and 9000 \pm 60% for 16bit images.

4.9.6 Software

Install the Set2Varian software if the detector is installed after a full dicomPACS®DX-R installation.

The setup adjusts the file "C:\dicompacs\console\sensors.xml" to match the installed detector.

```
For detector 2025:
```

```
<Sensor type="Varian" start="false" id="Varian" maxValue="12000"
name="Varian" serialNumber=" calibrationTime="" flip="none" invert="false"
rotate="none" sensitivityFactor="10" demo="false"
<targetDir>c:/dicomPACS/console/acquisitionsource</targetDir>
<configDir>c:/imagers/8843-07</configDir>
<demoDir>c:/Varian/Demo</demoDir>
</Sensor>
```

For detector 4030E:

For detector 4336 / 4343:

For detector 4336W:

```
<application exec="C:/dicomPACS/console/Varian4/Varian4Ctrl.exe" host="localhost" port="2024" />
```

</Sensor>

4.9.7 Sensor fine tuning

Some changes have to be made in the file C:\dicompacs\console\sensors.xml there to adjust the processing to the specifics of the X-ray tube/detector combination.

The following values are to be adjusted by using the image processing menu of *dicomPACS®DX-R* (on page 245):

4.9.7.1 Adjust offset

The offset sets the lower threshold for the range of grey values that will be used for image processing. All values below the range will be cut off from the raw image and interpreted as white (no radiation). This shall reduce the basic background noise. If the offset is too high, important image information might be deleted. If it is too low the signal-to-noise ratio is negatively influencing the image quality.

How to find the value:

- 1. Set "Offset=0" in sensors.xml
- 2. Start dicomPACS®DX-R
- 3. Take an image without exposing the panel (no dose). View the histogram of this image in the processing steps when logged in as admin (pw: setup) to enter the image processing menu (on page 245).

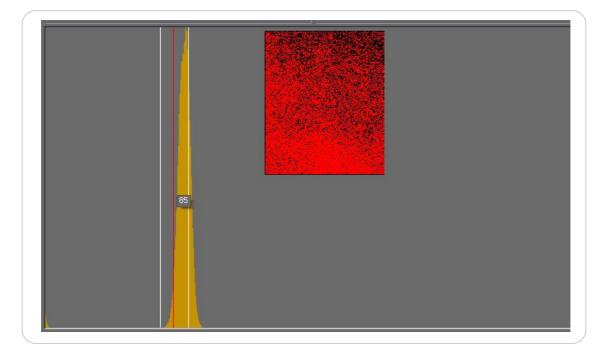


Figure 25. Histogram

This is a typical histogram of an image without a dose when the offset is set to zero. The red pixels in the preview show all pixels that are between the white lines in the histogram. When the cursor is held at a certain point in the histogram, the corresponding grey value is displayed. The offset should be chosen around the center of the left side of the peak. This will reduce the noise but allows to keep important data. In the above histogram the value would be at 85.

Write the value from your tests into the "Configuration of the sensors" dialogue of $dicomPACS^{\textcircled{R}}DX$ -R in the support mode in the section "Sensors". The relevant line where to enter the value is "Offset".

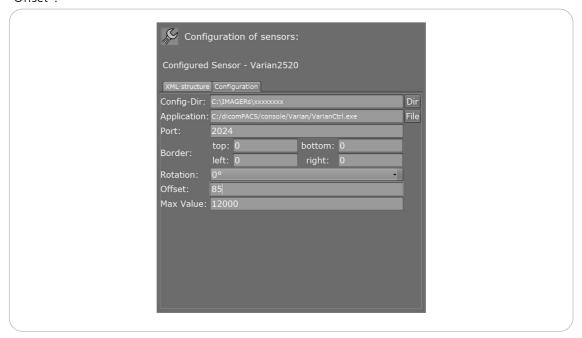


Figure 26. Configuration of sensors dialogue

4.9.7.2 Adjust the MaxValue

The MaxValue defines the upper threshold for grey values. If the MaxValue is too low, important image information might be lost. If it is too high, there will be stripes or artefacts when high dose values are used.

- 1. To determine the MaxValue it has to be set to the maximum value of the panel first. This is 16000 if the panel delivers 14Bit images, 65000 for 16Bit.
- 2. Restart the $dicomPACS^{\textcircled{\$}}DX$ -R and take an image with very high exposure (e.g. 70kVp, 30mAs, 1.2m FFD, no filters).
- 3. The image should shows stripes as some lines of the panel got overdosed.
- 4. Use the histogram described before and determine where the stripes start (e.g. in the screenshot below the value is 11750).
- 5. Set this MaxValue for the Varian sensor in the sensors.xml file and restart the software. Take the same exposure again. The image should not show any stripes.

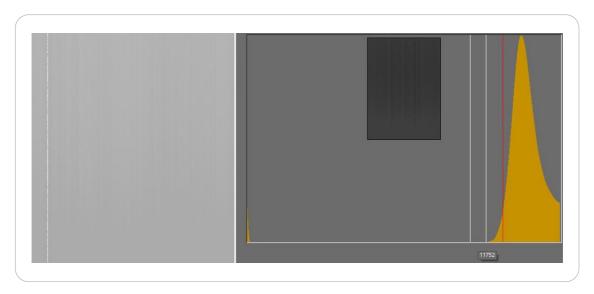


Figure 27. Histogram before adjusting the MaxValue

4.9.7.3 Check orientation

Adjust the tags "rotate", "flip" and "invert" for the Varian sensor in the sensors.xml to match the correct settings for most examinations. If certain examinations use different rotate and flip settings, they can be adjusted in the configuration of the examinations inside the *dicomPACS®DX-R*.

- 1. Check rotation
- 2. Check flipping
- 3. Check invert

To check all the settings, it is useful to run a test series with a test plate / pattern and 20mm aluminium as well as different often used dose ranges. The images should match the quality requirements.

4.9.7.4 AEC field definition

With the ascertainment of the AEC-Fields, *dicomPACS*®*DX-R* is able to set the ROI automatically correct, if the according study is configured for it.

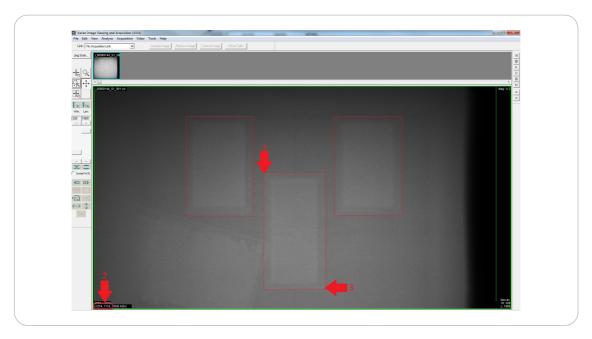


Figure 28. AEC fields

Therefore an image with the lowest dose must be taken. The image should look a bit like the one above.

Now the picture has to be opened with VIVA (via the Varian4RawTool) and you will get the above view. (The VarianRawTool can be found on the *dicomPACS®DX-R* OR-Addons DVD).

The fields are named left, right and centre.

Afterwards move the mouse cursor over the upper left corner of each field and note the value shown at marker '2'. These are the X- and Y-Coordinates. These coordinates don't need to be measured exactly. It can be a little bit bigger than the actual AEC-field. Please see Arrow '1' in the picture.

After that, the height and width of the fields have to be measured. Therefore move the courser to the lower right corner of each field and note the coordinates.

These coordinates need to be subtracted from the ones of the upper left corner of the AEC-Field to get the height and width of the field.

Example of the image:

Marker 1: X: 1250, Y: 1110Marker 3: X: 1700, Y: 2010

Resulting in following values for width and height:

Width: 1700 - 1250 = 450 and Height: 2010 - 1110 = 900

These values need to be entered in the sensors.xml.

Following has to be added to the according sensor (CenterAecField-Values are from our example):

<Sensor type=[...]>

Like described above, the AEC-fields are labelled left, right and center (LefAecField, RightAecField and CenterAecField).

Here the calculated and noted values have to be entered.

At last, the processings have to be adjusted, to use the defined AEC-fields for the ROI-finding.

The ROI will be set to the activated AEC-Fields for every future study, which has the AEC-fields activated and the according processing set to use AEC-fields for the ROI.

ett blank intentionally

Chapter 5. Support mode of dicomPACS®DX-R

The support mode is designed for the system setup of the digital X-ray system and is only available with the corresponding login level.

CAUTION/ATTENTION!



EN: Only a trained technician may configure or change the settings of the *dicomPACS®DX-R* configuration.

If unauthorised changes have been made to the delivered software, OR Technology will not accept any responsibility or liability for the correct functioning of the product in such a case.

FR: Seul un technicien qualifié peut configurer ou changer les paramètres de la configuration *dicomPACS®DX-R*. Si des changements non autorisées ont été effectués sur le logiciel livré, OR Technology n'acceptera aucune responsabilité pour le fonctionnement correct du produit dans un tel cas.

To enter the configuration menu of the *dicomPACS®DX-R*, start the application by a double click to the icon *dicomPACS®DX-R*, which is located on the desktop, or activated by using the start menu. When *dicomPACS®DX-R* has finished the start procedure, a login screen is displayed. The buttons "support mode" and "configuration" are enabled by default. Different login levels are possible. Select the support mode at the left bottom corner.

To change option in the support mode, login as administrator:

Username: adminPassword: setup

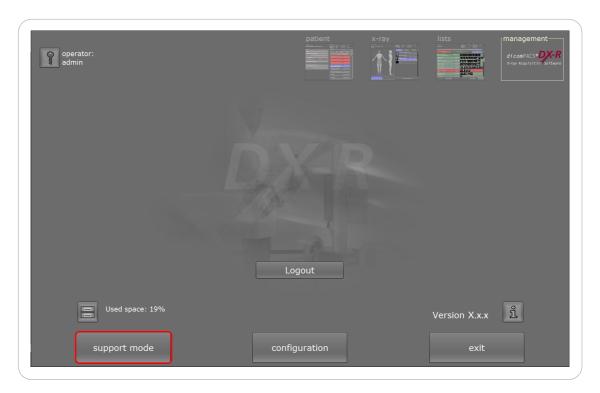


Figure 29. Admin login

A new screen is displayed with different configuration options.

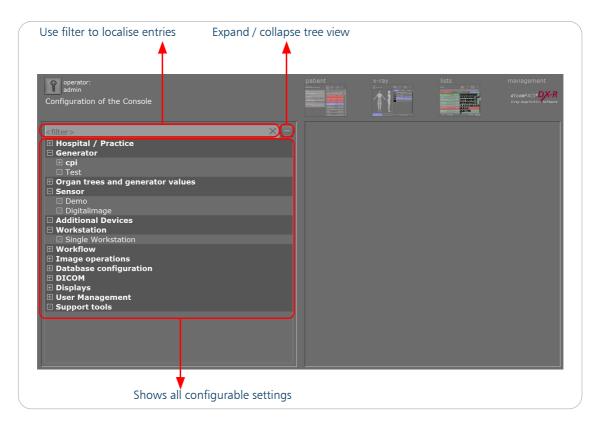


Figure 30. Support mode - overview

5.1 Configuration of hospital / practice data

Here you configure the data of practice. These data are used with the production of the DICOM images. Hospital/Practice Address Enter data for the selected entry

Figure 31. Support mode - Hospital practice

The configuration menu is designed in such a way that all configurable options are located on the right hand side and the navigation is located on the left hand side. For example:

The name of the hospital or the practice has to be entered into the field Hospital / Practice, e.g. "OR Technology GmbH - X-ray Testcenter".

Into the field Address the whole address of the hospital or practice has to be inserted, e.g. "Neptunallee 7c, 18057 Rostock".

The configured data of hospitals / practices are used for the DICOM tags "institution name" and "institution address".

5.1.1 Practice stamp

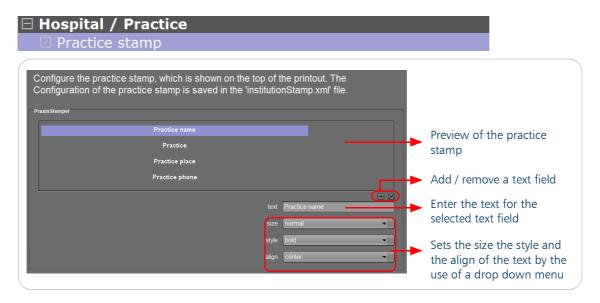


Figure 32. Support mode - Practice stamp

The practice stamp is used for paper print and the patient CD.

5.1.2 Date format



The date format can be configured in the support mode. The new configuration option of the date format enables a date display independent of the operating system.

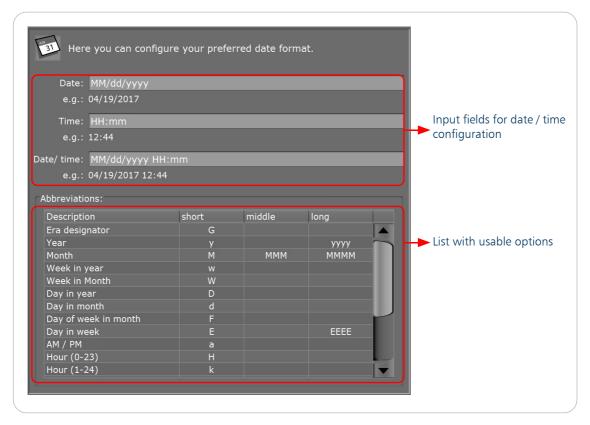


Figure 33. Configuration of the date format

The configured date format is saved in the C:\dicompacs\console\dicomPACS.properties. If no date format is configured the settings are taken from the according locales-file.

5.1.3 Performing physician/responsible inspector

⊟ Hospital / Practice	
☑ Practice stamp	
□ Date format	
☑ Performing physician	

The performing physician/responsible inspector (for ORinspect) can also be configured in the support mode. The information is stored in DICOM/DICONDE tag and also used e.g. for the function on burning in ID data into images.

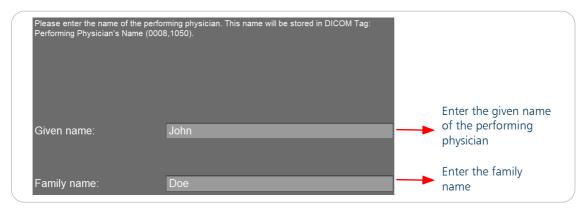


Figure 34. Configuration of the performing physician

5.2 Basic configuration of all generators types

Several generators can be configured for use with the software. They can be selected in the generator panel. Depending on the generator, different tabs for settings are displayed.

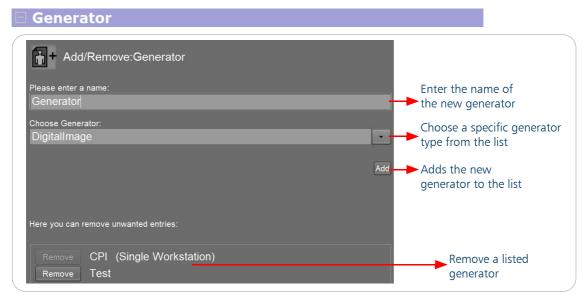


Figure 35. Support mode - add / remove generator

Enter a name for a generator, select a type of generator from a list of all available generator types and press "Add". A new entry is listed in the generator list. Entries can also be removed from this list.

5.2.1 Configuration of a new generator - first step

After adding a new generator, the view changes to the branch of the new generator. mAs, kVp and sec steps can be removed, which generates the following dialogue to be confirmed.



Figure 36. Support mode - confirm the deletion

Please refer to chapter Generators, see page 257 ff. for specific generator types.



Port settings can be executed in the configuration dialogue for the generator.

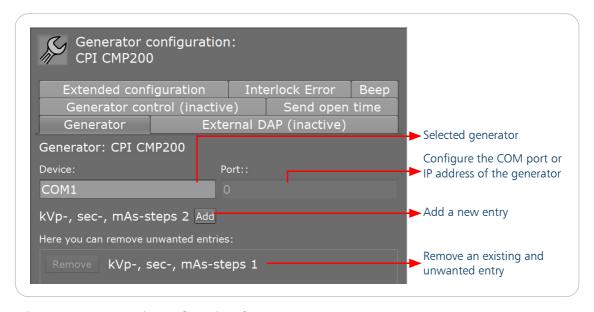
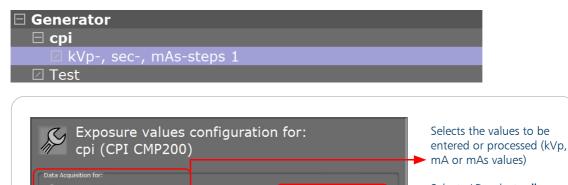


Figure 37. Support mode - configuration of a generator

5.2.1.1 Value ranges

If a new generator has been added, value ranges are visible for possible adjustments. The value ranges reflect the increment of kVp, mA and mAs values.



Selects / Deselects all values

Select all values

Select all values

Select all values

Selects / Deselects all values, e.g. for deletion

Deletes all selected values

Text field for editing new values, confirming by pressing the button "Add value"

List of values for all increment for the selected generator (here: List of all kVp values)

List of values for all increment for the selected generator (here: List of all kVp values)

Figure 38. Support mode - configuration of the value range

/!

CAUTION/ATTENTION!



EN: Value ranges are only useful for generators with fixed mA for certain kVp values and should not be changed! Please contact your service representative for more information.

FR: Les intervalles de valeurs sont utiles uniquement pour les générateurs avec mA fixes pour certaines valeurs kVp et ne doivent pas être modifiés! Veuillez contacter votre conseiller clientèle pour plus d'informations.

-

PRACTICAL HINT

It makes sense to use several value ranges if the generator defines different mAs values for different kVp values.

```
e. g. 50-60 \text{ kVp} + \text{mAs values} = \text{value range 1}
62-70 \text{ kVp} + \text{mAs values} = \text{value range 2}
```

If the value range should be configured, first of all the kind of values, e.g. kVp or mA must be selected. The steps of the generator can be set with minimum and maximum mA values. If additionally a list with mA values is already available, the minimum and maximum values cannot be changed in the display but have to be edited via the mA values list.

Values that are not needed can be deleted or missing values can be inserted.

If the configured value range should be removed from the system, press the "Remove" button beside the respective entry.



CAUTION/ATTENTION!



EN: When removing the value range from the generator, all values will be deleted from the database and must be entered again if required.

FR: En enlevant l'intervalle de valeurs du générateur, toutes les valeurs seront effacées de la base de données et doivent être entrées de nouveau si nécessaire.

It is necessary to confirm the deletion procedure by pressing the "Yes" button in the dialogue.

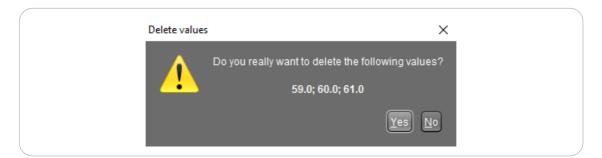


Figure 39. Support mode - confirm the deletion

5.2.2 Configuration of a new generator - External DAP

Beside the generator values, other parameters can be configured.

It is possible to connect various, external dose area product meter (DAP) with the software. This is important for generators, that do not have a DAP.

Configure the used COM port and programme path of the driver software. If the connection is successful, the DAP values are recorded for each exposure automatically and stored in the DICOM file.

Another solution is that the DAP is already connected to the generator. Refer to "Chapter 15. Specific generator settings" on page 257 for more information.

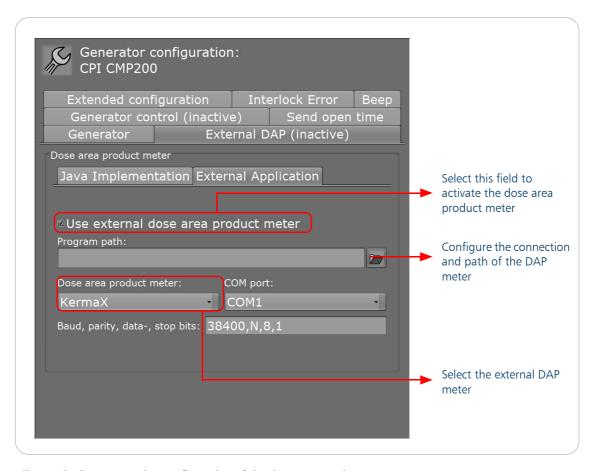


Figure 40. Support mode - configuration of the dose area product meter

5.2.3 Configuration of a new generator - Generator control

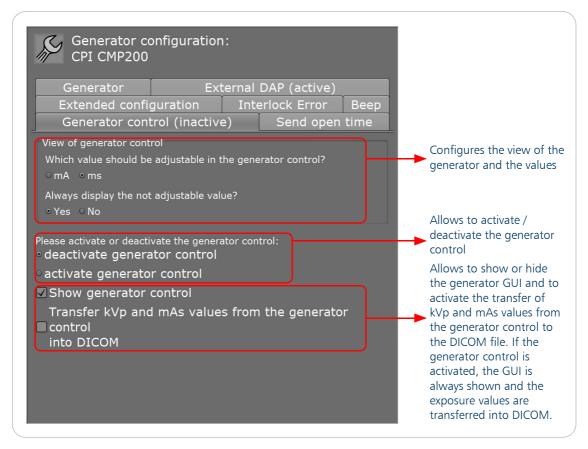


Figure 41. Support mode - configuration of the generator control

It is possible to decide whether the kVp or mAs values should be written into the DICOM. Furthermore, it is possible to disable the generator control. If the generator panel is deactivated, this means no generator is connected and configured. Then it must be operated by hardware console.

Different options for the generator control are also configurable. When the generator panel is activated, the generator panel is always displayed and the kVp and mAs values are transferred into the DICOM.

It is also possible to configure which parameter (mA or ms) should be adjustable inside the generator control. The changes in the X-ray view are only visible after a restart.

5.2.4 Configuration of a new generator - Send open time

This option is available for all generators.

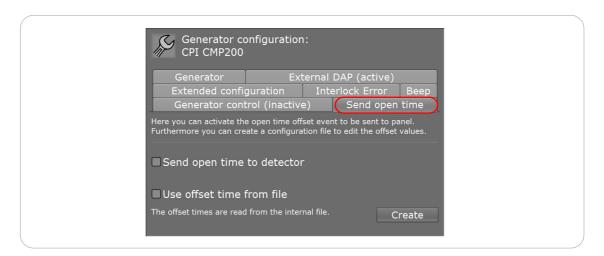


Figure 42. Support mode - generator configuration - send open time

If "Send open time to detector" is enabled, the open time and the offset of the generator are sent to the detector. This is important for generators that require a special preheat time before an exposure can be triggered. The offset values are taken from a table and depend on the selected kV. A table with default values is located in the folder:

c:\dicomPACS\console\config\generatorData\GeneratorOffsetTimes.csv The default values are taken from the Sitex CPseries generators.

Edit the existing csv file depending on the generator used with *dicomPACS*®*DX-R*. To reset the values, delete the csv file. A new csv file with the default values will be created after restarting the software.

5.2.5 Configuration of a new generator - Interlock error

Here you can edit the message displayed for the interlock error codes 080 and 081.

5.2.6 Configuration of a new generator - Beep

Enable a sound during exposure and adjust the volume for CPI generators.

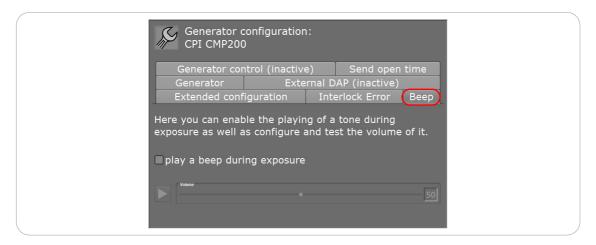
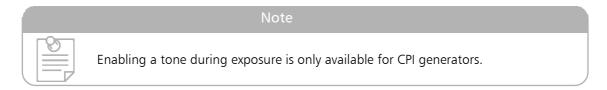


Figure 43. Enable sound during exposure



5.2.7 Generator - Signal tones

Enable or disable a signal tone if the generator is ready for exposure. This option may not be working for some generator models.

After enabling the signal tone, the volume can be adjusted.

By default the signal tone is disabled. A service technician must enable the signal tone.

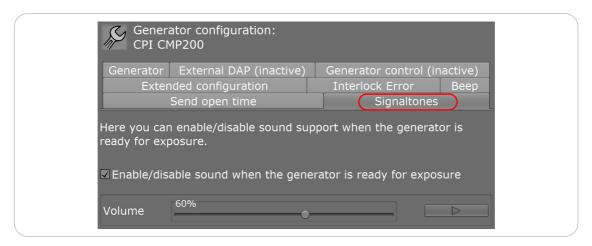


Figure 44. Enable sound for generator ready status

5.3 Organ trees and generator values

☐ Organ trees and generator values

dicomPACS®DX-R enables the configuration of several organ structures including various examinations.

5.3.1 Configuration of organ trees/exposure menu

☐ Organ trees and generator values☑ Configure organ trees☑ Assign generator values to examinations

In the human version, examinations for adults, children and infants are available.

In the veterinary version, examinations for horses, dogs, cats, small mammals/ birds/ reptiles and dental exams are available.

In the inspect and secure versions, respectable component groups are available, like weld inspecting, test objects, pearls and objects.

After adding a new organ structure a restart of the application is necessary.

The organ structures are for instance used in the X-ray view.

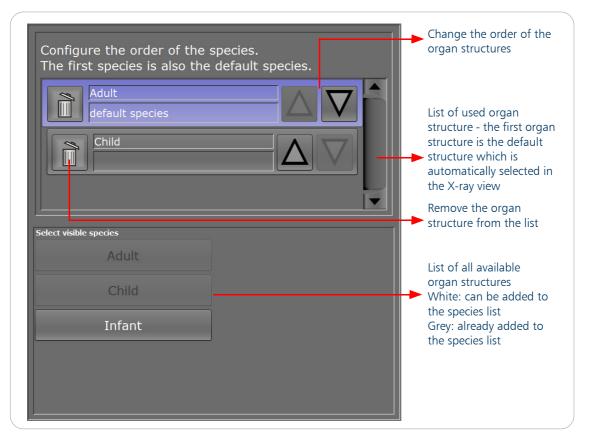
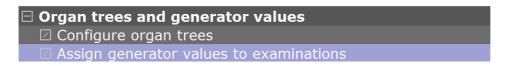


Figure 45. Support mode - configuration of the organ trees

5.3.2 Assignment of generator values to examinations



The default settings for the generator and, if required, additional information such as focus size, FFD (focus film distance), etc. can be entered for every single exposure within an organ structure.

These settings and details are shown in the software before the X-ray is taken, and if the generator control (optional) is active, transferred to the generator.

CAUTION/ATTENTION!



EN: Only trained X-ray technicians are allowed to enter or edit these settings. FR: Seuls les techniciens en radiologie qualifiés sont autorisés à entrer ou à modifier ces paramètres.

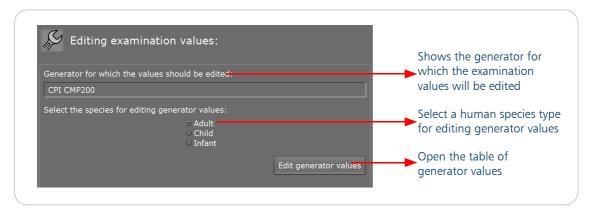


Figure 46. Support mode - adjustment of generator values for examination

When the button "Edit generator values" is pressed, a further window opens where all generator values are displayed respective to the examinations.

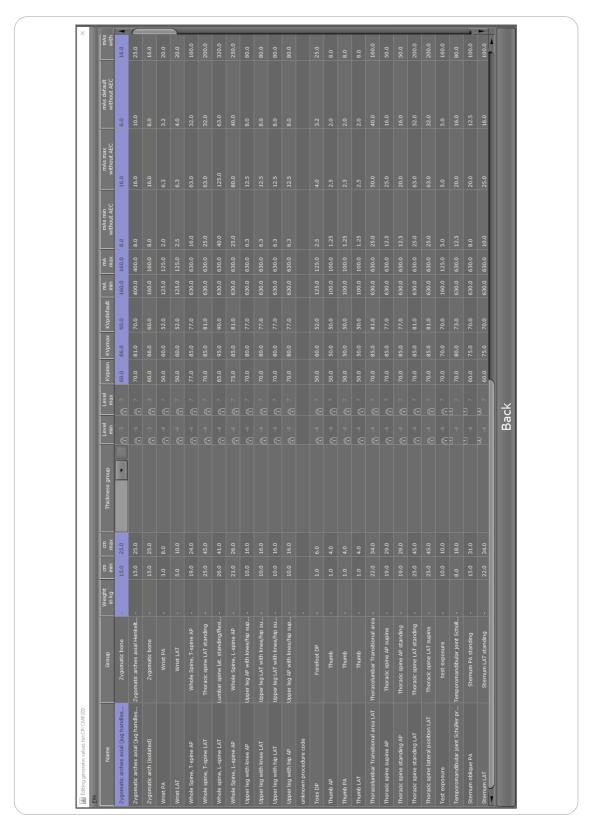


Figure 47. Support mode - edit generator values

Almost each value, except the values for "Level min" and "Level max", can be changed for each examination. These uneditable fields are marked with a padlock and coloured in grey.

\triangle

CAUTION/ATTENTION!



EN: All examinations are sorted in groups. If any value is changed, this value is changed for the whole group. To change the values only for one examination it is necessary to sort this examination in a separate group.

FR: Tous les examens sont classés en groupes. Si une valeur est modifiée, elle l'est pour le groupe entier. Pour modifier les valeurs uniquement pour un examen, il est nécessaire de classer cet examen dans un groupe séparé.

If you click on the edit button in "Weight in kg", the following dialogue appears to edit the weight steps:

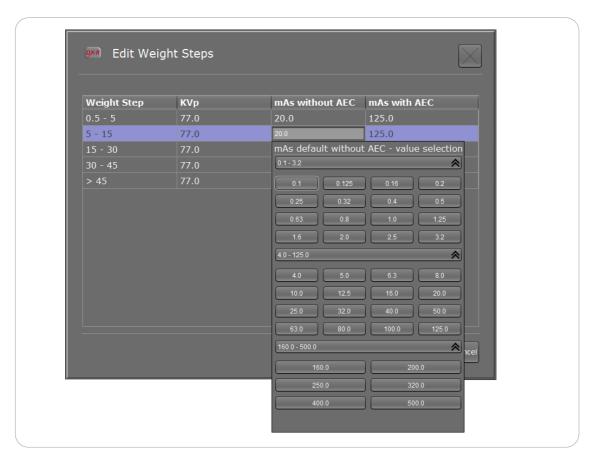


Figure 48. Edit weight steps

You can change the given value by selecting another value from the drop-down list.

In the veterinary version it is possible to adjust the "Thickness group". If you click on the edit button in "Thickness group", the following dialogue appears to edit the thickness groups:

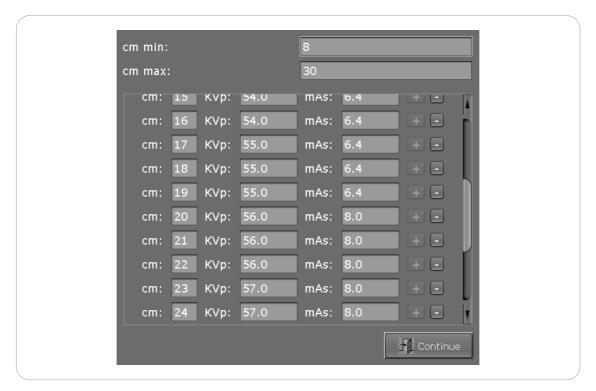


Figure 49. Edit thickness groups

You can change the given value by entering an alternative value. It is also possible to add and to delete thickness groups by clicking on the plus respectively the minus button.

Thickness control

There are two ways to modify the exposure values for thickness:

- min/max cm
- table with cm values and exposure technique

5.4 Configuration of sensors / detectors

Sensor

In this part of the configuration, sensors can be added and removed as well as configured. This is necessary for the configuration of the workstation.

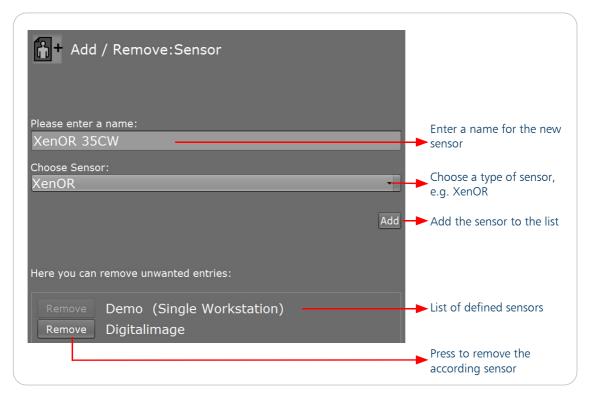


Figure 50. Support mode - add / remove sensor

If an existing sensor should be removed from the configuration, press the "Remove" button of the respective sensor.

For adding a sensor, enter the name into the input field on the right hand side and afterwards press the "Add" button.

A restart of dicomPACS®DX-R is necessary to apply the new settings.

5.4.1 Configuration of the new sensor / detector

A sensor can be selected from a list of available sensor types. Furthermore, in the tab "XML structure" the Sensors.xml is displayed for the corresponding sensor / detector.

After adding a new sensor, the view is changed to the branch of the new sensor.



For the "Demo" sensor an acoustic signal for the acquisition event can be enabled. A sound appears when a demo image is acquired. The volume is adjustable with the slider. By default this option is enabled.

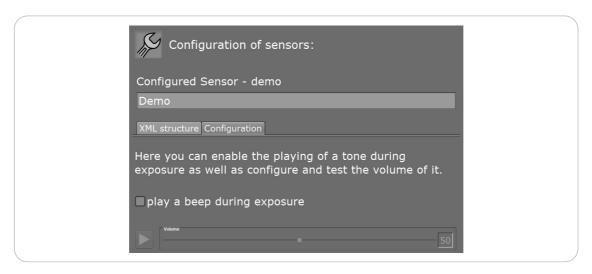


Figure 51. Support mode - demo sensor configuration



Note

We recommend to use the Set2xxDETECTORTYPExx.exe setups for the installation of sensors / detectors. The setups are individualised for the specific sensor / detector types.

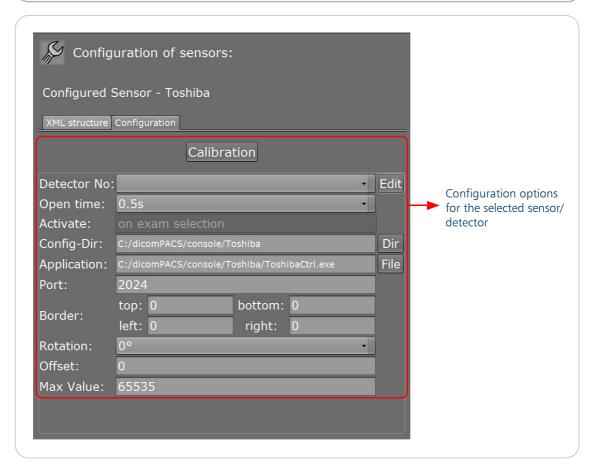
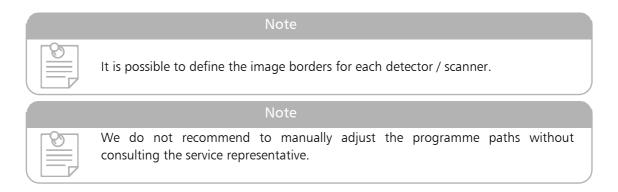


Figure 52. Support mode - exemplary Toshiba configuration

The configuration dialogue settings for the selected sensor / detector can be adjusted.



5.4.2 Photo sensor

In the support mode in the section "Sensor", the configuration of the DigitalImage sensor allows to set a standard directory from where the images should be imported. You can, however, import from any other directory when you select the path manually. Furthermore, it is possible to select to automatically delete the imported image from the directory, so that it is no longer available in the import directory but archived in *dicomPACS®DX-R*. The selection "Compress image data" imports any data material from the import directory as a jpg file in DICOM. The data size of the imported images can thus be minimised. Uncompressed data in RGB format have the advantage that any PACS can display it.

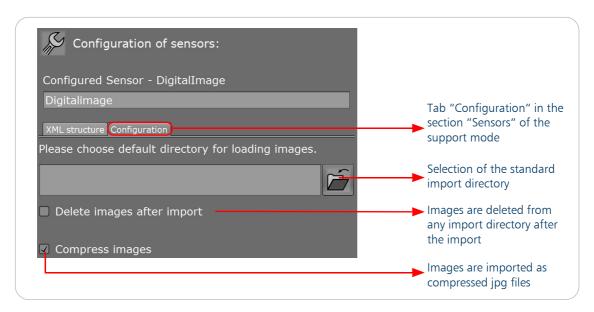


Figure 53. Sensor configuration

5.4.3 Sound playback

Signal and background sounds for various status events can be activated and played. The sound playback is disabled by default. In the support mode the sound output can be enabled. For this purpose, the software provides a number of standard settings which can be adjusted to your own requirements. For example, a sound can be played to signal that the detector is ready for the next image acquisition.

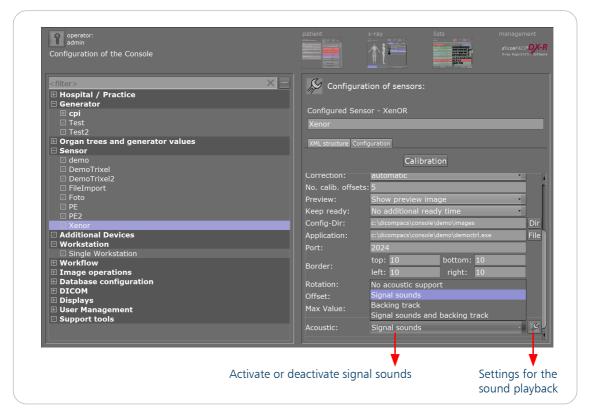


Figure 54. Support mode - enable acoustic sounds

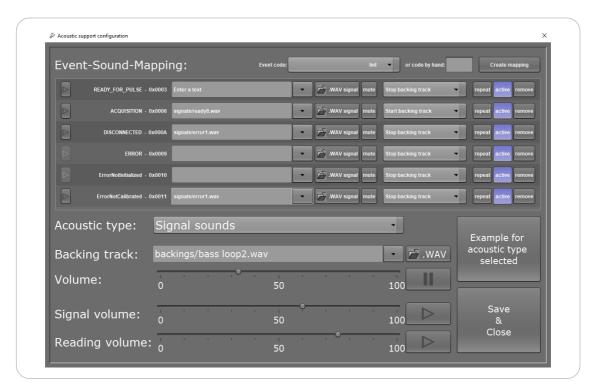


Figure 55. Configuration dialogue for signal and background sounds

There are various possibilities to configure the signal and background sounds. Depending on the acoustic type, different default settings are given. These are displayed by selecting "Example for acoustic type selected". In addition to the pre-set sounds the software can also play external WAV files or play texts via the Windows speech output. The volume for the different acoustic types can be configured separately.

Note



For further information or help with the configuration of the settings, please contact the OR Technology support team.

5.5 Additional Devices

Additional Devices

Here you can add additional devices to be operated with *dicomPACS*®*DX-R*, like e.g. a collimator or for NDT projects a pipe actuator. The device added in this section has to be entered in the section "Additional Devices" in the workstation.



Figure 56. Add / Remove device



When adding a collimator, set the COM port and the default size of the collimator light field.

Collimator model CX225

The default FFD for this model is set in the support mode. For each examination a FFD is deposited and delivered with the database. The "Send FFD" option can only be used if the X-ray system hardware does not send the FFD value to the collimator.



Figure 57. Default settings for collimator

For newly created examinations the FFD has to be set manually by the user. In the planning mode the examination has to be selected. Then, the user has to adjust the collimator FFD manually according to the required conditions. The measured distance is shown on the collimator display. In the exposure tab of *dicomPACS®DX-R* the manually set FFD has to be confirmed by clicking on "Store as default for selected exam". Once confirmed, the user cannot change the set FFD anymore.



Figure 58. Confirm the set FFD for this examination

5.6 Configuration of Workstation

■ Workstation

The main selection in the section "Workstation" refers to the mapping. It is necessary to select whether the workstation is a single workstation or more workstations, such as table or wall workstations.

In each case the name of the workstation should be entered in the text field below "Please enter a name:", which should be confirmed by clicking the button "Add". All names that were entered appear in the drop down box that can be opened by clicking on the small arrow on the right next to the selected workstation type.

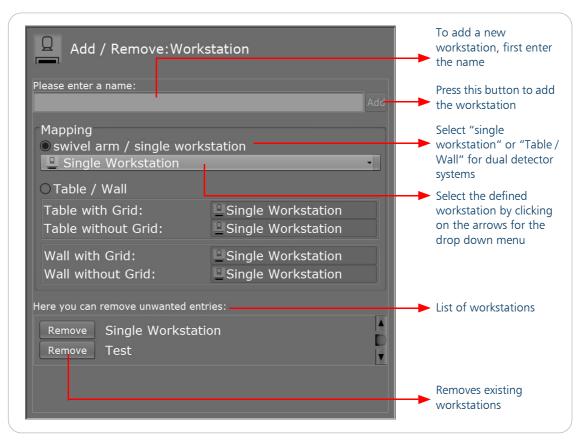


Figure 59. Support mode - Workstation

The following table shows the detector options and workstation selection. The "Workstation type" can be selected via the buttons in front of the respective type in the configuration dialogue:

Number of detectors	Number of generator workstations	Workstation type
1	1	swivel arm / single workstation
1	2 or more	Table / Wall
2	2 or more	Table / Wall

Table 11. Detector options and workstation selection



5.6.1 Workstation configuration - General

■ Workstation■ Single Workstation

After adding a new workstation, the configuration menu appears.

In the first step a description for identification, an icon and the activation of the workstation can be configured.

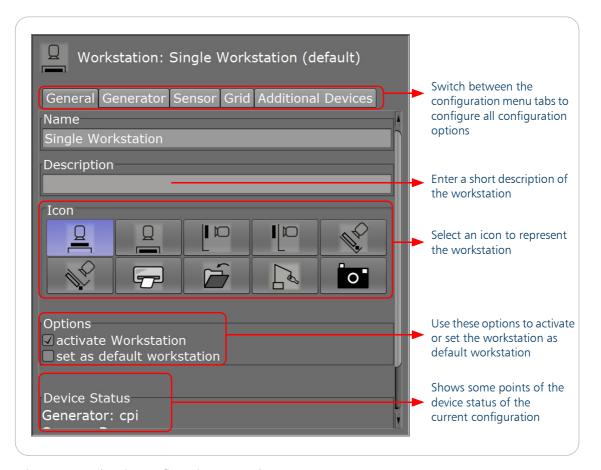


Figure 60. Workstation configuration - general

5.6.2 Workstation configuration - Generator

lt se

Note

It is necessary to configure a generator, see page 92, before the generator can be selected. The corresponding generator setup creates the right details in the section "Workstation". However, it is recommended to check that the right generator has been assigned in the section "Generator".

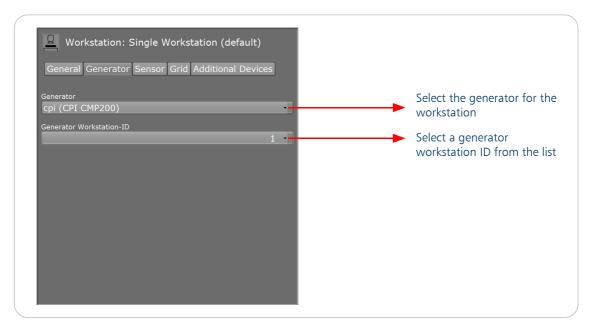
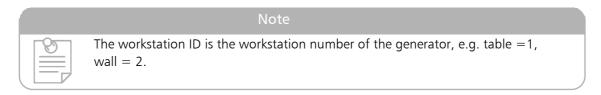


Figure 61. Workstation configuration - generator



5.6.3 Workstation configuration - Sensor

It is necessary to configure a sensor, see page 105, before the sensor can be selected.

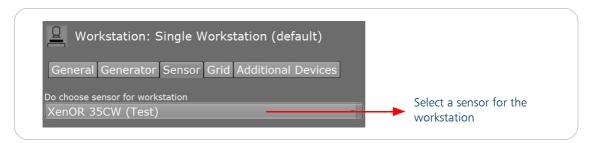


Figure 62. Workstation configuration - sensor

5.6.4 Workstation configuration - Grid

The grid check must be configured to monitor the presence of the removable X-ray grid.

Adhere to the following sequence:

Hardware:

• select open / close the logic (grid in open)

Software:

- select the checkbox "Do activate grid check"
- select the serial port and pin, see chapter Monitoring of external devices, page 320 for the assignments and for specific generator configurations regarding the EMD generator, see "Chapter 15. Specific generator settings" on page 257
- select the relevant pin
- select the open / closed circuit
- test the configuration by clicking on "Do test"

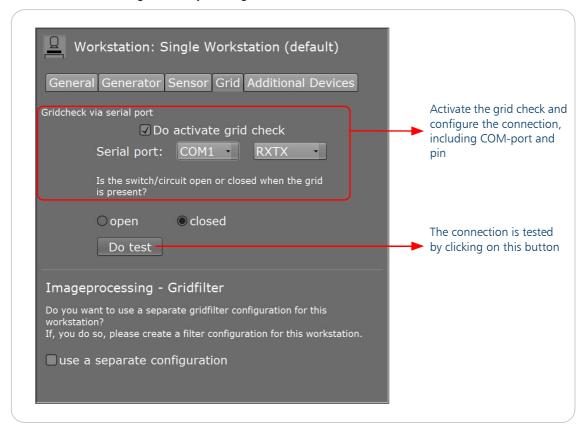


Figure 63. Workstation configuration - grid

The following table shows the selection options of the grid and circuit. The last column "Select open / closed" refers to the selection buttons below the question "Is the switch / circuit open when the grid is plugged or is it closed?" in the configuration dialogue:

Grid	Circuit	Select open / close
Present	Open	Open
Not present	Close	Open
Present	Close	Closed
Not present	Open	Closed

Table 12. Selection options for grids and circuit

For the grid check the following dialogue appears:

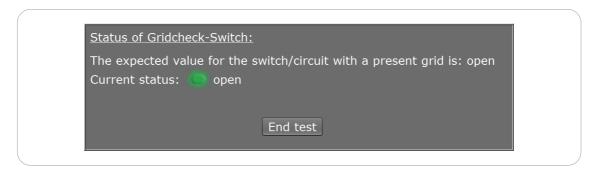


Figure 64. Support mode - grid check, open

When the grid is not inserted or pulled out, the status changes.

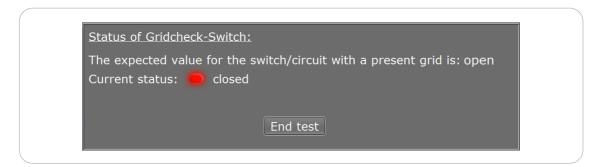
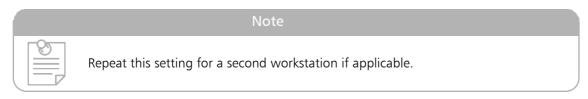


Figure 65. Support mode - grid check, closed



5.6.4.1 Hardware

The grid switch has to be connected to the COM port. The hardware must connect the selected pins to check the status.

Pins to check the status	Pins to be connected
RXTX	Pin 2 to Pin 3
RLSD	Pin 7 and Pin 4 to Pin 1
СТЅ	Pin 7 and Pin 4 to Pin 8
Ring	Pin 7 and Pin 4 to Pin 9
DSR	Pin 7 and Pin 4 to Pin 6

Figure 66. Grid check - hardware connection

Both outputs are used to obtain a better signal strength.

Note



Please note that the EMD generator uses the pins RTS (7), RLSD (1), CTS (8) and DSR (6) for the display of the irradiation events.

These cannot be used for a grid check on the same serial port. In this case only the pins 2 and 3 (RXTX), DTR (4) and Ring (9) can be used for the grid check.

5.6.5 Photo workstation

With *dicomPACS®DX-R* it is possible to import images from cameras or scanned documents to a study and to archive them. A setup "AddPhotoWorkstation.exe" in the "Modules/Sensor" folder is available in the installation sources that adds a workstation to import photos.

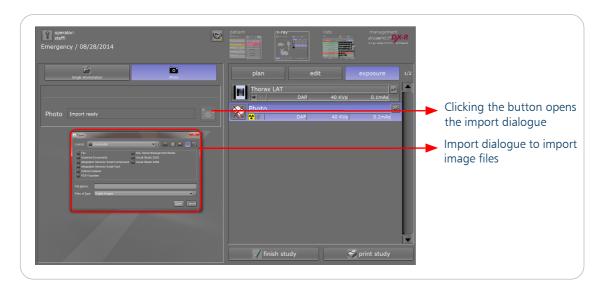


Figure 67. Digital Image / Photo sensor

5.6.6 Workstation configuration - Additional devices

Add additional devices to a workstation.

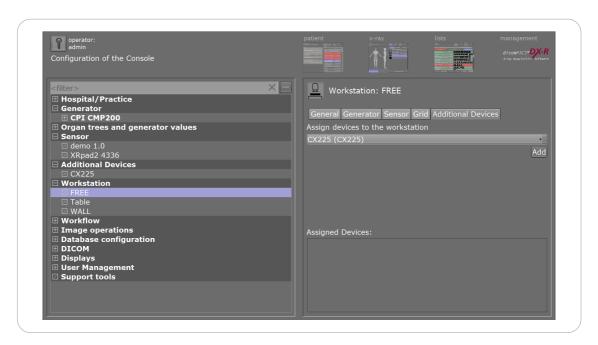


Figure 68. Add additional device to workstation.

5.7 Configuration of the workflow

Workflow

The configuration dialogue for the workflow offers the possibility to adjust different options for the workflow.

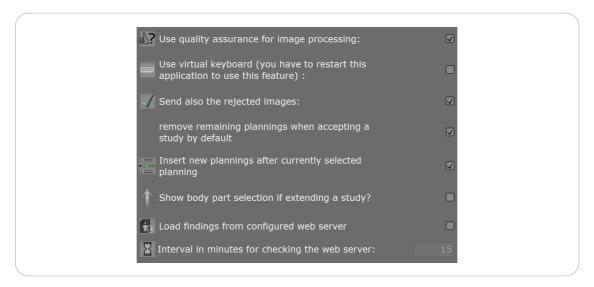


Figure 69. Support mode - configuration of the workflow

The quality assurance for images allows to evaluate the quality of new images. The visual impression of the images can be evaluated as "good", "moderate", "poor" and "not rateable". The quality assurance results are analysed by *dicomPACS®DX-R* technicians. If necessary, the processing for certain exposures can be adapted.

The virtual keyboard is a solution for touch screen systems. If the option has been activated, the virtual keyboard is always available when input fields need to be filled.

To send all images including also the rejected images, the option "Send also rejected images" has to be activated. Otherwise, only the finished images will be send.

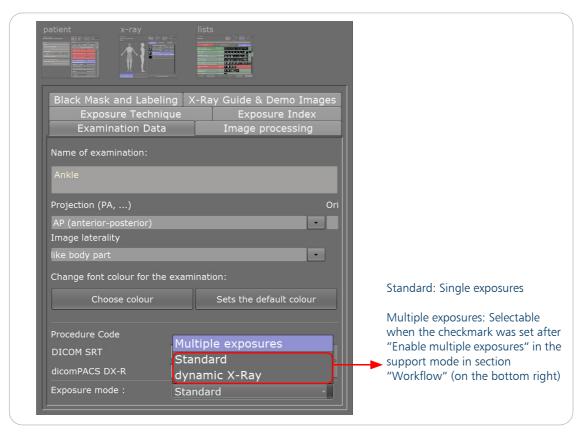


Figure 70. Exposure mode selectable in the configuration mode of macros / examinations

Activate the option "Insert new plannings after currently selected planning" to determine the inserting of new plannings, otherwise the new plannings are inserted at the end of the list. This can also be edited in the file C:\dicomPACS\console\dicomPACS.properties by setting the entry "Console.Plannings.InsertNewAfterCurrentSelection" true or false.

5.7.1 Configuration of patient / pregnancy

☐ **Workflow**☑ Patient / pregnancy

The recording of the pregnancy status takes place in the patient view as well as in the X-ray view. The location of the pregnancy status button is prominent in each view. By the default setting, the user will always be asked for the pregnancy status of females in a pre-defined age group. This constant inquiry is automatically activated, but can be configured in the support mode.

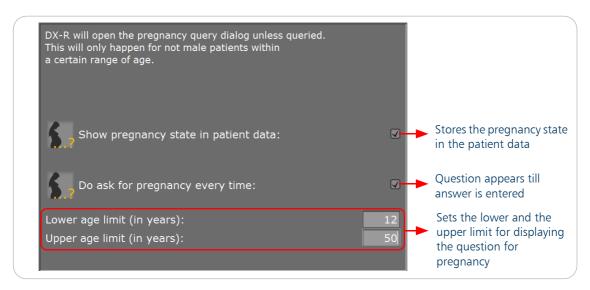


Figure 71. Support mode - pregnancy settings

5.7.2 Configuration of patient/encoding



In the "Patient / Encoding" section you can choose to split the first name at the first SPACE into the first name and a middle name.

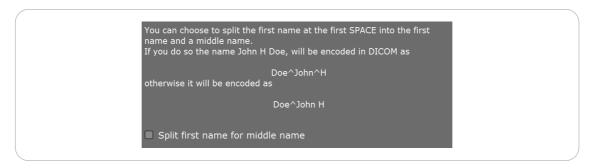


Figure 72. Support mode - Patient / encoding

5.7.3 Configuration of patient/display

□ Workflow	
☑ Patient /	pregnancy
☑ Patient / •	encoding
□ Patient/D	isplay

The configuration menu "Patient / Display" displays the following options:

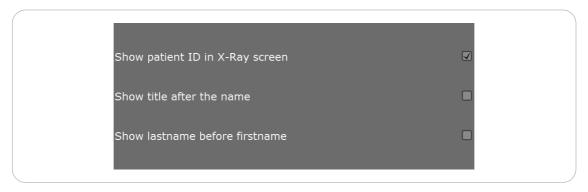


Figure 73. Support mode - Patient / Display

5.7.4 DICOM



These settings refer to the contents of the resulting DICOM image.

By default the accession number will be created if it was not given by the worklist query or the user input.

As further options:

- series can be stored as stack
- series number can be used as instance number
- use date and time of the first image for study date and time

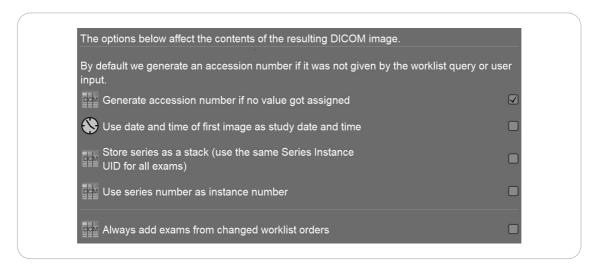
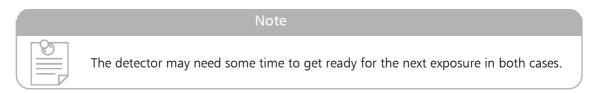


Figure 74. Options for the contents of the resulting DICOM image

5.7.5 Exposure configuration



Here you can configure the behaviour in the X-ray tab to allow consecutive exposures without interaction with the programme. To avoid unintentional exposures you should keep the "Block exposure" option enabled. Advise the user to take extra care when you disable this option.



You can also configure a status LED which shows when the detector and the software is ready for the next exposure.

Additionally you can prevent the images from false assignment from changing the planning after starting taking the X-ray.

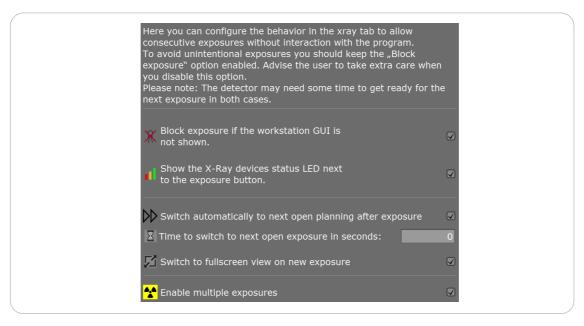
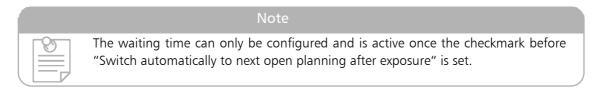


Figure 75. Support mode - Exposure

For non-destructive testing activate the option "Enable multiple exposures" to take several images for one examination. If this is enabled, in the configuration mode for examinations and macros it is possible to select the "Exposure mode" "Multiple exposures" in the tab "Examination Data".

To make the workflow even more effective, it is possible to automatically switch to the next examination. The waiting time in seconds, before the next examination is called up, can be freely configured. The manual selection of the next planning is possible at any time.



The support mode offers an automatic activation of the full screen mode. With this function active the software switches into full screen mode after the image acquisition. It is recommended to additionally enable the setting "switch automatically to next open planning after exposure".



Figure 76. Support mode - Exposure

If several plannings are entered in the X-ray view, the full screen mode always shows the last exposure taken. The full screen is displayed with a coloured border. Depending on the status of the workstation, this border is orange or green.

After the image acquisition, an orange frame will always be displayed first. It indicates that the workstation is not yet ready for the next acquisition. In the background the software switches to the next entered planning and the colour changes from orange to green. With the settings shown above (time to switch to next open exposure = 0 seconds) an automatic shift to the next scheduled planning takes place immediately. As soon as the detector is ready again, the colour of the frame changes to green until the next exposure.

This makes it easy to progress the list of plannings without leaving the full screen mode. After an image has been acquired for the last scheduled planning, the frame remains orange to indicate that no further plannings are pending.

If you leave the full screen mode and manually restart it, you will always see an orange frame.

The full screen mode shows the patient data and the most important status displays. These include:

- the ready indication of the detector
- the WiFi connection status detector workstation
- the battery status of the detector
- patient (name, DOB, ID)
- name of the image
- exposure index / S-value

The status display disappears after a few seconds if the mouse is not moved. A new movement of the mouse shows the status display again.



Figure 77. Full screen mode

The user can switch manually to the full screen view by clicking this icon in the tab "exposure" of the X-ray view. Then the selected image is shown in the full screen view.

5.7.6 Assignment of exposures

☐ Workflow	
☑ Patient/pregnancy	
☑ Patient/encoding	
☑ Patient/Display	
☑ DICOM	
☑ Exposure	
Assignment of exposures	

During the image acquisition phase:

If the detector receives the X-ray, $dicomPACS^{\$}DX$ -R remembers which examination was active during the X-ray acquisition. The user can already switch to the next scheduled examination before the image is shown in $dicomPACS^{\$}DX$ -R. It is possible to continue working if the detector is ready again.

All images will be assigned automatically to the examinations which were active during the X-ray exposure.

By default this behaviour is enabled (checkmark). The time in seconds (30) represents the time in which *dicomPACS*[®]*DX-R* can receive the finished image. It is freely configurable.

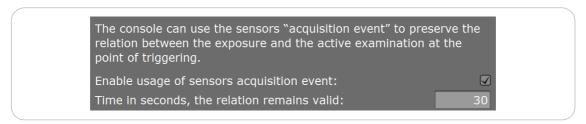


Figure 78. Settings for "Assignment of exposures"

5.7.7 Transfer Exposure Values to DICOM

Workflow
☑ Patient / pregnancy
☑ Patient / encoding
☑ Patient/Display
☑ DICOM
☑ Exposure
☑ Assignment of exposures
☑ Transfer exposure values to DICOM

The configuration menu of the section "Transfer Exposure Values To DICOM" is sorted in two groups - X-ray journal and APR (anatomically programmed radiography) and plannings.

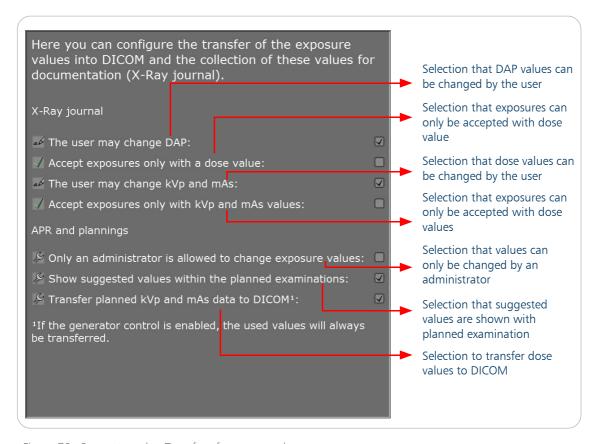


Figure 79. Support mode - Transfer of exposure values

The configuration dialogue reflects the diverse workflows and installations and ensures, that no incorrect values are displayed or transferred to the DICOM data. The distribution partner in charge of the system may specify that the exposure values can be changed only by an administrator. This is possible in the X-ray view after the expose took place by clicking on the edit button where the values can be adjusted. This can be of interest for systems with generator integration, where the

general user cannot change the values of the generator. For systems without generator integration, the system can be configured, so that the values must be recorded before the study can be completed.

Note



If the generator control is enabled, the exposure values are transferred to DICOM, see page 96.

5.7.7.1 Setting for the X-ray journal

If an automatic DAP value recorder is installed, it is not necessary to change the DAP values manually. But if there is no automatic DAP recording activated, the option "The user may change DAP" and the values can be activated manually.

If there is no DAP recorded, a pop-up window will appear in the Viewer that will prompt the user to set a DAP value.

Only the administrator is allowed to change the settings for the examinations in the configuration mode. If also the users should be allowed to change the settings, than activate the option "The user may change kVp and mAs".

If for all carried out exposures a dose value must be available, the option "Accept exposures only with a dose value" has to be activated. In this case, for all carried out exposure a DAP value has to be entered. Otherwise a pop-up menu opens if a study without a dose value will be finished.

5.7.7.2 APR and plannings

If the option "Only an administrator is allowed to change exposure values" is active, no other user can edit the exposure values of an examination. This option might be useful in cases of patient protection.

The option "Show suggested values within the planned examination" enables the display of the suggested values within the plannings and the operator can use the values as a hint.

To transfer values into DICOM with an disabled generator control, simply activate the option "Transfer planned kVp and mAs data to DICOM".

5.7.8 Image Laterality

Workflow
☑ Patient / pregnancy
☑ Patient / encoding
☑ Patient/Display
☐ Transfer exposure values to DICOM
☐ Image laterality

The image laterality describes the laterality of the certain (possibly paired) body part. Possible values are:

- left
- right
- both and
- unpaired

The value is stored in the DICOM tag 0020,0062. From *dicomPACS®DX-R* version 2.3, the image laterality can be defined separately for every examination. The value can either be assigned directly to an examimnation or indirectly by choosing one part of a paired body part (e.g. left or right hand).

Note



The functionality is limited to the human version of the software.

The functionality for choosing the image laterality from the body part overview has to be activated in the support mode. Once the sub-category is selected, it is possible to activate the functionality by setting the checkmark in front of "Display image laterality selection" on the right configuration window. The functionality is available after the restart of the application.

Here you can switch the display of the image laterality selection in the x-ray view.

Display image laterality selection

Figure 80. Activating image laterality

Usage of image laterality

When entering the "X-ray view" of the application, a body front overview is displayed, which is virtually departed into a left and a right side. Choosing either side will display the exam overview with the preselected image laterality. The selectable values will be displayed as a group of buttons below the list of exams. The captions in the exam selection, e.g. "(left)", as well as the components in the series list, will also contain the assigned image laterality. If the value is unpaired or the function is disabled, the image laterality value will not be included.

5.7.9 Rejection Reasons



Many rejection reasons for already created images are listed there. In the text field you can enter any reason for rejection, which is added to the list by clicking on the "+" button. Existing entries can be deleted by selecting the entry and clicking on "-".

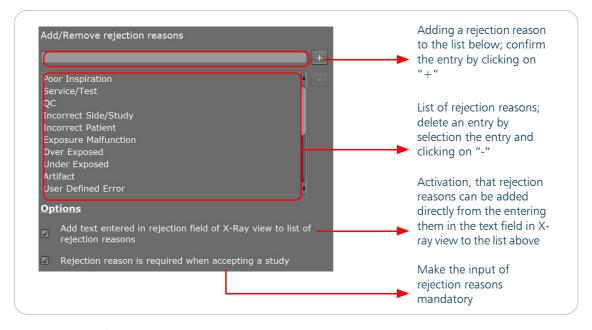


Figure 81. List of rejection reasons

The list of rejection reasons can be found in the X-ray tab if an image has to be rejected. In the list all pre-defined rejection reasons are included.

If a new rejection reason is entered in the X-ray tab, this will be saved for the selected rejected image only.

If in the menu item "Rejection Reasons" the option was activated to add the entered rejection reasons in the X-ray view, then any entry in the X-ray view is directly added to the list of rejection reasons and are also included in the list in the menu item "Rejection Reasons" in the support mode. The entered reasons will then always be displayed in addition and are also available for other rejected images.

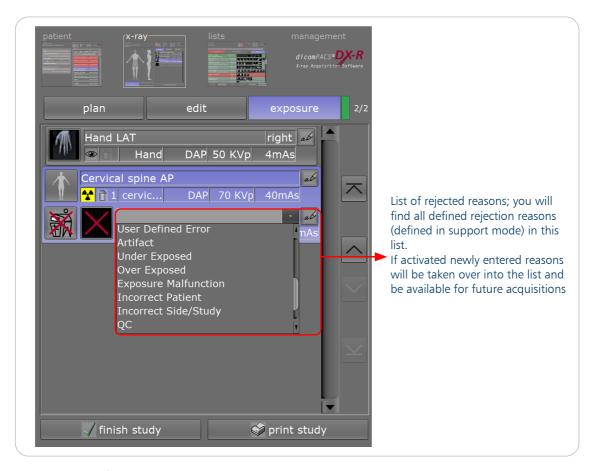


Figure 82. List of rejection reasons in the X-ray view

It is possible to define the input of a rejection reason as a mandatory information. If an image or a study is rejected without giving a rejection reason, a dialogue appears. The user is requested to complete the missing information.

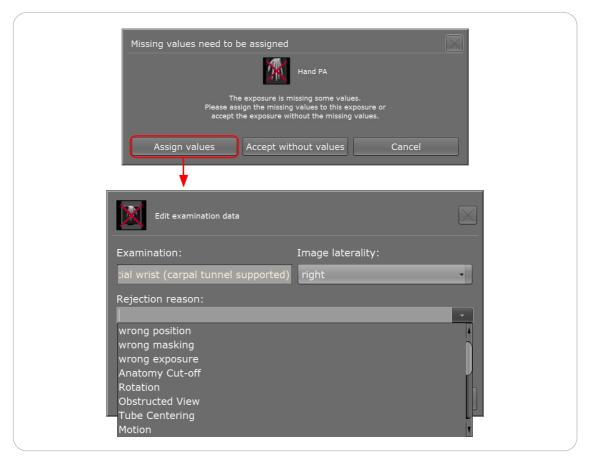


Figure 83. Enter rejection reasons

5.7.10 Locales/Encoding

Workflow
☑ Patient / pregnancy
☑ Patient / encoding
☑ Patient/Display
☑ Transfer exposure values to DICOM
☑ Image laterality
☑ Rejection reasons
□ Locales / encoding

Besides setting the language in the "dicomPACS.properties" file, you can change the language also in the section "Workflow" - "Locales/Encoding" of the support mode.

Three options are offered to encode the characters with the DICOM object.

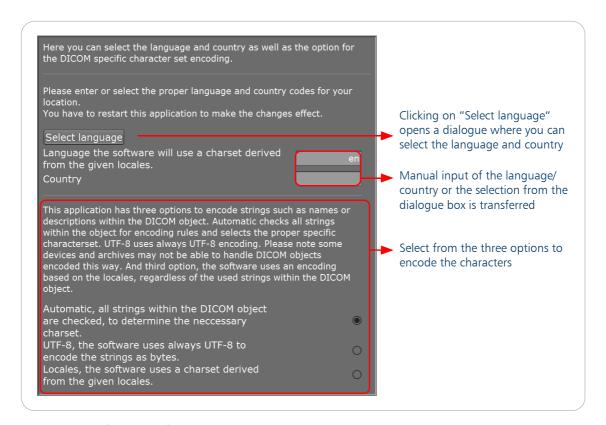


Figure 84. Configuration of Locales / Encoding

5.7.11 Worklist options

⊟ Workflow
☑ Patient / pregnancy
☑ Patient / encoding
☑ Patient/Display
☑ DICOM
oxtimes Transfer exposure values to DICOM
☑ Image laterality
☑ Rejection reasons
∠ Locales / encoding
⊟ Worklist options
☑ Proposal data
☑ Virtual keyboard

The order of the worklist entries can be adjusted here.

By default, the latest entry is displayed first and then sorted in descending order.

The entries can also be displayed in ascending order.

Furthermore, the time of the latest exposure is taken into account for sorting.

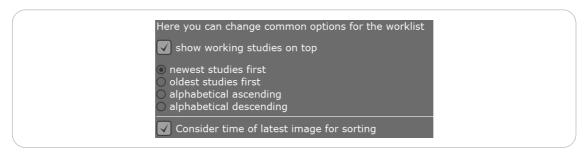


Figure 85. Choose order for the worklist entries

Proposal data

By default the proposal data is enabled as soon as the Worklist View is active.

Proposal data is shown on input of new patient data, when adjusting data of existing patients or emergency patients. At least three characters must be entered for displaying a proposal list.

By clicking on an already existing patient, the data is transferred to the input mask. The data does not need to be entered manually.

Additionally, a new worklist entry is created after selecting data from the proposal list.

Following settings for working with proposal data are available. After selecting an entry from the proposal list:

- the patient input should remain open
- a new worklist request is to be created automatically
- dicomPACS®DX-R switches directly to the X-ray view

These options include the following properties:

- Worklist.Proposals.showProposalPatients=true|false
- Worklist.Proposals.OnSelectedPatient.createNewOrder=true | false
- Worklist.Proposals.OnSelectedPatient.switchToXray=true|false

To ensure a faster workflow with the virtual keyboard, the patient data is deleted when emergency patients are edited. The new data can be entered immediately. (The virtual keyboard and Worklist View have to be enabled.)

Virtual keyboard

Different layouts for the virtual keyboard are available for entering data in the worklist (only if the Worklist View is enabled). Here you can choose which layout is to be used.

- modern and compact layout
- classical alphanumerical layout

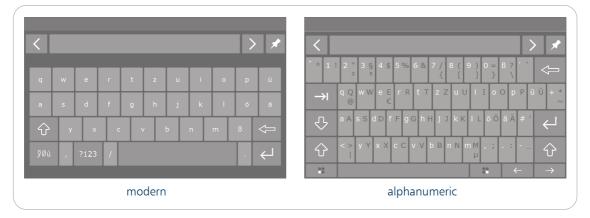


Figure 86. Virtual keyboard

The virtual keyboard can be undocked and moved to another position using the button. With

the virtual keyboard can be embedded again.

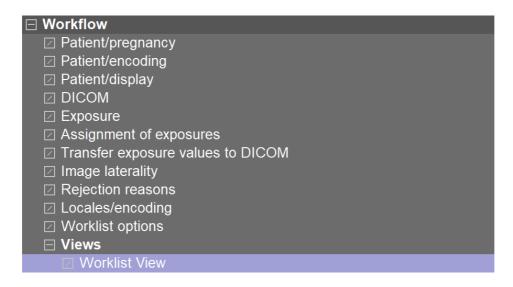
Additionally the virtual keyboard adapts to the needs of the input field. For example for the date of birth, only numbers are displayed.

If the virtual keyboard and the Worklist View are enabled, an "edit" button is displayed in the patient view to adjust patient data.



Figure 87. Patient view

5.7.12 Views



The Worklist View is available in this section. By default it is enabled after the installation. It offers a configurable design of the interface. The input mask in the patient view can be adjusted and worklist entries can be sorted alphabetically or by time of creation. Interrupted entries (marked in red) can be placed at the beginning of the list.

A list of all available input fields for the patient input is displayed. The patient data to be queried can be adjusted in this list.

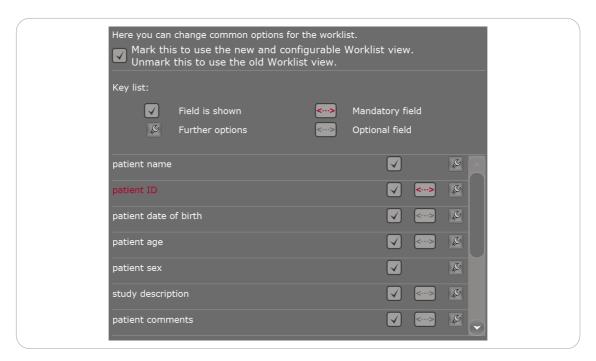


Figure 88. Support mode - Worklist view

Selected input fields are displayed in the patient view. You can specify which of the input fields are required fields. Mandatory fields are shown in red. In addition, extended options are available for some input fields:

- Patient name
- Patient ID
- Performing physician
- Requesting physician

Enable different case behaviour on manual input for each editor

- normal manual input
- capitalise first letter on manual input
- always upper case

This feature can be used with the attribute capitalisable="true" in the FXML definition. By default, the first letter is capitalised when text is entered.

This affects the following editors:

• human mode:

PatientName, PatientComment, PatientAddress, StudyDescription, PerformingPhysician, RequestingPhysician

• vet mode:

PatientOwnerName, PatientAnimalName, PatientColor, PatientBreed, PatientComment, PatientAddress, StudyDescription, PerformingPhysician, RequestingPhysician

- ndt mode (ORinspect): none
- security mode (ORsecure): LocationOwnerName

Virtual keyboard for the Worklist-View

For the Worklist-View a different than the standard virtual keyboard is available. It can be activated in the support mode if the Worklist-View (see "5.7.12 Views" on page 136) is enabled, too.

It is possible to configure the layout if an editor supports more than one option. Depending on the input field different input options are available.

- alphanumeric
- numeric with date delimiter (patient date of birth)
- date selection (patient date of birth)
- numeric with units (patient age)
- numeric (patient age)

5.7.13 Patient name

Here you can select the order in which the patient's name is to be queried.

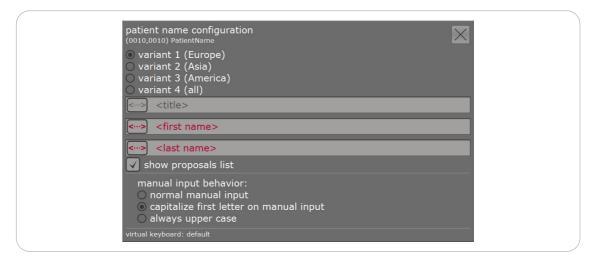


Figure 89. Define the query for patient name

Instead of separating the first and middle name with "^", it is possible to add extra input fields for the middle name and for a suffix like e.g. "Jr", "Sr".

5.7.14 Patient ID

By default the patient ID is a mandatory field.

If required, the patient ID can be generated automatically. In addition, it is possible to hide the automatically generated patient ID in the patient input. When creating worklist entries, the number of the patient ID is simply incremented. The automatically generated patient ID is not editable.

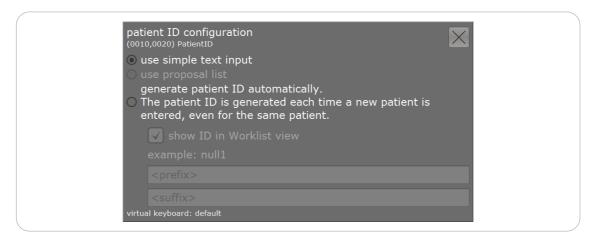


Figure 90. Settings for automatic patient ID

5.7.15 Proposal list for performing / requesting physicians

A proposal list is created from existing entries for performing / requesting physicians. When filling in the corresponding input field, the system displays a proposal list from which you can select an entry.

This means that the name of the performing / requesting physicians does not always have to be entered manually.

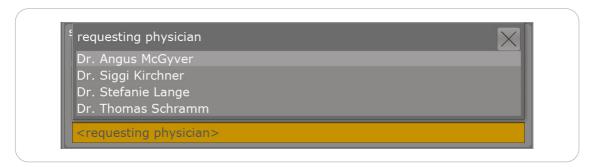


Figure 91. Patient input - proposal list for requesting physician

<u>5.7.16 Dynamic X-ray</u>

Dynamic X-ray enables fluoroscopic examinations in *dicomPACS*®*DX-R*.

Requirements

- wired XRpad2
- pulsed CPI generator
- synchronisation between IPU and generator (via Syncbox)
- a licence for using dynamic X-ray called "Fluoro"

Under "Workflow" - "dynamic X-ray" settings can be made regarding storing the images:

- Multi-Frame DICOM
 All images are stored together in one DICOM.
- JPEG 2000 compressed
 All image data is compressed and thus requires less storage space.

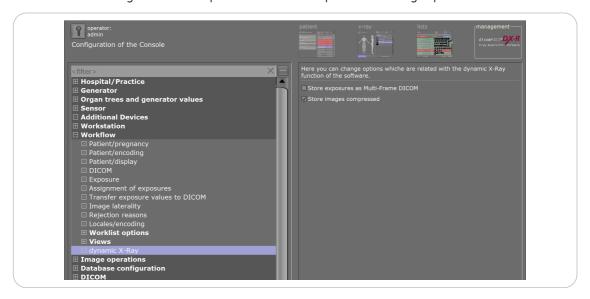


Figure 92. Support mode - dynamic X-ray

By default all image data is stored in one Multi-Frame DICOM.

If the multi-frame option is not selected, the images are stored as a series of individual DICOMs. This option is necessary for PACS systems that do not support multi-frame DICOMs.

5.8 Image operations

☐ Image operations

Under the point "Image operations" you find the common options regarding image operations.

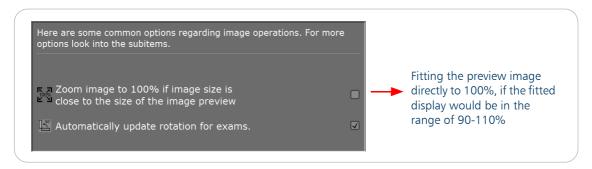


Figure 93. Common image operations

Detailed options are to be found in the subitems.

5.8.1 Processing

☐ Image operations ☐ Processing

It is possible to choose between four processing types:

- 1. Standard Processing
- 2. Cognitive Optimized Processing (COP I)
- 3. Cognitive Optimized Processing II (COP II)
- 4. Cognitive Optimized Processing III (COP III)

Simply select the check box to set the active processing.

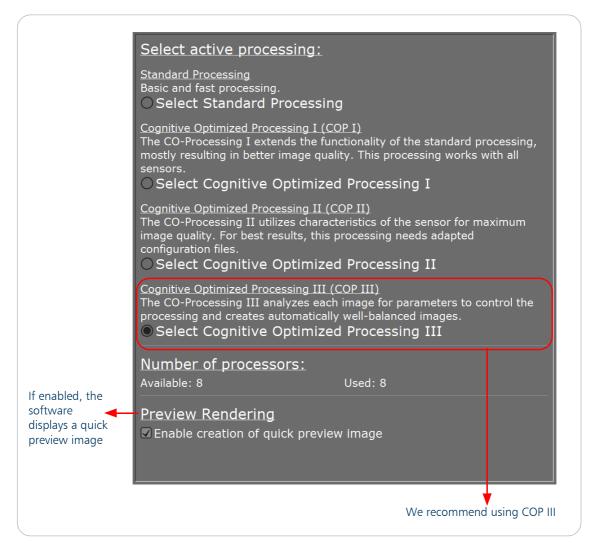


Figure 94. Support mode - processing

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With the option "Preview Rendering" enabled, *dicomPACS®DX-R* creates a preview image after the image acquisition. It is displayed right after the acquisition and makes it possible to continue working immediately. This preview image is reduced in resolution but it largely corresponds to the finished image. The final image processing then runs in the background. In the X-ray view "Preview" will be displayed.

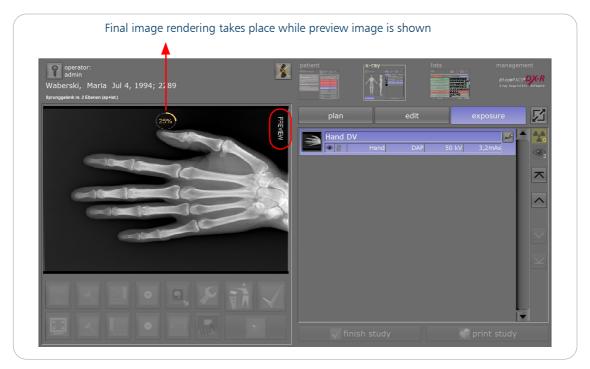


Figure 95. Show quick preview image

dicomPACS®DX-R offers different image processings.

The four processing types differ as shown in the following table:

Processing Ston	Processing-Type			
Processing-Step	Standard	COP I	COP II	COP III
Pixel Correction	1/7	1/10	1/10	1/10
Region of interest [ROI]	2/7	2/10	2/10	2/10
Look-Up-Table [LUT] configuration	3/7	3/10	3/10	3/10
Noise and Contrast	N/A	N/A	4/10	4/10
Equalize luminosity	4/7	4/10	5/10	5/10
Histogram Optimization	N/A	5/10	6/10	N/A
Contrast enhancement	N/A	6/10	7/10	6/10
Automatic LUT	N/A	N/A	N/A	7/10
Noisefilter	N/A	7/10	N/A	N/A
Look-Up-Table [LUT] configuration 2	5/7	8/10	8/10	8/10
Window level	6/7	9/10	9/10	9/10
Management	7/7	10/10	10/10	10/10

Table 13. Differences between the processing types and the single steps

For a description of the different steps of the image processing see "Chapter 9. Image processing" on page 201.

Also the number of processor cores, which are available and the number of cores that is used, is listed below the selection field. If not all cores are being used, the configuration of the system is incorrect.

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5.8.2 Exposure Index



To configure the exposure indices/exposure level indicator, go to "Image operations"/"Exposure index" in support mode. Here you can decide which values you would like to appear in the quick preview of every taken X-ray. When "Show exposure index (EI) and deviation index (DI)" is activated, you can show the target exposure index (TEI) and the exposure level indicator additionally. The exposure index according to IEC 62494-1 can be displayed together with the S-value.

The software can calculate two different types of exposure indices, the S-value (a manufacturer specific exposure index) and the exposure index according to IEC 62494-1 standard. In combination with the exposure index according to IEC 62494-1 an exposure level indicator can be used additionally. A detailed description of the two exposure indices and the exposure level indicator can be found in section "Chapter 8. Exposure Index" on page 252.

Which of the two exposure indices can be calculated and displayed depends on the used image processing mode. E.g. the exposure index according to IEC 62494-1 and the exposure level indicator can only be used in combination with the COP III processing.

Exposure index	S-value	Exposure Index according to IEC 62494-1		
Image processing		El and Dl	TEI	Exposure level indicator
Standard	available	not available		
COPI	available	not available		
COP II	available	not available		
COP III	available	available	available ¹	available ¹

Table 14. Difference between s-value and exposure index

¹ Can only be displayed in combination with EI and DI





An exposure index is always displayed in human mode of *dicomPACS®DX-R*, whereas in vet mode it is possible to deactivate the display of the exposure index.

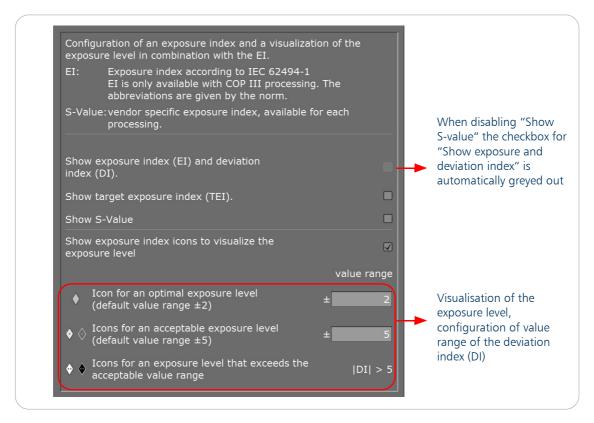


Figure 96. Settings - exposure index

5.8.2.1 Configuration

To access the statistical evaluation for a specific examination and to adjust the target exposure value (TEI), open the "Configuration of macros/examinations" by clicking on the configuration button. Select the required examination and open the tab "Exposure Index". Refer to the user manual "Configuration of examinations and macros" for further information.

Exposure index according to IEC 62494-1

The user can adjust the settings of the exposure index for each examination. The software also provides a statistical evaluation of the exposure index for each protocol/planning.

Adjusting the target exposure index

Edit the target exposure index by typing in a new value into the input field "Adjust target exposure index TEI".

Exposure index statistic

After selecting an examination, you get precise information for this single examination about:

- the number of shots since the exposure index had been activated
- the average exposure index
- the average deviation index

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Additionally, you have a quick overview of the exposure level ranges and the number of shots being an optimal exposure, overexposure, underexposure, strong overexposure or strong underexposure.

When adjusting the target exposure index (TEI), the evaluation is updated immediately using the new value for the TEI. The statistics can also be limited to the time frame "last year" and "last 30 days".



Figure 97. Tab "Exposure Index" with statistical overview

5.8.3 Black border / image cut



Sometimes it is necessary to hide parts of an image to have a better view on the important part or just to eliminate a surrounding. *dicomPACS®DX-R* offers diverse options to do that.

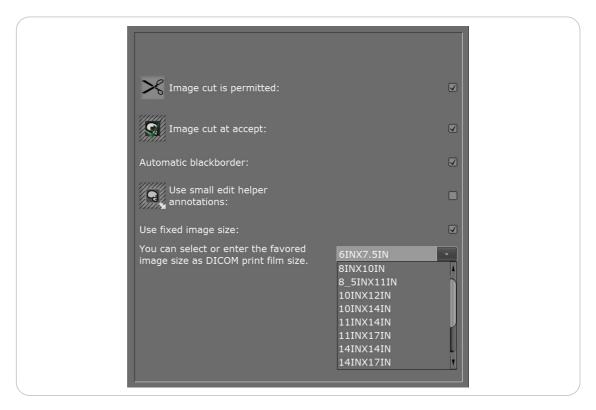


Figure 98. Support mode - black mask

The selection "Image cut is permitted" allows the user to cut images and the parts cut off the images are deleted.

When "Image cut at accept" is activated, the cutting of the faded out area is processed when the image is accepted and send to the PACS.

To configure examinations it is possible to let the programme determine an "automatic black mask". The necessary configuration takes place in the configuration mode and must be executed for each single examination.

In the file C:\dicomPACS\Console\dicomPACS.properties the parameter

ConsoleImageCutBorder.Extension.InMM=0 specifies how many millimetres around the black mask will be left when cutting out. The default value is 5.

When "Use small edit helper annotations" is activated, the arrows for rotating (in den corners) and moving (on the lines) the black mask will appear as dots.

When "Use fixed image size" is active you can enter or select a fixed size to which each image will be cut. A dashed frame will appear on the image, which can be moved as long as the black mask tool is active. The image can be cut out manually or you activate "Image cut at accept".

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5.8.4 Position labels and markings

\pm	Workflow
⊟	Image operations
	☑ Processing
	☑ Exposure index
	☐ Black border / image cut
	☐ Position labels and markings

In this section you can configure which labels shall be displayed on all examinations or only on selected exams within the X-ray view.

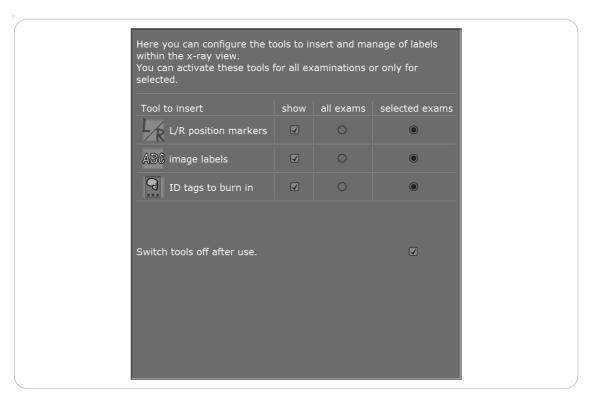


Figure 99. Support mode - configuration of position labels and markings

In case you choose "selected items": the configuration dialogue for individual macros and examinations can be used to determine which image markers are to be displayed. Therefore, switch

to the management screen, open the configuration and go to "Black Mask and Labeling".

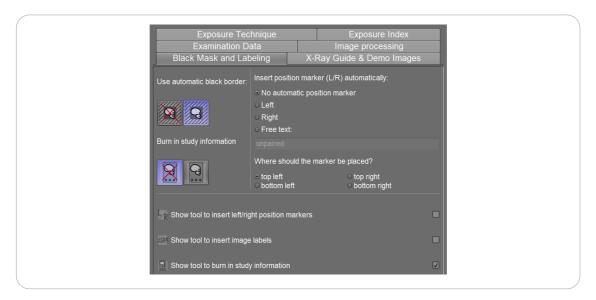
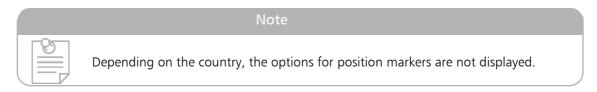
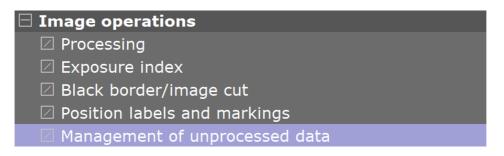


Figure 100. Configuration of macros - Black Mask and Labeling



5.8.5 Management of unprocessed data (ORinspect)



For *ORinspect* the exposure mode "DICONDE" is available. Raw data is stored in DICONDE format. Different modes are available for displaying the data in the internal viewer:

- display processed image, measure on RAW data
- display processed image, measure on processed data
- display RAW image, measure on RAW data

The button with in the internal viewer indicates the displaying mode active. By clicking on the button you can switch between the display mode but not between the mode measured. Display the processed or the raw image.

By default, the processed data is being displayed and the measurements take place on RAW data.

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5.9 Database configuration

☐ Database configuration

Here you can view the configuration of the used databases. Furthermore you can open the External Database Application.

5.9.1 Backup

□ Database configuration□ Backup

dicomPACS®DX-R uses different databases. The backup is written to C:\dicompacs\console\backup\

The backup is divided into three sections:

- the image database backup
- the Configuration database backup
- the Processing backup

This allows a safer handling of backups. When *dicomPACS*®*DX-R* exits, the backup of all three databases runs automatically.

5.9.1.1 Image Database



This creates a backup of the SQL database ORconsoleDB which contains the patient and the image information.

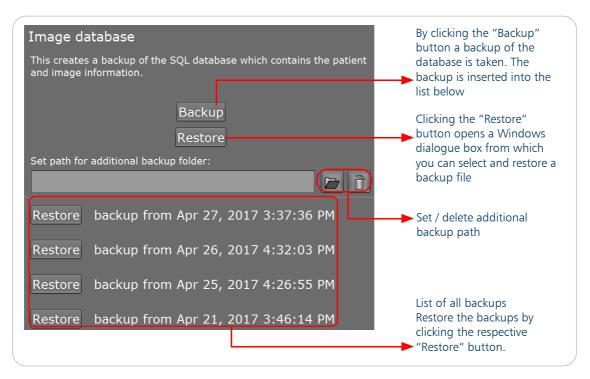


Figure 101. Support mode - backup

5.9.1.2 Configuration database

☐ Database configuration	
□ Backup	
☑ Image database	
Configuration database	

This creates a backup of the SQL database ORXrayDB which contains generator settings, exam tree, workplace settings, procedure codes and which processings are assigned to the exam. The backup of the configuration database is similar to the image database backup.

5.9.1.3 Export images



After finishing a study, the DICOM files are exported to a predefined directory. Images can be made available for other processes. To use this function, jDicomCC from version 4.12.3 onwards must be installed and running on the system. By default, this option is disabled.

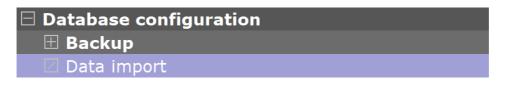
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5.9.1.4 Processing

□ Database configuration	
⊟ Backup	
☑ Image database	
Configuration database	

This creates a backup of the processing.

5.9.2 Data import



dicomPACS®DX-R offers the possibility to import DICOM files, RAW files or entire directories into the ORconsoleDB. To do so, select the directory or file.

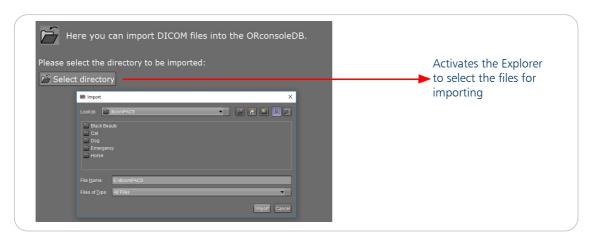
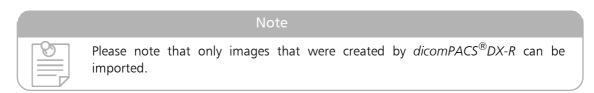


Figure 102. Support mode - selection of files for import

The file or directory for import can be selected in the above window. Mark the file and press "Import". The imported file or directory is stored in the database and can be used by the application.

This function offers to take over image data of the $dicomPACS^{\circledR}DX-R$ console database to another database. The images may be reprocessed and all tools and annotations can be applied to the image.



5.9.3 Export images

□ Database configuration	
⊞ Backup	
Export images	

Set options to export DICOM images to a default path right after the image acception.

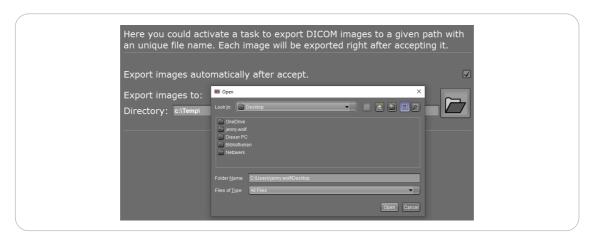


Figure 103.

5.9.4 Disk space / autodelete

☐ Database configuration	
⊞ Backup	
□ Data import	
oxtime Export images	
☑ Disk space/autodelete	

The free disk space is shown in this tab.

By default preview images from the detector are deleted after accepting an image.

In addition an autodelete can be configured.

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5.10 DICOM

DICOM

The application *dicomPACS®DX-R* offers the possibility to configure several worklists, DICOM send connections and printer configuration. A partner of each group can simply be added by entering a name and clicking on the button Add to add the partner.

Except for "miniPACS", it is possible to add several partners of each group.

You can also remove partners by clicking on the corresponding button Remove

5.10.1 Worklist



The application *dicomPACS*®*DX-R* offers the possibility to configure several worklists and the procedure code support.



Figure 104. Support mode - worklist

For the configuration of a worklist it is necessary to enter the host name, the AeTitle and the port of the provider station. Subsequently, it can be tested whether a connection is possible with the entered data.



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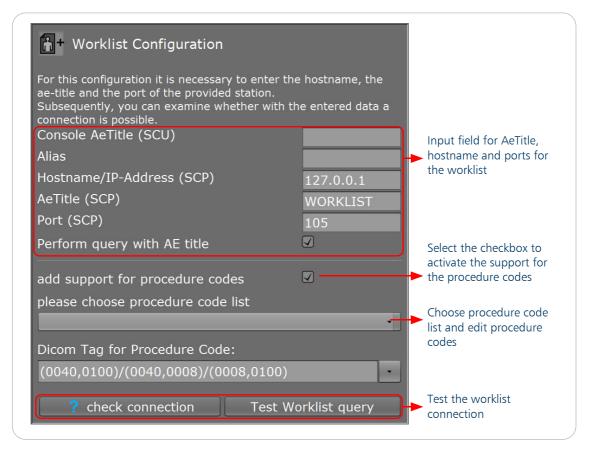


Figure 105. Support mode - DICOM worklist configuration

You have now the possibility to test the worklist query in support mode. You can first check the connection to the worklist server and then send a worklist query and see the result in a new window.

5.10.1.1 Configuration of worklist queries

In support mode (under the point "Worklist query") you can configure the requested information of the worklist query. Editing works directly via the table, with the "+" buttons you can add new elements.

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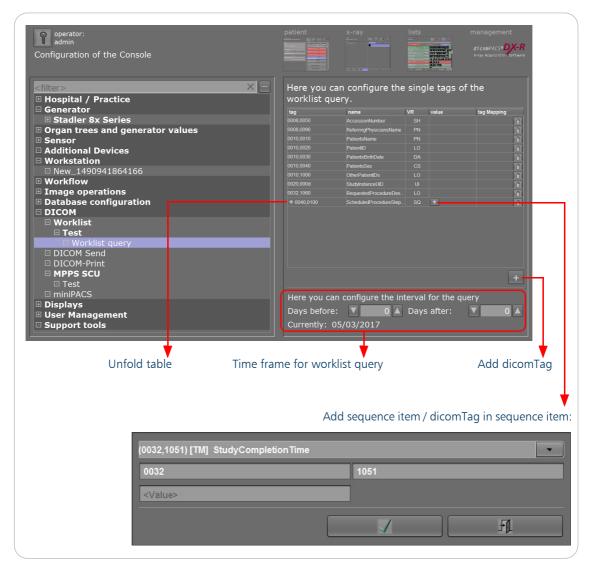


Figure 106. Configure "Worklist Query" in support mode

You can configure the interval for the query as well.

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5.10.2 DICOM Send



DICOM Send is configured in the same way as the worklist, i.e. first enter a name and add the name to the list and then enter an AeTitle, host name and port.

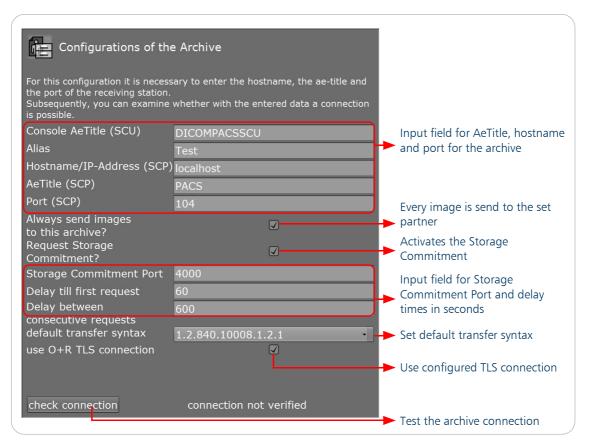


Figure 107. Support mode - configuration of the archive

The additional checkbox "Always send images to partner?" can be activated to set one or more partner. By doing this, this partner is selected and each finished image is sent automatically to the set partner.

Storage Commitment is an extension of the storage service, that gives information for each SOP instance (image) about whether it is stored in a particular archive. With this information, this data may be automatically deleted. The status is shown in the lists view.

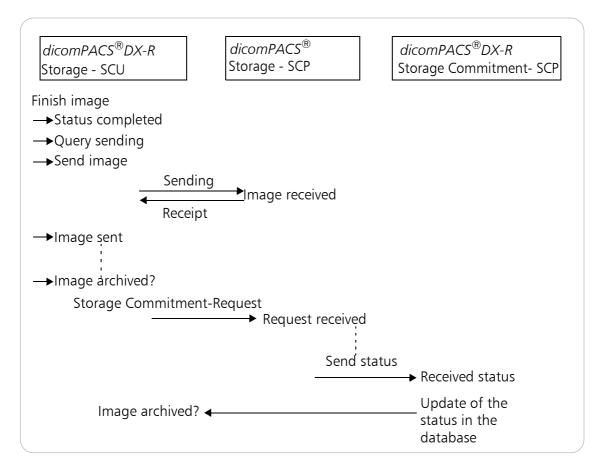
In dicomPACS®DX-R "Storage Commitment" is defined as a property of existing DICOM archives.

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The definition has the following consequences:

- 1. In the lists view two states are displayed:
 - a) Send status
 - b) Archiving status
- 2. The colour of the status "completed" is yellow
- 3. The colour of the status "sent" is yellow
- 4. The colour of the status "archiving confirmed" is green

The query for Storage Commitment starts shortly after the sending. The query is connectionless, which means that the SCU sends a query and the SCP sends a response as an SCU to the SCP. The SCP is launched from the ConsoleSCU and must be made known to the PACS.



The parameters

- "Console AeTitle (SCU)",
- "Storage Commitment Port",
- "Delay till first request" and
- "Delay between consecutive requests"

are the same for all DICOM Send archives. If one parameter is changed, it is also changed for the other archives that were set up.

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Use TLS connection and Transfer Syntax for teleradiology

It is possible to use a TLS connection for uploading images to ORCA or for sending images.

Available Transfer Syntaxes for encrypting are:

- 1.2.840.10008.1.2.1 Explicit VR Little Endian
- 1.2.840.10008.1.2 Implicit VR Little Endian: Default Transfer Syntax for DICOM
- 1.2.840.10008.1.2.4.80 JPEG-LS Lossless Image Compression
- 1.2.840.10008.1.2.4.90 JPEG 2000 Image Compression (Lossless Only)
- 1.2.840.10008.1.2.4.81 JPEG-LS Lossy (Near-Lossless) Image Compression

By default 1.2.840.10008.1.2.1 is used.

The TLS connection requires a running jDicomCC which is included in new installations from *dicomPACS®DX-R* from version 5.1 onwards. If necessary, a separate update must be carried out. For more information regarding the jDicomCC please also refer to the Technical manual jDicomCC (ORIX Document ID OR001686).

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5.10.3 DICOM Print

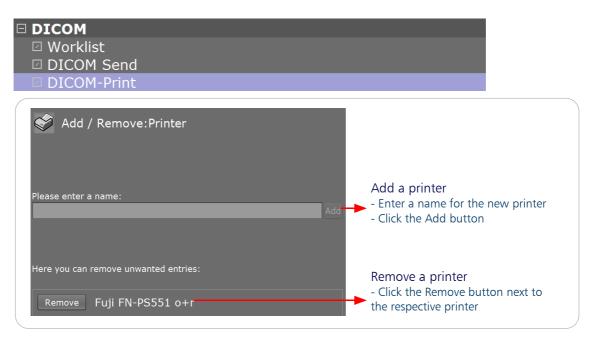


Figure 108. Support mode - DICOM Print

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5.10.3.1 Printer configuration

DICOM
⊞ Worklist
⊞ DICOM Send
☐ DICOM-Print
☑ Fuji FN-PS551 o+r

To configure an added printer, use the following dialogue.

All settings are stored in the file PrinterConfig.xml, located in C:\dicomPACS\console. The file defines the paper printers and DICOM printers usable by the software.

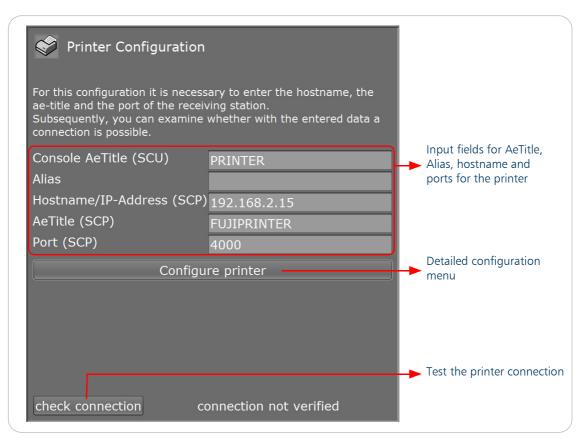


Figure 109. Support mode - printer configuration

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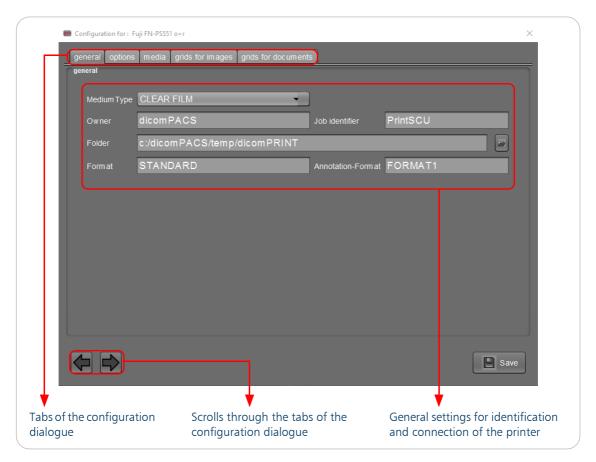


Figure 110. Printer configuration - general

The folder, the print jobs are stored in, can be edited. Using the correct folder is necessary for the PrintSCU.

Some DICOM printers offer to use different film box "Formats" and "Annotation-Formats". In this case the different formats can be set. The different settings describe the position of images and annotations for printing.

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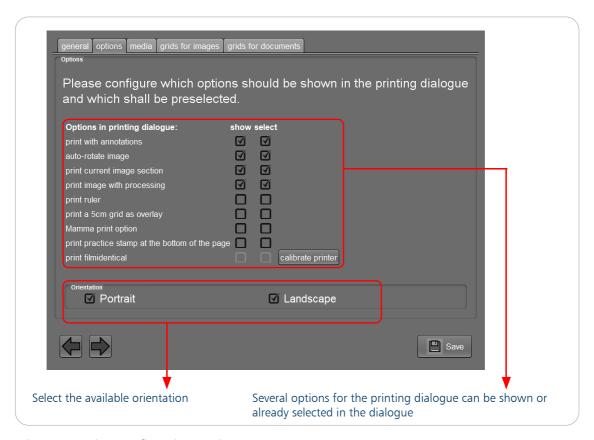


Figure 111. Printer configuration - options

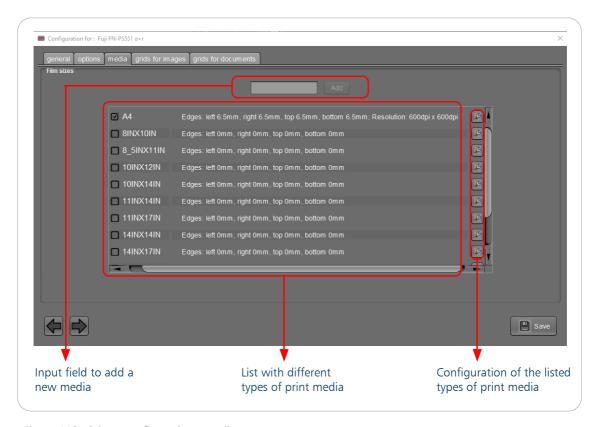


Figure 112. Printer configuration - media

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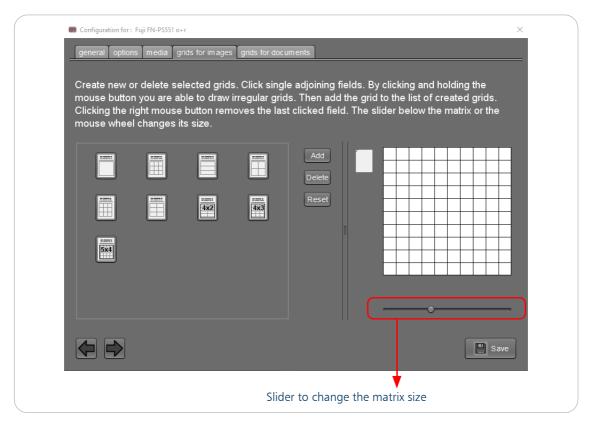
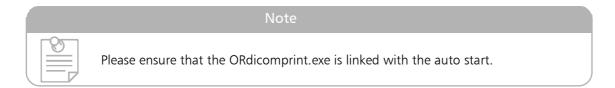


Figure 113. Printer configuration - grids

Create a new or delete selected grids. Therefore, click on the adjoining fields. By clicking and holding the mouse button you are able to draw irregular grids. Then add the grid to the list of created grids. Clicking the right mouse button removes the last clicked field. The slider below the matrix or the mouse wheel changes its size.

The done configuration is stored in the file PrinterConfig.xml in the folder C:\dicomPACS\console. For additional information see page 249.



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5.10.4 MPPS (SCU)

⊟	DICOM
	☐ Worklist
	□ DICOM Send
	□ DICOM-Print
	☑ MPPS SCU

The MPPS is configured in the same way as the worklist, i.e. first enter a name and add the name to the list and then enter an AeTitle, host name and port (see page 154).

MPPS (SCU) is short for modality performed procedure step. This is a DICOM service class to optimise the workflow. The start and the end of an examination is sent to a MPPS server. With this service HIS / RIS get more control over the execution of jobs. *dicomPACS®DX-R* sends messages about starting, executing and finishing of examinations on the set server. On the basis of these messages the server can determine the status of the processing.

IN PROGRESS

• Study is activated, i.e. it can be added to plannings or images can be taken

COMPLETED

• Study was completed

DISCONTINUED

Study has been deleted

These messages always refer to a study. When a study is activated, a process for this study is created in the SCP. All further messages relate to this process. The process is given the status **IN PROGRESS**. The states **COMPLETED** and **DISCONTINUED** can only be set for existing processes.

MPPS - SCP are defined as separate DICOM services.

The configuration consists of:

- Local AeTitel (SCU)
- Alias
- SCP Hostname
- SCP AeTitle
- SCP Port

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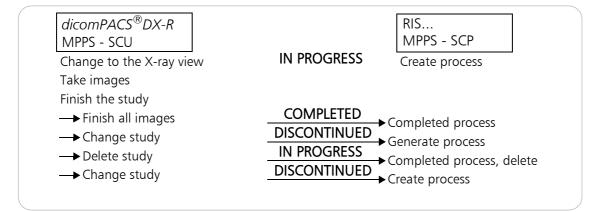


Figure 114. MPPS - visualisation



Figure 115. MPPS configuration

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5.10.5 miniPACS

□ DICOM	
☑ Worklist	
☑ DICOM Send	
☑ DICOM-Print	
☑ MPPS SCU	
☑ miniPACS	

The direct transfer of images from *dicomPACS*®*DX-R* to the miniPACS can be enabled in the interface. The configuration menu for miniPACS checks whether the required software is installed. If the miniPACS is installed, it can easily be activated or deactivated. If the necessary software is not installed, a message appears to install the software.

Is the network setup "DX-R_network_setup.exe", which prepares the system for a miniPACS, not installed, an according information is displayed. The network setup can be found in the installation sources in the "Modules" folder. The DICOM targets can be configured as usual, if required.



Figure 116. Support mode - miniPACS

5.11 Displays

Displays

If a multi-monitor system is used, the position of the programme window can be determined on connected displays. All available displays are shown and are available for the programme window.

The display can be determined for the console, the X-ray helper. The menu is similar and is shown for example for the console.



A graphics acceleration is possible via OpenGL (Open Graphics Library). Considering the system is equipped with modern hardware, there are clear performance advantages using the 64-bit version.

JAI (Java Advanced Imaging) is used by default. In case the graphics card support OpenGL, OpenGL can be used.

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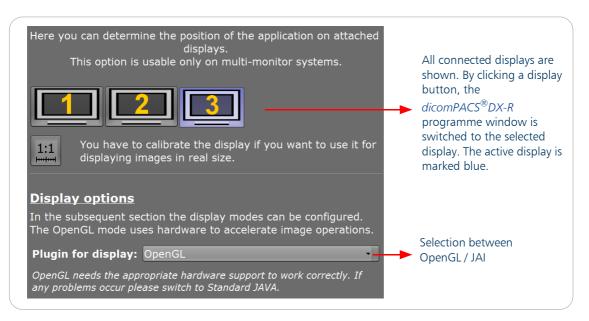
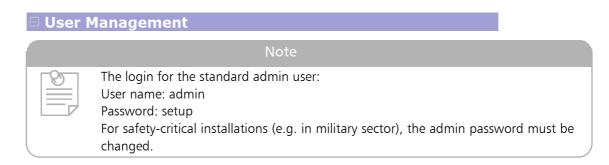


Figure 117. Support mode - display configuration

5.12 User Management



Only the user "admin" is configured after the installation. It is possible to add new users. Simply enter the name and select "Add".

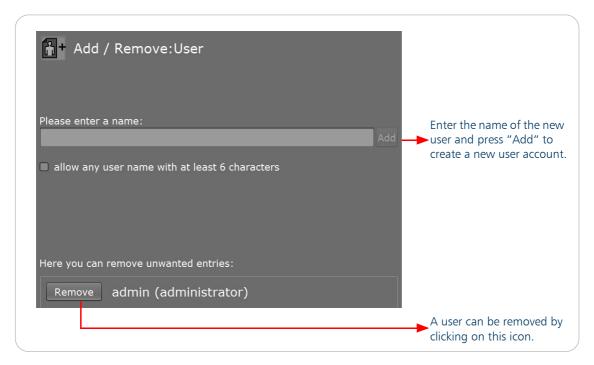


Figure 118. Support mode - user management

The new user is created and a password can be given. Also the password of existing users can be changed.



Click on the newly created user. Choose to give the user:

- admin rights (access to the support mode)
- rights to change patient data
- right to change the configuration of macros and examinations
- access via dicomPACS® MobileView

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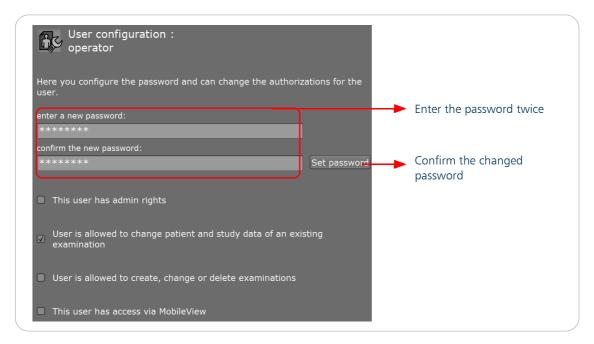


Figure 119. Support mode - configuration of the user

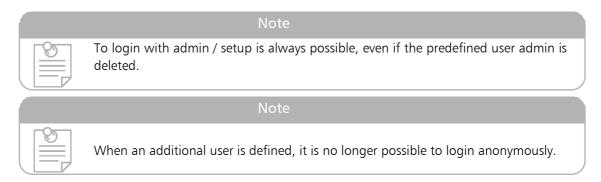
The "support mode" and "configuration" buttons are enabled by default. However, the rights determine whether a user has access to these settings or not.

If the access is denied, the user is prompted to log in with an account that has the appropriate rights. The process must be repeated if a function that requires higher rights shall be used.

However, admin users have always the right to change patient data or edit the configuration of macros and examinations.



Figure 120. Login with an other account



5.13 Support tools

☑ Support tools

It is now possible to start "Support Tools" via support mode. Here you can start the SupportLog.exe, the "cmd" command prompt and the Windows Explorer.

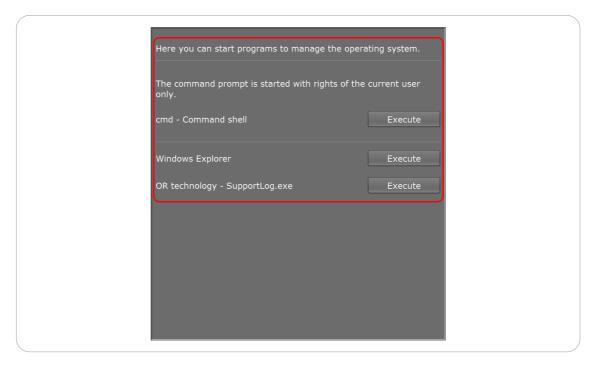


Figure 121. Support mode - Support tools

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Chapter 6. dicomPACS.properties

The file "dicomPACS.properties" defines options for the operating method and layout of the application.

In the following overview, the properties are listed with the default value and an explanation.

AccessManager.ShutdownTime.Min=

Idle time in minutes

If this time has elapsed without any action in the viewer, it shuts down automatically.

AccessManager.LogOffTime.Min=

Idle time in minutes

If this time has elapsed without any action in the viewer, the currently logged on viewer is logged off and the viewer shows the login screen.

AnnotationPoint.Active.DrawRect=false

Determines that the basis points of an annotation are indicated by a square when the mouse is moved within the range area.

Application.DemoModus=false

"true" activates the demo mode no license is requested only images from the Demo DB can be loaded the caption "Demo..." is blended into the image

Application.HighResolutionPatch=false

If set to "true" workaround for Java problem with large displays (2MP/5MP) is enabled. Image panels are not updated correctly.

Application.HighResolutionPatch.AllDisplays=false

Workaround to be applied to all displays

Application. High Resolution Patch. Height = 1024

Minimum size of image panels to enable the workaround

Application.HighResolutionPatch.Width=1024

Minimum size of image panels to enable the workaround

Application.lconDimension=32

Size of tool symbols (right side toolbar)

Application. Log Request Polling. Filter = Log request

Logrequest

If a file with this name is created within the viewer directory, the viewer creates a copy of the file dicomPACS.log in folder C:\dicomPACS\viewer.

This function allows a simple access to the logging file while the viewer is running.

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Application.OEM.Version=

OEM versions can be enabled in this section

dicomPACSsecure

dicomPACSVet

dicomPACSVetHB

dicomPACSChiro

dicomPACSInspect

Application.SeriesPreviewIconPos=center

Determines which image of a series is used as a preview image.

Possible values are: "first", "last", "center"

Application.UseLocales=de

Determines language

Application.UseLocalesCountry=de

Determines country settings

ApplyOnSeries.Filter=CT | MR

ApplyOnSeries.Gamma=CT|MR

ApplyOnSeries.Invers=CT | MR

ApplyOnSeries.LUT=CT | MR

ApplyOnSeries.Orientation=CT|MR|OT

ApplyOnSeries.ScaleDrag=CT|MR

ApplyOnSeries.WindowLevel=CT | MR

Determines the modalities in which all the images of a series are to be processed jointly by the same function. The modalities are separated by "|".

Attention.Activated=ORANGE

Colours of the warning symbol

Attention.FontColor=ORANGE

Colours of the warning symbol

Attention.IconBackground=ORANGE

Colours of the warning symbol

AutoImportBackup.MaxBackupSizeMB=2000

Maximum size of the backup directory for imported files

AutoImportBackup. MinDiscFreeMB = 1000

Minimum size that is held free on the backup drive

AutoImportBackup.TrashSizeMB=100

Maximum size of the directory for non-loadable files

BlackSurround.MaskInPercent=80.0

Percentage of opacity black masking

ConsoleDatabase.MinDiscFreeMB=500

Warning when hard disk has reached a certain limit, interesting for the autodelete function

ConsoleDatabase.WarnDiscFreeMB=1000

Warning when hard disk has reached a certain limit, interesting for the autodelete function

Console.Hints.FlippedHint.Fontheight=

Determines the size of the font for hints

Console.Hints.FlippedHint.Fontname=

Sets the font of the flipped hint

ConsoleImageCutBorder=5

Specifies how many mm around the black mask is left when cutting automatically

Console.ExposureDapTime.Increment=5

The DAP programme writes the values into the SQL database.

The console software then merges the dose with the associated image.

The matching criteria is based on time, which can be adapted.

Console.ExposureIndex.DoseDeviationInfo.ExposureReviewRange=5.0

Determines the value range for an acceptable exposure level

Console. Exposure Index. Dose Deviation Info. Normal Exposure Range = 2.0

Determines the value range for an normal exposure level

Console. Exposure Index. Dose Deviation Info. Show Exposure I consoleration and the property of the property

Determines the display of the exposure icons

Console.ExposureIndex.ShowExposureIndex=true

Determines to show exposure index (EI) and deviation index (DI)

Console.ExposureIndex.ShowSensitivity=true

Determines to show S-value

Console.ExposureIndex.ShowTarget=false

Determines to show target exposure index (TEI)

Console.Generator.GridAttenuationFactor=2.0

Defines the attenuation factor which is used for the adjustment of the mAs or s/mA exposure values when the grid in the X-ray tab is activated or deactivated.

typical value: between 1.5 and 4 allowed value: between 1.0 and 10.0

${\tt Console.Plannings.InsertNewAfterCurrentSelection} = {\tt true}$

Determines the inserting of new plannings after currently selected plannings

Console.ShutdownHardwareAtExit=false

If set to "true", the PC will shut down after closing the software

Console.Shutdown.TimeWait=30

Determines the time in seconds for the shut down of the PC

${\tt DailyVisualCheckTool.ExecuteOnStartup=true}$

Daily visual check is executed at viewer start-up

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DailyVisualCheckTool.ForceToExecute=true

Request for daily visual check if not successfully completed

DailyVisualCheckTool.StartOfWork=6

Clock time at which the daily visual check is to be executed again

Database.ConfigFile=databaseConfig.xml

Configuration file for databases

DateChooser.DateFormat=

Configured date format

DateChooser.DateTimeFormat=

Configured date and time format

DateChooser.TimeFormat=

Configured time format

DisplayAndResolution.ShowConfigurations=false

Logged additional information on graphics card and monitor

DisplayAndResolution.ShowDisplayModes=false

Logged additional information on graphics card and monitor

DisplayProperties.MaximumFontHeight=20

Font size of DICOM overlays

DisplayProperties.MinimumFontHeight=8

Font size of DICOM overlays

DisplayProperties.StandardFontHeight=10

Font size of DICOM overlays

DisplayProperties.StandardColor=LIGHT GRAY

Script colour of DICOM overlays

DisplayProperties.StandardStroke=2.0

DisplayableText.drawlfSmall=false

"true" = creates texts when calculated size is smaller than minimum size

FilterLupe.BlurringMagnifier.filter=Weich 1

Names of filters used with the magnifier function

FilterLupe.LookUpTableMagnifier.lut=Test 3

Names of filters used with the magnifier function

FilterLupe.ReliefMagnifier.filter=Relief 6

Names of filters used with the magnifier function

FilterLupe.SharpMagnifier.filter=Sch\u00E4rfe 2

Names of filters used with the magnifier function

FilterLupe.SpecialMagnifier.filter=Solarisation

Names of filters used with the magnifier function

FontConfig.MaximalHeight=16

Font of viewer areas

FontConfig.MinimalHeight=8

Font of viewer areas

FontConfig.StandardFontName=

Sets the font of *dicomPACS*®*DX-R*. By default this value is empty.

FontConfig.StandardHeight=10

Font of viewer areas

Histogram.Algorithm=Fixed

Standard algorithm used for determining windows: Fixed threshold Sum Threshold on distribution function

Histogram.Fixed.Black=1.6

Upper and lower limits for fixed histogram. Algorithm = Fixed

Histogram.Fixed.White=1.6

Upper and lower limits for fixed histogram. Algorithm = Fixed

InstanceData.UseSliceForOrder=false

"true" = instances sorted according to physical location of the slices "false" = instances sorted according to instance number

JAI.CacheSizeInMB=64

Size of the image processing cache. The value is important for the display speed of images and magnifier function. The value should be set at double the max. image size.

Magnifier.UseCrosshairCursor=false

"true" = Crosshairs in magnifier.

Workaround for display problems of the magnifier on 5MP systems.

PatientData.RequiredFields=LastName|FirstName|Id|Sex|BirthDate

Sets the mandatory fields of the archive dialogue

${\bf Patient CD. Burning Support Available = true}$

Switches on the CD/DVD function

PatientCD.CdBurningSimulation=false

"true" = the burning process is simulated

PatientCD.CDEject=false

Eject finished medium

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PatientCD.cdviewer=C\:/dicomPACS/cdviewer

Directory copied onto the medium for the viewer

PatientCD.HtmlCreator=C\:/dicomPACS/dcm2html/mkhtml.exe

Programme for creating the HTML preview

PatientCD.HtmlCreator.CfgPath=C\:/dicomPACS/dcm2html/mkhtml.ini

Configuration file for creating the HTML preview

PatientCD.MAX PATCD BACKUP=9

Maximum number of media for which a backup is stored

PatientCD.MaxCdSize.MB=600

Maximum size of the medium

PatientCD.ORDicomDir=C\:/dicomPACS/viewer/ORDicomDir.exe

Programme for generating the DICOMDIR structure

PatientCD.TempCD=C\:/dicomPACS/ temp/cdexport/

Directory in which CDs are prepared

PatientCD.VerifyCD=true

"true" = test medium after burning

PatientCD.writer=f

Drive letter of CD burner or Robot for Disc Publisher

PatientCD.writer.AutoCorrectSettings=true

Automatic ID of burner drive

PatientCD.writer.f.Speed=22

Burn speed in multiples of standard CD speed

MakeCD.available=false

"true" = external MakeCD (other computer) is used

"false" = in $dicomPACS^{\mathbb{R}}DX-R$ integrated MakeCD is used

MakeCD.BackupStatus.Show=false

Activates the display of the backup status

MakeCD.BackupStatus.IPAddress=localhost

IP address of the ORBackupService running system

MakeCD.BackupStatus.Port=2014

Port for the ORBackupService

MakeCD.BinDir=C:\dicomPACS\cdrecord

Folder of the applications of MakeCD

Make CD. Disable. < SCSI-Lun > = false

"true" = drive is not used by MakeCD

MakeCD.Drive.<SCSI-Lun>=

Set the drive letters manually if the automatic assignment failed

MakeCD.Drive.0,1,0.Speed.BR=

MakeCD.Drive.0,1,0.Speed.CD=

MakeCD.Drive.0,1,0.Speed.DVD=0

Set the burning speed for each media type

"0" = maximum speed

MakeCD.JobDirectory=C:\dicomPACS\ORBackup\media

Folder for the burn jobs and the data files

MakeCD.KeepJobTimeHours=168

Time elapsed in hour till old jobs are deleted from statsfile

MakeCD.ReloadBeforeVerify.<SCSI-Lun>=false

"true" = open drive before verification to reload CD data

MakeCD.TempDIR=C\:\\dicomPACS\\Temp\\

Determines the folder for the temporary files

Polling.Rate.ms=500

Interval during which new images and requests are monitored.

Polling.StartDataPolling=true

Starts the auto-import function

PraxisStempel=PraxisStempel.xml

Configuration file for paper printing

PrintData.enablePrintLog=false

Expanded logging during printing

PrinterConfig=PrinterConfig.xml

Configuration file for printer

PrinterPage.PatientData=patientdata.xml

Configuration file for patient data

PrinterPage.horizontalSpacing=0

PrinterPage.verticalSpacing=0

Distance between images at printing

Rendering.BlackMaskExtension=-3.2

Value in mm

determines the size of the white border

Using a value <0, the cropping area is reduced

robot.available=false

"false" = no disc publisher present

"true" = Disc publisher present

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robot.checkStatus=0

"0" = jobs are created and immediately reported to the viewer as done. Indication of progress via the job table.

"1" = the viewer tests the status of the robot and indicates this as if burning CDs in the local network drive.

robot.clientID=CDRobot

Name of the client computer

robot.Name=

The name of the drive used in dialogues

robot.jobDirectory=C:\PTBrnJobsNW

Job directory of the Disc Publisher. The directory is created by the application PTBurn and enabled in the network UNC path to be used.

robot.RightBin=

Medium type (CD, DVD) in the right container

robot.LeftBin=

Medium type (CD, DVD) in the left container

robot.writeMergeFile=false

"true" = compatibility mode for PTBurn 2.x

robot.defaultLabelTemplate=C\:/dicomPACS/Labels/PatCD.std

Standard template for printing on the medium (create with "SureThing CD Labeler")

robot.csvDelimiter=;

Sets the separator for the data fields of PTBurn 2.x ("," and ";" are possible)

robot.labelData.SinglePatient=

Determines the label which is used

SetResultState.ExecuteToolIfViewerIsEmpty=

No action takes place if no image is loaded in the $\textit{dicomPACS}^{\mathbb{R}}$ viewer

"de.or.dicom.viewer.tools.manage.StartPatSearchTool" = the patient search dialogue is opened if no image is loaded

"de.or.dicom.viewer.tools.inout.StartSwitchToPMSTool" = activates the PMS tool if all images are unloaded

SliderToolBox.DEFAULTSLIDERHEIGHT=90

Size of filter components

Standard Tags = Standard Tags.xml

Configuration file for tags

StudyPreview.ModalitiesToHide=PR

Modalities not to be displayed

TagAnnotation.MaxFontHeight=20

Maximum size of the overlay text in pixel displayed on the image

TagAnnotation.MinFontHeight=10

Minimum size of the overlay text in pixel

$TagOverlayStandard = C:\dicomPACS\viewer\voverlay\TagOverlayStandard.xml$

Configuration file for inserting annotations

$Tools. PATIENT_SEARCH = de. or. dicom. viewer. dialog. Study Search Dialog$

Programme started up for searching for patients. The viewer specific dialogue is configured by the value "de.or.dicom.viewer.dialog. Study Search Dialog"

UseUserSettings=false

"true" = if present, the user specific configuration file MultiViewerFrame Config.xml is used

"false" = the global MultiViewerFrame- Config.xml is always used.

UseUserSettings.ToolsConfig=false

"true" = if present, the user specific configuration file ToolsConfig.xml is used.

"false" = the global ToolsConfig.xml is used.

WebShareTool.SenderAddress=

Sender email address for the webshare function

WebShareTool.SenderAddress.EnableEdit=true

"true" = enables to edit the sender address

"false" = disables to edit the sender address in the dialogue

WorkingDir=C\:/dicomPACS/temp/viewer/dataworking/

Worklist.Proposals.OnSelectedPatient.createNewOrder=true

if WorklistView is active

"true" = creat new worklist entry after selecting data from the proposal list

Worklist.Proposals.OnSelectedPatient.switchToXray=false

if WorklistView is active

"true" = switch to the X-ray view after selecting a patient from the proposal list

Worklist.Proposals.showProposalPatients=true

if WorklistView is active

"true" = display proposal list for patient entry

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ett blant intentionally

Chapter 7. Internal viewer

7.1 Access the settings menu of the internal viewer

You can access the settings of the internal viewer in two different ways:

- 1. You can open the menus of the toolbar (little double arrow to the left) and click the little wrench icon (on the lower left hand side of each open menu) of each toolgroup → the toolgroup specific settings menu will open
- 2. Press Ctrl + F1 the general settings menu opens containing the settings of all toolbar groups (you have got a search box here to find the desired settings menu faster)

In both settings menus you can enter the admin login, to activate the locked advanced settings.

7.2 Plug-ins

Plug-ins are small programmes or software packages that are used to customize and extend the software to your needs. To achieve a better individual configuration of the program with the best possible performance and usability, some applications have are moved to plug-ins.

You have the option to de-/activate your required plug-ins via the "system preferences" in the section "management". This relates to the tools "stitching" and in the veterinary field the "prepurchase examination".

7.3 Daily Visual Check of monitors

The function "Daily Visual Check" uses the following configuration files:

File	Task
VisualCheckTask.xml	Defines the execution of the Daily Visual Check
DINConfig.xml	Description of the DIN test image for the Daily Visual Check
SMPTEConfig.xml	Description of the SMPTE images for the Daily Visual Check

Table 15. Configuration files for the Daily Visual Check

The files must not be amended manually. The configuration is done via the configuration dialogue "Daily Visual Check" via the tool group "Filter".

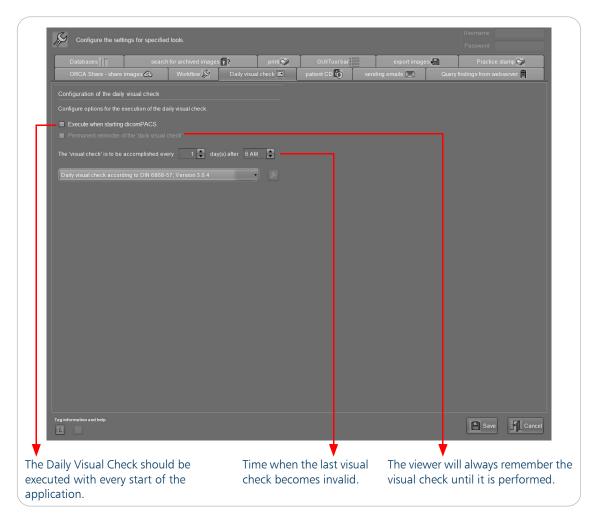


Figure 122. Daily Visual Check

The results of the "Daily Visual Check" are stored in the default database (Table DisplayCheck). The configuration of the database is executed in the file "DatabaseConfig.xml".

7.4 Monitor calibration (film identical representation)

Monitor calibration is the process by which the pixel spacing of the monitor and the physical resolution of the monitor is determined. The viewer is thereby enabled to display calibrated images in the same size as they would appear on an exposed film.

$\hat{}$

CAUTION/ATTENTION!



EN: Please note that the basic principles of X-rays by necessity cause magnification of displayed subjects by a factor that is usually known. $dicomPACS^{\mathbb{R}}$ displays the images at the same size as on a film, i.e. slightly magnified.

FR: Veuillez noter que les principes de base de la radiographie causent inévitablement l'agrandissement des objets affichés par un facteur qui est généralement connu. *dicomPACS*® affiche les images à la même taille que sur un film, c'est-à-dire légèrement agrandies.

In order to calibrate a monitor, it must satisfy the following preconditions:

- Pixel matrix at least 1024 x 1024
- Monitor size at least 25cm x 30cm
- Identical pixel spacing in the horizontal and vertical directions

In addition, the calibration ruler or some other measuring scale must be available.

The calibration ruler offers a simpler and easier control of line lengths. It provides a range of line templates allocated to letters, which allow reference lines to be measured without additional measuring equipment.

For the calibration, click on the 1:1 tool. You can also access the calibration dialogue via the little wrench icon of the tool group "Magnifier/Zoom", tab "Display filmidentical". Now you proceed as follows:

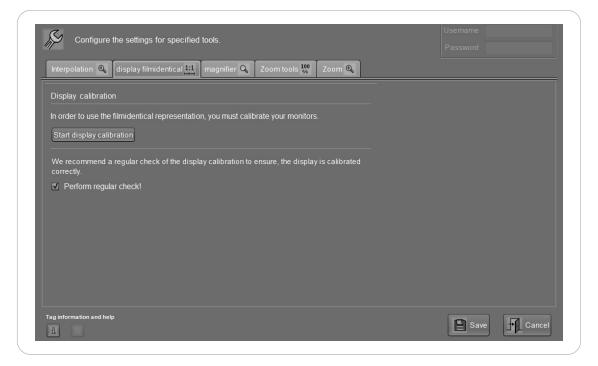


Figure 123. Configuration dialogue display filmidentical

Select the button "Start display calibration" and a full-screen dialogue will appear.



Figure 124. Full screen dialogue

Perform the calibration as follows:

- 1. Select the monitor which shall be calibrated. If more than one monitor needs calibration, repeat step 1 and 2 for each monitor before clicking "Test".
- 2. Direct measurement. Select measuring device (e.g. 200 mm ruler), place a calibrated ruler on the monitor and adjust the lines in the bottom part of the dialogue to the selected distance (e.g. 200 mm, depending on the ruler you chose). If you have got more than one monitor, change the position of the dialogue by clicking on the respective display and adjusting the lines there as well.
- 3. Click "Test" and measure the diagonal line. Select the length from the shown values, then click "Check". When you have more than one monitor the calibration check will appear on each monitor.

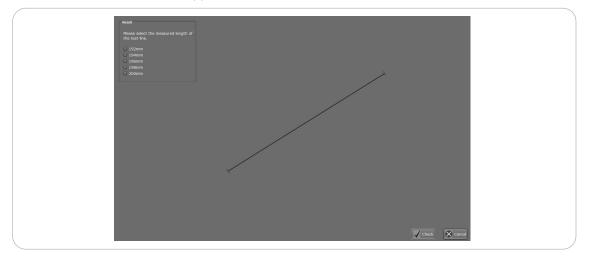


Figure 125. Calibration test

Confirm and store the calibration by selecting save/"store".

If the calibration has succeeded, the corresponding monitor is identified as calibrated and can be used for 1:1 displays.

If "Perform regular check!" is selected, each time *dicomPACS*[®] is started, the calibration must be checked. The quick calibration test is started at the first selection of the 1:1 function and is performed by the user with the help of a ruler.

The following configuration file is used:

File	Task
DisplayCalibrationInfo.xml	Contains the captured calibration data of all connected monitors

7.5 Monitor LUT

dicomPACS® applies a grayscale lookup table (LUT) when displaying images. It adjusts grayscale values of the image to the characteristics of the monitor. The LUT is selected and edited with the configuration dialogue "MonitorLUT" of tool group "Filter / Dynamic". The dialogue requires the logon as the user "support".

7.5 Monitor LUT 187 / 372

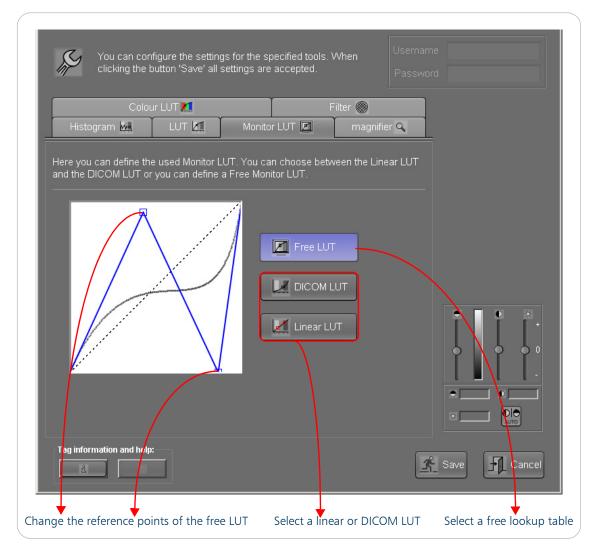
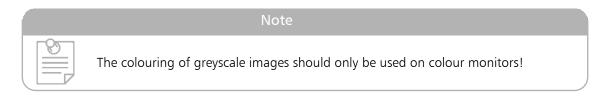


Figure 126. Monitor LUT

7.6 Film LUT

The colouring of greyscale images may improve the perception of greyscale nuances.

dicomPACS® can display greyscale images with colour dyeing. The configuration of the colour is executed with the configuration dialogue "Film LUT" in tool group "Filter/Dynamic". The dialogue requires the login as the user "support".



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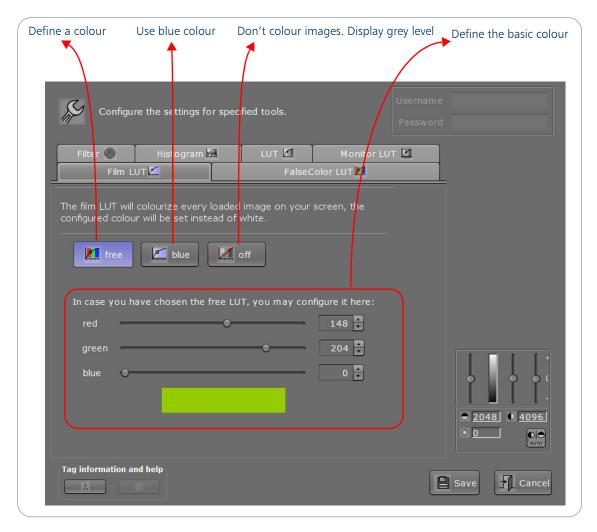


Figure 127. Film LUT

7.7 VOI-LUT

In the section "Brightness" the levelling can be done with pre-defined VOI-LUT's. Click on the button to choose the VOI-LUT that shall be applied to the image.

7.8 Database configuration

The database configuration takes place in the file DatabaseConfig.xml. *dicomPACS*[®] uses the MSSQL server database for querying DICOM data, as well as for storing administrative and statistical information. In addition, a second, local database is used for storing the results of the daily visual check (alias = VisualCheckBackup).

The viewer can access image data in two different ways:

7.7 VOI-LUT 189 / 372

- 1. Access via a local or network file system (standard)
- 2. Access via a file transfer protocol like http or ftp

The configuration file also contains the data of DICOM AEs that can be queried by means of DICOM - Query/Retrieve. These entries contain a database configuration too. It is used to cache the results of a DICOM query.

Each database configuration may contain the definition of a worklist server. The worklist function of the viewer is described on page 183.

 $\textit{dicomPACS}^{\$}$ contains a configuration dialogue which allows a simple database configuration. It is password protected.

But the configuration file DatabaseConfig.xml must be edited manually to configure further databases, DICOM Query / Retrieve or a worklist server.

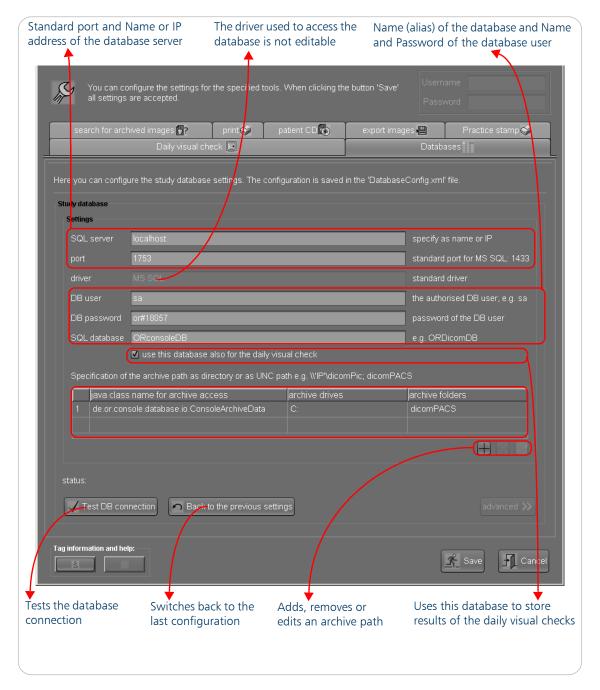


Figure 128. Database configuration

Description of the configuration file "DatabaseConfig.xml":

XML nodes	Value	Descriptio n	Attribu te	Attribute value
DatabaseCon fig	Database DatabaseLis t	Root node	Version	Version of the file format:5.1.2

7.8 Database configuration 191 / 372

XML nodes	Value	Descriptio n	Attribu te	Attribute value
DatabaseList	Database	Databases are allocated to a Java class	class	Class used by the database: de.or.dicom.viewer.dataBase. QRArchive de.or.dicom.viewer.dataBase. StudyDatabase de.or.dicom.viewer.dataBase. DisplayCheckDB
			ld	Unique name of the filter
		5 (1.11)	name	Name used in the patient administration
DatabaseFilte rGroup	Filter	Definition of selectable filters	dbColumn	Column name of the table'DicomStudys' which shall be used with the filter
			MultiSelecti on	Enables multiple selection: true/false
		Deficition	name	Text displayed in the patient administration
Filter		Definition of a filter selection	statement	SQL query (part of a ,where' clause of table DicomStudys) – e.g.: (Modality = ,CR')
Database	Driver Connection ArchivePath PrefetchPat h DICOM WorklistSC U WorklistSCP	Database definition	alias	Practice VisualCheckbackup
Driver			class	Driver clas
Connection		Access data of the database	url user pwd catalogue	Database URL Database username Database password Name of the database
ArchivePath	<directory ></directory 	Directory with image data	class	Defines the java class which is used to acces the image data <empty> Use the standard access methode via shared file system de.or.dicom.viewer.dataBase.io. UrlArchiveData Access image data via http or ftp protocol</empty>
			device	Defines the folder or URL
			root	Defines the root folder dicomPACS®
PrefetchPath	<directory ></directory 			

XML nodes	Value	Descriptio n	Attribu te	Attribute value
			AETitle	AE-Title of the remote AE
			hostname	Hostname of the remote AE
			port	Port address of the remote AE
DICOM		Definition of DICOM-AE	scu	AE-Title of the viewer (for querying this AE) This value is not used in this version. The local AE title is taken from the file ,dicomPACS.properties' – value ,Scu.QueryRetrieve.Aetitle' (see page 383)
WorklistSCU		Restriction of a worklist query to a special AE	aeTitle	Only worklist items of this AE are queried.
WorklistSCP	DICOM	Access data of the worklist SCP		

Table 16. DatabaseConfig.xml

An example of the "DatabaseConfig.xml" is given below:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<DatabaseConfig version="5.1.2">
```

Definition of a SQL database server (Microsoft SQL-Server). Image data is loaded from a file system, drive N: (shared network file system). Additionally, a worklist server is defined. Query results are stored in the same database:

Definition of a SQL database server (Microsoft SQL-Server). Image data is loaded via the html protocol. The patient administration contains filters for the doctors name and modality:

7.8 Database configuration 193 / 372

The databases are assigned to the following viewer functions (represented by the java class names):

Function	Class
image archive	de.or.dicom.viewer.dataBase.StudyDatabase
DICOM – Image archive (accessed by Query/Retrieve)	de.or.dicom.viewer.dataBase.QRArchive
Worklist	de.or.dicom.viewer.dataBase.WorklistDb
Daily visual check of monitors	de.or.dicom.viewer.dataBase.DisplayCheckDB

Table 17. Database assigned viewer functions

Every function can use multiple databases. The first image archive database is the default database. It is used to store access rights.

Definition of filter groups:

Every filter group can contain multiple filter definitions. If a filter group is referenced within the database definition, the filters are offered as filter selection in the patient administration.

```
<DatabaseFilterGroup id="modality" MultiSelection="true">
    <Filter name="CR" statement="(Modality = 'CR')" />
    <Filter name="CT" statement="(Modality = 'CT')" />
    <Filter name="MR" statement="(Modality = 'MR')" />
    <Filter name="NUK" statement="(Modality = 'NM')" />
    <Filter name="Alle anderen Mod." statement="(Modality != 'CR' AND Modality != 'CT' AND Modality != 'MR' AND Modality != 'NM')" />
    </DatabaseFilterGroup>
```

The filter group may contain a column name. The viewer will query all different values of this column and display every value as a filter selection:

```
<DatabaseFilterGroup id="allmodalities" name="Select modality"
dbColumn="modality" MultiSelection="true" />
```

A filter group with all names of referring physicians is available. Only one name is selectable:

```
< DatabaseFilterGroup id="Arzt" name="Select physician" dbColumn="info1"
MultiSelection="false">
```

The configuration file ends with:

```
</DatabaseConfig>
```

7.8 Database configuration 195 / 372

7.9 Interpolation

The interpolation is used to reduce artefacts on the images.

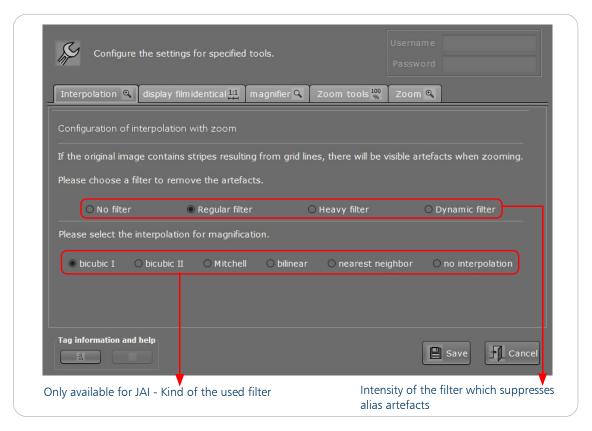


Figure 129. Interpolation with zoom

This screen allows to change the used filter and the intensity of the filter.

For JAI: The default filter is bicubic I. The change of the filter type might be necessary if the image impression is not satisfying. Please try bicubic II at first. If you have an image with much text, the usage of the bilinear filter might better for the quality.

By changing the settings of the intensity, the effect of the filter can be determined.

196 / 372 7.9 Interpolation

Chapter 8. Sensors.xml

For the calibration of the panels refer to the documentation of the manufacturer.

How the panel is connected to the console software is configured in the file C:\dicompacs\console\sensors.xml. The setup prepares this file to have all the basic settings for the chosen panel.

Adjustments need to be made to some of those settings.

8.1 MaxValue

The option MaxValue indicates a limit, above this, all grey values will be considered to be overdosed and cut off.

To set this value, expose the sensor with a high dose. If you see stripes in the image the dose was high enough and the sensor got overloaded in those lines. Open the histogram of this image in the processing step 1. Identify the grey value where the stripes begin to show.

E.g. for a 14bit sensor (range from 0 for black to 65k for white) this might be around 12000. Set the MaxValue in the sensors.xml to this value, restart the software and do the same shot again. Now the image should have no stripes.

E.g. maxValue="12000"





Set it to "0" if the processing is done by third party software.

8.2 Offset

The option offset is used to eliminate the basic background noise on the panel.

Take an image without radiation. Look into the histogram and look for the peak in the low values on the left side. Take a value shortly before the peak and set the offset to this value. The value is shown by a tool tip. Therefore, locate the mouse pointer at the according position on the histogram.

Note



Set it to "0" if the processing is done by third party software.

8.1 MaxValue 197 / 372

8.3 Invert

The option invert determines whether a raw image is inverted before processing it further or not. This option can be set true or false.

E.g. invert="true"

8.4 Rotate

The option rotate can be set none, rot90, rot180 or rot270 and determines whether a raw image is rotated before processing it further or not.

E.g. rotate="rot90"

8.5 Flip

The option flip can be set none, horizontal or vertical and determines whether a raw image is flipped before processing it further or not.

E.g.flip="vertical"

8.6 Processed

The option processed can be set true or false and determines whether a raw image is processed or not.

E.g. processed="false"

8.7 Start

The option start can be set true and determines whether the sensor interface is started while $dicomPACS^{\textcircled{\$}}DX$ -R is started. It also can be set false which means that the detector can be selected in the configuration dialogue but is not started.

E.g. start="true"

198 / 372 8.3 Invert

8.8 Sensitivity factor

The sensitivity factor is used to calculate the exposure indices.

E.g. sensitivityFactor="30"(This depends on the used detector.)

The S-value shall resemble the sensitivity of analogue screens, to give a hint how much radiation was used to get the image. The higher the S-value, the less dose was used. A doubled S-value means half the dose was used. A typical examination should result with the S-value being between 200 and 400. This is meant to give the doctor a quick clue if the dose was too high (very low S-value) or too low (very high S-value).

Take a typical examination and look at the S-value. Then adjust the "sensitivityFactor" accordingly so that result is in the range of 200 to 400.

Set it to 0 if the processing is done by third party software.

8.9 Name

The name of the detector is used to display and assign the detector to a workstation in dicomPACS®DX-R.

E.g. name="Test"

8.10 Class

The class is the name of the java class that realises the interface to the detector.

8.11 AEC-field position

The position of the AEC fields is important for the image processing. It is used to determine the region of interest when the AEC is used with the generator.

For the software to know where the AEC fields are located, they must be defined in the file c:\dicompacs\console\sensors.xml:

```
<Sensor maxValue="9000" serialNumber="T2836139NH02" calibrationTime="" flip="none" invert="false"
    rotate="none" sensitivityFactor="7" offset="115" demo="false" modality="DR"
    class="de.or.sensors.Varian4Net" id="table" type="Varian4" start="true" name="table">
    <CenterAecField x="1261" y="1261" width="700" height="550" />
    <LeftAecField x="710" y="1861" width="700" height="550" />
    <RightAecField x="710" y="661" width="700" height="550" />
  </Sensor>
```

8.8 Sensitivity factor 199 / 372

As can be seen in the example above, the squares are defined by one corner (upper left) and a width and height parameter.

To test this you can mark your AEC-fields with some lead or other objects and take an examination with all three AEC activated. When you choose the white point tool, the AEC squares used by the console software will be shown in the image. Alternatively, you can check this in the processing step two, when you choose "AEC" instead of "automatic" for the detection of the region of interest.

8.12 Modality

Here you can configure the modality of the images. Several values are possible. Often used modalities are CR and DR.

E.g.: modality="CR"

200 / 372 8.12 Modality

Chapter 9. Image processing

The appropriate login level allows you to access to the configuration of the image processing filters for raw images. It is necessary to login as an administrator to switch to this configuration. Press the wrench button inside the x-ray view after a carried out exposure to apply changes to the image processing filters.

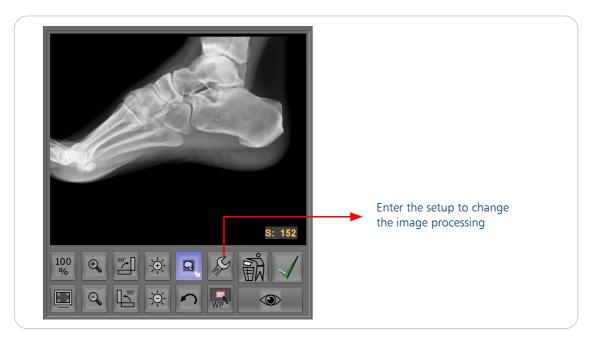


Figure 130. Access to the image processing setup



PRACTICAL HINT

To back up/restore the complete image processing configuration use the backup/restore function in support mode. For more details see "Backup" on page 150.





The wrench button might be disabled, when no raw image is loaded (e.g. when using demo DICOM images in demo mode of the software).

9.1 Management [10/10]

Standard, COP I, COP II, COP III

When entering the image processing, the "Management" section will be shown. The right hand side of the screen shows a list with the image processing procedures already defined. An image processing procedure can be allocated to several different examinations.

9.1 Management [10/10] 201 / 372

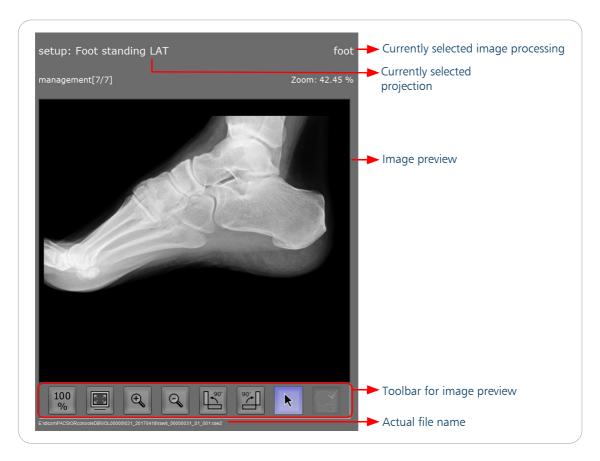


Figure 131. Management - image preview

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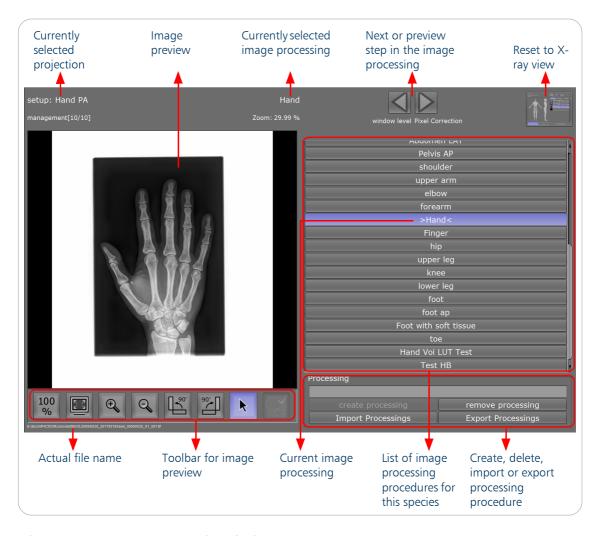


Figure 132. Management - processing selection

The processing procedure that is being applied is highlighted in blue and is also displayed in the centre of the upper screen area. If you click on a different procedure from the list, the image is recalculated. The recalculated image is shown on the left hand side after a short delay. It is possible to zoom in and zoom out by using the mouse wheel. Below the image a toolbar is located to zoom or rotate the image.

In the bottom right corner you can delete or create new processing procedures and also import or export processings.

Click on the "X-ray" icon



at the upper edge of the screen to return to the X-ray view.

9.1 Management [10/10] 203 / 372

9.1.1 Import and export of processings

This functions can be used to transfer the processing settings between workstations.

Import of processings

Before importing an external processing an automatic backup takes place. After selecting the

Import Processings

icon the following dialogue is displayed.

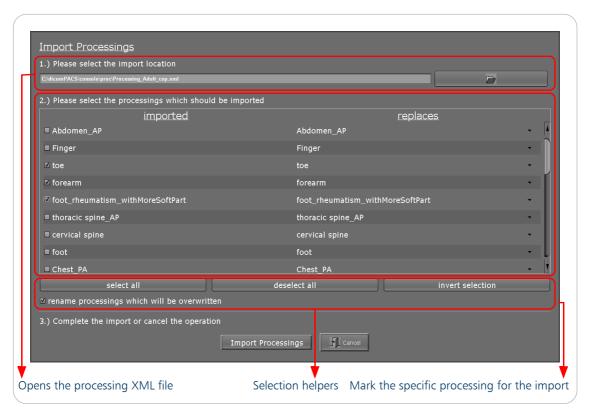


Figure 133. Import dialogue

The import of processings is only possible in the same species / kind of processing (standard or COProcessing), otherwise an error message is displayed, including the reason of the termination. E.g.: "Wrong species ...".

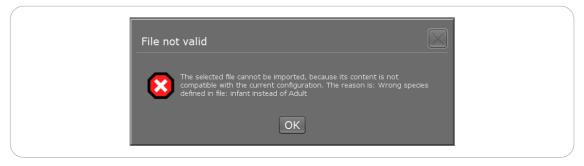


Figure 134. Error message of the import dialogue

Export of processings

A well done set of processing settings can be shared with other workstations by exporting the settings and import these setting on the other workstations. To open the export processing dialogue

click on the icon Export Processings

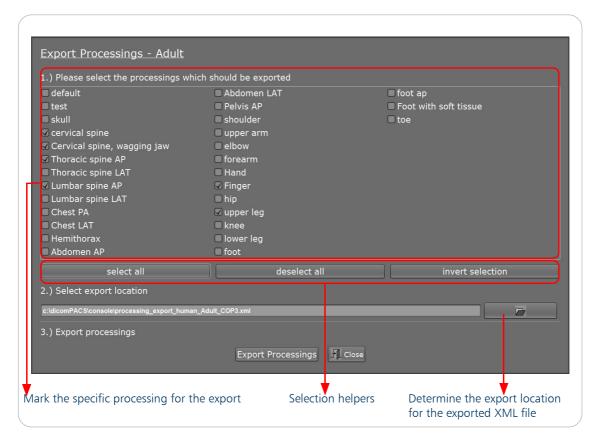


Figure 135. Export dialogue

9.1 Management [10/10] 205 / 372

9.2 Define the defect pixel [1/10]

Standard, COP I, COP II, COP III

This step offers different options for COP III compared to the other processings.

This processing step defines the threshold for defect pixel to reduce their number. The result is displayed on the left hand side of the screen.

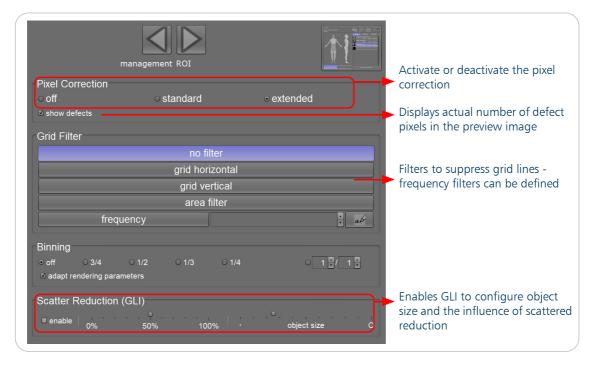


Figure 136. Pixel correction

In "real-time" operation, each pixel in the raw image within the sensor array is compared to its neighboring pixel values. If the differences in these values are greater than the specified threshold, the defective pixel is replaced with an updated value.

There are two buttons to choose from:

- 1. "Off" deactivates the pixel correction
- 2. "Standard" activates a simple and fast pixel correction, i.e. it detects extreme outlier
- 3. "Extended" activates a comprehensive pixel correction, i.e. it minimises the general noise, in addition to the "Standard" pixel correction

The chosen pixel correction is the basis for the further processing options.

The "Pixel Correction" is set to "Standard" by default. By default also the defect pixels are shown in the preview window.

Note



The step "Extended" in pixel correction is not available in the "Standard" image processing.

9.2.1 Grid filter

Here additional grid filters can be activated if a fixed grid is used in the X-ray system. These filters remove any grid lines that may be visible.

No filter	Does not remove grid lines
Grid horizontal	Removes horizontal grid lines
Grid vertical	Removes vertical grid lines
Area filter	Tries to remove all grid lines
Frequency filter	Removes grid lines in a frequency range

Table 18. Filter options

Frequency filter

A grid filter is implemented, which is realized through a frequency filter. This serves to remove fixed grid lines, without loosing sharpness due to the filtering in the frequency range of the image. Thus, fine structures and edges remain largely intact. Furthermore, it is possible to adjust the filter frequency to different grid sizes.

The filtering can be applied to several frequency ranges. Removing a frequency range is possible when dragging the mouse out of the diagram while holding the left mouse button.

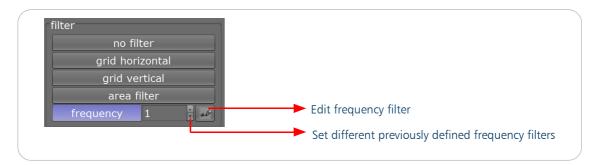


Figure 137. Frequency filter

The use of the frequency filter is necessary for the configuration of each grid-panel combination that is applied. In addition, it is dependent on each system configuration (FFD) and must be adapted accordingly.

Note



For multi-detector systems, the frequency filter is to be set for each sensor.

Note



If the image borders for the detector were defined under the menu item "Sensor" in the support mode, the frequency filter must be adjusted.

First a flat-field image has to be taken in which the detector surface is fully exposed without any collimation.

In the second processing step [2/10], the frequency filter can be defined by a technician by clicking on the edit icon. Depending on the grid orientation (Horizontal / Vertical) the respective peak region in the frequency range has to be selected holding down the left mouse button and moving the mouse. The identified peaks remove the grid lines. The filtering can be applied to several peaks. Removing a peak region is possible when dragging the mouse out of the diagram while holding the left mouse button.

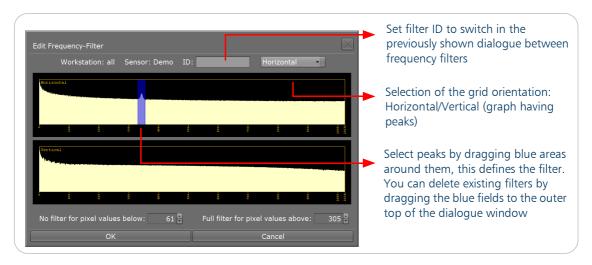


Figure 138. Diagram - define frequency filter

Clicking "OK" applies the frequency filter.

The settings of the currently set frequency filter is saved in the gridfilter.xml in the folder C:\dicomPACS\console\proc, which is automatically created. Thus, the current settings can be stored and reapplied if necessary.

9.2.2 Binning



Binning combines adjacent pixels, reducing the resolution of the image. Due to a better signal-tonoise ratio the image noise is reduced. It is especially helpful when rough structures have to be displayed and no information is lost during scaling.

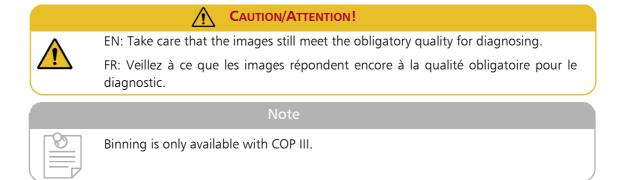


Figure 139. Binning settings

By default, Binning it is switched off but can be adjusted for each processing individually.

The smaller the selected value, the lower the resolution if the image at the end of the processing. The smallest selectable value is 1/10.

By activating "Adapt rendering parameters" the image impression remains largely constant when applying Binning.



9.2.3 Gridless imaging algorithm (GLI)

The influence of scattered radiation on the image quality of *dicomPACS*[®]*DX-R* can be reduced as in case of gridless image acquisition during the examinations on the patient's bedside.

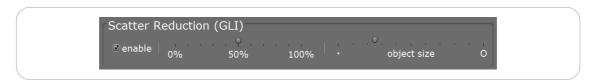


Figure 140. GLI settings

When enabling GLI, the influence of how much the scattered radiation shall be reduced, can be configured:

- Turning the slider to "0 %", scattered radiation will not be reduced at all.
- Turning the slider to "100 %", the maximum possible filter effect will be achieved.

The patient's size matters, as it makes difference to X-ray an obese patient in contrast to a normal weight one. Thats why the GLI offers a configuration of the object size. With adjusting the object size, the contrast can be improved while reducing the patient's dose at the same time.

- Turning the slider to the left indicates X-raying normal weight subjects or small objects.
- Turning the slider to the right indicates X-raying obese patients or larger objects.

9.3 Define the region of interest (ROI) [2/10]

Standard, COP I, COP II, COP III

The processing step "ROI" allows you to define the region of interest. It displays the diagram of the pixel data. The preview image in the histogram enables the user to view the pixel data referring to the relevant image regions.

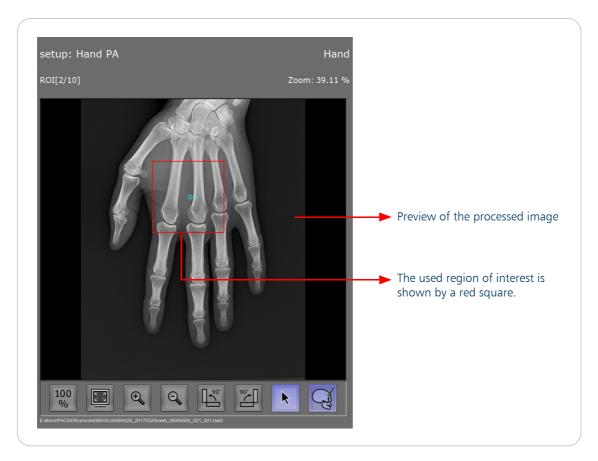


Figure 141. Preview with used ROI

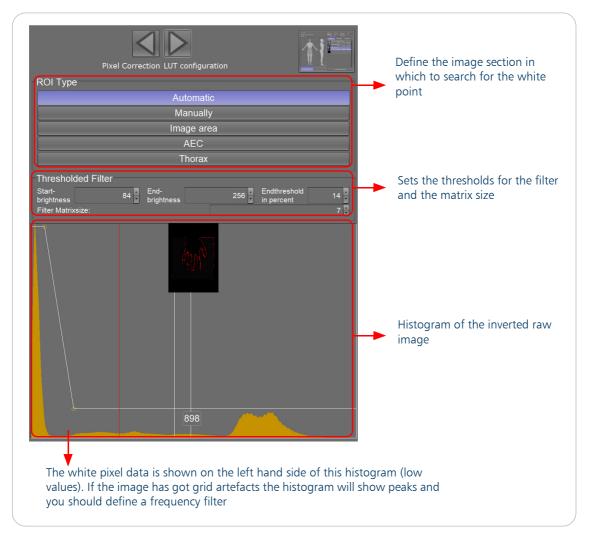


Figure 142. ROI - region of interest

Note



The step ROI in the standard image processing only contains the "set image area", "filter" and histogram. GLI and Thresholds for filter are available from COP I onwards.

Note

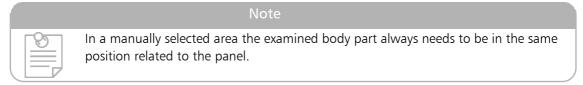


The red line in the histogram symbolises the white point calculated for the image. Determining the correct white point is the basis for all following image processing steps. The white point should correspond to the lightest reading of the region of interest. In most cases this is the lightest bone area.

Since the histogram from the image is inverted in this assessment, the highest white reading in this histogram corresponds to the lowest reading in the region of interest.

9.3.1 Set image area

"Set image area" is the section to determine where to locate the white point. Normally the section for locating the white point is configured to "Automatic" or "AEC". The software uses the position of the AEC fields which is set in the file sensors.xml.



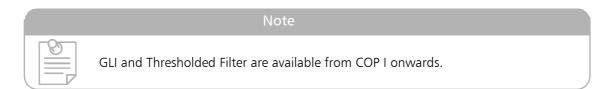
Automatic	Automatically identifies the optimum image area to find the white point
Manually	A new frame can be drawn by holding down the left mouse click
lmage area	The entire image is used to find the white point
AEC	AEC fields are used for the white point determination
Thorax	Automatic detection of all relevant thorax structures

Table 19. Image area options

9.3.2 Thresholded Filter



In this area the values for the ROI filter can be defined. Therefore, configure the start and the end brightness. Also the end threshold and the size of the filter matrix can be adjusted for each processing.



9.4 Configure LUT 1 [3/10]

Standard, COP I, COP II, COP III

This is to prepare the basic LUT (Look Up Table) that corresponds to a film characteristic curve.

The linear characteristic curve of digital sensors is thus converted into a logarithmic characteristic curve as in a conventional film. This characteristic curve can take different viewing habits into account (e.g. emphasis on soft tissue or bones). Fine details in the image display are corrected at a later stage. The white logarithmic curve is a LUT whose values are used to transfer the image. The curve can be changed by moving the curve points (the small yellow circles on the LUT).

The histogram of the image is based on the original values on the bottom axis and the target values on the vertical axis.

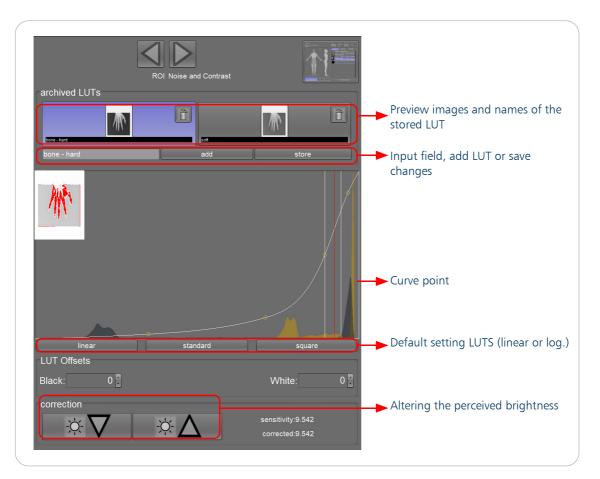
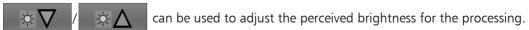


Figure 143. LUT configuration

White is now on the right-hand side of this histogram (high values). The "correction" buttons



The image on the left hand side has now been assigned a so-called basic processing procedure and should already be close to an X-ray image.

9.4 Configure LUT 1 [3/10] 213 / 372

Note



The curve should always stay near to a logarithmic curve. This step is not suited for fine adjustments.

9.5 Noise and contrast

COP II, COP III

The "Noise and Contrast" tab allows the reduction of noise in the image and enhances the details. In addition to the conventional image analysis, the step "Noise and Contrast" offers an extended image analysis with noise or noise and edges.



Figure 144. Noise and Contrast configuration from COP III

Noisefilter:

The degree of noise filtering can be set using two sliders (range, weight).

range: Range defines the boundary between the image information and the

noise, The noise filter works up to the value set by the slider. The range of values is sensor relevant. It determines how many pixels are denoised

weight: Weight defines the intensity of the noise filter

Detail Enhancement:

Detail enhancement reinforces (strengthens, amplifies) the edges in the image.

The slider changes the percentage value of the initial amplification factor (defined in the "processingParameter.xml"). Detail enhancement affects only small structures. "off" ignores the initial amplification factors.

Contrast Enhancement:

The slider changes the percentage value of the initial amplification factor (defined in the "processingParameter.xml"). This slider influences medium and large structures. "off" ignores the initial amplification factors.

Contrast Limiting:

Limits the Detail Enhancement and the Contrast Enhancement in areas with high contrast.

Note



The step "Noise and contrast" varies from COP II and COP III. "Image Analysis" is only configurable with COP III processing activated.

The GUI for Noise and Contrast in COP II is divided into four areas with several sliders.



Figure 145. Noise and Contrast configuration tab from the COP II

Noisefilter:

The degree of noise filtering can be set using two sliders (range, weight).

range: Range defines the boundary between the image information and the

noise, The noise filter works up to the value set by the slider. The range of values is sensor relevant. It determines how many pixels are denoised

weight: Weight defines the intensity of the noise filter

Detail Enhancement:

Detail enhancement reinforces (strengthens, amplifies) the edges in the image.

9.5 Noise and contrast 215 / 372

The slider changes the percentage value of the initial amplification factor (defined in the "processingParameter.xml"). Detail enhancement affects only small structures. "off" ignores the initial amplification factors.

Contrast Enhancement:

The slider changes the percentage value of the initial amplification factor (defined in the "processingParameter.xml"). This slider influences medium and large structures. "off" ignores the initial amplification factors.

Contrast Limiting:

Limits the Detail Enhancement and the Contrast Enhancement in areas with high contrast.



CAUTION/ATTENTION!



EN: This controller may also increase the noise, if it is not matched with the controllers range and weight.

FR: Cet appareil de contrôle peut également augmenter le bruit, s'il ne correspond pas à l'intervalle et au poids de l'appareil de contrôle.

Note



Adjustment of the Contrast Enhancement does not affect noise amplification.

9.6 Equalize luminosity [5/10]

Standard, COP I, COP II, COP III

Large differences in the density of X-rayed organs often cannot be displayed at the same time.

"equalize luminosity" can achieve a similar effect to common copper or aluminium wedge filters. The enhancement or reduction is calculated automatically and individually for each small region. The intensity can be adjusted in steps of 25%.

The "Radius" selection from four categories can be done with the COP processings:

S - Small (50 pixel)

M - Medium (100 pixel)

L - Large (200 pixel)

XL - Extra Large (700 pixel)

Each pixel effects the other; the larger the radius, the higher is the luminosity equalization of the pixels in the radius. The radius XL e. g. gives a very natural impression of the image.

If the .proc files a radius is used that does not correspond to the settings of S, M, L, XL, a further button "I" for "Individual" appears in the dialogue.

"highlight details": achieve a sharpened image without increasing the noise. Figures above 120% should be checked carefully as they may result in over sharpening.

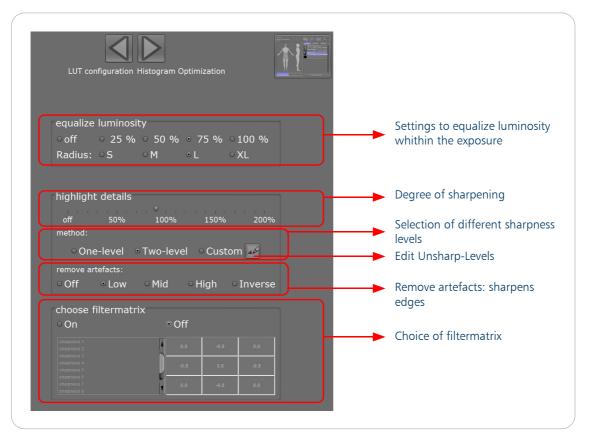


Figure 146. Equalize luminosity

Three methods for selecting the strength of the sharpening are available from *dicomPACS*®*DX-R* version 2.1 on:

- 1. "One-level" single-stage sharpening [with large filter]
- 2. "Two-level" two-stage sharpening [with smaller filters]
- 3. "Custom" user defined method in a separate dialogue

Each different method has different characteristics in relation to the sharpened structures and sharpening artefacts. However, artefacts, that are caused by the sharpening of an image (with unsharp masks) are already effectively reduced with the different methods. This applies primarily to sharpness halos and artificially increased noise.

Single-stage sharpening is recommended for rough structures with moderate sharpening.

Multi-stage sharpening is more suitable for the sharpening of fine structures.

After selecting a level from the list, it can be changed by entering other values in the window Edit Unsharp-Levels in the corresponding lower text boxes "FilterSize" and "GainFactor".

The button "Add" allows to add be filter levels to the list. The button "remove" removes the currently selected level.

The button "OK" accepts the currently displayed list and "Cancel" discards all changes and closes the dialogue.

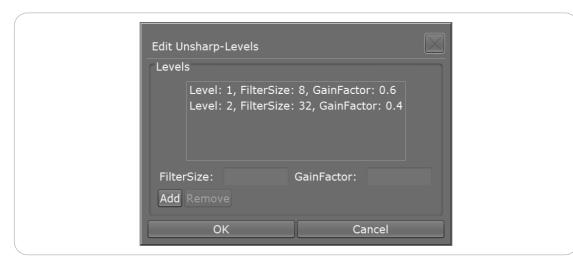


Figure 147. Edit Unsharp-Levels

In addition it is possible to select the degree of the removal of artefacts, caused by the sharpening of an image (with unsharp masks). This applies primarily to sharpness halos and artificially increased noise. The COP processing allows to adjust different levels of the reduction of artefacts to reduce even more noise. The following levels to "remove artefacts" are available in the COP processings from dicomPACS®DX-R version 2.1 on:

- 1. Off switches off the artefact reduction
- 2. Low artefact reduction for halos and some noise (equals the standard reduction)
- 3. Mid average artefact reduction for halos and noise
- 4. High strong artefact reduction for halos and noise

Note



The level "High" also intervenes in bone structures and is more suitable for soft tissue.

The dialogue also offers a "filtermatrix" with predefined filters, which can be activated with "On" and deactivated with "Off".

Note



To rename the listed filter e.g. Schärfe1 to sharpness1, rename the according entries in the "filter.xml" which is stored in the folder "C:\dicomPACS\console".

The sharpening methods could previously only be set by changing the configuration file "processingParameter.xml". This option remains and it is ensured that settings from previous versions are transferred correctly.

<u>^</u>

CAUTION/ATTENTION!



EN: For some diagnoses the equalisation of the luminosity is not wanted because the difference between brighter and darker regions is needed for diagnosis purposes.

FR: Pour certains diagnostics, l'égalisation de la luminosité n'est pas souhaitée car la différence entre les zones plus lumineuses et plus sombres est nécessaire à des fins de diagnostic.

Note



Settings from earlier *dicomPACS*[®]*DX-R* versions are transferred, so that there are no changes in the way how the image data is processed. This can lead to the fact that the slider of the dialogues are set to "0".

9.7 Histogram Optimisation

COP I, COP II

If the option is activated, the application calculates an optimized histogram distribution which effects in an optimized contrast enhancement. This is an automatic process without the possibilities of configuration. There is however the possibility to select between two different modes or deactivate the calculation modes.

There is also a display of a preview image that instantly shows where the current pixel values are marked in red.

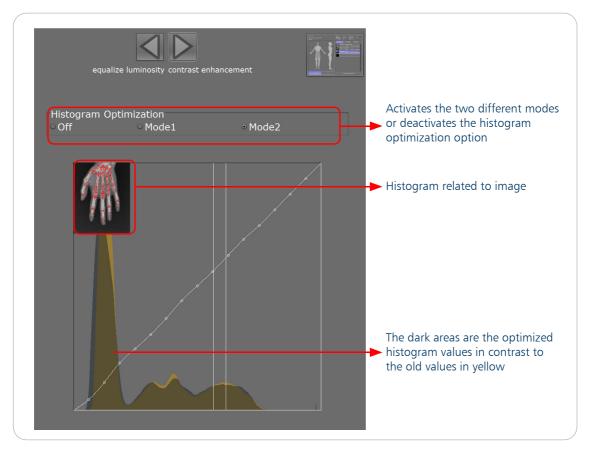


Figure 148. Histogram optimisation

9.8 Contrast enhancement [6/10]

COP I, COP II, COP III

The contrast is optimised by using an algorithm, called grey value function. In this dialogue, it is possible to define the intensity of the influence of the algorithm.

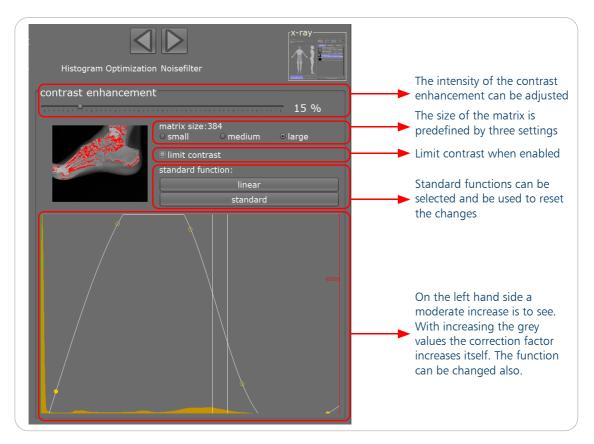


Figure 149. Contrast enhancement

The green line represents the lower limit, above which the grey value function is to be used. The red line represents the upper limit of the grey value function. To make an adjustment of the curve, grab the yellow and drag them to the desired position. To create new adjustment points, simply click in the curve. Reposition the line to adjust how much contrast of the different image areas (yellow histogram) will be enhanced.

With the slider, the influence on the intensity effect of the contrast balance can be adjusted. With 0% no effect and 100% a fully balanced input is computed.

If "limit contrast" is enabled, the contrast enhancement in regions without objects will be disabled. It generates less noise in regions of soft tissue. The standard curve has different appearances with enabled resp. disabled contrast limitation.

When enabling "limit contrast" click on "standard" so the curve recalculates to the contrast settings.

The matrix size is large by default. Smaller sizes can optimise the contrast for images with many details, but with the risk of tiles in the image.

The result of all changes can be seen on the left hand side.

9.9 Automatic LUT [7/10]



The Automatic LUT detects the relevant image value range from soft tissue and bone and converts it to user-defined brightness values.

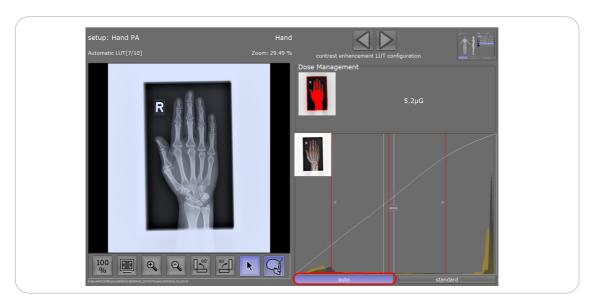


Figure 150. Automatic LUT configuration

Clicking on "auto" turns on/off the Automatic LUT.

After turning on the Automatic LUT, the curve changes slightly and three rulers appear. The rulers can be adjusted manually.

Moving the middle ruler adjusts the brightness of the image. Turning it to the left gives a darker image impression. Turning it to the right gives a lighter image impression.

Moving the outer right and left rulers to the middle reduces the contrast. The left ruler affects regions of soft tissue. The right ruler affects regions of bones.

The button "standard" resets any modifications to the Automatic LUT to a fixed value of dicomPACS®DX-R. This value is equal for each image acquisition.

9.10 Noisefilter



The noisefilter reduction has four adjustment options:

- "Off" turns off the noise filter.
- "Mild" the noise reduction is low, therefore, no details are lost. Particularly well suited for weak bone structures.
- "Standard" the noise reduction is high, but without affecting edges. Particularly well suited for strong bone structures (e.g. thoracic and lumbar spine).
- "Strong" the noise reduction is high, with influence on the edges and additional correction of visually disturbing outlier. Particularly well suited for strong bone structures (e.g. thoracic and lumbar spine).

We recommend to verify the processing using various types of images, if for the delivery of the system at the customer site the processing differs from the standard processing. The appropriate choice of detector also plays an important role.

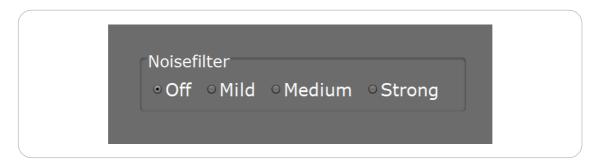


Figure 151. Noisefilter

9.11 Look-Up-Table (LUT) configuration 2 [8/10]

Standard, COP I, COP II, COP III

The purpose of this menu is the final LUT adjustment. Details can easily be corrected. The preview image in the LUT helps to find the LUT area that needs to be changed. Thus, certain areas in the image can easily be displayed lighter or darker.

In addition, LUT configurations can be stored as VOI-LUTs.

9.10 Noisefilter 223 / 372

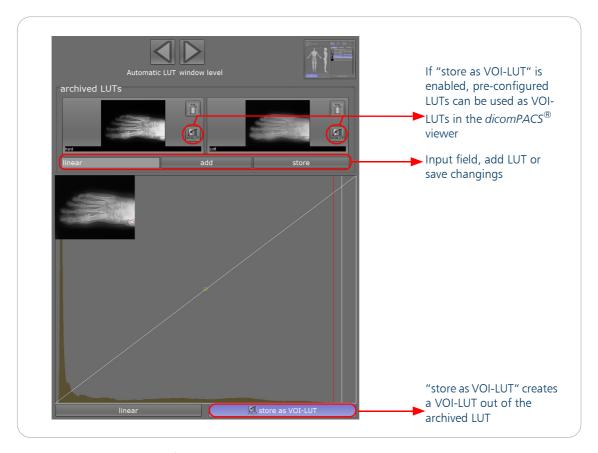


Figure 152. LUT detailed configurations

The red pixel, displayed on the preview image, indicates the current area of the histogram. The more the curve gets stepper, the more the contrast of the image raises.





The step possibility to store a LUT configuration as VOI LUT is only available with COP III processing.

9.11.1 Configure window level values

"Set bit depth" allows you to control the bit depth of the finished images. The bit depth should not exceed the scope of the sensor raw data.

Note



Setting lower bit rates does not decrease the file size of the images, until they are compressed. But by allocating a lower bit rate all following calculations, like filtering or magnification, are faster.

In most cases, automatic window levelling gives the best results, because unused black and white areas at the beginning and at the end of the histogram are reduced. The image impression is

"Full band" sets the window centre to the middle and window width to the maximum available value. The outcome may be adjusted to special viewing habits by using "set window manually".

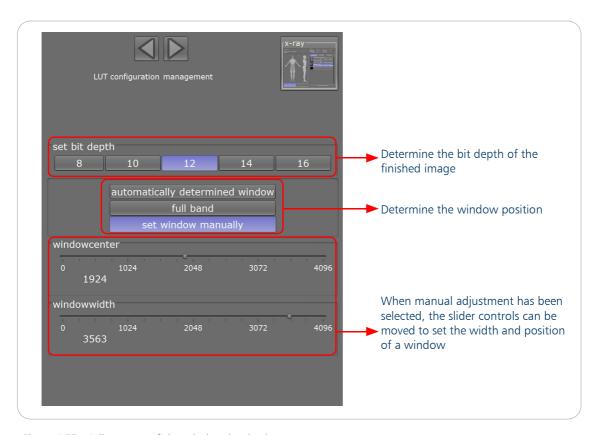


Figure 153. Adjustment of the window level values

9.12 Leave the setup via the X-ray view icon



Figure 154. Leaving the processings menu

When a processing has been changed, a decision has to be made in a dialogue box on how to proceed with the changed data.



Figure 155. Dialogue when exiting the image processing

Chapter 10. Exposure Index

In digital radiography, there is no direct relationship between the image receptor dose and the brightness (by analogy with optical density) of the processed image. Incorrect exposures can be compensated by the image processing in a wide range so that there is always a constant brightness and contrast effect. Therefore in digital radiography it is not possible to determine the actual image receptor dose based exclusively on the brightness impression of the final image, unlike analogue images, which represent this value.

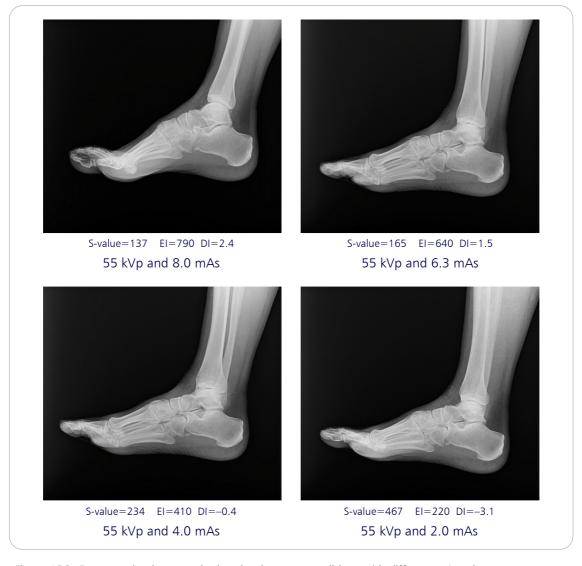


Figure 156. Foot examinations acquired under the same conditions with different mAs values, target exposure index is set to 450

Certainly, with digital radiography, underexposed images have a higher noise level and less detail, but this typically is compensated by the image processing too. Overexposed images increase the radiation of the patient and partially the staff. If the final images are observed without any additional information, the decision whether the exposure of an image is correct or not is a nearly impossible task.

Digital radiography uses exposure indices to solve this dilemma. Therefore in most of the countries it is regulated that the manufacturer of digital radiography systems must use an exposure index (dose indicator, dose index) in order to give the user the possibility to estimate the exposure level of an image and accomplish the task of acquiring correctly exposed images.

Historically, there were different standards for exposure indices. E.g. until May 2013 in Germany this was regulated by DIN 6868-58. Early standards only demanded a numerical value for the exposure index, which correlates with the image receptor dose under the same recording conditions. This is why there are different manufacturer-specific exposure indices can be found in digital radiography.

With *dicomPACS*®*DX-R* you can use two different exposure index types, the S-value that is oriented towards the sensitivity classes of film-screen-systems (Speed Class) and the exposure index according to the international standard IEC 62494-1.

The following table will give you a comparing overview of both exposure index types:

Description	Speed Class	S-value	EI (IEC 62494-1)	Dose required
High definition	100	100	1000	10.0 <i>μ</i> Gy
Universal film	200	200	500	5.0 μGy
High gain	400	400	250	2.5 μGy
Highest gain	800	800	125	1.25 <i>μ</i> Gy

Table 20. Comparison of exposure indices and speed class system

The exposure index can be configured in the *dicomPACS*[®]*DX-R* support mode. The available exposure index options depend on the configured image processing type. For more details, please look up the chapter "Exposure Index" on page 144.

To achieve correct exposure index values for different sensors (flat panel detector, CR reader etc.), each sensor type has a sensor specific configuration that represents its sensitivity. Usually the configuration is done automatically by the sensor installation. If necessary, sensor sensitivity can be adjusted via the parameter "sensitivityFactor" in "sensors.xml" file. For more information, please look up the chapter "Sensors.xml" on page 197.

Additionally, for all exposure indices it has to be kept in mind that an exposure index is not a measuring device like a dose meter. A dose cannot be measured with exposure indices. Any exposure index is a computed value referring to a region of interest found in the image. Therefore, merely the exposure level can be estimated with exposure indices.

10.1 Exposure index according to IEC 62494-1

Note



The chapter "Processing" on page 141 and chapter "Exposure Index" on page 144 give detailed information on how to activate the exposure index according to IEC 62494-1. The exposure index according to IEC 62494-1 and its features are only available with COP III image processing.

The IEC 62494-1 standard introduces three indices depending on each other. The exposure index (EI), the target exposure index (TEI) and the deviation index (DI). The values of these three indices are stored in the DICOM header of the processed images and can be found in the following DICOM tags:

(0018, 1411) Exposure Index

(0018, 1412) Target Exposure Index

(0018, 1413) Deviation Index

The exposure index (EI) is the presentation of the average dose which was detected on the sensor in the relevant image area (region of interest). The relevant image area is an examination-specific subarea in the image that contains the information relevant for the diagnosis. The exposure parameters are usually optimised for this area.

According to IEC 62494-1, the value of the EI is defined as the numerical value of the calculated dose D_r in μ Gy multiplied by 100:

 $EI = \{D_r\} \times 100 \text{ with } D_r \text{ being the calculated dose in } \mu Gy.$

Examples:

$$D_r=2.5\mu Gy \rightarrow EI=2.5 \times 100 = 250$$

 $D_r=10.0\mu Gy \rightarrow EI=10.0 \times 100 = 1000$

The calculation of the dose is performed on the basis of a given value from the relevant image area. This value is determined using an average value method and the relevant image area is determined using a histogram-based method.

The target exposure index (TEI) is the expected exposure index (EI) for a correct exposure of a specific examination. For each examination a default TEI is defined in the software which can be adapted individually. For more information about the configuration of examinations/macros, see "Tab Exposure Index" in the user manual.

The deviation index (DI) is a value that represents the difference between the exposure index and the target exposure index. It shows quantitatively how much the EI deviates from the TEI. The DI is scaled logarithmically:

 $DI = 10 \times \log_{10}(EI / TEI)$

Examples:

Situation	DI	El	Relative dose	Relative dose increase
four times the dose	6.0	EI=4xTEI	400%	+300%
appr. three times the dose	5.0	EI=3.15xTEI	315%	+215%
two and a half times the dose	4.0	EI=2.5xTEI	250%	+150%
double the dose	3.0	EI=2xTEI	200%	+100%
appr. eight fifth of the dose	2.0	EI=1.58xTEI	158%	+58%
five quarters of the dose	1.0	EI=1.25xTEI	125%	+25%
dose for a correct exposure	0.0	EI=TEI	100%	+0%
four fifth of the dose	-1.0	EI=0.8xTEI	80%	-20%
appr. three fifth of the dose	-2.0	EI=0.62xTEI	63%	-37%
half the dose	-3.0	EI=0.5xTEI	50%	-50%
four tenth of the dose	-4.0	EI=0.4xTEI	40%	-60%
appr. one third of the dose	-5.0	EI=0.31xTEI	32%	-68%
a quarter of the dose	-6.0	EI=0.25xTEI	25%	-75%

Table 21. Examples for the dose deviation index

Because of the logarithmic scaling of the DI, working with the DI is like working with the well known exposure point system. That means that a value of +1 corresponds to an exposure with one exposure point too much dose, a value of -6 corresponds to a six exposure points too little dose and an image that is underexposed about four times.



PRACTICAL HINT

EI and DI can be shown instead of or additional to the S-value. The TEI can also be displayed.

10.1.1 Exposure level indicators

There are five symbols which are used as indicators for the current exposure level of an image and represent the ranges of the actual deviation index. The default configuration for the symbols is explained in the table below. This configuration can be customized in the support mode (see "Exposure Index" on page 144).

Symbol	Situation	Default DI configuration
•	strong overexposure, not acceptable	> +5.0

Symbol	Situation	Default DI configuration
	overexposure, acceptable in exceptional cases	from +5.0 to +2.0
\Diamond	(almost) correct exposure	from +2.0 to -2.0
\Diamond	underexposure, acceptable in exceptional cases	from -2.0 to -5.0
\Diamond	strong underexposure, not acceptable	< -5.0

Table 22. Exposure level indicators

10.1.2 In practice

According to IEC 62494-1which is usually applied in human medicine, the exposure index (EI) and the deviation index (DI) have to be provided. The values are displayed in the lower right corner of the image after the image acquisition. Depending on the configuration, the target exposure index (TEI), the exposure level indicator and as well the S-value can be displayed additionally and were presented together with the values of EI and DI.

Note



Due to the regulations in IEC 62494-1 the EI cannot be displayed as a single value.

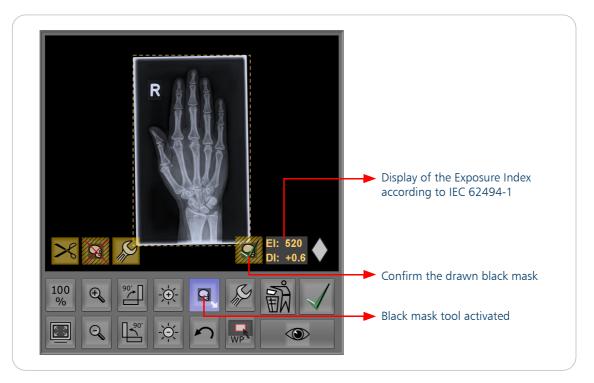


Figure 157. Display of the exposure index according to IEC 62494-1

If the automatic calculation of the exposure index fails (e.g. if the automatic region finder fails), a recalculation can be started by the user. The relevant image area for calculating the exposure index depends on the black mask (automatic shutter) that is automatically found by the software. Therefore, to get the recalculation started, the user has to check and correct the black mask by using the black mask tool. The recalculation is triggered by the button for confirming the black mask. For details how to use the black mask tool refer to "Black border / cropping" in the user manual.



PRACTICAL HINT

Additionally, a user with administration rights can check the found relevant image region in detail in the image processing step ROI, see "Automatic LUT [7/10]" on page 222.

To determine an EI or TEI suitable for the purpose of the examination and to manage regular occurrence of overexposure or underexposure with appropriate DI values are tasks which should be considered and solved coherently. When evaluating EI/TEI and DI values, the X-ray technique (e. g. kVp, mAs, grid/filter usage and source-image distance) and dosage measurement values (such as DAP) should always be checked for plausibility.

In addition and as explained previously, the exposure index is not a measuring device. In daily work, the calculated EI and DI values vary according to the dose actually applied, the kVp-range used, the organ examined and considering the calculation of the DI values the configured TEI for the examination.

It is therefore advisable, to first check the magnitude of the exposure index in routine operation to determine an average normal value for each system with its individual configuration and the individual operating principles of the staff. This investigation must, of course, be carried out

separately for each examination type/organ. Therefore defining an EI/TEI for a correct exposure is, strictly speaking, an application-specific task. In order to support the user in this task, the software provides statistics on the already calculated EI values for each examination. Please see "Tab Exposure Index" in the user manual for further information on the configuration of examinations/ macros. Nevertheless, for orientation and to illustrate this, common target exposure indices can be given for selected applications in typical working environment, please see tables below:

	adult, stationary DD Csl ¹	adult, stationary GOS ²	child, stationary DD Csl ¹	child, stationary GOS ²
EI/TEI extremities	450	560	250	360
EI/TEI trunk/torso	280	360	125-200	160-250

Table 23. Common (target) exposure indices in human application

	cat/dog, stationary DD Csl ¹	cat/dog, stationary GOS ²	small pets (e. g. birds) DD Csl ¹	equine, mobile DD Csl ¹
EI/TEI extremities	450	630	800	450
EI/TEI trunk/torso	320	400	500	280

Table 24. Common (target) exposure indices in veterinarian application

Once a TEI has been specified and configured for each examination, DI calculation and therefore statements for each image with respect to exposure level can be made, i.e. under, over or correct exposure dependent on the configuration of the exposure level indicator.

10.2 S-value

The S-value as an exposure index in *dicomPACS*[®]*DX-R* is oriented towards the speed class system of film-sheet systems (as shown in Table 25 "S-value / radiation dose relation" on page 234). The S-value is a manufacturer-specific exposure index and represents the average dose in the region of interest of the acquired images. The S-value can be used in all image processing modes. The chapter "Exposure Index" on page 144 gives instructions on how to activate the S-value.

The valid value range of the S-value ranges from 5 to 20000. The relationship between S-value and radiation dose is linear and inversely proportional. For the work with the S-value this means:

high S-value → small dose (underexposure)

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^{1:} direct deposit caesium iodide flat-panel detector

²: gadolinum oxide flat-panel detector

small S-value → high dose (overexposure)
double dose → half S-value
half dose → double S-value

S-value	1600	800	400	200	100	50
Mean Radiation dose [μGy]	0.63	1.25	2.5	5	10	20
Mean radiation dose [mR]	0.07	0.14	0.29	0.57	1.14	2.28

Table 25. S-value / radiation dose relation

The calculated S-value is stored in the DICOM header of the processed image. The value can be found on the following DICOM tags:

(0018,6000) Sensitivity (0018; 1405) Relative X-ray exposure

<u>10.2.1 In practice</u>

The S-value is displayed at the bottom right corner of the image after the image acquisition.

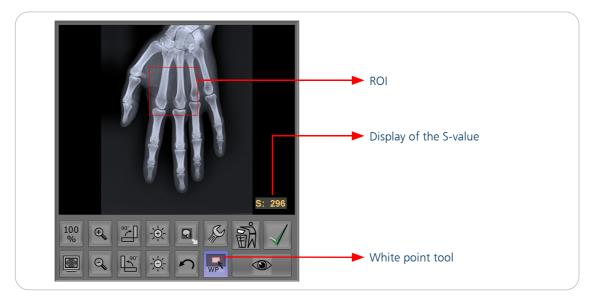


Figure 158. Display of the S-value

If the automatic calculation of the S-value fails (e. g. if the automatic region finder fails), a recalculation can be started by the user. The calculation of the S-value uses the region of interest. The white point tool has to display and control this region of interest. Afterwards, the white point tool can be used to correct the region of interest and start an S-value recalculation.

As explained previously, the S-value being an exposure index is not a measuring device. In daily work, the displayed S-values vary according to the dose actually applied, the kV-range used and the organ examined.

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It is therefore advisable, to first check the magnitude of the S-Value in routine operation to determine an average normal value for each system with its individual configuration and the individual operating principles of the staff. This investigation must, of course, be carried out separately for each examination type/organ. Thus defining S-values for a correct exposure is, strictly speaking, an examination-specific task.

Nevertheless, for orientation and to illustrate this, common S-values can be given for selected applications in typical working environment, please see the tables below:

	adult, stationary DD Csl ¹	adult, stationary GOS ²	child, stationary DD Csl ¹	child, stationary GOS ²
S-value extremities	250	160	400	280
S-value trunk/ torso	360	280	500-800	400-630

Table 26. Common S-values in human application

	cat/dog, stationary DD Csl	cat/dog, stationary GOS	small pets (e. g. birds), DD Csl	equine, mobile GOS
S-value extremities	200	160	120	220
S-value trunk / torso	280	200	200	400

Table 27. Common S-values in veterinarian application

Once a S-value has been specified for a correct exposure, statements for each image with respect to exposure level can be made, i. e. under, over or correct exposure. The following example illustrates this:

For the correct exposure of a trunk image, the S-value 360 is set. Overexposure is defined as double-dose exposure and underexposure is defined as half-dose exposure. Exposures with triple or-one-third of the dose are considered to be significantly over- or underexposed.

	strong underexposure	underexposure	correct exposure	overexposure	strong overexposure
S-value	1080	720	360	180	120

Table 28. Example - how to work with the S-value

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^{1:} direct deposit caesium iodide flat-panel detector

²: gadolinum oxide flat-panel detector

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Chapter 11. License Management

The license management system consists of the following programme and modules:

- ORLicenseService (license service)
- ORLicenseManager (administration programme for the license)
- ORLicenseSelector (test and configuration programme)
- License library which ensures the connection with the license server. Different versions of this library are integrated in *dicomPACS®DX-R*. The library is installed as part of the application.

The license server waits for license queries at TCP port 3602 and for search broadcasts by license clients at UDP port 3602.

The license library on the client expects the broadcast response at port 3601 UDP.

11.1 Management of DICOM-UIDs

In addition to its main task, the license service is used to allocate and distribute DICOM-UIDs. Each license server uses a root UID by default. To differentiate between installations, each license server is automatically allocated an unique installation ID, which is encoded in each license key for the transfer to the license server. Each license server creates a machine ID for each connected license client. This ID can be queried by the applications. Server and machine IDs are saved by the license library in the registry together with a running study number.

11.2 Installation

The installation is carried out by running the installation programme Setup_ORLicense22x.exe. The installation takes place in the directory *C:\dicomPACS\ORLicense* by default.

The installation programme starts the license service and if selected, the license manager.

11.3 ORLicenseManager

The programme ORLicenseManager monitors and configures the license service. After its startup, the programme attempts to contact the license service. The existing licenses are displayed in a table. You can display the host allocating a license by a double-click on the license. The hosts are displayed at the right hand side. The next double click closes the host view.

In the running programme the button "Refresh" queries the current state of the license service.

By activating the checkbox "Silent mode" the license server is hidden for a port request of the clients. This can be useful in networks with several license server.

11.3.1 Determine the request key

License keys must be created by OR Technology. The license manager is able to collect the necessary information and to send it by Email.

Start the ORLicenseManager via the Start menu "Start → search for → ORLicense". Then select the menu item "License → Get Request Key" and enter the requested data:

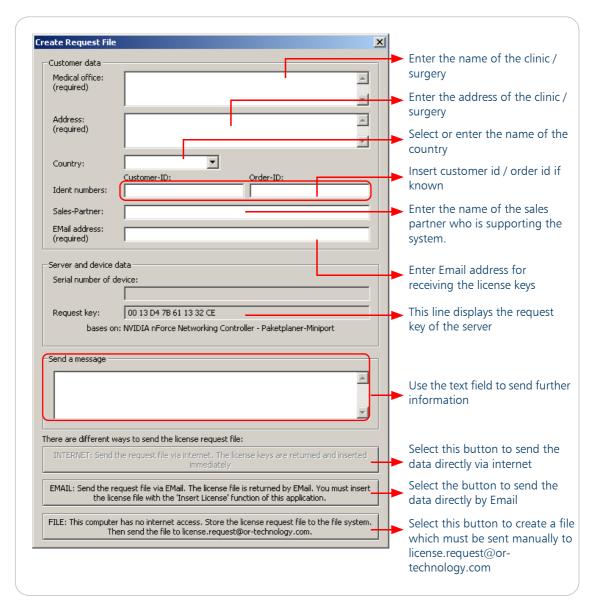


Figure 159. License request

11.3.2 Enter a license key

Go to the ORLicenseManager and select the menu item "License — Insert License Key". A dialogue box opens which allows you to enter new license keys in different ways:

- Type in a key in the input field, then click the button "Add". You do not need to enter the license name including the colon.
- Insert one or more keys from the clipboard by selecting the button Clipboard.
- Load a license file with the button File.

The content of the license keys is shown in the table below the input area. Then click on the button Insert License Keys to activate them.

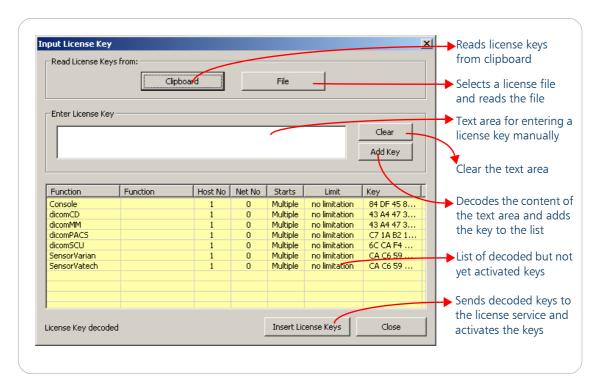


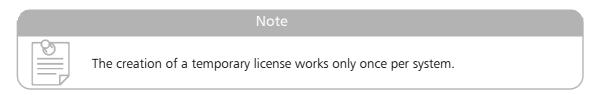
Figure 160. Enter license key

11.3.3 Create a temporary license

Every *dicomPACS*®*DX-R* installation can be activated with a limited key which is valid for 20 days and allows full functionality.

This works only once per *dicomPACS*[®]*DX-R* installation.

To activate the temporary license, select the menu item "License — Temporary Key" within ORLicenseManager and confirm with the "OK" button.



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11.3.4 Remove client

There are two ways to remove a client.

The first is to set the license to zero, so the client can't occupy the license as long as the license server runs.

The second way is to open the license and mark the client. Select "remove client" in the license menu. This works until the removed client is restarted.

11.4 Configure a licensed application

The license library is able to identify a license server in the local network and to establish a connection. The connection data is stored in the registry. There should be to change the configuration of the license client.

In networks with several license servers it may be necessary to change access data for a license server. The access data is saved in the values Server and Port in the registry key

[HKEY_LOCAL_MACHINE\SOFTWARE\O+R Software\Licence]

This can be changed manually or with the program 'ORLicenseSelector'. The programme can additionally search the local network for license servers and send license requests to a license server.

11.5 The license service

The license service distributes the licenses to the clients and manages the already set licenses.

11.5.1 Overview

The programme ORLicenseService is started as a system service via the service manager (SCM). All output is sent to the log file ORLicense.log. This file is located in a subdirectory (Log) of the directory which contains the license file.

The service keeps a table of connected PC names and their IP addresses to speed up the name resolution. The table is monitored regularly for correctness. It is saved in the file HostList.dat.

The service is started and stopped via the ORLicenseManager or via the service manager. The service is named O+R License Service.

11.5.2 Reasons for losing the license

License information may be lost under the following conditions:

- 1. The license service uses a hardware hash to identify the server hardware which includes the MAC address of a network card. The licenses are lost if the MAC address is no longer available on the license server, e.g. because of deactivated network card.
- 2. The license information may be lost if the system time of the license server is changed. If the system time is important for you, please ensure that the system time does not have more than ten minutes deviation from the official standard time. A good approach is to synchronize it to a network time server by the network time protocol (NTP).
- 3. Daylight saving time (DST) is supported.
- 4. It is <u>not</u> possible to restore an old recovery point of the Windows configuration or to restore the Windows registry without losing the license information. If you need to do this, please ask for a repair key.

11.5.3 Change the network card

If you change a network card the request key may change. Please follow the following procedure:

- 1. Change the network card.
- 2. Request the new request key.
- 3. Send the old key and the new request key to OR Technology via Email or fax. You will then receive a key to reset the license service as well as a set of new license keys.

11.6 Configuration

11.6.1 ORLicense.ini

Since version 2.3.2 of the ORLicense service the configuration file ORLicense.ini is used. The file is located in C:\dicomPACS\ORLicense\ORLicense.ini.

Key	Default	Description	
[ORLicense]			
CompareType	7	How compare host data (default: 7) 1 = compare IP address 2 = compare hostnames 4 = compare host id's (and hostname) use all data: 1 + 2 + 4 = 7	
AcceptIPv6	false	enable IPv6 (for test only)	
SilentMode	false	Server does not respond on search requests	
HideDongle	false	hide drive letter of dongle	

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Key	Default	Description
NameResolution	3	use special type of name resolution (for client version $<$ 2.3.0) 0 = no name resolution, 1 = use DNS only, 2 = DNS + internal list, 3 = hostname ($>$ = 2.3)

Table 29. ORLicense.ini

11.6.2 Registry values of the license server

ORLicense saves its settings under the registry key

[HKEY_LOCAL_MACHINE\SOFTWARE\O+R Software\Licence]

Key	Default	Description
LicenceFile	C:\dicomPACS\ORLicense\License.dat	File containing the license data
LicenceTimeout	120	Time after which a license expires if the client programme has not accessed the license.

Table 30. Registry values of the license server

11.6.3 Registry values of the license client

The license function of the application saves the connection data under the registry key

[HKEY_LOCAL_MACHINE\SOFTWARE\O+R Software\Licence]

If the user does not have writing access to this registry area, the data is saved under

 $[\mathsf{HKEY_CURRENT_USER}\backslash \mathsf{SOFTWARE}\backslash \mathsf{O} + \mathsf{R}\ \mathsf{Software}\backslash \mathsf{Licence}]$

Key	Default	Description
Server		Name of the license server
Port	3602	Port of the license server

Table 31. Registry values of the license client

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11.7 Problems and solutions

11.7.1 Troubleshooting

Please check the logging file of the license service. The file is located in the subdirectory log of the installation directory.

Content	Description / What to do?	
Can't load license file.	The license file could not be loaded for the given reason. Please try to eliminate the reason. Then stop and restart the license service. Contact OR Technology. If possible send the log file attached to an Email to support@oehm-rehbein.com.	
No license found.	The license is not available. Please check: • Was the license key entered correctly? Does ORLicenseManager display these licenses? • Are there free licenses available? • Is the license occupied by another host?	
There is no connection of the client listed.	Please check: • Is the client configured for another license server? • Is port 3602 (TCP) or 3602 (UDP) blocked by a firewall on the server? • Is port 3601 (UDP) blocked on the client?	

Table 32. Some troubleshooting points





EN: In an emergency take the following action:

Stop the failing license service. Install the license service on another computer in the network which executes Windows. Activate the temporary license.

FR: En cas d'urgence, prenez les mesures suivantes:

Arrêtez le service de licences défaillant. Installez le service de licences sur un autre ordinateur dans le réseau qui exécute Windows. Activez la licence temporaire.

All clients should find the new license server after a restart.

11.7.2 Known problems

1. If the license service and license client are running on the same machine and the machine is subject to changing network configurations (e.g. a notebook on the network and stand alone computers) the client will be registered as "localhost" or under its configured machine name (depending on whether it is connected to the network). Under these circumstances, a host license may be connected to a non-existing host name.

<u>Solution:</u> Please enter the host name in the file HostList.dat. This file is located in C:\dicomPACS\ORLicense. TCP/IP name resolution will then take place independent of the network.

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- 2. Only one programme can search a machine for a license server at a time, as each programme tries to engage UDP-port 3601.
 - <u>Solution:</u> This only happens at the first startup, as afterwards access data from the registry is used and a search is no longer necessary.
- 3. Previous versions of the license library can cause a crash of an application if sending of broadcasts is prohibited on the client.

Solution: Configure the license client by editing the registry as noted above.

Chapter 12. miniPACS

12.1 Server installation

miniPACS means using the *dicomPACS®DX-R* PC also as a server to connect a few *dicomPACS®* viewing clients.

The console_DXR_network_setup.exe is setting up a *dicomPACS*[®]-database and creates all files that are needed to install clients connected to the database. It can be chosen on which drive the images of this database will be stored. It is recommended to use a different partition or drive than the one that is used for the *dicomPACS*[®]DX-R image files, e.g. N:\.

Note



The same drive letter that is used for the images of the *dicomPACS*[®]-database must be available on all clients.

On this drive the following structure is created:

- <dicomPACS>\<Install>
 All files needed to install clients
- <dicomPACS>\<OrdicomDB> images
- <dicomPACS>\<StartUp>
 prepared structure to configure and update the clients

The following gives a short overview of the steps to be done on the *dicomPACS®DX-R* server side:

- 1. Prepare programme files and database to be on drive C:\ for dicomPACS®DX-R
- 2. Prepare image files to be on drive D:\
- 3. Run dicomPACS DX R setup EN.exe from the FTP-server, USB or DVD
- 4. Run console DX-R network setup x.x from the FTP-server, USB or DVD

miniPACS

- 5. Programme files and database remain on drive C:\
- 6. Image files remain on drive D:\
- 7. Create new database to store images separately, typically on drive N:\
- 8. Installation files for the clients (dicomPACS client setup.exe) are created on that drive
- 9. Create a network share containing the image and client installation files
- 10. Share the folder/drive on the server, containing the dicomPACS folder, not the dicomPACS folder itself!

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12.2 Client installation

The client setup installs the $dicomPACS^{\textcircled{R}}$ viewer and additional components to connect to an existing dicomPACS-database.

A precondition for the installation is a connected network drive to see the drive of the *dicomPACS*®-database under the same drive letter.

Users need full access rights both (at least read and write permission) on the network drive and on the local workstation where *dicomPACS*[®]*DX-R* is installed.

Note



All clients need read and write rights on the $dicomPACS^{\textcircled{R}}$ drive (e.g. N:\dicomPACS*).

If you want to limit rights further you can give read and write rights to only *\dicomPACS\ORdicomDB, *\dicomPACS\StartUp, *\dicomPACS\temp, *\dicomPACS\viewer and *\bdt*.

However we do not recommend giving the clients rights to actually delete files on those paths!

-

PRACTICAL HINT

If the user console / dxr was used, then you should simply use this user also to login to the client systems on the server.

To start the client installation run the *<dicomPACS><install> dicomPACS_client_setup.exe*. from the connected network drive.

This will copy all folders and files from

<dicomPACS><install>\<AllUsers>\<LW C>*

to

c:\<dicomPACS>*.*

The setup will create a desktop icon and a shortcut in the common startup folder for the *dicomPACS*[®] viewing application.

Additionally, a license server has to be selected. Therefore, the ORLicenseSelector is started automatically at the end of the client setup. Please choose the license-server in the dialogue by highlighting the correct one and press the "set" button in the [Select License Server] section. Afterwards exit the ORLicenseSelector. Accept all warnings and messages of the firewall and allow the programme to build a connection each time, otherwise the miniPACS does not work.

The following gives a short overview of the steps to be done on the viewing client side after completing step 1-9 on the *dicomPACS*®*DX-R* host side, page 245:

Network share

- 1. Use the network share containing the images and client installation files
- 2. Map a network drive to the share using the same drive letter as it is on the server, typically drive N:\ and run the dicomPACS_client_setup.exe (dicomPACS\Install\dicomPACS_client_setup.exe) from that mapped network drive on each client
- 3. For each Viewer (client) prepare programme files to be on drive C:\
- 4. License, database and images will be received from the server

Note



It is only possible to view images with $dicomPACS^{\circledR}$ that were done by $dicomPACS^{\circledR}DX-R$ after the installation of $dicomPACS^{\circledR}$. If older images should be viewed, they must be imported separately.

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Chapter 13. Print

The programme prints DICOM images on DICOM compatible printers and laser imagers using the programme *ordicomprint.exe*. The programme is located in the ConsoleSCU or in the jDicomCC directory (C:\dicomPACS\ConsoleSCU or C:\dicomPACS\DicomCC).

The programme is started via the autostart directory and monitors the inbound directory of the ConsoleSCU for job files with the extension .dcmprn.

The job files are created by $dicomPACS^{\circledR}DX-R$ and contain all data necessary for printing, including links to the image files. The job files from the $dicomPACS^{\circledR}DX-R$ are received by the PrintSCU and forwarded to the printer.

If a file is recognised, ORDicomPrint deletes its working directory and creates a configuration file with the print job data. Then it starts the programme dcmpsprt.exe which creates a hard copy image and stores it in the working directory. After that, the programme dcmprscu.exe is started to send the hard copy image to the printer.

ORDicomPrint renames its job files as follows:

*.dcmprn.req	The job file has been read and saved in the worklist according to its priority. When the programme is started, these files are read together with any new job files.	
*.dcmprn.rdy	The job file has been processed successfully.	
*.dcmprn.err The processing has been cancelled due to errors.		

Table 33. Names of job files

Old job files (extensions *.dcmprn.rdy and *.dcmprn.err) are deleted after about one hour. ORDicomPrint searches within the local directory for following configuration files.

- ORDicomPrint.ini
- ConsoleSCU.ini

The first file found is used by the programme.

ORDicomPrint creates the subdirectory dcmPrint to use it as the working directory and stores it in the subdirectory defined by the value SCPstore_DIR. The log file is saved in the subdirectory Log.

The programme has to be started in the installation directory (in order to find the configuration file). ORDicomPrint can be started with the following options:

-h	The programme starts in the minimised mode ($-h = hide$).	
-noremove	Job and image files are not deleted (for debugging). This option can be switched on and off in the running programme via the user interface.	

Table 34. Start options for ORDicomPrint

ORDicomPrint detects an already running instance of itself. This instance will be brought to the front (if it has not been opened with the option –h in force) and the second instance is closed immediately.

13.1 Operation

The main window displays a list of the last 250 print jobs since the start of the programme. Entries with the status 'New' or 'Preparation' can be selected and cancelled with the button "Cancel Print Job".

If the check box "Remove old job and image files" is selected, the programme removes old print jobs and associated data after the successful execution or about one hour after processing the job.

The programme may be exited by right clicking on a free area in the programme window. To minimise the programme click on the icon in the system tray and select the associated menu item.

The icon "Exit" will minimise the window and place it in the system tray.

13.2 Configuration file ORDicomPrint.ini

The file uses the windows.ini format.

Option	Default	Description
TempDir	C:\dicomPACS\Temp	Specifies the folder to store temporary data. If this key does not exist, the programme uses the key [SCP] SCP_storeDir instead.
JobDir	C:\dicomPACS\Temp\dico m-verteiler\1\info	This folder is monitored for print jobs. If the key does not exist the programme uses the key [SCP] SCP_infoDir instead.
Support12Bit	1	If set to ,0' the programme will convert the image data to 8 bit gray level images.
SupportsPresentationL UT	1	The value ,0' suppresses the output of the presentation LUT.
MaxPixelSize	16000000	If the value is given, the application will reduce the image size to it. This parameter was introduced as a workaround for old DICOM printers which do not support large images. Attention: This option requires the prgramme dcmscale.exe which must exist in the same folder as ORDicomPrint.exe.
RemoveFiles	1	The value ,0' prevents the removal of processed jobs. This should be used for trouble shooting only.

Table 35. Configuration of the ORDicomPrint.ini

13.3 Configuration file dicomPACS.properties for overlays

To configure the size of the overlays at the film print, use the following parameter:

DisplayProperties.DicomPrint.StandardFontHeight= DisplayProperties.DicomPrint.MaximumFontHeight= DisplayProperties.DicomPrint.MinimumFontHeight=

To orientate the printed images use the following parameters in the file C:\dicompacs\console\dicomPACS.properties can be used:

PrinterPage.imageBeneath PrinterPage.imageUpside

Chapter 14. Patient CD

The Patient CD module copies selected data from one or more patients onto a CD, DVD or USB stick. The creation of a CD or DVD can be executed on a locally installed CD/DVD burner or on a disc publisher (CD / DVD-Robot) available on the network.

The module first copies the DICOM files, as well as the files for the CD viewer, for HTML display and the autostart function in a temporary directory in the file system.

Then the following programmes are started:

ORDicomDir

The programme creates a DICOMDIR conforming directory structure from the prepared directory, i.e. file and directory names are abbreviated to eight symbols. Compressed files are decompressed and the file DICOMDIR is created.

MkHtml

The programme creates the HTML preview for the web viewer of the patient CD. Therefore, all DICOM files are compressed and copied in the folder "preview".

For the configuration of the file "MkHtml.ini" the following values are of importance:

Parameter	Default value	Description		
[MkHtml]		Section		
CreatePreview	true	Activates the creation of the web viewer files		
DicomDir	Preview	Folder to store the DICOM files for the web viewer		
PreviewDir	Preview	Folder for the preview images of the web viewer		
PreviewFormat	WVL-NR	Method of compression for the web viewer images		
PreviewImageSize	128	Size of the preview images		
RemoveSourceFiles	false	Deletes of the source DICOM files. It is not possible to create a DICOMDIR compliant media, only the web viewer is available		
LogLevel	1	Sets the Loglevel of the application, "1" = Debug		
PracticeStamp	C:\dicomPACS\vie wer\PracticeStamp .xml	Indicates the practice stamp file		
SplitMultiframe	true	"true" = multiframe images are separated in single images of the same series		
ShowSingleUSImage s	true	Ultrasound images of a series are displayed as a stack by default by the web viewer. Generally, there are two options to view these images: 1) in a grid 2) as a stack		

Parameter	Default value	Description
OverlavEile		If the parameter is not set, the application searches for the files: C:\dicomPACS\Dcm2Html\overlay.ini C:\dicomPACS\console\modalities.xml
OverlayFile		Determines the file of the overlay configuration. If an ini file is set, this file is copied to each study, however the modality is. If a xml file is set, for each study a separate ini file is creating according to the xml file.

Table 36. Configuration of the MkHtml.ini

Note



To use the same images for the "DicomDir" and web viewer set the parameter "DicomDir" and "PreviewDir" identically. The compression and the reloading functionality are not available.

The directory is copied to the data carrier.

Medium	Action
USB Memory stick	Copying of the files
Local CD/DVD burner	Creates the CD/DVD with MakeCD
Disk Publisher CD/DVD Robot	The directory is copied to the job directory of the "Disc Publisher" and the job file is created. The up-to-date "PTBurn" software must be installed on the computer of the CD Robot.

Table 37. Data carrier for the patient CD

The configuration of the patient CD module is executed in the file "dicomPACS.properties":

Key	Default	Description
PatientCD.BurningSupportAvailable	true	Switches on the CD/DVD function
PatientCD.CdBurningSimulation	false	"true" = the burning process is simulated
PatientCD.CDEject	false	Eject finished medium
PatientCD.cdviewer	C:\dicomPACS\cdview er	Directory copied onto the medium for the viewer
PatientCD.CreateHtmlPreview	true	Generates the HTML preview
PatientCD.HtmlCreator	C:\dicomPACS\dcm2h tml/mkhtml.exe	Programme for creating the HTML preview
PatientCD.HtmlCreator.CfgPath	C:\dicomPACS\dcm2h tml\mkhtml.ini	Configuration file for creating the HTML preview
PatientCD.MAX_PATCD_BACKUP	9	Maximum number of media for which a backup is stored
PatientCD.MaxCdSize.MB	600	Maximum size of the medium

Key	Default	Description
PatientCD.ORDicomDir	C:\dicomPACS\viewer\ ORDicomDir.exe	Programme for generating the DICOMDIR structure
PatientCD.TempCD	C:\dicomPACS\ temp\cdexport\	Directory in which CDs are prepared
PatientCD.VerifyCD	true	"true" = test medium after burning
PatientCD.writer	f	Drive letter of CD burner or Robot for Disc Publisher
PatientCD.writer.AutoCorrectSettings	true	Automatic ID of burner drive
PatientCD.writer.f.Speed	22	Burn speed in multiples of standard CD speed
MakeCD.available	false	"true" = external MakeCD (other computer) is used "false" = in dicomPACS®DX-R intergrated MakeCD is used
MakeCD.BackupStatus.Show	false	Activates the display of the backup status
MakeCD.BackupStatus.IPAddress	localhost	IPAddress of the ORBackupService running system
MakeCD.BackupStatus.Port	2014	Port for the ORBackupService
MakeCD.BinDir	C:\dicomPACS\cdreco rd	Folder of the applications of MakeCD
MakeCD.Disable. < SCSI-Lun>	false	"true" = drive is not used by MakeCD
MakeCD.Drive. <scsi-lun></scsi-lun>		Set the drive letters manually if the automatic assignment failed
MakeCD.Drive.0,1,0.Speed.BR MakeCD.Drive.0,1,0.Speed.CD MakeCD.Drive.0,1,0.Speed.DVD	0	Set the burning speed for each media type "0" = maximum speed
MakeCD.JobDirectory	C:\dicomPACS\ORBac kup\media	Folder for the burn jobs and the data files
MakeCD.KeepJobTimeHours	168	Time elapsed in hour till old jobs are deleted from statsfile
MakeCD.ReloadBeforeVerify. <scsi- Lun></scsi- 	false	"true" = open drive before verification to reload CD data
MakeCD.TempDIR	C:\dicomPACS\temp\	Determines the folder for the temporary files
robot.available	false	"false" = no disc publisher present "true" = Disc publisher present
robot.checkStatus	0	"0" = jobs are created and immediately reported to the viewer as done. Indication of progress via the job table. "1" = the viewer tests the status of the robot and indicates this as if burning CDs in the local network drive.
robot.clientID	CDRobot	Name of the client computer
robot.Name		The name of the drive used in dialogues

Key	Default	Description
robot.jobDirectory	C:\PTBrnJobsNW	Job directory of the Disc Publisher. The directory is created by the application PTBurn and enabled in the network UNC path to be used
robot.RightBin		Medium type (CD, DVD) in the right container
robot.LeftBin		Medium type (CD, DVD) in the left container
robot.writeMergeFile	false	"true" = compatibility mode for PTBurn 2.x
robot.defaultLabelTemplate	C:\dicomPACS\Labels\ PatCD.std	Standard template for printing on the medium (created with ,SureThing CD Labeler')
robot.csvDelimiter	;	Sets the separator for the data fields of PTBurn 2.x ("," and ";" are possible)
robot.labelData.SinglePatient		Determines the label which is used

Table 38. Configuration in the dicomPACS.properties

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Chapter 15. Specific generator settings

General configuration settings of the generator are described in section "Basic configuration of all generators types" on page 91.

Before starting, the generator has to be connected physically to the computer.

15.1 Amadeo P-125/100V and Amadeo P-125/100VB

The generator is integrated in dicomPACS®DX-R since version 6.1.39

The generator is available in two models:

- Amadeo P-125/100V (without battery)
- Amadeo P-125/100VB (with battery)

Required licence: xrayBeatle

The generator offers the range of values as it can be seen in the following table. The mAs values vary depending on the model used.

Kind of value	Values	Comments
kV	40 - 125	stepless
mA	10 mA - 100 mA 10, 11, 12.5, 14, 16, 18, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 63, 71, 80, 90, 100	

Table 39. Generator value range

Extended configuration can be done in the support mode if the generator control is active:

- enable display of grid selection
- export generator settings as XML file

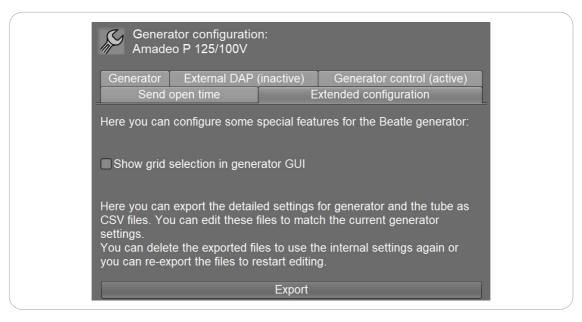


Figure 161. Extended configuration for Amadeo P-125/100V series

15.2 Control-X Generator

The installation of the APEX light software is required for the installation. Apex light has to run on the system automatically, e.g. by auto boot. The Control-X generator can be configured in the support mode of the *dicomPACS®DX-R* software.

15.2.1 Configuration

If the generator is connected to the computer the generator should be configured in $dicomPACS^{\$}DX-R$ or selected during the $dicomPACS^{\$}DX-R$ installation.

Therefore, start the application, login using admin rights and change to the support mode. Choose on the left hand side "Generator" and add the Control-X generator to the application.

Generator

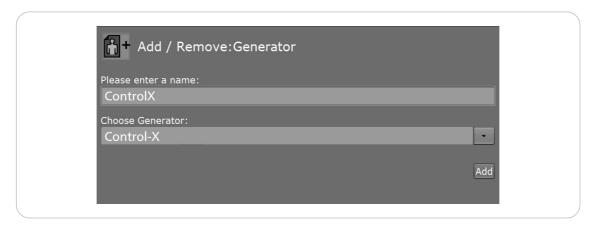


Figure 162. Add Control-X generator

Afterwards *dicomPACS*[®]*DX-R* switches to the configuration view of the added generator. Additionally, it should be configured on which device the communication should take place.



Figure 163. Configure Control-X generator

The connection data "localhost" and port "2289" have to be set if not done automatically. If the configuration for the communication has been finished, the exposure values should be configured.

15.2 Control-X Generator 259 / 372

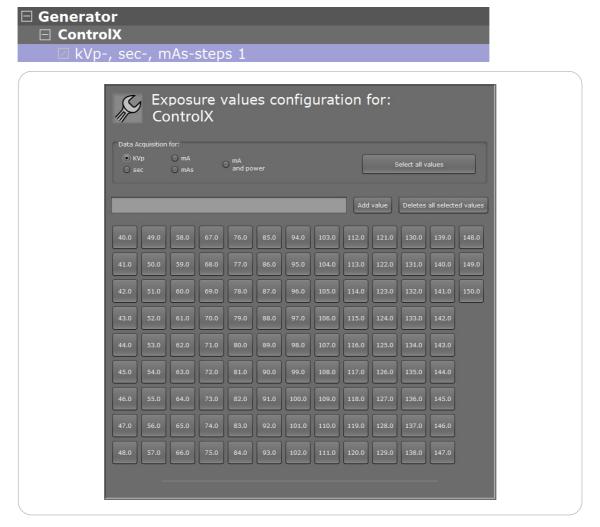


Figure 164. Configure Control-X values (kVp)

15.2.2 User information

During the communication between the generator and $dicomPACS^{\mathbb{R}}DX$ -R only $dicomPACS^{\mathbb{R}}DX$ -R can send values to the generator. After doing the exposure the generator will send the values from the done exposure.



CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué.

If the generator is in an error status, a warning is shown. All errors of the generator have to be confirmed by the reset button. If an error occurs all the time, please ask your Control-X Medical technician.

15.3 CFD

The generator is integrated in *dicomPACS*®DX-R since version 7.0.37.

Required licence: xrayCFD Following models are integrated:

• XGEN32

Extended configuration can be done in the support mode if the generator control is active:

• enable display of grid selection

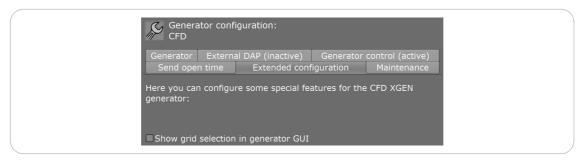


Figure 165. Extended configuration for CFD

Maintenance - Tube conditioning

After a long period of inactivity (over two weeks), it is necessary to perform X-ray tube formation in order to ensure a long life of the X-ray tube.

kV	mAs	mA	ms	Pause sec	Total exposure
40	10	100	100	60	3
50	16	160	100	60	3
60	20	100	200	60	3
70	32	160	200	60	3
80	20	100	200	60	3
90	32	160	200	60	3
100	20	100	200	60	3
100	32	160	200	60	3

Table 40. Parameters for X-ray tube conditioning

In order to perform the tube conditioning, enter the "Maintenance" tab and click on "Perform procedure". The date of the last X-ray tube conditioning will be displayed there.

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A new dialogue opens, displaying the generator panel. Click on "Start sequence" to begin. This will enter the X-ray parameters for the next required exposure. Then, the X-rays must be taken.

It is required to leave a one-minute time pause between the exposures.

The time to wait until the next exposure will be displayed. The software automatically switches to the next exposure. During the whole process, no images are acquired.

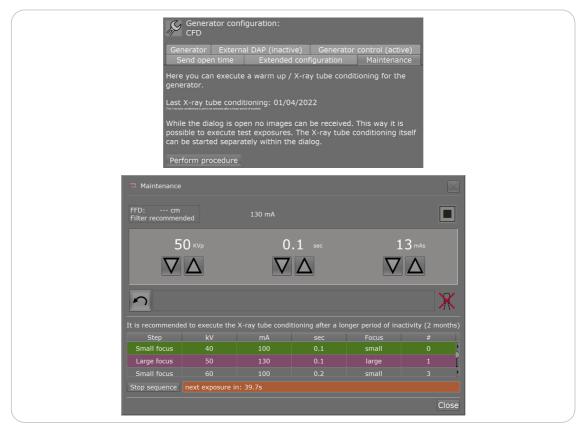


Figure 166. X-ray tube conditioning in *dicomPACS*®*DX-R*

After finishing all exposures (all steps are marked green), you can close the dialogue. Then, the date of the X-ray tube conditioning is displayed in the "Maintenance" tab.

Clicking on "Stop sequence" will interrupt the sequence and you will have to start from the beginning.

If an anomaly or malfunction is detected during the process, please interrupt this process for at least half an hour and repeat the X-ray tube conditioning from the beginning.

If no anomalies are found, the system is ready to be used.



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15.4 CPI

Required licence: xrayCPI

Following models are integrated:

- CPI CMP 150 (integrated in *dicomPACS®DX-R* since version 7.0.38)
- CPI CMP 200

See the following table for the range of values:

Value	CPI CMP 150	CPI CMP 200
kV	40 - 125	40 - 150
mA	-	10 - 1000 mA
ms	-	0.001 - 6.3 ms max. 6.3 seconds can be set using the protocol
mAs	0,5 - 1000 mA	0.5 - 1000 mAs
AEC	-	-4 till +4 (nine steps)
X-ray technique	2-point technique	3-point technique

Table 41. CPI generator value range

The generator uses an internal DAP, this value will be assigned to the taken exposure.

15.4.1 Requirements

Regarding the generator requirements please refer to the manufacturer manual (CPI)

Licence: DR

Before starting *dicomPACS®DX-R*, the generator has to be connected physically to the computer. The generator is controlled via a serial protocol. It is connected with a cable from RJ45 to serial (RS-232). This cable is supplied by CPI. The RJ45 side is for the generator and RS-232 for the PC. For the membrane console, J3 is for connection of an external hand switch.

The serial port can be configured in the configuration menu for the generator.

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$\hat{}$

CAUTION/ATTENTION!



EN: The generator should be connected via the supplied cable. It is possible to connect the PC and the generator also via a RS-232 cable. This connection is, however, intended only for maintenance purposes. If the PC is connected via this cable, then errors will be possible. If you are unsure of the installation, please ask your CPI technician.

FR: Le générateur doit être connecté via le câble fourni. Il est également possible de connecter le PC et le générateur via un câble RS-232. Cependant, cette connexion est destinée à des fins de maintenance. Si le PC est connecté via ce câble, des erreurs peuvent survenir. Si vous n'êtes pas sûr de l'installation, veuillez interroger votre technicien CPI.

15.4.2 Configuration

Afterwards *dicomPACS*[®]*DX-R* switches to the configuration view of the added generator. Additionally, it should be configured on which device the communication should take place.

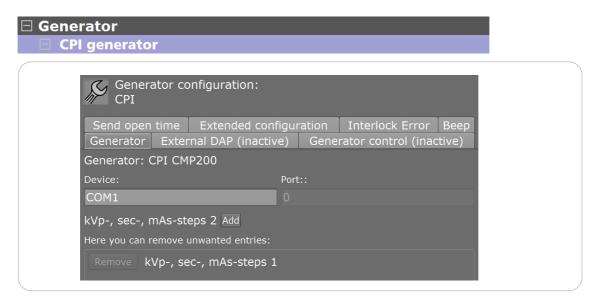
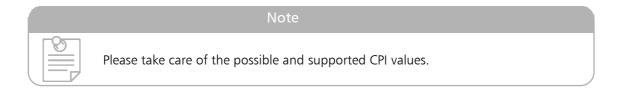


Figure 167. Configure CPI generator

If the configuration for the communication has finished, configure the exposure values.



Configuration parameters

In some cases it might be necessary to edit the serial parameters, e.g. if it is not possible to communicate with the generator.

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The configuration of the serial parameters is as follows:

Baudrate: 19200 Databits: 8 Parity: None Stopbits: 2

With the help of the following properties parameter you can change to Stopbits 1 CPI.GeneratorProtocol.UseStopBits1=true

15.4.3 Dynamic X-ray

With the CPI generator dynamic X-ray can be performed.

Requirements to use dynamic X-ray

- XRpad2
- CPI CMP-200DR
- Licence "Fluoro"
- Interface Option 26 for the CPI generator
- synchronisation between IPU and generator via OR syncbox

Software settings

The Interface Option 26 for the CPI must be activated in the GenWare® dialogue box "About". If the Digital Interface Option is enabled, it will be displayed as shown below:

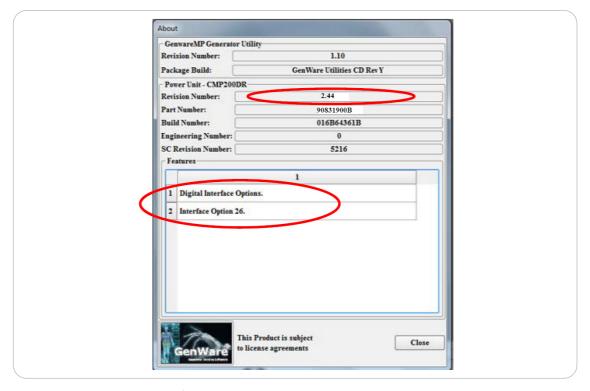


Figure 168. Enable Digital Interface Option 26

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If the Interface Option 26 is not yet activated, enter the generator programming menu:

- select GEN CONFIGURATION menu
- enter RECEPTOR menu
- select the image receptor that is to be configured as the digital imaging receptor
- within the RECEPTOR SETUP menu choose the following options:
 For Dual and Single Console Integrated Solution INTERFACE OPTS: 26
 For Dual Console Integration Solution Only: FUNCTIONAL OPTS: 13
 SERIAL: Yes

Hardware

The plug of the OR Syncbox has to be connected to the J25-8 connection of the CPI generator.

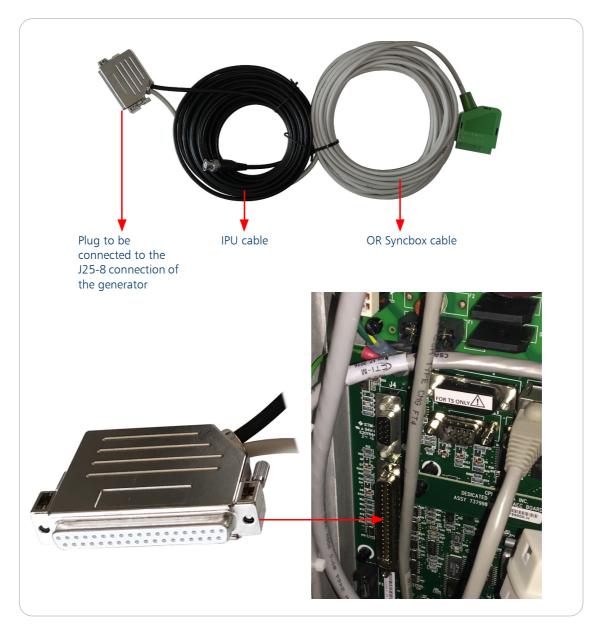


Figure 169. Hardware components

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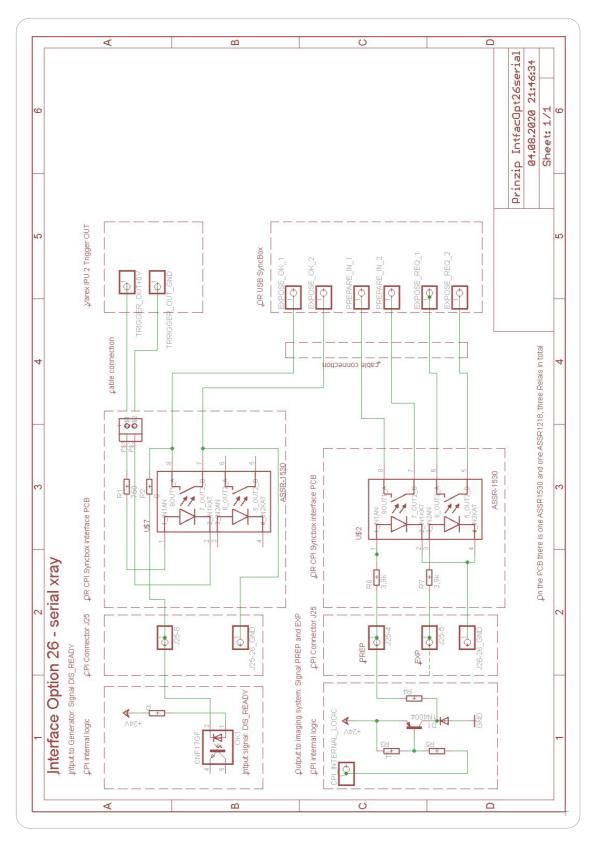


Figure 170. Schematic for Interface Option 26

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15.4.4 User information

During the communication between the CPI generator and dicomPACS®DX-R only dicomPACS®DX-R can send values to the CPI generator. After doing the exposure the generator will send the values from the done exposure.

CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel of the Interpreter or generator console.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué.

If the generator is in an error status, a warning is shown. All errors of the generator have to be confirmed by the reset button. If an error occurs all the time, please ask your CPI technician.

15.5 DRGEM GXR Series

The generator will be controlled via a serial protocol. The commands will be transmitted via the GXR software module. The software module also provides software for the calibration and a simple surface for controlling the generator. This surface can run parallel to dicomPACS®DX-R. dicomPACS®DX-R communicates via UDP on Port 5000/5001. These Ports are not configurable. Physically the PC will be connected with the on-off switch. There the hand switch is connected, too.

15.5.1 Values and features

Kind of value	Values	Comments
kV	40 - 120	continuous
mA	10 mA - 1000 mA	R20' the maximal mA depends on the power of the generator
ms	1 - 10000 (10s)	R20'
AEC	-8 till +8	exposure steps

15.5.2 User information

The focus from the generator will be adjusted in dependence of the chosen current. It cannot be chosen directly from the user.

AEC is optional. It can be activated or deactivated in the support mode.

GXR SDK has to be installed. The software starts automatically.

15.6 EMD Epsilon, Eta

There are two models of EMD generators: Epsilon and Eta. Both types are supporting over 100 different types of X-ray tubes. The generators are used in RAD mode. The typical power is between 30 and 80 kW.

Two serial ports are required to connect the generator. One port is used for the RS232 communication protocol and the other is used for the generator's exposure events.

For the PC tool Epsilon, a third port is used or the RS232 communication protocol has to be replugged on the generator. Generators that were built in the year 2012, before that or that were upgraded to the 3rd edition, have an additional USB-connector J21 at the controller basket via an USB printer cable.

Note



Please note that the RS232 communication protocol uses port J10 for the generator control

The PC tool uses port J16 with RS232 or J21 via an USB.

15.6.1 Special features

The protocol does not sent information about the prepare, ready and exposure status. There is the possibility to get these states from the hardware outputs. Therefore, we use the ports J15 A7, J15 A8 and J15 B1. The electric signals at the ports are fed via opto coulpers in the serial port (9 pins).

Status	Generator port	Serial port
Prep	J15 A8	RLSD (Pin1)
Ready	J15 A7	CTS (Pin 8)
Exposure	J15 B1	DSR (Pin 6)

Table 42. Ports

The opto couplers are supplied by the generator from terminal J14 11 (\pm 24V supply). The opto couplers connect the serial port RTS (pin 7) with the respective sensor signal from the generator.

When the electric circuit of the opto coupler closes, we can recognise that on the serial port. In this way, we can arrange the events from the generator to a state to get this mandatory circuit to function. The following procedure "Extended configuration of the generator" must be performed.

15.6.2 Extended configuration of the generator

The configuration menu in the support mode contains amongst others a dialogue to confirm the settings of the generator's exposure events in the menu "Extended Configuration".

15.6 EMD Epsilon, Eta 269 / 372

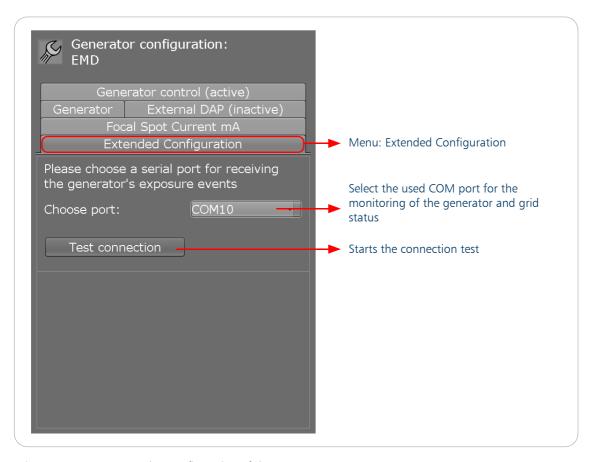


Figure 171. Support mode - configuration of the EMD generator

After selecting the used port, it is necessary to check the connection by clicking on the button "Test connection".

A screen appears with the generator panel to determine the values on the left hand side and the evaluation is displayed on the right hand side.

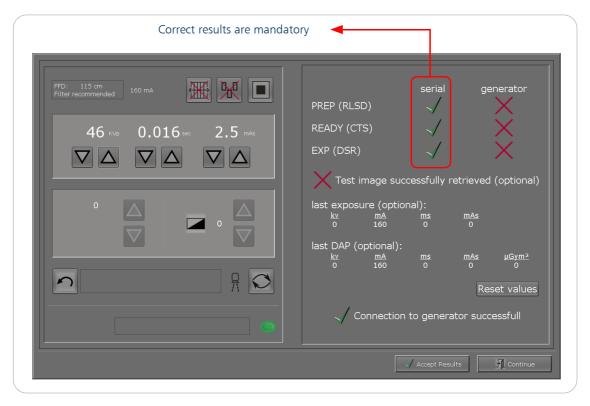


Figure 172. Configuration screen for exposure events

If the test of the serial connection is passed, that means the prepare, ready and exposure events were received correctly, click on the "Accept Results" button. Correct events at the serial port are mandatory but correct generator values, exposure values of the DAP and receiving an image are only optional. By accepting the results the according settings in the *dicomPACS®DX-R* database will be stored as a flag. In case the test has failed, then select the "Continue" button and no setting will be changed in the database.

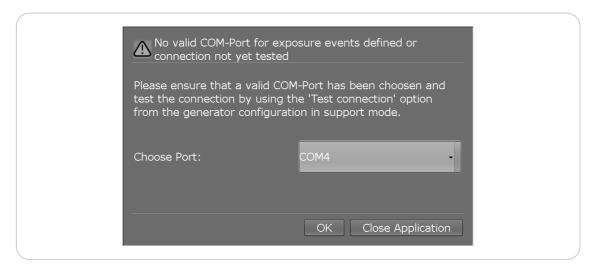


Figure 173. Incorrect configuration

This screen appears during the start of the application if an incorrect connection is configured. There are two possibilities for the further proceeding:

15.6 EMD Epsilon, Eta 271 / 372

- 1. To change the COM port of the generator status recognition choose the correct serial port in the drop down menu. Continue with "OK" and log in as the administrator to perform the extended configuration again, see page 269.
- 2. To skip this mandatory procedure, click on the button "Close Application" and contact the support to check the hardware connection.

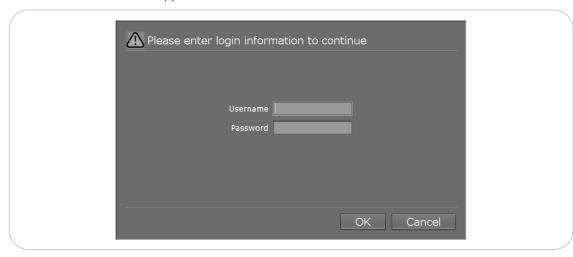


Figure 174. Confirmation of the configuration

15.6.2.1 Wiring diagrammes

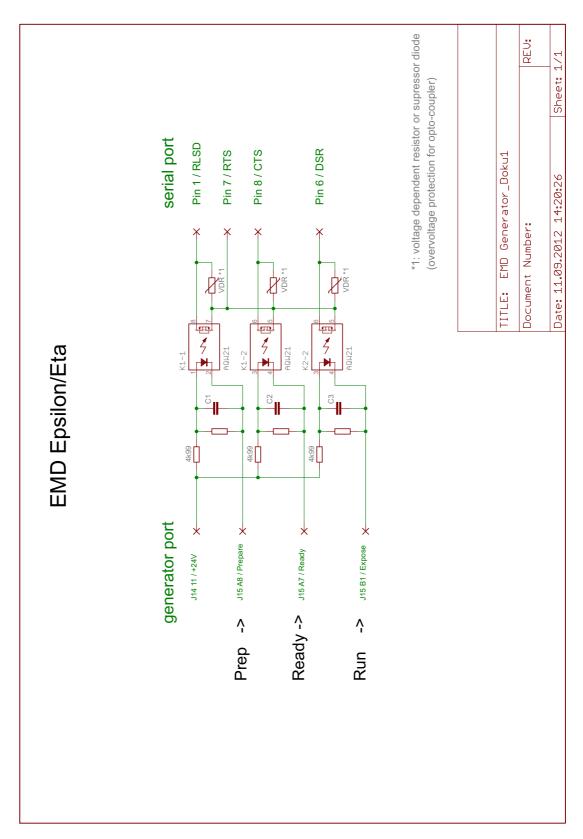


Figure 175. Wiring diagram - generator's exposure states and serial port

15.6 EMD Epsilon, Eta 273 / 372

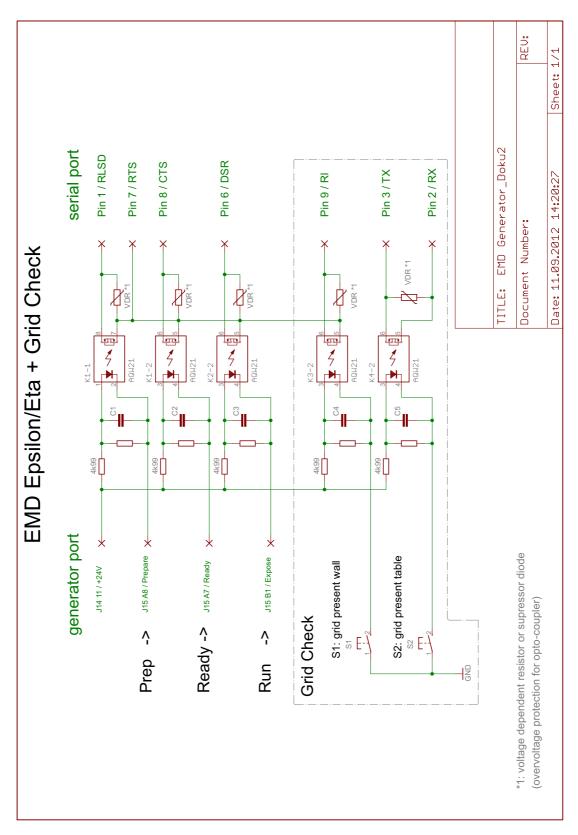


Figure 176. Wiring diagram - grid check

15.6.3 Configuration of the focal spot

The minimum and maximum value for the small and large focal spot can be set for the EMD generator. The mA limits can be selected for the entire kVp range (40-125 kVp).

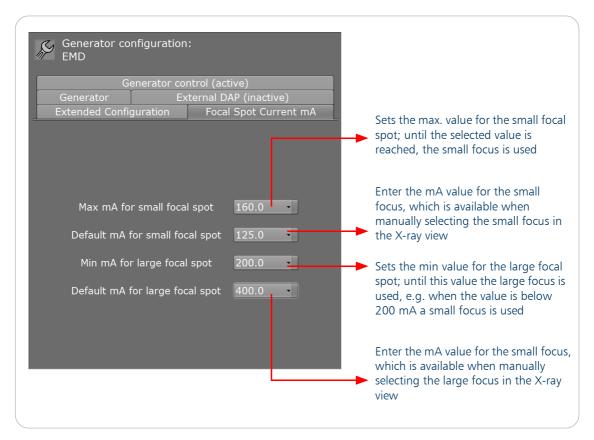


Figure 177. Support mode - Focal Spot Current mA

Note



The programme does not calculate the mA values according to the tube nomogram, which means that the mA value is not calculated on the basis of the kVp value.

15.6 EMD Epsilon, Eta 275 / 372

15.7 Gierth generator

Different generator models are supported. All models are mobile generators and do not need a software integration. The generator panel cannot send values to the generator, when using a Gierth generator. The following description is designed for the Gierth HF 400 ML.

Also available models are:

- Gierth TR 80 30
- Gierth TR 90 30
- Gierth RHF 200 ML
- Gierth HF 80 ML
- Gierth HF 200 A plus
- Gierth HF 400 ML

15.7.1 Connection

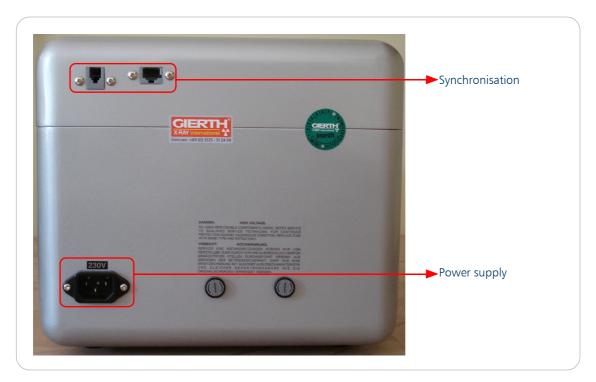


Figure 178. Backside of the generator

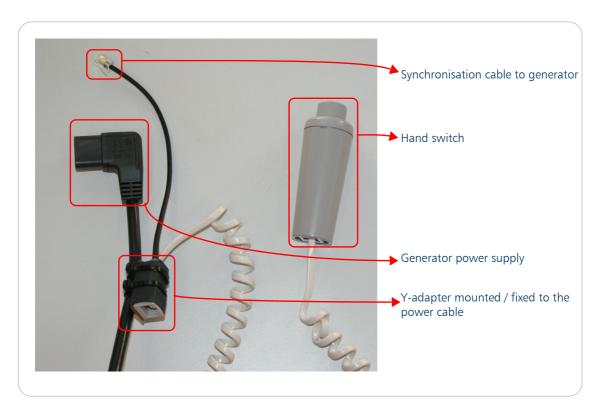


Figure 179. Cables

To connect the generator plug in the synchronisation cable to the RJ45 plug on the computer side and to the RJ11 plug on the generator side.

15.7 Gierth generator 277 / 372

15.7.2 Buttons and control field

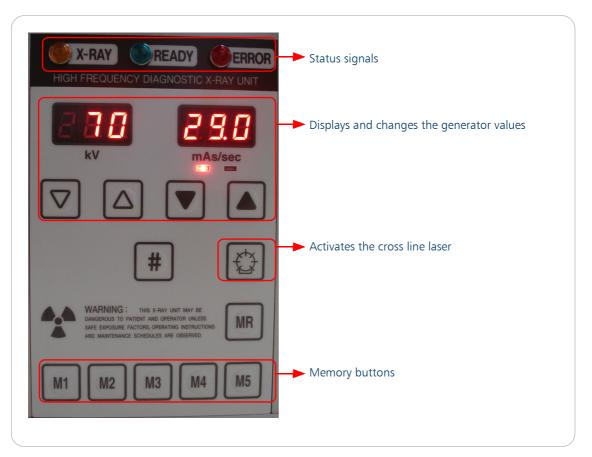


Figure 180. Control field

To switch from mAs to sec or back, hold # and press



<u>/!\</u>

CAUTION/ATTENTION!



EN: Please connect the patch cable (RJ45) only to the Y-adapter, not directly to the generator.

FR: Veuillez connecter le câble patch (RJ45) uniquement à l'adaptateur en Y et pas directement au générateur.

DANGER!



EN: Protection against Excessive High Contact Voltages

To reduce the risk of electric shock or product damage, do not expose this appliance to rain, splashing, dripping or moisture.

FR: Protection contre les tensions de contact trop élevées

Pour réduire le risque de choc électrique ou de dégradation du produit, n'exposez pas cet appareil à la pluie, aux éclaboussures, aux coulures ou à l'humidité.

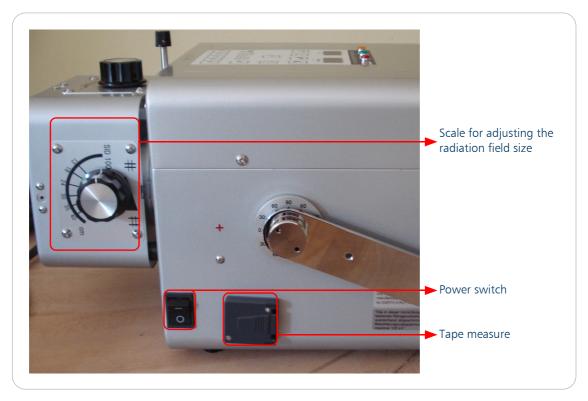


Figure 181. Side of the generator

15.7 Gierth generator 279 / 372

15.8 Golden Engineering

The Golden Engineering generators are models for NDT and security applications (*ORinspect* and *ORsecure*).

Integrated models:

Model	Version	Max pulses	Idle time	Max. exp time	Licence
XR150 (10.8-12 V)	7 pin	100	4 minutes	25.0 s	
XR150 (18-20 V)	7 pin	200	4 minutes	20.0 s	
XR200 (18-20 V)	7 pin	200	4 minutes	20.0 s	xrayGEngineer
XRS3 (18-20 V)	7 pin	200	4 minutes	13.3 s	
XRS4 (18-20 V)	7 pin	200	4 minutes	22.2 s	

Figure 182. List of generator models

The generator models are battery-operated X-ray units for pulsed operation.

15.8.1 Hardware

It is possible to connect the hardware using Wireless Link for wireless or for wired communication. For more information, please refer to the ORIX document with the ORIX ID OR002933 or OR002948.

Only generators with a 7-pin plug can be connected to the Wireless Link.

Depending on the generator connection, a different generator control is used.

15.8.2 Configuration in dicomPACS®DX-R

Two configuration options are available for Golden Engineering generators. Depending on the pin connection, you have to choose "Golden Engineering direct" or "XR200" to connect the generator to the workstation.

Golden Engineering direct

All generator models with a 7-pin connection must be connected to the workstation using "Golden Engineering direct".

With the generator control enabled, choose the connection type "wired" or "wireless". After activating the generator control, *dicomPACS*®*DX-R* needs to be restarted.

During operation, it is possible to switch the generator model if the connection type (wired/wireless) is still the same.

For generators with 7-pin connection, a software sync is available. By default, the software sync is disabled. Using the property "Generator.SyncExposure" you can enable/disable the software sync option. Take care, the following settings are enabled in the generator configuration tab "Generator control":

• Trigger image acquisition through software synchronization

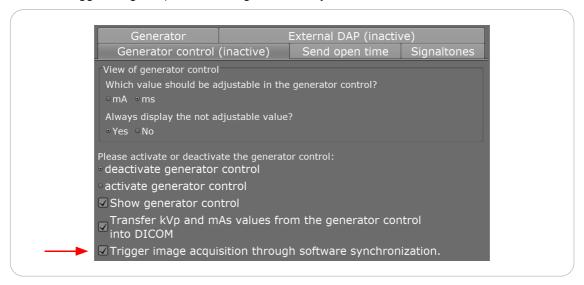
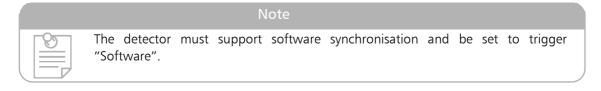


Figure 183. Settings for software synchronisation



XR200

All generator models with a 5-pin connection must be connected to the workstation using "XR200".

15.8.2.1 Configuration parameters

In some cases it might be necessary to edit the serial parameters, e.g. if it is not possible to communicate with the generator.

The configuration of the serial parameters is as follows:

Baudrate: 57600 (wired); 9600 (wireless)

Databits: 8
Parity: None
Stopbits: 1

15.8 Golden Engineering 281 / 372

15.9 K&S Röntgenwerk Bochum generator

Different generator models are supported:

Model	Energy
Editor HFe 401	40 kW
Editor HFe 501	50 kW
Editor HFe 601	65 kW
Editor HFe 801	80 kW

Table 43. List of generator models

The generator offers the range of values that you see in the following table:

Kind of value	Values	Comments
kVp	40 - 150	stepless
mA	10, 13, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 320, 400, 500, 650 ¹ , 800 ²	insert steps
ms	0.001, 0.002, 0.003, 0.004, 0.005, 0.006, 0.007, 0.008, 0.01, 0.011, 0.013, 0.016, 0.02, 0.025, 0.032, 0.04, 0.05, 0.063, 0.08, 0.1, 0.13, 0.16, 0.2, 0.25, 0.32, 0.4, 0.5, 0.63, 0.8, 1.0, 1.25, 1.6, 2.0, 2.5, 3.2, 4.0, 5.0, 6.3	insert steps (max. 6,3 seconds can be set using the protocol)
AEC	-4 till +4	9 steps

Table 44. Generator value range

For the different energy the max values as well as the mA table has to be adjusted to the selected generator. The values using the *dicomPACS*®*DX-R* are for the Editor HFe 501. The generator can use an internal DAP, in this case the DAP will be assigned automatically.

15.9.1 Connection

Two kinds of connecting the generator are possible. On the one hand a generator console and on the other hand an interpreter. Both components will be connected using a serial interface.

The generator console normally uses 38400 baud. The interpreter normally uses a 19200 baud.

For switching between 19200 baud and 38400 baud use the input field "Device". The according parameter is "BaudBase=". All parameters will be separate by a semicolon.

¹ from Editor HFe 501; ² from Editor HFe 601

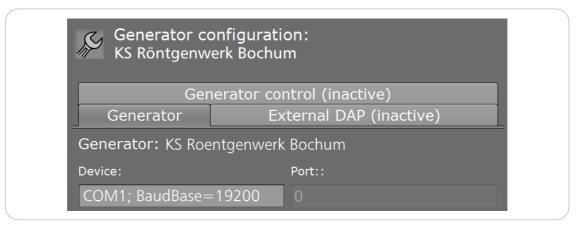


Figure 184. Configure baud rate

If no baud rate is given dicomPACS®DX-R use the default baud rate 38400. Changes for the baud rate, set in the device manager, are ignored.

15.9.2 Requirements

Before starting the *dicomPACS®DX-R* the generator has to be connected physical to the computer. Therefore a serial interface on the computer are necessary; the serial interface is 9 pin connector. The interface connection is for all models the same.

CAUTION/ATTENTION!



EN: If you are unsure, please ask your K&S Röntgenwerk Bochum technician.

FR: Si vous n'êtes pas sûr, veuillez interroger votre technicien K&S Röntgenwerk Bochum.

15.9.3 User information

During the communication between the K&S Röntgenwerk Bochum generator and dicomPACS®DX-R only dicomPACS®DX-R can send values to the K&S Röntgenwerk Bochum generator. After doing the exposure the generator will send the values from the done exposure.



CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel of the Interpreter or generator console.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué de la console de l'interpréteur ou du générateur.

If the generator is in an error status a warning is shown. All errors of the generator have to be confirmed by the reset button. If an error occurs all the time, please ask your K&S Röntgenwerk Bochum technician.

15.10 Poskom POX-100DR

15.10.1 Hardware

The Poskom POX-100DR is a generator for the application in human medicine. The generator is integrated into a complete system with a PC and touch screen. There is already a connection for a detector and a corresponding mounting bracket. A connected detector is necessary to trigger an exposure. The entire system is powered by a single power cord with a standard 220V connection. On the left side of the system there are each switches to de-/ activate the generator, respectively the associated PC. The generator has, due to its mobile property and the low-voltage power supply, a battery, which is continuously charged to provide the power for an exposure. The current charge level is visualised both on the device itself as well as in the generator control of dicomPACS®DX-R.

15.10.2 Configuration

The generator is connected in series internally with the PC. The default port is "COM2". If it should not match with the current configuration of the mobile system, the port must be changed manually after the installation in the "Generator" configuration of the support mode.

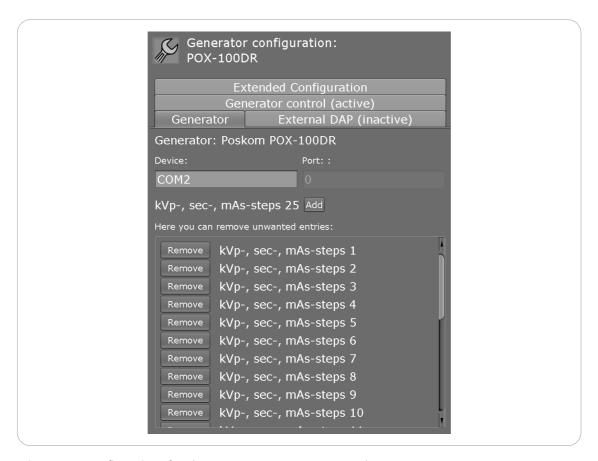


Figure 185. Configuration of Poskom POX-100DR - "Generator" tab

Since the generator has a number of different power levels, they are hidden by default. Because the generator protocol works with fixed specified indices of each generator value (kVp, mAs, etc.) these lists cannot be edited in *dicomPACS®DX-R*. However, the values for planning individual studies can be edited. Unlike other generators, the POX-100DR has a separate list for the patient size-control, which is accessible via the tab "Extended Configuration".

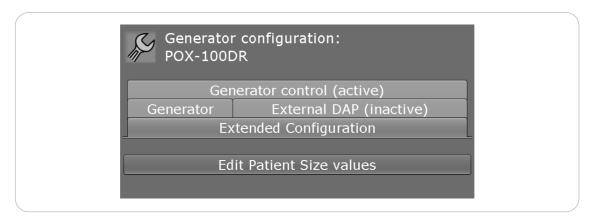


Figure 186. Configuration of Poskom POX-100DR "Extended Configuration" tab

15.10.3 User information

The generator has a lamp to adjust the positioning as well as the opening angle of the collimator. This lamp can be switched on both on the device itself as well as via the generator control of $dicomPACS^{\$}DX-R$. The lamp is always burning for a period of 30 seconds and then turns off automatically. If errors occur, the connection to the generator must be re-established. This is done when the user has confirmed the error in the corresponding error message in $dicomPACS^{\$}DX-R$. The restart is mandatory and takes a few seconds. After the automatic restart, the values of the current planning are reset; from this moment the values can be changed again by the user.

15.10.4 Performance data

Tube voltage	Current	mAs
40 kVp - 50 kVp	20 mA	0.1 mAs
	40 mA	0.2 - 0.3 mAs
	100 mA	0.4 - 10.0 mAs
	80 mA	12.0 - 32.0 mAs
	60 mA	36.0 - 80.0 mAs
	50 mA	100.0 mAs

15.10 Poskom POX-100DR 285 / 372

Tube voltage	Current	mAs
51 kVp - 60 kVp	20 mA	0.1 mAs
	40 mA	0.2 - 0.3 mAs
	80 mA	0.4 - 8.0 mAs
	50 mA	9.0 - 80.0 mAs
	40 mA	100.0 mAs
	20 mA	0.1 mAs
	40 mA	0.2 - 0.3 mAs
61 kVp - 70 kVp	80 mA	0.4 - 8.0 mAs
	50 mA	9.0 - 80.0 mAs
	40 mA	100.0 mAs
	20 mAs	0.1 mAs
	40 mAs	0.2 - 0.3 mAs
71 kVp - 80 kVp	50 mAs	0.4 - 8.0 mAs
	40 mAs	9.0 - 21.0 mAs
	30 mAs	25.0 - 64.0 mAs
	20 mAs	0.1 mAs
81 kVp - 100 kVp	40 mAs	0.2 -8.0 mAs
δ1 κνρ - 100 κνρ	30 mAs	9.0 - 30.0 mAs
	20 mAs	32.0 - 80.0 mAs
	20 mAs	0.1 mAs
101 k/n 110 k/n	40 mAs	0.2 - 5.0 mAs
101 kVp - 110 kVp	30 mAs	6.4 - 12.0 mAs
	20 mAs	18.0 - 80.0 mAs

Table 45. Performance data Poskom POX-100DR

15.11 Poskom PXP-100CA

15.11.1 Hardware

The Poskom PXP-100CA is the portable generator for the application in human medicine. It is operated via a power cord and a standard 220V socket. It is connected to the PC and thus to $dicomPACS^{®}DX-R$ via a serial cable, which splits to also realise the PC as well as the detector connection. This connection is essential to be able to trigger an X-ray shot. The generator has, due

to its mobile property and the low-voltage power supply, a battery, which is continuously charged to provide the power for exposures. The current charge level is visualised both on the device itself as well as in the generator control of *dicomPACS®DX-R*.

15.11.2 Configuration

After the installation, the proper COM port has to be selected in the "Generator" configuration of the support mode, since the generator is connected via a serial cable. "COM1" is the default "Device".

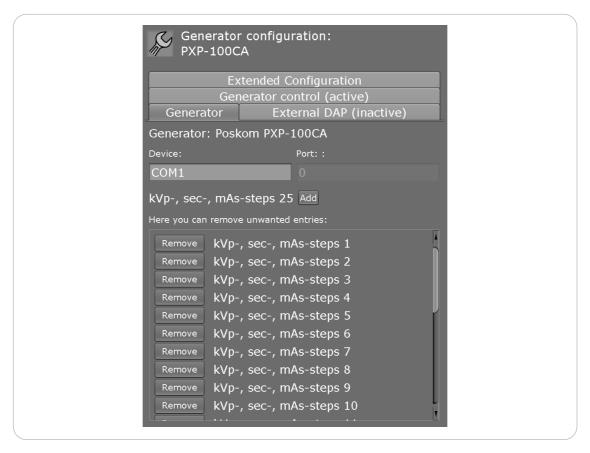


Figure 187. Configuration of Poskom PXP-100CA - "Generator" tab

Since the generator has a number of different power levels, they are hidden by default. Because the generator protocol works with fixed specified indices of each generator value (kVp, mAs, etc.) these lists cannot be edited in *dicomPACS®DX-R*. However, the values for planning individual studies can be edited. Unlike other generators, the PXP-100CA has a separate list for the patient size-control, which is accessible via the tab "Extended Configuration".

15.11 Poskom PXP-100CA 287 / 372

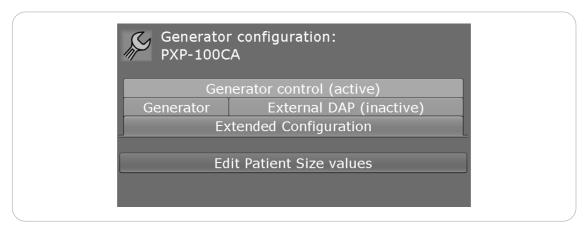


Figure 188. Configuration of Poskom PXP-100CA "Extended Configuration" tab

The individual levels are listed with the size information according to the scheme M -> L -> XL, and in the list of the corresponding index with 0 -> 1 -> 2.

15.11.3 User information

The generator has a lamp to adjust the positioning as well as the opening angle of the collimator. This lamp can be switched on both on the device itself as well as via the generator control of $dicomPACS^{\circledR}DX-R$. The lamp is always burning for a period of 30 seconds and then turns off automatically. If errors occur, the connection to the generator must be re-established. This is done when the user has confirmed the error in the corresponding error message in $dicomPACS^{\circledR}DX-R$. The restart is mandatory and takes a few seconds. After the automatic restart, the values of the current planning are reset; from this moment the values can be changed again by the user.

15.11.4 Performance data

Tube voltage	Current	mAs
	20 mA	0.1 mAs
	40 mA	0.2 - 0.3 mAs
40 kVp - 50 kVp	100 mA	0.4 - 10.0 mAs
40 κνρ - 30 κνρ	80 mA	12.0 - 32.0 mAs
	60 mA	36.0 - 80.0 mAs
	50 mA	100.0 mAs

Tube voltage	Current	mAs
	20 mA	0.1 mAs
	40 mA	0.2 - 0.3 mAs
51 kVp - 60 kVp	80 mA	0.4 - 8.0 mAs
	50 mA	9.0 - 80.0 mAs
	40 mA	100.0 mAs
	20 mA	0.1 mAs
	40 mA	0.2 - 0.3 mAs
61 kVp - 70 kVp	80 mA	0.4 - 8.0 mAs
	50 mA	9.0 - 80.0 mAs
	40 mA	100.0 mAs
	20 mAs	0.1 mAs
	40 mAs	0.2 - 0.3 mAs
71 kVp - 80 kVp	50 mAs	0.4 - 8.0 mAs
	40 mAs	9.0 - 21.0 mAs
	30 mAs	25.0 - 64.0 mAs
	20 mAs	0.1 mAs
81 kVp - 100 kVp	40 mAs	0.2 -8.0 mAs
οι κνμ - 100 κνμ	30 mAs	9.0 - 30.0 mAs
	20 mAs	32.0 - 80.0 mAs
	20 mAs	0.1 mAs
101 kVp - 110 kVp	40 mAs	0.2 - 5.0 mAs
101 κνρ - 110 κνρ	30 mAs	6.4 - 12.0 mAs
	20 mAs	18.0 - 80.0 mAs

Table 46. Performance data Poskom PXP-100CA

15.12 Poskom PXR-1

15.12.1 Hardware

The Poskom PXR-1 is a generator for the application in human medicine. *dicomPACS®DX-R* currently does not support it; this means that the corresponding GUI elements for changing the AEC fields were removed. The generator needs a high-voltage power supply to operate. The corresponding I/O box is connected via a power cord to a standard 220V socket. The I/O box is connected via serial cable to the generator. The operating panel, which is used outside of *dicomPACS®DX-R* to operate the generator, will also be connected via serial cable. The I/O box is

15.12 Poskom PXR-1 289 / 372

connected via a network cable (Fast Ethernet) to the PC and thus *dicomPACS*[®]*DX-R*. While *dicomPACS*[®]*DX-R* is controlling the generator, the operating panel only serves as a visualization of the values; they cannot be changed via the operating panel. The generator is triggered by a hand switch, which is connected to the operating panel, or via the appropriate trigger buttons in the lower right corner of the operating panel.

15.12.2 Configuration

dicomPACS®DX-R is connected via a network cable to the I/O box. The "Device" must be set to IP address 10.52.66.37 and the "Port" must be 5000 to build a connection with the I/O box.

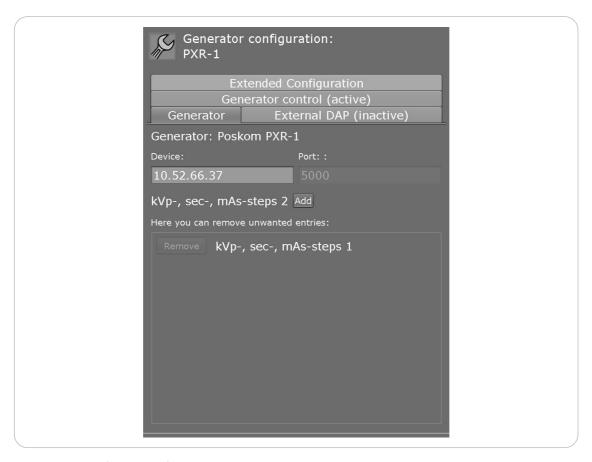


Figure 189. Configuration of Poskom PXR-1 - "Generator" tab

To ensure smooth communication with the PC, the NIC (Network Interface Card) connected to the I/O box should get an IP address in the same subnet (e.g. 10.52.66.38). Since the sensor installation does not select the correct "Generator Workstation-ID" after the generator setup, this must also be done manually. Therefore make the appropriate selection in the tab "Generator" of the "Workstation". There is a choice between "Bucky1" and "Bucky2", which correspond to either "Wall" or "Table" depending on the setting, and "Aux" for all other cases. Unlike other generators, the PXR-1 has a separate list for the patient size-control, which is accessible via the tab "Extended Configuration".

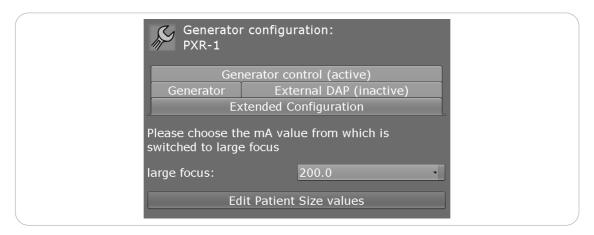


Figure 190. Configuration of Poskom PXR-1 "Extended Configuration" tab

The individual levels are listed with the size information according to the scheme $M \rightarrow L \rightarrow XL$, and in the list of the corresponding index with $0 \rightarrow 1 \rightarrow 2$. In the configuration it can also be defined from which mA value it should be switched to the large focus. The default value for this is 200mA, which corresponds to the default value for the switch in the generator. The value should therefore only be changed if the value, set in the generator, has been changed.

15.12.3 User information

If errors occur, the connection to the generator must be re-established. This is done when the user has confirmed the error in the corresponding error message in *dicomPACS®DX-R*. The restart is mandatory and takes a few seconds. After the automatic restart, the values of the current planning are reset, from this moment the values can be changed again by the user. If *dicomPACS®DX-R* loses the connection to the generator, it switches off automatically, which is also recognised by *dicomPACS®DX-R* after a certain time out phase and the user is informed by a dialogue. Before confirming the dialogue initiating a restart, the physical connection to the I/O box as well as the generator should be checked. Since the generator protocol works with fixed specified indices of each generator value (kVp, mAs, etc.) these lists cannot be edited in *dicomPACS®DX-R*. However, the values for planning individual studies can be edited.

15.12.4 Performance data

Kind of values	Range of values
kVp	40 - 150
mA	0.1 - 1000
mA	10 - 1000
sec	0.001 -10

Table 47. Performance data Poskom PXR-1

15.12 Poskom PXR-1 291 / 372

15.13 PoskomVET -20BT

15.13.1 Hardware

The PoskomVET-20BT is the portable generator for the application in veterinary medicine. The generator consists of an interface box and the X-ray generator. Both parts have internal batteries and can be operated without external power supply. The communication between the interface and the generator takes place via WiFi.

The interface box is connected to the PC via USB. The synchronization, respectively the connection to the hand switch takes place via a socket on the generator.

The control panel of the generator is only enabled when the generator has no connection to the interface box. If the local keys should be used and a connection to the interface box was available, the generator must be turned on again.

15.13.2 Installation

The software is installed with the setup programme gen_PosKom.exe. This setup programme installs the required software and registers the pkusb.ocx.

The programme as well as the used port can be set in the generator configuration.



CAUTION/ATTENTION!



EN: The port of the generator connection must be different from the port of the detector connection.

FR: Le port du raccordement du générateur doit être différent du port du raccordement du détecteur.

If the interface box is connected to the PC for the first time, Windows requires a driver. The driver is located in the directory C:\dicomPACS\Console\PosKom\USB Driver.

15.13.3 Configuration

The configuration is executed by the file PosKomCtrl.ini. The file contains only one parameter:

EnableHWSync

true = the programme does not sent DR-OK signals to the generator. The signal must be provided by the synchronisation hardware.

false = The generator is enabled for the exposure by the software.

Table 48. PosKomCtrl.ini

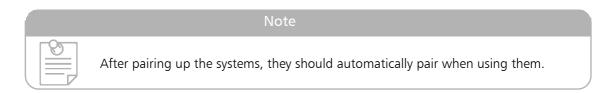
15.13.4 Bluetooth Installation

The PoskomVET-20BT can be used as a wireless bluetooth generator. The following points have to be considered to make it work.

First you need a running Version of $dicomPACS^{®}DX-R$, if that is not the case please update your programme. For Windows 7 the Bluetooth Dongle has to be installed too.

After that you have to pair the generator with the PC using the pairing code "9007". When the PC recognizes the generator you can start installing the software by clicking the "gen Poskom 20BT.exe". The setup should find the generator automatically.

Now you can start *dicomPACS*®*DX-R* with the generator control.



<u> 15.14 Rampoldi</u>

The generator is integrated in *dicomPACS*®*DX-R* since version 6.1.45.

Licence: xrayRampo

Following models are integrated:

XRST30

Extended configuration can be done in the support mode if the generator control is active:

- enable display of grid selection
- export generator settings as XML file

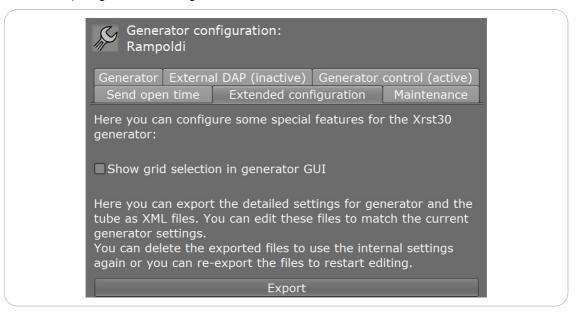


Figure 191. Extended configuration for Rampoldi

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Maintenance - Tube conditioning

After a long period of inactivity (over two months), it is necessary to perform X-ray tube formation in order to ensure a long life.

	kV	mA	Exposure sec	Pause sec	Exposures per step	Total exposure
Heating (small focus)	40 50 60 70	80 80 80 80	0.5 0.5 0.5 0.5	15 15 15 15	2 2 3 3	10
kV increase (small focus)	80 90 100 110 120 125	80 80 80 80 80	0.01 0.01 0.01 0.01 0.01 0.01	5 5 5 5 5	3 3 3 3 3 3	18
Radiography (large focus)	85 95 105 115 125	160 160 160 160 160	0.1 0.1 0.1 0.1 0.1	6 6 6 6	4 4 4 4 4	20

Table 49. Parameters for X-ray tube conditioning

In order to perform the tube conditioning, enter the "Maintenance" tab and click on "Perform procedure". The date of the last X-ray tube conditioning will be displayed there.

A new dialogue opens, displaying the generator panel. Click on "Start sequence" to begin. This will enter the X-ray parameters for the next required exposure. Then, the X-rays can be taken.

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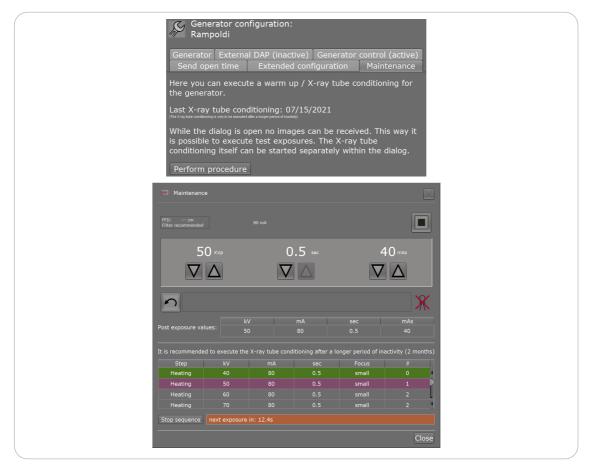


Figure 192. X-ray tube conditioning in dicomPACS®DX-R

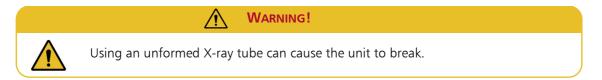
The time to wait until the next exposure will be displayed. The software automatically switches to the next exposure. During the whole process, no images are acquired.

After finishing all exposures (all steps are marked green), you can close the dialogue. Then, the date of the X-ray tube conditioning is displayed in the "Maintenance" tab.

Clicking on "Stop sequence" will interrupt the sequence and you will have to start from the beginning.

If an anomaly or malfunction is detected during the process, please interrupt this process for at least half an hour and repeat the X-ray tube conditioning from the beginning.

If no anomalies are found, the system is ready to be used.



15.14 Rampoldi 295 / 372

15.15 Sedecal

Following models are integrated:

- SHF 530
- SHF 330
- SHF 210

The generator offers the range of values as it can be seen in the following table:

Kind of value	Values	Comments
kV	40 - 150	stepless
mA	8, 10, 12.5, 16, 20, 25, 32, 40, 50, 64, 80, 100, 125, 160, 200, 250, 320, 400, 500, 640, 800,1000	
s	0.001, 0.002, 0.003, 0.004, 0.005, 0.006, 0.008, 0.01, 0.012, 0.016, 0.02, 0.025, 0.032, 0.04, 0.05, 0.064, 0.08, 0.1, 0.125, 0.16, 0.2, 0.25, 0.32, 0.4, 0.5, 0.64, 0.8, 1, 1.25, 1.6, 2, 2.5, 3.2, 4, 5, 6.4, 8, 10	
AEC	-2 till +2 (5 steps) or -4 till +4 (9 steps)	5 steps or 9 steps

Table 50. Sedecal generator value range

The Sedecal generator can use the small focus till 160mA, for mA values above the large focus is used.

Note



We support more than one generator type, for a special generator please ask Sedecal.

Have the serial number ready.

15.15.1 Requirements

Before starting $dicomPACS^{\mathbb{R}}DX-R$ the generator has to be connected physically to the computer. Therefore a serial interface on the computer is necessary; the serial interface is a 9 pin connector. The interface connection is the same for all models.

CAUTION/ATTENTION!



EN: If you are unsure, please ask your Sedecal technician.

FR: Si vous n'êtes pas sûr, veuillez interroger votre technicien Sedecal.

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15.15.2 User information

During the communication between the Sedecal generators and dicomPACS®DX-R only dicomPACS®DX-R can send values to the Sedecal generators. After doing the exposure the generator will send the values from the done exposure.

CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel of the interpreter or generator console.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué de la console de l'interpréteur ou du générateur.

If the generator is in an error status a warning is shown. All errors of the generator has to be confirmed by the reset button. If an error occurs all the time, please ask your technician.

15.16 Shimadzu generator

The generator offers the range of values see the following table:

Kind of values	Range of values	Comments
kVp	40 - 150	stepless
mA	10, 12, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 320, 400, 500, 630	insert steps
ms	0.001, 0.002, 0.004, 0.005, 0.008, 0.01, 0.012, 0.016, 0.02, 0.025, 0.032, 0.04, 0.05, 0.063, 0.08, 0.1, 0.125, 0.16, 0.2, 0.25, 0.32, 0.4, 0.5, 0.63, 0.8, 1.0, 1.25, 1.6, 2.0, 2.5, 3.2, 4.0, 5.0, 6.3, 8.0	insert steps (max. 8 seconds can be set using the protocol)
AEC	-3 till +3	7 steps

Table 51. Range of Shimadzu generator values

15.16.1 Requirements

Before starting the dicomPACS®DX-R the generator has to be connected physical to the computer. Therefore a serial interface on the computer are necessary; the serial interface is 9-pin connector.

At the Shimadzu generator a communication unit should be connected.

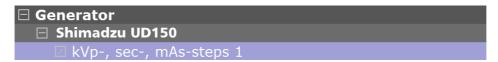
$\hat{}$

CAUTION/ATTENTION!



EN: If you are unsure please ask your Shimadzu technician.

FR: Si vous n'êtes pas sûr, veuillez interroger votre technicien Shimadzu.



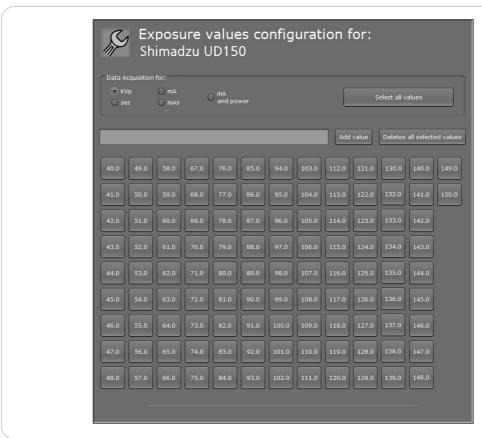


Figure 193. Configure Shimadzu generator values

15.16.2 User information

During the communication between the Shimadzu generator and $dicomPACS^{\circledR}DX$ -RCarePACS DXR only $dicomPACS^{\circledR}DX$ -RCarePACS DXR can send values to the Shimadzu generator. After doing the exposure the generator will send the values from the done exposure.



CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué.

If false values were sent to the Shimadzu generator the generator reports an error at the generator user panel. The error has to be confirmed by the user.

15.16.3 Test Procedure

Step	Description	Expected Result
1	Check the configured kVp values and remove or add values if necessary	Only valid values for the generator configuration are defined
2	Check the configured mA values and remove or add values if necessary	Only valid values for the generator configuration are defined
3	Check the configured mAs values and remove or add values if necessary	Only valid values for the generator configuration are defined
4	Check the configured ms values and remove or add values if necessary	Only valid values for the generator configuration are defined
5	Create a test patient: Name: Test Shimadzu ID: ts-1234	Patient is created
6	Switch to x-ray tab	Software displays the X-ray tab and is ready to plan examinations.
7	Please select the macro table Please plan 3 examinations for consistency check	The macro examinations are displayed. At least there is a consistency examination. You will get 3 plannings with consistency check.
8	Switch to exposure	Exposure is selected and the values are transferred to the generator. The generator panel displays the selected values.
9	Make an exposure	An exposure is taken. The image receives the exposure values.
10	Select the next examination and increase kVp and mAs	The new values are displayed at the generator panel
11	Select an AEC field	The AEC selection is displayed at the generator panel
12	Put a body equivalent dummy in front of the selected AEC field and make an exposure.	An exposure is taken. The image receives the exposure values.
13	Select the next examination and change to: 45kVp, 16ms, 100mA	The generator panel displays the selected values
14	Select the lowest mA value	The generator panel displays the selected values
15	Lower the mAs to the lowest value	The generator panel displays the selected values
16	Reset the exposure values	The generator panel displays the selected values
17	change to: 45kVp, 20ms, 100mA	The generator panel displays the selected values
18	Select the lowest mA value	The generator panel displays the selected value.
19	Lower the mAs to the lowest value	The generator panel displays the selected values

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Step	Description	Expected Result
20	Reset the exposure values	The generator panel displays the selected values
21	change to: 45kVp, 8ms, 100mA	The generator panel displays the selected values
22	Select the lowest mA value	The generator panel displays the selected values
23	Lower the mAs to the lowest value	The generator panel displays the selected values
24	Reset the exposure values	The generator panel displays the selected values
25	Make an exposure	An exposure is taken. The image receives the exposure values
26	Finish the study	The study is finished

Table 52. Test procedure

15.17 Stadler - SE80X0

Installation requirements:

- Installation of the .NET Framework version 3.5. (Setup dotnetfx35.exe)
- Installation of the generator software (C:\xray)
- Calibration data of the generator must be available

The generator needs to be connected to a serial port of the PC.

The installation is executed by the setups gen_Stadler.exe or gen_StadlerNoAEC.exe. The setups install the *dicomPACS®DX-R* interfaces to both the Stadler generator and the Imix detector.

Start *dicomPACS*[®]*DX-R* and log in as the administrator, then activate the generator in the generator configuration.

The generator is configured with a ConnectString. It can be edited in the tab 'Generator' in the field 'Device:'. The single parameters are separated by semicolons.

The following connection string parameters are specific for the SE80X0:

Parameter	Description
Feature	Mandatory. Specifies the generator type to use. The following values are supported: "Se80x0" for all variations of the SE80X0 generator
Se80x0GeneratorSerialPort	Mandatory. The serial COM port to use for communication with the generator.
Se80x0GeneratorAecDevic eType	Mandatory if AEC is used, optional otherwise. Identifies the type of the used AEC measurement chamber. The following values are supported: "Comet 275.431 1" for COMET measurement chambers

Parameter	Description
Se80x0GeneratorAecSettin gsFile	Optional. The full path to the AEC settings file generated by the 8x Installation & Service Tool. Use local or UNC paths.
Se80x0GeneratorWorkplac	Optional. Overrides the workplace settings provided to the Set Exposure action of the Generator API and always uses a predefined workplace provided by this parameter. The following values are supported:
eOverride	0: Don't use override, use workplace number provided by the Set Exposure action 1-4: Always use the defined workplace number (between 1 and 4)

Table 53. Connection string parameters

A simple ConnectString is:

Feature=Se80x0;Se80x0GeneratorSerialPort=1

Connect string with AEC (all parameters have to be written in one line):

- Feature=Se80x0;Se80x0GeneratorSerialPort=1;Se80x0GeneratorAecDeviceType=Comet 275.431 1;
- Se80x0GeneratorAecSettingsFile=c:\Xray\SE80X0\Se80x0AecSettings.xml;Se80x0GeneratorWorkplaceOverride=1;
- Se80x0GeneratorAecTableFile=c:\Xray\SE80X0\Se80x0AeiTable.xml

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15.18 Summit

The generator is integrated in dicomPACS®DX-R since version 7.0.43

Required licence: xraySummit

All generator models are integrated. Use serial connection RS232 for the summit models.

Kind of values	Range of values
kV	40 - 125
mA	50 - 500 small focus (≤100 mA) large focus (≥ 200 mA)
mAs	0.2 - 600

Table 54. Value range Summit

The value range described above depends on the model in use and may vary.

The communication between generator and generator console is bidirectional.

The generator offers three workstation possibilities:

- table (with AEC and grid)
- table (without AEC/grid)
- wall

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Chapter 16. ConsoleSCU

The ConsoleSCU fulfils the following task:

Distribution of DICOM files - sending by DICOM protocol

The ConsoleSCU runs on a machine within the network and requires access to the SQL database and to the image directory. It is installed in the subdirectory ConsoleSCU of the installation directory by default.

ConsoleSCU requires the following programmes and libraries:

Programme / module	Task / Function
ConsoleSCU.exe	Main programme
Listview.dll	Support library
ORdicomWorld.dll	Support library for file specific DICOM functions
ORstorageSCU.dll	Library to send DICOM images

Table 55. ConsoleSCU

16.1 Configuration file ConsoleSCU.ini

The ConsoleSCU is configured by the configuration file ConsoleSCU.ini. The file uses the Windows-*.ini format.

Key	Default	Description
[SCU]		
AETitle	DICOM_VERTEILER	AE-Title used by the storage SCU
[DEFAULLT_PARTNER]		
AETitle		ConsoleSCU will forward all data to this AE
[Parameter]		Options for data transmission
Compression_TrSyntax_Lossless	23	Transfer syntax for teleradiology lossless data transmission
Compression_TrSyntax_High	24	Transfer syntax for teleradiology; high quality (but lossy) data transmission
Compression_Quality_High	98	Compression quality for teleradiology; high quality data transmission
Compression_TrSyntax_Mediu m	24	Transfer syntax for teleradiology; medium quality (lossy) data transmission

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Key	Default	Description
Compression_Quality_Medium	90	Compression quality for teleradiology; medium data transmission
Language		Defines language of the user interface
LanguageFile		Defines the language file
[Partners]		
AETitles	ARCHIV	List of DICOM-AEs to receive images For each entry, a separate section is defined in the file; this section is named 'AE-Section'
PendingDir	N:\dicomPACS\temp\ ConsoleSCU \Pending	This folder is used to store images during processing
[AE-Section]		
Alias		Name which is displayed as a send destination in the viewer
Host	127.0.0.1	Hostname
Port	104	Port
TrSyntax	LEE	Preferred transfer syntax of the other AE
Quality	98	Quality factor in percent (25%, 100%) if lossy compression is used A smaller value causes a better compression but a lower image quality It is recommended to use only lossless compression!
Distribute2Partner	1	0 = this AE is not a destination for automatic forwarding 1 = ConsoleSCU will send all images which match the forward condition to this AE
HidePartner2dicomSendList	0	1 = this AE is shown as DICOM destination in $dicom$ PACS [®] viewer
UseRAS	0	1 = ConsoleSCU will use a dialup connection to connect to this AE
PruefTAG	\$00100020	The DICOM tag is to be checked for automatic forwarding
EqualString	19*PoTT	The value of the tag to trigger the automatic forwarding

Table 56. Configuration of the ConsoleSCU.ini

16.2 Transfer Syntax

The table shows the coding for all supported transfer syntax. Bold entries are the preferred transfer syntax for transmissions to *dicomPACS®DX-R*.

Value	Description	Abbreviation	Lossless
0	Little Endian Implicit	LEI	yes
2	LittleEndianExplicit	LEE	yes
3	BigEndianExplicit	BEE	yes
4	Standard JPEG		no
5	Jpeg Extended	JPEG_EXTENDED	no
9	Jpeg - full progression	JPEG_FULLPROG	no
11	JPEG lossless	JPEG_LL	yes
21	JPEG lossless 1st order prediction	JPEG_LL1	yes
23	JPEG-LS	JPEGLS	yes
24	JPEG-LS lossy	JPEGLS_LOSSY	no
26	JPEG-2000	JPEG2000	yes
27	JPEG-2000 lossy	JPEG2000_LOSSY	no

Table 57. ConsoleSCU - Transfer syntax

16.3 Clear the image database

To clear the image database it is necessary to end the *dicomPACS*[®]*DX-R* application. Then start the application deleteImageData.exe in folder C:\dicomPACS\tools.



CAUTION/ATTENTION!



EN: This tool deletes the image database and creates a new empty one!

FR: Cet outil efface la base de données d'images et en crée une nouvelle entièrement vide !

First of all you need to select the database which shall be deleted. The window also is for confirmation. Only if "I AM SURE" is entered in capitals the application deletes the image database.

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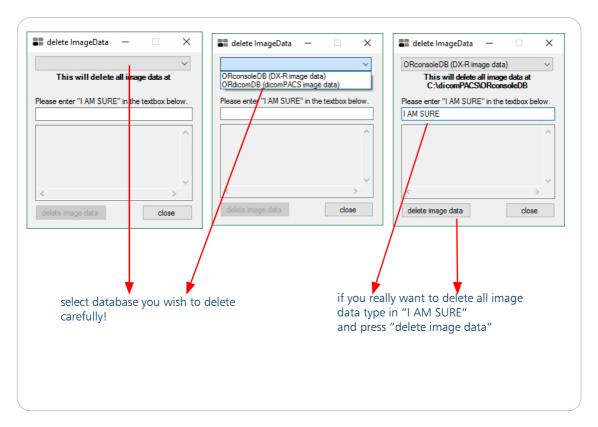


Figure 194. Confirmation

This screen offers the last chance to abort the action. These two kinds of confirmation are necessary to avoid an unintended deleting of the database.

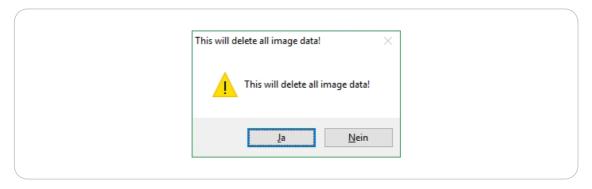


Figure 195. Second confirmation

If "Yes" (in the screenshot "Ja") is selected the setup starts and deletes the database and restarts the ConsoleSCU. If you select "No" (here: "Nein"), the delete is aborted and you return to the previous dialogue.

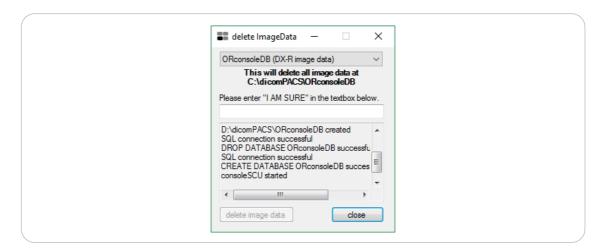


Figure 196. Database successfully deleted, consoleSCU restarted

eft blank intentionally

Chapter 17. Database

The *dicomPACS®DX-R* database consists of a directory structure for saving images and other data files and a Microsoft SQL-Server or a MSDE server which contains several database tables.

dicomPACS®DX-R uses an SQL database called ORconsoleDB by default. The database files are saved under the same name in the MSDE default directory

C:\dicompacs\ORconsoleDB

The database server, database name, login name and password have to be configured for each process accessing the database.

dicomPACS®DX-R works using two databases. They are needed for storing information about the images and studies as well as information about the settings. The information about the database is stored in the databaseConfig.xml.

 $\textit{dicomPACS}^{\circledR}\textit{DX-R}$ processes use the ODBC-API or the JDBC-API to access the database.

17.1 ORxrayDB

The database ORxrayDB consists of the following tables:

Table	Content
BodyPart	
Dictionary	
Exam	
GeneratorDescription	
GeneratorKvData	
GeneratorMaData	Generator settings
Generator Mas Data	Generator settings
GeneratorSecData	
GeneratorSettings	
HtmlText	
Images	
MacroContent	
RegionXRayMapping	
Species	

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Table	Content
SWVersions	
Text	
Text_en	
TranslationText	
UsedGenerator	
Videos	
Workspace	

Table 58. ORXrayDB tables

The database ORxrayDB includes information of the $dicomPACS^{\textcircled{\$}}DX-R$ settings, e.g. generator values, structure of the examination and macros.

17.2 ORconsoleDB

The database ORconsoleDB consists of the following tables:

Table	Content
BlackBorderStatistik	
DicomInstance	The table contains information about DICOM files.
DicomPartner	The table contains the DICOM devices which are known by <i>dicomPACS®DX-R</i> .
DicomSeries	The table contains data of DICOM series.
DicomStudys	DICOM studies, The table field "Autoincrement" is used internally to identify a study and to name the associated files.
DisplayCheck	The table stores the execution and results of the daily visual checks of the viewer workstations.
Dosis	
GroupAccessRules	
ImageBackup	The table stores all files which are yet to be backed up.
UserAccessRules	
Worklist	Worklist data

Table 59. ORConsoleDB tables

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The database ORconsoleDB includes information about studies, worklists and images. The database includes a table "DicomStudys". Inside this table all important information of the studies are discarded.

17.2.1 Directory structure and file names

The directory structure is fixed relative to a root directory. The root directory has to be configured for all client processes. Access to the root directory is given via a shared file system.

The directory "C:\dicomPACS" is used as a root directory by default. The name of the last subdirectory ,ORconsoleDB' corresponds to the name of the MSDE database.

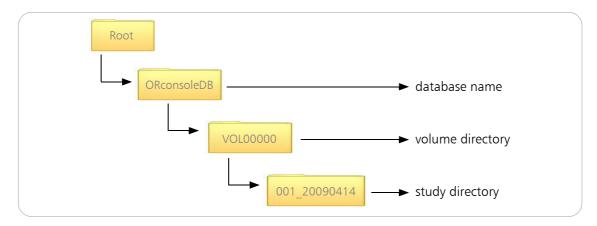


Figure 197. Directory structure

The volume directory is made up of the three letters "VOL" and the first five digits of the study number.

The study directory is made up of the last three digits of the study number, an underscore and the study date.

The study directory contains the following files:

1. Directory information (study.xml)

Each study directory contains a file with information on the image files within the directory. The file name is made up of the patient name and the patient ID:

File name: <Lastname> <Firstname> <ID>.sdb

The file "study.xml" is used by the viewer to load study information.

2. DICOM image files (I *.dcm)

Image files are saved in DICOM format. The file name consists of the study number as well as the running series and image numbers:

I <studynumber> S<seriesnumber> <imagenumber>.DCM

3. Preview images (S*.jpg)

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For each DICOM image file, different sizes of JPG preview images are created. The file name is created from the resolution and the corresponding DICOM file name. <Pixel> can take the values '64' and '128':

S<Pixel>_<studynumber>_S< seriesnumber >_<imagenumber>.jpg

4. Image processing data (I *.ipd)

dicomPACS®DX-R creates an option file for each DICOM file displayed. This file contains the options set when the file was last viewed, e.g. zoom, windowing, rotation, measurements taken and mark ups, etc. The file name corresponds to the name of the DICOM file and ends in '.ipd'.

To change the storage folder, copy all files to the new folder and edit the ArchivePath settings in the databaseconfig.xml in C:\dicomPACS\console. Change the class and the device of the ArchivePath according to the new settings.

Then restart the system to confirm the changed settings.

The PACS system never changes data in DICOM image files, nor does it delete files. If studies are deleted by a user, they will be marked with an '@' at the beginning of the file name, but will remain in their original position.

17.2.2 Backup

To backup the ORconsoleDB the command:

osql -S localhost\dicomPACS -U sa -P "or18057" -n -Q "BACKUP DATABASE ORConsoleDB TO DISK = 'C:\dicomPACS\console\Backup\WameOfMyBackupfile.bak'"

should be executed in the osql-console. To backup the different studies, copy the study folders to the backup device.

OrconsoleDB is backed up each time dicomPACS®DX-R is closed.

17.3 Database configuration

The database configuration takes place inside the "databaseConfig.xml" file, which is located in C:\dicomPACS\console\.

The first option inside the configuration file is DatabaseConfig.

XML nodes	Value	Descriptio n	Attribute	Attribute values
DatabaseConfig	Database DatabaseList DatabaseFilterGroupe	Root node	version	Version of the file format: 5.1.2

Table 60. Configuration of the database

The configuration of the value <Database> and <DatabaseList> are needed for the faultless functionality of *dicomPACS®DX-R*.

17.3.1 < Database >

The section <Database> inside the databaseConfig.xml defines the parameters for the database connection. Therefore different parameters and attributes available. The section <Database> has to be defined always for ORconsoleDB and for ORxrayDB.

XML nodes	Paramet er	Descripti on	Attribu te	Attribute values
Driver		alias	define a reference	
Database	Connection ArchivePath WorklistSCU WorklistSCP	Database definition	showInStu dySearch	default: true parameter for the ,patient search' using the viewer application. Set to false , for hide the search results of the ORconsoleDB

Note



If no alternative database with study information is configured and the parameter "showInStudySearch" is set to "false", the option "patient search" is not available!

The different parameters of the section <Database>:

XML	Paramet	Descripti	Attribut	Attribute value
nodes	er	on	е	
Driver			class	Driver Class
Connection		Access data of the database	url user pwd catalouge	database URL database username database password name of the database
ArchivePath	<directory></directory>	Directory with image data	class	Defines the java class which is used to access the image data <empty> Use the standard access method via the shared file system de.or.dicom.viewer.dataBase.io.UrlArch iveData Access image data via the http or ftp protocol</empty>

XML nodes	Paramet er	Descripti on	Attribut e	Attribute value
WorklistSCU		Restriction of a worklist query to a special AE	aeTitle	Only worklist items of this AE are queried.
WorklistSCP	DICOM	Access data of the worklist SC	alias	
			aeTitle	AE of the WorklistSCP
			hostname	Hostname or IP from the WorklistSCP
DICOM			port	Port for communication
2.55.0	DICOM		localAeTitle	AE from the WorklistSCU. Should only be defined if it differ from the WorklistSCU entry If not define WorklistSCU aeTitle is used

Table 61. Database

17.3.2 < DatabaseList >

If no section DatabaseList is configured, *dicomPACS®DX-R* does not work. The following DatabaseLists have to be configured, *"ConsoleDatabase"* and *"SpeciesDB"*. All other lists are optional or require licenses.

XML nodes	Value	Descripti on	Attribut e	Attribute value
DatabaseList	Database	Database are allocated to a Java class	class	Class used by the database: de.or.console.database.ConsoleDatabas e de.or.console.database.SpeciesDB de.or.dicom.viewer.dataBase. QRArchive de.or.dicom.viewer.dataBase. StudyDatabase de.or.dicom.viewer.dataBase. DisplayCheckDB

Table 62. DatabaseList

The optional List is "DisplayCheckDB". "WebshareDB", "WorklistDB" and "QRArchive" are lists which require a license. The "StudyDatabase" requires the dicomPACS®DX-R system.

17.3.3 < DatabaseFilterGroup >

The <DatabaseFilterGroup> defines the filter parameter for the patient search.

XML nodes	Valu e	Description	Attribut e	Attribute value
DatabaseFilt	Filtor	Definition of selectable filters	id	Unique name of the filter
er Group	Tittet		name	Name used in the patient administration
	– Filter Definition of a filter selection	Definition of a	name	Text displayed in the patient administration
– Filter		statement	SQL query (part of a ,where' clause of table DicomStudys) – e.g.: (Modality = ,CR')	

Table 63. DatabaseFilterGroup

An example of the DatabaseConfig.xml is given below:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<DatabaseConfig version="5.1.2">
```

17.3.4 Definition of a SQL database server

The image data is loaded from the file system, drive C: (shared network filesystem). Additionally a worklist server is defined. Query results are stored in the same database, e.g.:

17.3.5 Tagmapping

In *dicomPACS*®*DX-R* you can map any DICOM information from worklist queries to the DICOM data created by *dicomPACS*®*DX-R*. The configuration uses the files databaseConfig.xml and WorklistQuery.xml. You have to configure the use of WorklistQuery.xml in the databaseConfig.xml. A worklist query without a configured WorklistQuery will use a default set of tags.

```
Configuration in the XML-tag < DICOM >
```

```
<WorklistQuery file="WorklistQuery.xml" />
```

Example:

You have to enter all DICOM tags to query in the file WorklistQuery.xml. To map an element you have to add the XML-tag attributes mapToGroup and mapToElement to the query element. For example: You want to map the content of 0040,0006 (Scheduled Performing Physician's Name) to tag 0032,1032 (Requesting Physician):

17.4 SQuirreL - Restore ORXrayDB or ORConsoleDB

SQuirreL is a tool for managing different databases. It supports MS SQL server as well as H2 database.

Usage: the tool is located under dicomPACS/tools/Squirrel-SQLPortable or can be called up at http://ftp.orhro.com/main.html?download&weblink=b4b93a0ad8222ed303efbac5e78f0d32&realfilename=Squirrel-SQLPortable.zip

17.4.1 Connect to a database

After starting the application, a list of the used aliases is displayed on the left side.

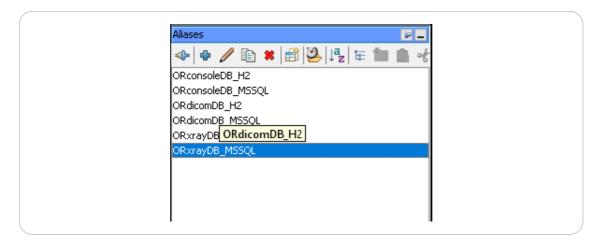


Figure 198. List of aliases

The list contains all saved connections to databases. After installation, the list contains the connection to the default databases of *dicom*PACS[®] and *dicomPACS*[®]DX-R. Both the MS SQL and H2 variants.

Double clicking an entry or via right mouse button — "Connect" connects to the respective database. If you are connected, the list on the left shows all databases (catalogues) of the connected server. In contrast to SQL Management Studio, however, you can not automatically view the tables of all existing catalogues (databases), but only those of the currently selected one. If you want to switch to another catalogue, you can select it from the drop down menu above the list or select a catalogue with the right mouse button and then choose "Set Default Catalog".

17.4.2 Show and edit content

In order to take a look at the contents or properties (data types, indices, etc.) of the tables, the correct user must be selected in the tree structure below the catalogue.

for SQL Server
$$\longrightarrow$$
 dbo for H2 \longrightarrow PUBLIC

Unfolding this subitem displays all tables. If you select one of them, you can view the properties and edit the content on the window on the right. To edit entries directly, select the "Content" tab, right click in the window and choose "Make Editable" from the menu.

17.4.3 Import of backups

17.4.3.1. SQL Server

In SQuirreL you can not directly import bak files via the interface. Use a SQL command to do so. Follow the next steps:

- 1. Connect to the database you wish to recover via the list of Aliases
- 2. Select the tab SQL to execute SQL statements
- 3. Execute the following command with the appropriate path and database name

ORxrayDB

restore database ORxrayDB from disk "D:ORxrayDB.bak" with move "ORdicomDB_dat" to "C:\dicomPACS\ORconsoleDB\ORxrayDB.mdf", move "ORdicomDB_log" to "C:\dicomPACS\ORconsoleDB\ORxrayDB.ldf"

ORconsoleDB

restore database ORconsoleDB from disk "D:ORconsoleDB.bak" with move "ORconsoleDB" to "C:\dicomPACS\ORconsoleDB\ORconsoleDB.mdf", move "ORconsoleDB_log" to "C:\dicomPACS\ORconsoleDB\ORconsoleDB.ldf"

ORdicomDB

restore database ORdicomDB from disk "D:ORdicomDB.bak" with move "ORdicomDB" to "C:\dicomPACS\ORdicomDB\ORdicomDB.mdf", move "ORdicomDB_log" to "C:\dicomPACS\ORdicomDB\ORdicomDB.ldf"

4. Refresh the list of catalogues by right clicking on the list of catalogues → Refresh Items and Cache

17.4.3.2. H2

When using H2 the backup files are not available as binary file but as executable SQL script which has been packed into a zip archive. In order to import this backup, the following steps must be carried out:

- 1. Unzip the zip file
- 2. Connect to the database for which the backup is to be restored
- 3. Delete all remaining data wit the command

DROP ALL OBJECTS

- 4. Open the unzipped SQL file with an editor and copy the content into the SQL editor of SQuirreL
 - It is recommended to not directly open the file with SQuirreL because SQuirreL sometimes gets stuck here.
- 5. Execute the statement
- 6. Refresh the list of catalogues by right clicking on the list of catalogues → Refresh Items and Cache

Chapter 18. Open Recycle Bin - lists view

18.1 Empty Recycle Bin

In the lists view in the section "More" there is the option "Open Recycle Bin". This tool is capable of showing all images that were moved to the recycle bin.

The deletion of all studies of the recycle bin may be executed by clicking on the button "Empty Recycle Bin" with administration rights only. A pop-up window opens thereafter, which asks for the password of the day to confirm the process.

The password of the day is known to the authorised technician.

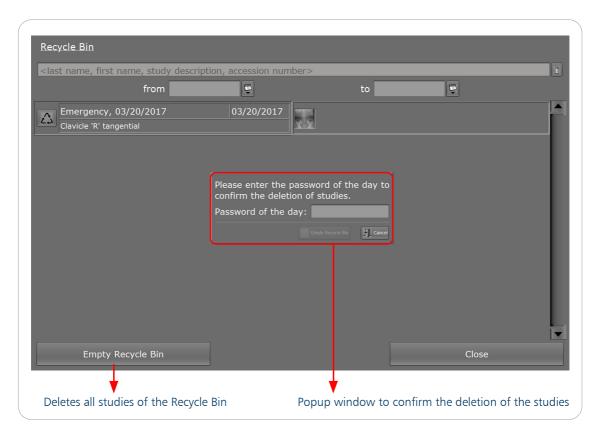


Figure 199. Empty Recycle Bin

The recycle bin is available in the list view from *dicomPACS*®*DX-R* version 2.2 on. This can be activated if not already done with an update by setting the parameter *Console.UseNewSendView* in the file *dicomPACS.properties* to *true*.

Always when the recycle bin is emptied, it is logged in the directory "Log". The name of the .log file is made of "RecycleBin" and the time stamp of the day of deletion. The .log file itself comprises information on the user that deleted the recycle bin, the time and gives information on the studies that were deleted.

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Chapter 19. Monitoring of external devices

With this module switches of external devices can be inquired via serial ports. *dicomPACS®DX-R* can monitor up to five events or devices on one serial port.

Input	Output
RX	TX
RTS/DTR	CTS
RTS/DTR	DSR
RTS/DTR	RLSD
RTS/DTR	RI

Table 64. Serial port connections

Port	Pin
RX	2
TX	3
RTS	7
DTR	4
CTS	8
DSR	6
RLSD	1
RI	9

Table 65. Serial port - pin

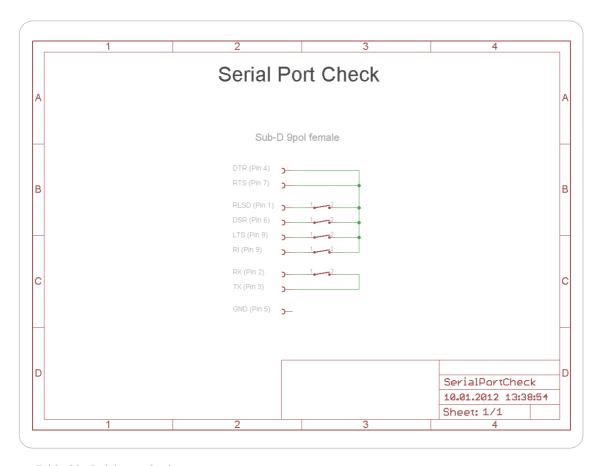


Table 66. Serial port check

Note



The serial port check is used for the grid check (see page 198) and the synchronisation of the Thales detector.

18.1 Empty Recycle Bin 321 / 372

Chapter 20. Prosthesis module

20.1 Requirements

The following requirements are important for the use of the prosthesis module:

1. dicom1on1 license

On every computer with a prosthesis module, you need a dicom1on1 license. After you have installed the dicom1on1 license, you need to prepare the computer for the 1on1 examination.

2. Image material

Make sure that the image material, which your customer wishes to use with prosthesis templates, has the correct pixel spacing.

Pixel spacing is the real distance between two pixels (from the middle) on the image sensor. With the pixel spacing the user can draw for example a distance measurement or use prosthesis templates in DICOM images. In summary, if you draw a distance measurement and receive a metric unit, the DICOM image has a pixel spacing. Make sure that this pixel spacing is correct.

3. Further steps

To use the prosthesis templates properly, please contact us to discuss further details. In most cases we need the prosthesis template foils from your customer to digitalise these or to compare them with existing ones.

After this, you will get a customised "ProsthesisConfig.xml", which you have to insert into "C:\dicomPACS\console" and "C:\dicomPACS\console64" (on x64 systems). Possibly you also need a recent "prothesisData.bin" file. This file needs to be inserted into "C:\dicomPACS\console\lib" and "C:\dicomPACS\console64\lib" (on x64 systems).

After all these three steps are completed, your customer can use the prosthesis templates in $dicomPACS^{®}DX$ -R.

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Chapter 21. ORBackup Version 2.2.X

ORBackup requires a separate license.

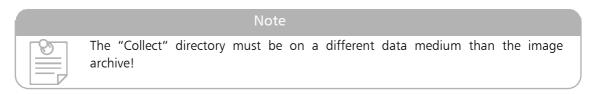
The backup function performs a continuous backup of the image database. For this purpose all newly added image files and the entire database data are copied in a directory structure at least once a day. The directory structure, hereafter called backup directory, will be used to create the CD or DVD media.

ORBackup also supports the backup to USB or NAS drives. The comparison of the backup hard disk and the image archive is done when connecting the hard disk.

All backup functions are performed by the system service "O+R Backup Service" and are therefore also effective when no user is logged on.

The programme "ORBackupMonitor" visualises the status of the backup service to a registered user to allow the configuration and control of the service.

The service collects data in the directory "Collect". Once the "Collect" directory has reached the size of a medium and the conditions for the execution of the backups are fulfilled, a backup medium is created in the directory "media". Thereafter the data is transferred to the burning programme.



The "Collect" directory and the backup media have a similar directory structure like the *dicomPACS*® archive.

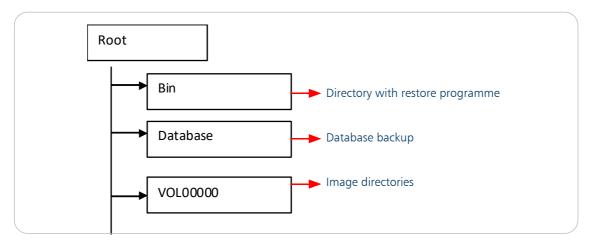


Figure 200: Backup directory structure

21.1 Installation

Start the installation programme "Setup_ORBackup.exe". The setup programme guides you through the installation process.

At the end of the installation the installation programme starts the ORBackup monitor. None standard configurations should be executed instantly.

21.2 Uninstall process

Exit the programme "ORBackupMonitor". Then run the uninstall process from the Control Panel -> Software. The uninstall programme does not delete backup folders. These must be removed manually.

21.3 Operation of the ORBackupMonitor

The programme "ORBackupMonitor" is used to monitor and configure the service. The configuration files are saved in the file "C:\dicomPACS\ORBackup\bin\ORBackup.ini".

The status of each programme feature of "ORBackupService" is visualised by coloured symbols. The meanings are listed in the following table:

Colour	Service - Process status	Copy - Copy status
Grey	Service is stopped	No copy
Red	Error, the service does not work	Copy process stopped because of insufficient disk space
Yellow	Service is starting or stopping	Warning due to low disk space
Green	Service is active	File is copied

Table 67. Colour symbolism

By clicking the right mouse button on a blank area in the programme window, a menu with the following options opens:

- Version
- Start ORBackup Service
- Stop ORBackup Service
- Show options
- Create media
- Recreate Job Files
- Exit

324 / 372 21.1 Installation

When the programme is started, it usually shows only the status tabs. The configuration tabs are only visible after selecting "Show options".

21.3.1 Tab Status

The tab "Status" displays important messages of the ORBackup service. Warning and error messages are marked in yellow or red colour.

21.3.2 Tab Medium list

The tab "Medium list" is only displayed if the option "backup on CD/DVD/BR" is selected in the tab "Backup options". The tab shows a list of recently created backup media and their status.

The status can be changed by clicking the right mouse button on the status column. After the change of any information the daily password is requested.

The creation of another medium with the same content can be started from the table of the saved media in the same way.

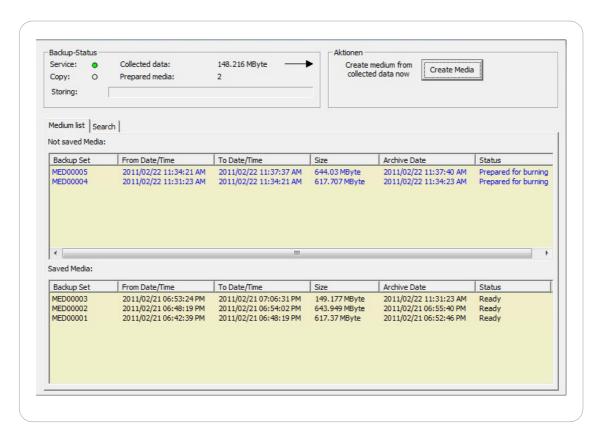


Figure 201. ORBackupMonitor - Medium list

<u>^</u>

CAUTION/ATTENTION!



EN: Please note that all images of a study are copied to subsequently created media. It is therefore possible that more than one disk is required.

FR: Veuillez noter que toutes les images d'un examen sont copiées sur les supports créés par la suite. Il est donc possible que plus d'un disque soit nécessaire.

21.3.3 Tab Harddisks

The tab "Harddisks" is only displayed if the option "Backup on Harddisk" is selected in the tab "Backup options".

The tab displays the list of backup disks and allows the configuration of the harddisks. It supports backup on USB drives as well as on NAS (Network Attached Storage). You can define a certain range of study IDs, which shall be saved on the disk.

Value "0" means an undefined study ID. This value is set if the capacity of the disk is exhausted.

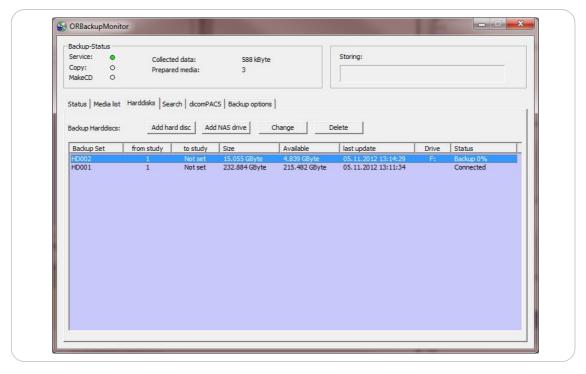


Figure 202. ORBackupMonitor - Harddisk

To add a USB drive click on button "Add harddisk". This opens a dialogue box with a list of attached USB hard drives. Select the disk and enter a name for this media and the range of study IDs, which shall be saved on the disk.

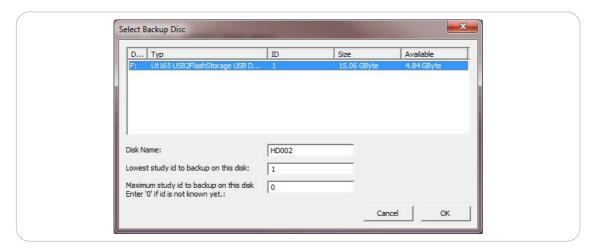


Figure 203. ORBackupMonitor - harddisk selection

To add a NAS drive click on button "Add NAS drive". This opens a dialogue box where you can enter network path, user name and password:

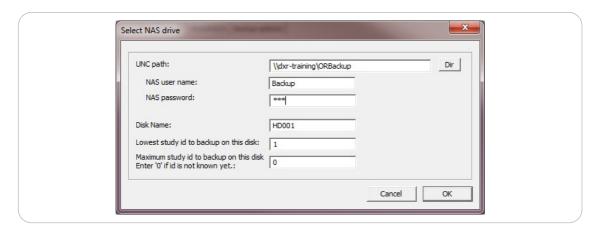


Figure 204. ORBackupMonitor - NAS selection

The backup process is started by connecting a backup hard disk with the computer. The backup status is displayed in the list of hard disks. All USB drives must be disconnected from the system by using the "safely remove hardware" function of the operating system.

The button "change" is only available if the selected hard disk is connected to the computer. Only the name and the area of study ids can be changed. But no data were deleted from the hard disk.

Selecting the "delete" button deleted the database entry of a backup hard disk. As a result this hard disk is no longer used as backup media. But no data on the hard disk are deleted.

21.3.4 Search

In the tab "Search" it is possible to search by patient name, patient ID number and the media number. The search will start shortly after an entry in the input field. This function can not list the content of backup hard disks because of too many entries.

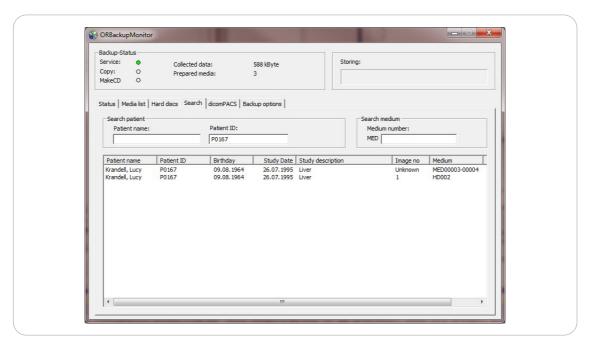


Figure 205. ORBackupMonitor - Search patient

21.3.5 Tab dicomPACS

All configurations of the image archive and other data to be saved are performed in the tab "dicomPACS". Incorrect values or values with warnings are highlighted in red. The error message is displayed when the mouse pointer is moved over the element.

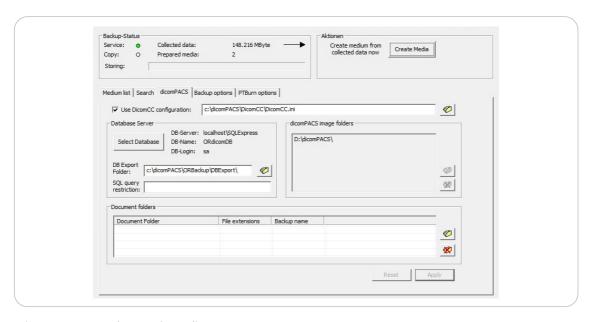


Figure 206. ORBackupMonitor - dicomPACS

Input field	Function	
dicomPACS		
Use DicomCC configuration	"ORBackup" uses the archive settings from the configuration of dicomCC or the ConsoleSCU	
Database Server		
Select Database	Opens a dialogue for the selection of the SQL server database	
dicomPACS image folders		
dicomPACS image folders	Allows the addition of directories of the image archive	
Export Folder	Directory, where the database is exported. The directory must be accessible from "ORBackup" as well by the database server under the same path name! If the database is on a different computer, the directory is to be indicated in UNC notation	
SQL query restriction	Allows the restriction of the file selection for the backup, for example when multiple practices work with one common PACS	
Document folders		
Document folders	Allows the addition of directories that should be monitored and secured by the backup service	

Table 68. Input fields and their functions - dicomPACS

21.3.6 Tab Backup options

The backup options can be set in the tab "Backup options". Incorrect values or values with warnings are highlighted in red.

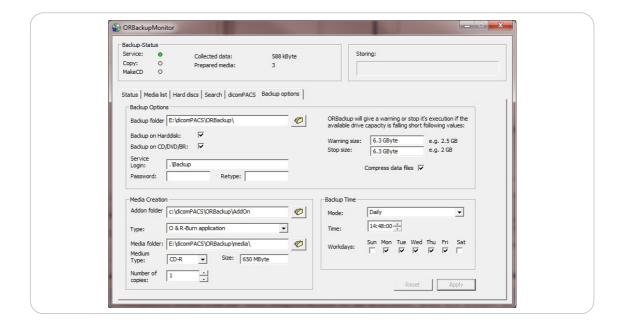


Figure 207. ORBackupMonitor - Backup options

Input field	Function	
Section Backup Options		
Backup folder	Directory location where the data are collected (subdirectories Collect, Recreate). Moreover, the media directories are compiled here by default. For network drives, the UNC notation is to be used. The directory should not be located on the same drive as the image archive!	
Backup on Harddisk	Enable backup on Harddisk	
Backup on CD/ DVD/BR	Enable backup on CD/DVD media	
Service Login	Enter the user name, which shall be used to execute the backup service. The user must be created by the user management function of the operating system.	
Password	Enter the password of the user, who executes the backup service	
Retype	Re-enter the password	
Warning size	When falling below the defined free space, a warning is displayed.	
Stop size	When falling below the defined free space, the backup service stops working. This function ensures that other <i>dicomPACS®DX-R</i> functions can be performed in spite of low memory.	
Compress data files	Enable the compression of data files	
Section Media Crea	tion	
Addon folder	Directory with files to be copied to any backup medium, e.g. restore programme	
Туре	Select the burning programme: - "O + R MakeCD" - Local CD / DVD burner with MakeCD - "Primera Disc Publisher" - Disc Publisher with PTBurn 3.x	
Medium folder	Directory, in which the media are compiled and transferred to the burning programme. For network drives, the UNC notation is to be used. The directory should not be located on the same drive as the image archive!	
Medium Type	Directory, in which the media are compiled and transferred to the burning programme. For network drives, the UNC notation is to be used. The directory should not be located on the same drive as the image archive!	
Size	Set the size of the medium	
Number of copies	Select the number of media copies	
Backup Time		

Input field	Function
Mode	- "Daily" - creates a backup medium on every selected workday. If the medium is full - "If medium is full" - the medium is created once enough data is collected to fit on the medium
Time	Enter the backup execution time
Workdays	Select the weekdays when the back up should be performed

Table 69. Input fields and their functions - Backup options

21.3.7 Tab PTBurn options

The tab "PTBurn options" is only available if "PTBurn" has been selected as the burn unit. Additional parameters for a CD / DVD publisher can be defined in this tab.

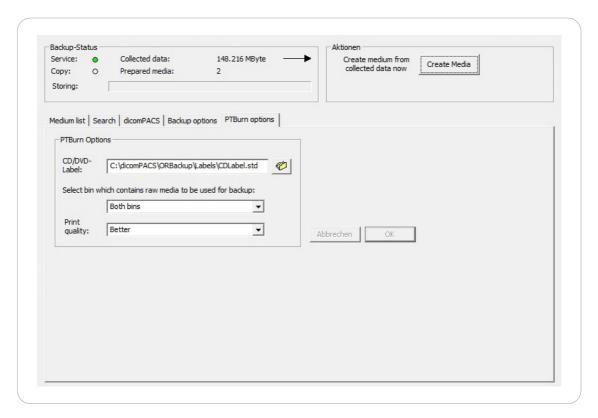


Figure 208. ORBackupMonitor - PTBurn options

21.4 ORBackupService

The programme is usually started as a service via the Services Manager (SCM). All output is written to the log file "ORBackup.log". This is located in the directory "log" of the backup directory.

Parameters of "ORBackupService":

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- -i → install as a system service
- -s → run as system service
- -u → system service uninstall
- -e → stop system service
- -d → start programme as a normal console application (debug mode).

The service runs at low priority. Starting and stopping the service can be carried out by "ORBackupMonitor" or through the SCM. The service is registered under the name "O + R Backup Service".

The service reads the configuration file "ORbackup.ini". If values are changed through "ORBackupMonitor" in the file, the service will restart.

The service periodically checks whether enough free space is available in the backup directory. When falling below the warning limit, a warning is displayed by the "ORBackupMonitor". When falling below the margin of error, the copy function is stopped and an error message is displayed.

21.5 ORRestore

The programme ORRestore transfers back data from one or more backup media to the *dicomPACS®DX-R* database. The following options are can be selected:

Input field	Function
Data source	
Directory / drive	Directory or drive from which the backup media should be read.
Request new media	When selected, a new medium is requested after reading the other.
Media	Shows the selected backup media. If a directory is selected, various media can be displayed.
Restore	
Database restore	The backup data is transferred back to the image database. Warning! The MSDE database may not yet exist!
Copy data in a directory	The image data is copied from the backup media in a directory and if necessary it is uncompressed. The database contents are not restored.
Send data per DICOM	The image data is sent to a DICOM receiver. The database contents are not restored.
Start	Start the recovery
Pause	Pause the recovery
Exit	Exits the programme

Table 70. Input fields and their functions - ORRestore

21.6 Configuration

In the following you will find detailed information on the configuration procedures, which should be paid attention to.

21.6.1 Network configuration

"ORBackup" can be run on a different computer system than the image server. The following should be considered:

- "ORBackupService" is running normally under the user "system". This user may normally not access network shares on other computers. The system service therefore needs to be run under a different user name (e.g. "backup"). The user needs has to exist with the same password on the image server and should have at least read permission to the image data.
- "ORBackupService" starts as a service and therefore may attempt to access already the image data directory access before any drives are connected. All paths of the image server must therefore be specified in UNC notation.
- The export directory of the database is accessed by both computers with the same path name (using UNC notation). Thus, write permissions for the SQL server are necessary as well.

21.6.2 Configuration for selective backup

The function allows that only a certain part of the image database is saved by the backup process (e.g. for the joint use of a PACS system by several practices).

If the value "SQL query restriction" contains text, the view "ImageBackup View" is used (instead of the table "ImageBackup"). The text will be added AND-linked to the query of the view, e.g. the record and may read as follows:

PATID like 'IDC%'

SQL query:

select StudyAutoIncrement, Filename, BackupStatus from ImageBackupView where BackupStatus < 10 and PATID like 'IDC%' order by StudyAutoIncrement

The backup service creates the view "ImageBackupView" as follows, if it is required and non-existent:

create view ImageBackupView as SELECT dbo.ImageBackup.autoincrement, dbo.ImageBackup.Studyautoincrement, dbo.ImageBackup.Filename, dbo.ImageBackup.Backupstatus, dbo.ImageBackup.Backuptime, dbo.dicomstudys.PATID,dbo.dicomstudys.STUDYINSTANCEUID,

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dbo.dicomstudys.STUDYID
FROM dbo.dicomstudys INNER JOIN
dbo.ImageBackup ON dbo.dicomstudys.autoincrement =
dbo.ImageBackup.Studyautoincrement

It can be created with different parameters if required. However, the bold columns must be present.

21.6.3 Configuration file ORBackup.ini

The configuration file "ORBackup.ini" is located in the directory "C:\dicomPACS\ORBackup\Bin". Bold parameters cannot be set via the interface of "ORBackupMonitor":

Parameter	Standard	Function
ORBackup		
RemoteMonitor	true	Opens the port connection for the status display by MakeCD - is set during the setup. The service is started on port 2014
ScanIPDs	false	,true' = when started, scan the archive for new IPD files
StartMakeCD	false	,true' = MakeCD is started when a new medium is added to the media list
DocDirNames		List of document directories
DBServer DBName DBLogin DBPassword		Database access (if ,dicomCC.ini' is not used)
ConfigTime		Time of the last configuration change; change causes restart of the ,ORBackupService'
DicomCCIni		File name of the dicomCC.ini to be used
UseDicomCCIni	false	,true' = use dicomCC.ini
MediaDir	C:\dicomPACS\ORBacku p\media\	Directory for the media data and jobs
CDLabelTemplate	C:\dicomPACS\ORBacku p\Template\CDLabel.std	Label file for PTBurn
BackupDir	C:\dicomPACS\ORBacku p\	Directory for ,collect' and ,recreate' folder
AddonDir	C:\dicomPACS\ORBacku p\AddOn	Directory with data to be burned to all media
MaxMediaSize	650M	Usable size of the media
MediumType	CD	Medium type

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Parameter	Standard	Function
BurnerType	ORMediaCreator PTBurn	Burning programme
StartTime	00:00:00	Time of the media creation
Mode	1	Backup mode ,1' = daily ,2' = when the media is full
DiskFreeWarning		If the free disk space falls below the value, a warning is displayed.
DiskFreeError		If the free disk space falls below the value, the process is stopped.
Copies	1	Number of copies of each medium
UseDICOMCompression n UseDBCompression UseDocCompression	true	Compression
PTBurnBinID		Bin of the CD-robot
PTBurnPrintQuality		Print quality of the CD-robot
HDFreeSize	400	Storage space to be kept free for HD backup
HDUpdateInterval	1h	Time after a disk backup after which it is checked for new data
HDVerifyInterval	24h	Time after which the complete disk is compared with the archive
WorkDays	-XXXX-	Working days of the week - the seven characters represent the weekdays from Sunday to Saturday. One active day, when a backup should be performed, is marked by one "X". A day with no backup is marked by "-". The backup in the example is thus from Monday to Friday.
BackupData		
LASTBACKUP		Date of the last backup

Table 71. Parameters of ORBackup.ini

21.7 Known problems and solutions

1. If a directory of the *dicomPACS®DX-R* database is a direct share (no subdirectory), it is possible that an error message occurs as follows: 06-10-04 10:13:46, [1772] ERROR log <>- directory \\dicompacsserver\db\ does not exist

- 2. In the "BackupMonitor" media are indicated as handed over to CD burner. MakeCD however does not show the jobs.
 - -> Please check if both programmes use the same media directory.
 - in C:\dicomPACS\ORBackup\bin\ORBackup.ini MediaDir=C:\dicomPACS\ORBackup\media\
 - in C:\dicomPACS\ORBackup\MakeCD\dicomPACS.properties MakeCD.JobDirectory=C:\\dicomPACS\\ORBackup\\media\\
- 3. No media are compiled, although sufficient data have been collected. Please check the log file for errors that might have occurred during the database export. Probably the SQL Server lacks the write access in the respective directory. If the export takes place to a network drive, then UNC paths are to be used.
- 4. The update from version 1.4.x starts during the installation. The process takes possibly very long. The service can not be exited during this time (-> error message at shutdown)
- 5. The update of the media list takes place only after every 20 seconds that means that changes might be displayed with a delay of about 20 seconds.
- 6. In MakeCD drive letters may be assigned incorrectly especially on USB drives. In this case, a drive letter may be configured in the file "dicomPACS.properties".

21.8 MakeCD

The programme MakeCD is used to create CD's and DVD's on standard CD / DVD burner (no robotic devices). The programme takes jobs from *dicomPACS*® viewer or "ORBackup". The jobs may be placed via the local network.

<u>21.8.1 Operation</u>

MakeCD is started by ORBackup as soon as burn jobs were issued. It may also be started from the Start MakeCD: C:\dicomPACS\ORBackup\MakeCD\MakeCD.exe. MakeCD is represented by an icon in the system tray. Following an example with Windows 7:



Figure 209. MakeCD icon

The application window is opened by double clicking the tray icon. It opens automatically when user input is required. The user interface shows the drives, as well as pending and completed jobs.

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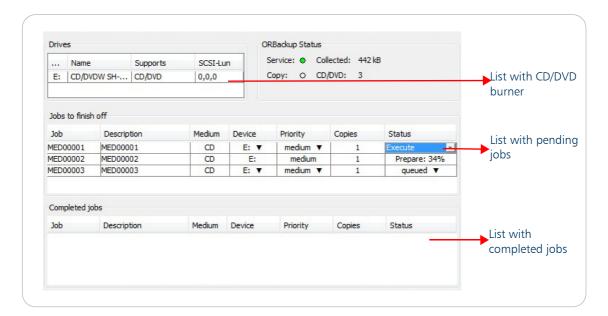


Figure 210. MakeCD interface

MakeCD can be configured to display the status of the "ORBackupService". In this case, the backup status is displayed on the right of the drive list:

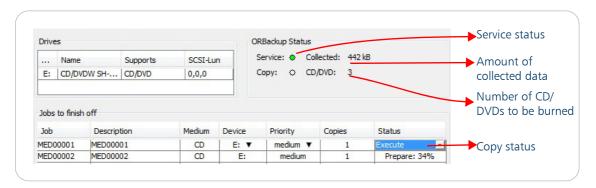


Figure 211. MakeCD - Service status

MakeCD processes the jobs according to priority. First, a copy of the medium is created. Then it is checked whether a suitable medium is available in the drive. If no medium is available, the drive tray opens and the following dialogue is displayed:



Figure 212. Dialogue - Insert medium

21.8 MakeCD 337 / 372

Please insert a medium and then click the button "medium inserted" or close the tray of the CD / DVD burner. When clicked on the "Create later", then the job is pending until it is activated again manually or until the programme is restarted.

For jobs that are not being processed, the drive (if several are available), the priority and status to be changed. Click on the corresponding table field and select a menu item. With this function, a pending job can be activated.

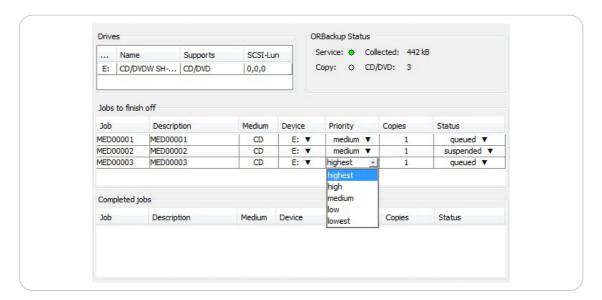


Figure 213. MakeCD - Compile job

21.8.2 Configuration of MakeCD

MakeCD is installed to the directory "C:\dicomPACS\ORBackup\MakeCD". Used programmes, from version 1.0.7, are located in the directory "C:\dicomPACS\cdrecord". During the startup, the programme reads the configuration file "dicomPACS.properties" from the installation directory. In the following the available parameters are listed:

Parameter	Standard value	Function
MakeCD.BackupStatus.Show	false	Activates the display of the backup status.
MakeCD.BackupStatus.IpAddres s	localhost	Ip_address or hostname of the computer running ORBackupService.
MakeCD.BackupStatus.Port	2014	Port of ORBackupService that is waiting for connections.
MakeCD.BinDir	C\:\\dicomPACS\\ cdrecord\\	Directory in which the programmes used by MakeCD are located.
MakeCD.Disable. < SCSI-Lun>	false	The entry 'true' results in not using the drive which us used by MakeCD.

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Parameter	Standard value	Function
MakeCD.Drive. < SCSI-Lun>	<leer></leer>	If the automatic assignment of the drive letters to the drives does not work, here the correct drive letter can be set: e.g. =\E:
MakeCD.Drive.0,1,0.Speed.BR MakeCD.Drive.0,1,0.Speed.CD MakeCD.Drive.0,1,0.Speed.DVD	0	Burning speed for each media type ,0' = maximum speed of the drive
MakeCD.JobDirectory	C\:\\dicomPACS\\ ORBackup\\media\ \	Directory, where the files with the burn jobs and data directories are expected. If the directory is shared in the network, also other jobs from other computers may be processed.
MakeCD.KeepJobTimeHours	168	Time in hours, according to which old jobs are deleted from the status file.
MakeCD.ReloadBeforeVerify. < S CSI-Lun >	false	If set to 'true', the disk tray is opened and closed again before 'verify'. Windows is then forced to read the data from the CD.

Table 72. Parameter MakeCD

MakeCD writes the current status during the operation in the job directory "/Status/Status.txt".

21.8.3 File extension of the job files

File extension	Description
*.jrq	Job file has not yet been loaded by MakeCD
*.qrj	Job file is loaded from MakeCD, but is not in progress
*.inp	Job file is in process
*.don	Job was completed successfully. The file is deleted immediately from version 1.0.7.
*.err	During the processing of the job errors occured. The job is repeated.
*.cnl	Job was cancelled/aborted by the user.
*.unn	Invalid job file

Table 73. File extension of job files

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21.8.4 Log files

The following log files are created:

- "makeCD.log", which contains the log entries of the programme run by MakeCD
- "cdrecord.log", which contains the output of the programmes "mkisofs" and "cdrecord" accessed by MakeCD.

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Chapter 22. Checklist

22.1 Starting the system

Description	checked
dicomPACS®DX-R software starts automatically when a user logs on	
No messages (errors) are shown on boot / login	
Required additional components start automatically and correctly:	
ConsoleSCU	
dicomCC (optional)	
Worklistserver (optional)	
OrdicomPrint (optional)	

22.2 Workflow

Description	checked
Localisation:	
The correct language is installed	
The correct version (human / vet) is installed	
The virtual keyboard has the correct charts	
Data input:	
Manual data input in the patient tab shows the required fields	
RIS/HIS connection:	
Worklist jobs from the RIS/HIS are shown correctly	
RIS query does not take more time than one second (if not, in most cases it is a DNS problem and could be solved by filling the host file)	
Image acquisition:	
X-Ray helper:	

22.1 Starting the system 341 / 372

Description	checked
Is installed for the used language	
Is installed for the used exam tree	
Examination tree:	
Contains the needed examinations	
Unused tree parts / examinations are not shown	
Exams have correct settings for flip / mirror	
<u>Please notice</u> that in some countries automatic flipping/mirroring is not allowed and has to be disabled!	
X-ray generator control:	
The selected generator has the same settings for kVp/mAs steps as the one used	
If no generator control is used, it is also possible to disable the generator control panel in the exposure tab, then deselect "Show generator control" in the generator tab of the support mode	
AEC-fields:	
The selected AEC fields are used correctly by the generator. To test it, cover all except one with led and measure if the generator puts out the correct dose.	
The position of the ACE-fields is used correctly for the ROI in the processing.	
Sensors (Panel or CR):	
The sensors are installed (and calibrated) following the manufacturers instructions	
For <u>each</u> sensor the following settings are set to typical user values:	
Flip / mirror	
Invert	
Offset is set in sensors.xml according to the manual	
Maxvalue is set in sensors.xml according to the manual	
Data Output:	
The institution data is correctly shown in the created DICOM images	
The patient data is in the correct DICOM tags in the created DICOM image	
The pixel spacing shown in the created dicom images equals the one for the panel/reader	
Processings are adjusted to the doctor's needs and assigned to the correct examinations	

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Description	checked
Training of staff is done	

22.3 Backup

Description	checked
When the installation is finished, a database backup is made in the dicomPACS®DX-R configuration tab	
A backup of the processing xml files is made	
When the installation is finished a disk image is made	

22.3 Backup 343 / 372

ett blank intentionally

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Chapter 23. Frequently Asked Questions - FAQ

23.1 How to change the language

 $dicomPACS^{®}DX-R$ can be configured in any language that is supported by the programme. If no specific language is configured, English is used as a standard. The language settings of the user interface can be changed in the file:

C:\dicomPACS\console\dicomPACS.properties

To change the language, please change the following parameters:

Application.UseLocales=en
Application.UseLocalesCountry=EN

For a list of supported languages see the table below:

Language	Abbreviation
German	de
English	en_EN (default), en_BE (Belgium)
French	fr
Japanese	ja
Hungarian	hu
Italian	it_IT (Italy), it_CH(Switzerland)
Korean	ko
Polish	pl
Russian	ru
Ukrainian	uk
Latvian	lv
Lithuanian	It
Estonian	et
Bosnian	bs
Spanish	es_ES (Spain)
Portuguese	pt
Chinese	zh
Czech	cs
Thai	th (for patient data input only)
Arabic	ar (for patient data input only)

Language	Abbreviation
Hebrew	iw (for patient data input only)
Modern Greek	el (for patient data input only)
Hindi	hi (for patient data input only)

Table 74. List of all available languages

The date format can be changed separately for *dicomPACS*®*DX-R* in the support mode.

23.2 How to transfer settings between workstations

Generator values are stored in the SQL database ORXrayDB. Additionally, the assignment of processings to examinations is kept in this database.

To backup this database, go into the support mode in the console software. Backup the ORXrayDB from the tab Backup and ConfigurationDB. The backup file, e.g. "ORXrayDB_Monday.bak", is stored in "C:\dicompacs\console\backup".

You can copy this file and insert it on another working station; then use the restore function in the support mode of the console software.

DANGER!



EN: This will overwrite all generator settings and processing assignments on the target machine!

FR: Cela écrasera tous les paramètres et tâches de traitement du générateur sur la machine cible!

To transfer the actual processings, another step is needed. The processings are stored in xml-files in the folder "C:\dicompacs\console\proc". One file for each organ tree.

Processing_Adult.xml Processing_Child.xml

Copy those files if you need the processings on the other working station, too.

Note



If the actual image processing is done by third party software (e.g. KodakQC) please refer to the manuals of the according manufacturer.

23.3 How to backup images and databases

To have a complete backup of the image database, you need to take two steps:

- 1. backup the SQL
- 2. copy the actual images

Since version 1.7 the software writes a backup of the SQL image database to c:\dicompacs\console\backup automatically when the programme is closed.

Alternatively, you can backup that database using your own scripts:

e.g. osql -S localhost -U sa -P "or18057" -n -Q "BACKUP DATABASE ORconsoleDB TO DISK = 'c:\dicomPACS\console\Backup\NameOfMyBackupfile.bak"

Copy that file to a backup device.

The second step is to copy the folder c:\dicompacs\orconsoledb or d:\dicompacs\orconsoledb (depending on your installation) to a backup device.

To restore the database after a working station failure, you have to take three steps.

- 1. install dicomPACS®DX-R, if not already installed
- 2. restore the database by the restore dialogue of the database in the support mode or from the backup file
 - osql -S localhost -U sa -P "or18057" -n -Q "Restore DATABASE ORconsoleDB FROM DISK = 'c:\dicomPACS\console\Backup\NameOfMyBackupfile.bak"

Note



You might have to drop the current database *orconsoledb* before you can restore it from the file.

3. copy the folder ORconsoleDB from the backup device back to the machine, e.g. D:\dicomPACS\...

23.4 How to change generator settings for examinations

There are two ways to do this.

The first one is executed in the support mode. There you can assign generator values for the different organ trees in one big table per organ tree.

The other way is executed in the configuration mode (management -> configuration). There you have one tab within each examination's configuration screen which is named generator values. Using this way you can only edit the line concerning this examination, while using the first way you can change multiple examinations faster.

23.5 How to connect to a worklist service provider

Enter the support mode. Create an alias for your new worklist. Select this newly created worklist alias from the list on the left side. On the right side you have to configure the parameters for the dicom communication.

Console AET = AETitle the console uses to identify itself
Hostname = IP/Hostname of worklistserver
AET (SCP) = AETitle the console uses to address the worklistserver
Port = port on which the worklist server is listening for incoming connections
The according license is required to use a worklist service provider.

23.6 How to add a macro

For recurring planned sequences (e.g. Thorax pa + Thorax lat.) you can define a macro. This saves time when planning a study, as it plans multiple examinations with one click.

Switch to the configuration mode from the management screen. Navigate to the body part where you need the macro. At the end of the examination list there is a button to create a new macro.

At the right side you can set the name of the macro. Then use the button at bottom right to add examinations to the macro. When you have added all the needed exams and sorted them like the customer wants, click finish at the bottom right and this sequence of examination is saved in the macro.

23.7 How to configure DAP

In the support mode select the generator settings. There you can configure the path to the DAP interface program and the settings for the serial port.

The DAP program will write the values into the SQL database. The console software then merges the dose with the associated image. The matching criteria is based on time. When there is a dose from two seconds before to five seconds after an image was taken, this dose will be merged with this image. The interval of five seconds can be adjusted in the file c:\dicompacs\console\dicompacs.properties.

Search for the parameter Console.ExposureDapTime.Increment=5 or add this parameter if its not already in this file. Then adjust the value to your needs.

23.8 How to use multi exposure

At first you have to activate this option in the tab of the support mode.

Afterwards multi exposure has to be configured for each examination in the Configuration mode. Therefore, select an examination and the image processing tab. Select the usage of multi exposure. When a study with configured multi exposure is planned, a number of exposure has to be taken. After the exposures, select between a image with minimum, maximum or an average of image values to be used. This resulting image is additionally stored in the study.

23.9 How to configure Storage Commitment

Storage Commitment is a DICOM service class and is used by a DICOM device to get a confirmation that a particular DICOM image in the archive is available and is stored there (forever). Only the SOP instance UID and SOP class UID of the image is transmitted and checked. In one data set, the data of several frames can be transmitted.

The DICOM device can, for example if it gets a successful request delete the image data in its own database. The first Storage Commitment request is sent five minutes after the successful storage and is repeated each hour in the case of a failure.

Storage Commitment is available from version 2.6l of the ConsoleSCU.

23.9.1 Configuration in the dicomCC.ini

All AE's which are sending Storage Commitment requests have to be defined as follows:

```
[AE-Title]
host=<HOSTNAME>
port=<PORT NUMBER>
```

They must not be configured as PARTNERS. The data is used to send back the Storage Commitment report. Otherwise the connection is refused with an error message.

The tag 0008;0016 has to be added:

```
[dicom-ARCHIV]
AdditionalInstanceTags=$00080016
```

The tag includes the SOP class UID of the images. For this tag the column G0008E0016 is created in the table dicomInstance. This table is essential for using the Storage Commitment.

To activate the Storage Commitment SCP set this options as follows:

```
[SCP]
; enable storage commitment SCP
SC_enable=1
SC Port=0
```

23.9.2 Configuration in the ConsoleSCU

Add this port in the ConsoleSCU.ini to receive the storage commitment answers.

```
[SCU] ; the port on which the SCU receives the SC report ; if not set or '0' SC receiver is not started SC_Port=4000
```

Additionally the time range for the queries can be edited. Therefor add the following parameters:

```
SCFirstRequest=60 → Sets the seconds till the first query SCRepeatRequest=600 → Sets the seconds till the next query
```

It must be defined at least one sending destination as Storage Commitment-SCP.

```
[ARCHIVE]
host=archive
port=104
...
RequestStorageCommitment=1
```

23.10 How to backup the acquisition software

Databases

- ORConsoleDB
- ORXrayDB

Configuration files

In "C:\Users\"user name"\dicomPACS-Console"

- MultiViewerFrameConfig.xml
- ToolsConfig.xml

In "C:\dicomPACS\Console"

- Console.ini
- dicomPACS.properties
- all *.XML files
- the entire "proc" folder
- the entire "overlays" folder
- the entire folder from the detector if used, e.g. "C:\dicomPACS\Console\DRTech" for the Flaatz Panel

If you are using one of these functions, you also need to backup:

• Hanging-Protocols: HangingProtocols.xml

Prothesis: ProsthesisConfig.xmldicom-printer: PrinterConfig.xml

In "C:\dicomPACS\consoleSCU"

consoleSCU.ini

Note



Please note that this information is only applicable on standard systems. This information is not complete for systems with a high degree of customisation.

23.11 How to send images via a database SQLstatement

If you wish to resend images at once, you can make an entry in the SQL database. The ConsoleSCU then receives the job automatically. If you want to resent all images e.g. from the last three month starting from 01.11.2013 you have to insert the following information into the job table:

(JobType, ZielAET, SQLstatement, trsyntax, quality) values ('send','<ZielAET>','studydate > "20130111" ',",")

If you wish to e.g. send all images from the ORconsoleDB, e.g. set autoincrement=0 or adjust the time frame required.

You have to replace the value <ZielAET> with the AE Title of the partner, that is registered in the ConsoleSCU and to which the images should be sent.

23.12 Test exposures

In the section of the created macros in the organ tree of the X-ray view, a test exposure is available. E.g. during the installation of an X-ray unit, you have got two macros (70kVp or 100kVp) including several recommended exposures for the constancy test of X-ray units. Those macros are used in the medical field.

You can activate additional macros for the acceptance test in configuration mode. Therefor you have to activate them by setting the checkmark in front of the macro's name, which changes the crossed out name of the macro. Now you can find the respective macro in X-ray view.

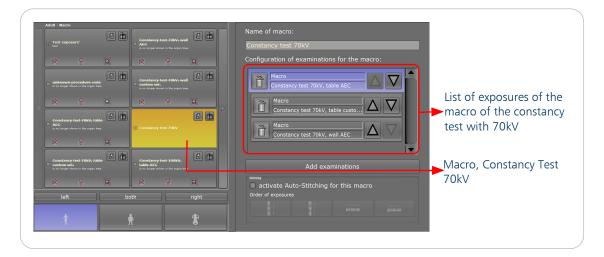


Figure 214: Configuration mode - macros

The macros each contain exposures that are required by the DIN 6868-150 "RöV acceptance test of medical radiographic and fluoroscopic X-ray equipment" as well as DIN 6868-13 "RöV constancy test of projection radiography systems with digital image receptors" according to the German X-ray regulations.





The exposures contain recommended values as per the German standard, please check the regulations in the country of installation!

This simplifies the process in preparation for the tests, since the manual creation of individual exposures for each upcoming test that is performed in intervals is omitted. You may, however, as possible for each macro, add exposures to the macro or change their order.

If changes to the recommended values need to be made, for example when deviation were found during the acceptance test for the constancy test, it can be done in the respective exposures. These are stored in the macros and can be recalled for subsequent constancy tests again and again.

In the field of veterinary medicine only a test exposure is necessary.

23.13 Prevent disconnection of SQL database overnight

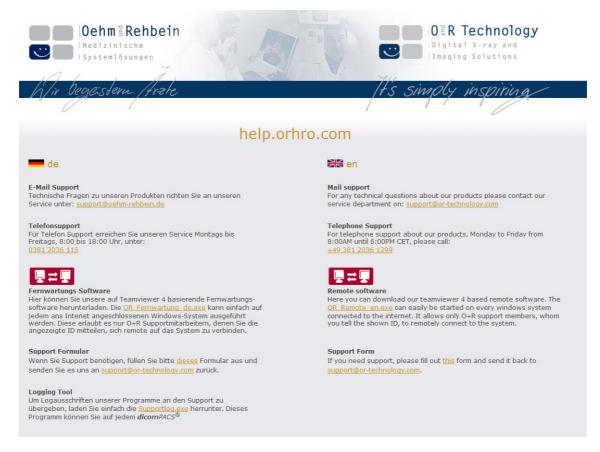
If the database connection breaks overnight because the PC is in sleep mode, the jDicomCC looses its connection. When creating the first study the following day, the jDicomCC fails to transfer the first image. After about one minute the first image will be sent again. In case images are sent to the Viewer within less than one minute, the missing image will not show up immediately.

To avoid this behaviour, disable the hibernation on your system.

Execute the cmd as admin and enter "powercfg.exe /hibernate off".

Chapter 24. Support by OR Technology

In case you need support by OR Technology, please visit the following website http://help.orhro.com/



There you can find what type of information is requested for a fast and efficient support process.

In every support case it is necessary to fill out the support form and to send the Supportlog.exe. It gives detailed information on the configuration files and system information.

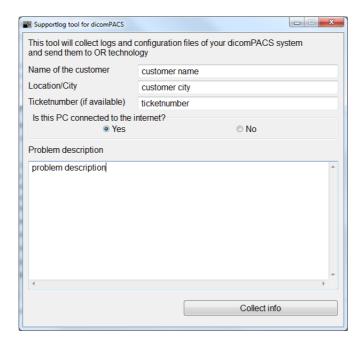
If you have an internet connection, the Supportlog.exe is loaded automatically on the FTP Server of OR Technology and the support is informed of the new entry.

In case you have no internet connection, the zip file has to be sent by email. The zip file is always located under C:\dicompacs\supportlog.

24.1 Supportlog.exe

The tool "Supportlog.exe" helps the supporters to identify/clarify a problem by collecting data from customers. If an internet connection is available, this data is sent directly to the FTP server of OR Technology, whereby an automatic Email will be sent to OR Technology. Below is a brief explanation on how to properly execute the "Supportlog.exe":

After starting the "Supportlog.exe", a window opens, in which the name of the customer, the location and the existing ticket number for this issue should be specified where possible. Also the problem description should be given as detailed as possible.



Afterwards, press the button "Collect info", which will open a CMD window that includes all necessary data, such as log files, database XML's and information about the customer's hardware. If everything went well, you will receive a message that the upload of the "Supportlog" has been successful.

Chapter 25. Appendix

25.1 FDA relevant information

Summary of the Digital Panel Characteristics

Additional details are provided in the following documents:

- Manuals of the respective flat panel detector or cassette
- Sensitometric response characteristics typical of flat panel detectors:

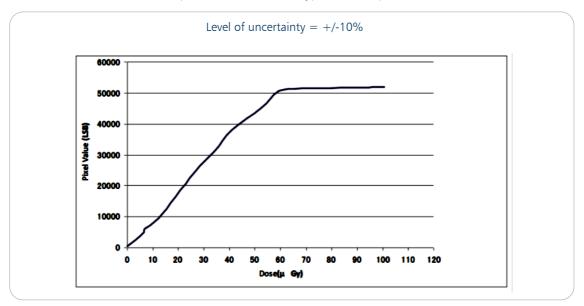


Figure 215. Response characteristics

Display means utilised

For the diagnostic review of digital X-ray images, we recommend the highest LCD resolution available given your budgetary limitations. We can recommend diagnostic grade displays which have received FDA 510(k) clearance, with 5 mega pixel resolution (or more). Resolution can be computed by multiplying the maximum horizontal resolution by the maximum vertical resolution.

Results of image tests

A USA based board certified radiologist reviewed images from all six panels and found them to be of good quality, high resolution, and clinically acceptable. The review was conducted in accordance with the FDA guidance document on solid state X-ray imaging panels.

Typical patient doses

The table below gives typical dose reference level for adults (height: 175cm, weight: 75kg) and is valid for all six panels.

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Examination	DAP * [dGycm ²]	Examination	DAP * [dGycm ²]
Skull AP/PA **	6.5	Thoracic spine AP	13
Skull LAT***	6	Thoracic spine LAT	17
Chest PA	1.6	Lumbar spine AP	23
Chest LAT	5.5	Lumbar spine LAT	42
Abdomen AP/PA	30	Pelvis AP	30

Table 75. Dose reference level

* DAP: dose area product

** AP: anterior-posterior PA: posterior- anterior

*** LAT: lateral

List of preprogrammed examinations

List of pre-programmend examinations

Subpopulation Child:

S-Va	- 200	- 200	- 200	- 200	- 200	- 200	- 200	250 -	250 -	- 200	- 200	- 102	- 020		
ĄĒC	yes	kes	yes	yes	yes	yes	ou	no	ou	yes	ņ	no	04		
Filtration	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	yes (+ 0,1mm Cu)	(i) mm() +) sen		
Grid	yes	none	sań	yes	yes	none	none	none	none	auou	none	none	euou		
FFD	115	150	150	115	115	115	105	105	105	115	105	105	105		
mAsaec	S	16	10	8	S	32	33	16	∞	32	22	50	16		
mAs _{def.}	∞	3,2	1,6	10	6,4	4	3,2	2	9,1	2	2,5	2,5	2.5		
mAsmax	10	2	2	12,5		6,4	2	3,2	2,5	6,3	4	4	7		
m.As _{m in}	6,4	3,2	1,25		2	3,2	2,5	1,25	1,25	4	2	2	16		
kV def.	70	20	109	70	73	63	63	22	20	70	63	63	50		
КУmax	77	08	120	E,	77	99	99	8	23	73	99	99	23		
kУmin	70		70		1 00	99	70	09	09	25	20	70	09	09	53
Thickness	16	10	15	15	16	8	7	2	2	10	7	7	Ľ		
Protocol Name	Whole spine AP	Chest standing up to 6 years PA	Chest standing PA	Skull pa	Pelvis supine AP	Gavide supine AP	Humerus 2 joints	Forearm both joints AP	Hand DV	Upper leg 2 joints AP	Knee AP	Lower leg 2 joints	Andelat		
Clinical Application (Target)	Spine	Thorax	Thorax	Skull	Pelvis	Shoulder girdle	Upper Limb	Upper limb	Hand	Lower limb	Lower limb	Lower limb	Foot		

Subpopulation Infant:

S-Va		- 005	250 -	- 005	250 -	- 200	250 -	- 005	250 -	- 200	250 -
AEC		no									
Filtration		yes (+ 0,1mm Cu)									
Grid		none	none	uou	none						
FFD	[cm]	105	105	105	105	105	105	105	105	105	105
mASAEC							-	-		-	
mAs _{def.}		1	1	1,25	1	1,25	1,25	1,6	9′1	2	2
mAs _{max}		1,25	1,25	9'1	1,6		2	2	2,5	2.5	
m.As _{m in}		8,0	8'0	ı	8'0	-	1	1,25	1,25	1,6	1,6
k∨		09	09	09	09	63	63	99	99	99	99
КV		09	09	09	09	œ	63	99	99	99	99
kVmin		09	09	09	09	63	63	99	99	99	99
Thickness	[du]	5	S	- 2	9	00	8	10	6	11	10
Protocol Name		Abdom en <1 kg	Chest <1kg	Abdomen 1-2kg	Chest 1-2kg	Abdomen 2-3kg	Chest 2-3kg	Abdomen 3-4kg	Chest 3-4kg	Abdom en >4kg	Grest >4ka
Clinical Application	[Target]	Abdomen	Chest								

kV_{min}, kV_{max}, kV_{dd.}: Range of voltage adjustment and the default votage for the x-ray examinations (same for AEC and manual technique) mAS_{min}, The default mAs-Product for the x-ray examinitions (manual technique)

Thickness: Estimated thickness of the body part to be examined Filtration: Additional filtration of the X-ray beam corresponding to the other values in the table S-Value: The targeted S-Value for the examinations (same for AEC and manual technique) FFD: film-focus distance — AEC: automatic exposure control

List of pre-programmend examinations

Subpopulation Adult:

ne		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	250		100	100	000
S-Value		250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	250 - 400	150 - 250		250 - 400	250 - 400 250 - 400	250 - 400 250 - 400 250 - 400
AEC		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	ou	ou	ou	0.071)es	ou	n o
Filtration		none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	1 1	none	none	none
Grid		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	no	2011	SE)	no	00 00
FFD	[cm]	115	115	115	115	115	115	180	180	115	115	115	115	115	115	105	105	105	115	2	115	115
mAs _{AEC}		63	100	200	250	320	125	32	63	160	160	200	100	20	63	25	32	20	80)	50	50
mAs _{def.}		10	16	32	40	80	20	2,5	6,3	16	16	16	16	12,5	10	4	4	2	000)	4	3.2
mAs _{max}		12,5	20	63	80	125	32	3,2	8	20	40	63	32	16	12,5	6,3	6,3	3,2	12.5)	12,5	12,5
mAs _{min}		8	12,5	25	25	40	16	1,25	3,2	12,5	10	8	8	8	8	2,5	3,2	1,3	6.3		2,=	2,5
kV _{def.}		70	77	81	81	06	77	125	125	70	81	77	77	99	99	22	22	20	77		09	09
kV _{max}		27	85	85	85	92	85	125	125	75	100	06	80	75	75	09	09	09	80		70	70
kV _{min}		99	70	70	70	85	70	125	125	09	80	75	70	09	09	20	20	20	20		09	09
Thickness	[cm]	13	22	32	21	31	19	22	32	20	21	19	19	12	10	9	9	3	16		11	11
		Cervical spine AP	Thoracic spine standing AP	Thoracic spine standing LAT	Lumbar spine AP	Lumbar spine LAT	Skull PA	Chest PA	Chest dexsin. LAT	Hemithorax (Ribs) PA	Abdomen standing PA	Pelvis AP	Hip joint AP	Shoulder neutral AP	Humerus AP	Elbow VD	Forearm VD	Hand DV	Upper lea with knee Hip		Knee LAT	Knee LAT Lower Leg AP
Clinical Application Protocol Name	[Target]	Spine	Spine	Spine	Spine	Spine	Skull	Thorax	Thorax	Thorax	Abdomen	Pelvis	Pelvis	Shoulder girdle	Upper limb	Upper limb	Upper limb	Hand	Lower limb		Lower limb	Lower limb Lower limb

kV_{min}, kV_{max}, KV_{def.}: Range of voltage adjustment and the default votage for the x-ray examinations (same for AEC and manual technique) mAs_{min}, mAs_{max}, mAs_{def.} : Range of mAs product adjustments and the default mAs product for the x-ray examinitions (manual technique) mAs_{AEC}: The default mAs-Product for the x-ray examinitions (AEC technique)

Thickness: Estimated thickness of the body part to be examined Filtration: Additional filtration of the X-ray beam corresponding to the other values in the table S-Value: The targeted S-Value for the examinations (same for AEC and manual technique) FFD: film-focus distance AEC: automatic exposure control

25.2 Guidelines for pediatric subjects

Use special care when imaging patients outside the typical adult size range.



CAUTION/ATTENTION!



EN: Children are more radiosensitive than adults. Adopting the Image Gently campaign guidelines and reducing dose for radiographic procedures while maintaining acceptable clinical image quality will benefit patients.

FR: Les enfants sont plus radiosensibles que les adultes. Les paramètres d'exposition conçus pour les adultes peuvent résulter en une exposition excessive aux radiations s'ils sont utilisés pour de jeunes patients. Les principes « As Low As Reasonably Achievable » (ALARA) devraient toujours être suivis lors du choix des paramètres de l'équipement afin de minimiser l'exposition aux radiations du patient pédiatrique.

As a general rule, the following recommendations shall be observed in pediatrics:

- Use short exposure times and ensure necessary immobilization of the child (by device or parent).
- Set a correct field size (not too large, not too small, set it by hand).
- Apply necessary shielding, particularly to gonads and thyroid.
- Whenever possible, use high kVp techniques.
- If possible, add more filtration.
- Do not use anti scatter grid below body part thickness of 12 cm to apply lower doses.
- Check whether AEC technique is useful. If in doubt, preferably use a manual technique.

Positioning the pediatric patient

Pediatric patients are not as likely as adults to understand the need to remain still during the procedure. Therefore it makes sense to provide aids to maintaining stable positioning. It is strongly recommended the use **of immobilizing devices** such as bean bags and restraint systems (foam wedges, adhesive tapes, etc.) to avoid the need of repeating exposures due to the movement of the pediatric patients. Whenever possible use techniques based on the lowest exposure times.

Protective shielding

Extra shielding of radiosensitive organs or tissues such as eyes, gonads and thyroid glands is strongly recommended. Applying a correct collimation will help to protect the patient against excessive radiation as well.

Please review the following scientific literature regarding pediatric radiosensitivity:

GROSSMAN, Herman. "Radiation Protection in Diagnostic Radiography of Children". Pediatric Radiology, Vol. 51, (No. 1): 141- 144, January, 1973: http://pediatrics.aappublications.org/cgi/reprint/51/1/141.

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Technique factors

You should take steps to reduce technique factors to the lowest possible levels consistent with good image acquisition. For example if your adult abdomen settings are: 70-85 kVp, 200-400 mA, 15-80 mAs, consider starting at 65-75 kVp, 100-160 mA, 2.5-10 mAs for a pediatric patient. Whenever possible use high kVp techniques and large SID (Source Image Distance).

The following table can be used to estimate technique factors for various body builds.* As the patient size increases, the kVp generally increases. Also depicted in Table 1 are the corresponding values of X-ray beam cross-sectional area and the estimated patient thickness in terms of water equivalence

Age	Head	Chest	Abdomen	Extremity (Forearm)
Newborn	67 kV/2.0 mAs (110 cm²/9.0 cm)	60 kV/2.0 mAs (140 cm²/8.0 cm)	60 kV/2.0 mAs (140 cm²/8.0 cm)	NA
1-yr-old	72 kV/2.0 mAs	66 kV/2.0 mAs	70 kV/4.0 mAs	56 kVp/5.0 mAs
	(160 cm²/12 cm)	(240 cm²/9.0 cm)	(300 cm²/13 cm)	(35 cm²/1.8 cm)
5-yr-old	75 kV/2.0 mAs	70 kV/2.0 mAs	72 kV/5.0 mAs	60 kVp/5.0 mAs
	(210 cm²/14 cm)	(430 cm²/10 cm)	(540 cm²/15 cm)	(84 cm²/3.3 cm)
10-yr-old	77 kV/2.0 mAs	74 kV/3.0 mAs	75 kV/6.0 mAs	62 kVp/6 mAs
	(240 cm²/15 cm)	(670 cm²/13 cm)	(820 cm²/17 cm)	(140 cm²/5.0 cm)
15-yr-old	79 kV/2.0 mAs	78 kV/4.0 mAs	78 kV/7.0 mAs	65 kVp/6.0 mAs
	(270 cm²/16 cm)	(780 cm²/12 cm)	(900 cm²/20 cm)	(200 cm²/6.2 cm)
Adult	75 kV/15 mAs	120 kV/2.0 mAs	75 kV/15 mAs	65 kVp/8.0 mAs
	(320 cm²/20 cm)	(1300 cm²/15 cm)	(1200 cm²/22 cm)	(200 cm²/7.9 cm)

Table 76. From "Pediatric effective doses in diagnostic radiology" (Walter Huada¹, Nikolaos A Gkanatsios², Robert J Botash¹, Ann S Botash³)

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- ² Department of Radiology, University of Florida, Gainesville, FL, USA
- ³ Department of Pediatrics, SUNY Health Science Center at Syracuse, NY, USA

Dosimetry

The next table summarizes the key dosimetry parameters for the four types of radiographic examination for patients ranging from newborn to the adult. In each cell, the first value is the entrance skin air kerma (free-in-air) in μ Gy. The second term gives the energy imparted to the patient, expressed in μ J. In parentheses on the second line are the corresponding values of patient effective dose in μ Sv.

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Age	Head 100 μGy/78.2 μJ (10μSv)	Newborn Chest 77 µGy/66 µJ (19µSv)	Abdomen 100 μGy/140 μJ (62μSv)	Extremity (Forearm)
1-yr-old	120 μGy/165 μJ	96 μGy/160 μJ	230 μGy/580 μJ	130 μGy/9.5 μJ
	(7.3 μSv)	(16 μSv)	(90 μSv)	(0.21 μSv)
5-yr-old	140 μGy/260 μJ	110 μGy/340 μJ	320 μGy/1500 μJ	160 μGy/44 μJ
	(5.9 μSv)	(18 μSv)	(120 μSv)	(0.50 μSv)
10-yr-old	150 μGy/320 μJ	190 μGy/1100 μJ	420 μGy/3300 μJ	200 μGy/130 μJ
	(4.3 μSv)	(33 μSv)	(160 μSv)	(0.87 μSv)
15-yr-old	150 μGy/400 μJ	280 μGy/2100 μJ	550 μGy/5100 μJ	220 μGy/240 μJ
	(3.1 μSv)	(36 μSv)	(140 μSv)	(0.92 μSv)
Adult	1100 μGy/3200 μJ	150 μGy/2500 μJ	1100 μGy/13000 μJ	300 μGy/360 μJ
	(19 μSv)	(34 μSv)	(290 μSv)	(1.1 μSv)

Table 77. Dosimetry

Field size

Limiting the X-ray beam by setting an appropriate field size is very important in pediatric radiography. A field size set too small obviously degrades the respective image, but even a field size which is set too large will degrade the image quality. A field set too large will impair image contrast and resolution by increasing the amount of scattered radiation but also - most importantly - result in unnecessary irradiation of the body outside the area of interest.

Other references for pediatric dosimetry:

- Size measurements are based on approximate mean values (averaged across males and females) from: McDowell, M.A., C.D. Fryar, C.L. Ogden, and K. M. Flegal. 2008. Anthropomorphic Reference Data for Children and Adults, United States, 2003-2006. National Health Statistics Reports, 10, 1-48. Available for download at: http://www.cdc.gov/nchs/data/nhsr/nhsr010.pdf. The weight given for the neonate subgroup is lower than the average to ensure that a broad range of sizes is adequately covered.
- These suggested subgroups fall within the age groups identified in the guidance entitled "Premarket Assessment of Pediatric Medical Devices" (http://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM089742.pdf): neonate (birth-1 month), infant (1 month-2 yrs.), child (2-12 yrs.), adolescent (12-21 yrs.). For design and evaluation of radiological devices, patient size (i.e. height, weight, thickness) is a better indicator.
- Based on reports of the lifetime incidence of cancer vs. age of exposure data, these pediatric
 subgroups defined by the Agency cover the region where the largest age dependence is
 expected for cancer risk. Risk decreases much less steeply as a function of age for individuals
 over 21 years old. [See NAS National Research Council Committee to Assess Health Risks from
 Exposure to Low Levels of Ionizing Radiation. 2006. Health risks from exposure to low levels of
 ionizing radiation: BEIR VII phase 2. Washington, D.C.: National Academy of Sciences, National
 Academies Press.]

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- The following reference gives current data for anteroposterior and transverse body diameter for pediatric patients ranging in age from 0.5 to 20 years: Kleinman, P. L., K. J. Strauss, D. Zurakowski, K. S. Buckley, and G. A. Taylor. 2010. Patient size measured as a function of age at a tertiary care children's hospital. American Journal of Roentgenology, 194, 1611-1619.
- The following reference used cylindrical phantoms with diameters of 8, 16, 24, and 32 cm to represent a neonate, 5 year old, 12 year old, and adult patient respectively: Siegel, M. J., et al. 2004. Radiation dose and image quality in pediatric CT: effect of technical factors and phantom size and shape. Radiology, 233(2), 515- 522.

Summary:

- Image only when there is a clear medical benefit.
- Image only the indicated area.
- Use the lowest amount of radiation for adequate imaging based on size of the child.
- Try to use always short exposure times, large SID values, high kVp techniques and immobilizing devices.

Avoid multiple scans and use alternative diagnostic studies (such as ultrasound or MRI) when possible.

25.3 Protect your imaging system from cybersecurity threads

Because the Digital Radiography Systems are connected by Wi-Fi or Ethernet to the host computer containing the software, and the host computer may in turn be connected to the hospital information system, and ultimately the Internet, cybersecurity may become an issue for you. Here are some tips to keep your system and your medical images secure.

25.3.1 Required strategies: Your responsibilities

Use antivirus programmes such as:

- TotalAV
- ScanGuard Security Suite
- Norton by Sumantec
- PCProtect
- Mcafee Antivirus Plus

Keep these products up to date.

Identify and protect:

- Limit access to trusted users only: Limit access to devices through the authentication of users (e.g. user ID and password.)
- For remote access (e.g TeamViewer) set a password
- Use a correctly configured firewall (only used ports shall be available while other ports has to be blocked)

Ensure trusted content:

- Restrict software or firmware updates to authenticated code. Use only materials supplied by us four your image management software updates.
- Use systematic procedures for authorized users to download version-identifiable software and firmware from the manufacturer.

Detect, respond, recover:

- Watch for on-screen warnings of possible virus infections.
- Respond by scanning for and removing possible virus infections.
- Recover from possible virus infections by having up-to-date backups of your host computer.

25.3.2 Required strategies: Our responsibilities

We affirm our commitment to providing you with validated software updates and patches as needed throughout the life cycle of the medical device to continue to assure its continued safety and effectiveness. Please promptly apply software updates and patches provided by us, and never use image management software supplied by anyone else. Our development process utilizes the Microsoft Malware Defense Guide which can be found at:

https://technet.microsoft.com/library/cc162791#E1F

We are constantly scanning our development computers for malware. We hope you are doing the same.

A summary of our integrity controls

- Our development computers are constantly being scanned for malware, and our supplier for antivirus software automatically updates the software continuously as new threats are revealed.
- We perform daily backups to our external hard drives. These drives are then disconnected from the system after the backups.
- During software development, we disconnect from the Internet to prevent external attacks.
- Our development process utilizes the Microsoft Malware Defense Guide.
- Copies of software updates we will be sending you are individually scanned for malware. Use only materials supplied by OR Technology for your updates.

Conclusion

It is our joint responsibility to ensure your medical image software and image collection are safe and secure. We must both do our parts.

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Chapter 26. List of warnings in the technical manual

page 17

♠ CAUTION/ATTENTION!



EN: dicomPACS®DX-R is not designed for b/w monitors!

FR: dicomPACS®DX-R est exclusivement conçu pour les écrans en couleur!

page 18

CAUTION/ATTENTION!



EN: If one of this image source should be used, install first the according software and afterwards install *dicomPACS®DX-R*. Otherwise the functionality of the software can not be guaranteed.

FR: Si l'une de ces sources d'image devait être utilisée, installez d'abord le logiciel correspondant et installez ensuite *dicomPACS®DX-R*, sans quoi la fonctionnalité du logiciel ne peut être garantie.

page 25

↑ CAUTION/ATTENTION!



EN: All images and configurations are deleted respectively reset.

FR: Toutes les images et configurations sont effacées et réinitialisées respectivement.

page 30

CAUTION/ATTENTION!



EN: While running the VistaScanConfig application Dürr enters with the wrong IP address (192.168.6.14). This has to be deactivated manually in the following tab. Type in the correct IP address which is 192.168.3.125. Then the device will be recognized and can be used in *dicomPACS®DX-R*.

FR: En démarrant l'application VistaScanConfig de Dürr, une adresse IP erronée est enregistrée dans le logiciel de radiographie (192.168.6.14). Cela doit être désactivé manuellement dans l'onglet suivant. Saisissez l'adresse IP correcte qui est 192.168.3.125. L'appareil sera ensuite reconnu et pourra être utilisé dans *dicomPACS®DX-R*.

page 37

CAUTION/ATTENTION!



EN: The IdentifierString is dependent on the license server. The SeriesUID is generated by the license server. If one is planning in a demo license mode, and then enters a proper license, and one scans only then, the images will not be read for this planning because the SeriesUID is not correct! It is necessary to delete the planning delete and replan the examination.

FR: L'IdentifierString dépend du serveur de licence. Le SeriesUID est généré par le serveur de licence. Si l'on programme dans un mode de licence démo puis que l'on entre une véritable licence et que l'on scanne seulement ensuite, les images ne seront pas lues pour cette programmation car le SeriesUID n'est pas correct! Il est nécessaire d'effacer la programmation. Supprimez et reprogrammez l'examen.

page 42

CAUTION/ATTENTION!



EN: For the installation of Kodak QC use the version 3.2 or higher provided on installation CDs.

FR: Pour l'installation de Kodak QC, utilisez la version 3.2 ou une version plus récente fournie sur les CD d'installation.

page 44

DANGER!



EN: For the installation of Kodak QC use the version 3.2 or higher provided on installation CDs.

FR: Pour l'installation de Kodak QC, utilisez la version 3.2 ou une version plus récente fournie sur les CD d'installation.

page 47

CAUTION/ATTENTION!



EN: To use the PoC with the Kodak processing, please configure the Kodak image processing inside the support mode of *dicomPACS®DX-R*. Otherwise an acceptable image quality cannot be guaranteed.

FR: Pour utiliser le PoC avec le processus Kodak, veuillez configurer le processus d'image de Kodak au sein du mode support de *dicomPACS®DX-R*, sans quoi une qualité d'image acceptable ne peut être garantie.

page 48

↑ CAUTION/ATTENTION!



EN: When using the PoC with O+R processing, please configure the O+R image processing in the support mode of $dicomPACS^{\textcircled{\tiny R}}DX$ -R. Otherwise, an acceptable image quality cannot be guaranteed.

FR: En utilisant le PoC avec le processus O+R, veuillez configurer le processus d'image O+R dans le mode support de $dicomPACS^{®}DX-R$, sans quoi une qualité d'image acceptable ne peut être garantie.

page 57

CAUTION/ATTENTION!



EN: Make sure all ports mentioned in the communication section are open for incoming and outgoing data transfer.

Ports: 18016, 18017, 18018, 18019, 18030

FR: Assurez-vous que tous les ports mentionnés dans la section de communication sont ouverts pour le transfert de données entrantes et sortantes.

Ports: 18016, 18017, 18018, 18019, 18030

page 87

CAUTION/ATTENTION!



EN: Only a trained technician may configure or change the settings of the *dicomPACS®DX-R* configuration.

If unauthorised changes have been made to the delivered software, OR Technology will not accept any responsibility or liability for the correct functioning of the product in such a case.

FR: Seul un technicien qualifié peut configurer ou changer les paramètres de la configuration *dicomPACS®DX-R*. Si des changements non autorisées ont été effectués sur le logiciel livré, OR Technology n'acceptera aucune responsabilité pour le fonctionnement correct du produit dans un tel cas.

page 93

CAUTION/ATTENTION!



EN: Value ranges are only useful for generators with fixed mA for certain kVp values and should not be changed! Please contact your service representative for more information.

FR: Les intervalles de valeurs sont utiles uniquement pour les générateurs avec mA fixes pour certaines valeurs kVp et ne doivent pas être modifiés! Veuillez contacter votre conseiller clientèle pour plus d'informations.

page 94

↑ CAUTION/ATTENTION!



EN: When removing the value range from the generator, all values will be deleted from the database and must be entered again if required.

FR: En enlevant l'intervalle de valeurs du générateur, toutes les valeurs seront effacées de la base de données et doivent être entrées de nouveau si nécessaire.

page 100

CAUTION/ATTENTION!



EN: Only trained X-ray technicians are allowed to enter or edit these settings. FR: Seuls les techniciens en radiologie qualifiés sont autorisés à entrer ou à modifier ces paramètres.

page 103

! CAUTION/ATTENTION!



EN: All examinations are sorted in groups. If any value is changed, this value is changed for the whole group. To change the values only for one examination it is necessary to sort this examination in a separate group. FR: Tous les examens sont classés en groupes. Si une valeur est modifiée, elle l'est pour le groupe entier. Pour modifier les valeurs uniquement pour un examen, il est nécessaire de classer cet examen dans un groupe séparé.

page 185

CAUTION/ATTENTION!



EN: Please note that the basic principles of X-rays by necessity cause magnification of displayed subjects by a factor that is usually known. *dicom*PACS[®] displays the images at the same size as on a film, i.e. slightly magnified.

FR: Veuillez noter que les principes de base de la radiographie causent inévitablement l'agrandissement des objets affichés par un facteur qui est généralement connu. *dicom*PACS[®] affiche les images à la même taille que sur un film, c'est-à-dire légèrement agrandies.

page 209

♠ CAUTION/ATTENTION!



EN: Take care that the images still meet the obligatory quality for diagnosing.

FR: Veillez à ce que les images répondent encore à la qualité obligatoire pour le diagnostic.

page 216

CAUTION/ATTENTION!



EN: This controller may also increase the noise, if it is not matched with the controllers range and weight.

FR: Cet appareil de contrôle peut également augmenter le bruit, s'il ne correspond pas à l'intervalle et au poids de l'appareil de contrôle.

page 219

↑ CAUTION/ATTENTION!



EN: For some diagnoses the equalisation of the luminosity is not wanted because the difference between brighter and darker regions is needed for diagnosis purposes.

FR: Pour certains diagnostics, l'égalisation de la luminosité n'est pas souhaitée car la différence entre les zones plus lumineuses et plus sombres est nécessaire à des fins de diagnostic.

page 243

CAUTION/ATTENTION!



EN: In an emergency take the following action:

Stop the failing license service. Install the license service on another computer in the network which executes Windows. Activate the temporary license.

FR: En cas d'urgence, prenez les mesures suivantes:

Arrêtez le service de licences défaillant. Installez le service de licences sur un autre ordinateur dans le réseau qui exécute Windows. Activez la licence temporaire.

page 260

CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué.

page 262

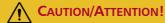
\wedge

WARNING!



Using an unformed X-ray tube can cause the unit to break.

page 264





EN: The generator should be connected via the supplied cable. It is possible to connect the PC and the generator also via a RS-232 cable. This connection is, however, intended only for maintenance purposes. If the PC is connected via this cable, then errors will be possible. If you are unsure of the installation, please ask your CPI technician.

FR: Le générateur doit être connecté via le câble fourni. Il est également possible de connecter le PC et le générateur via un câble RS-232. Cependant, cette connexion est destinée à des fins de maintenance. Si le PC est connecté via ce câble, des erreurs peuvent survenir. Si vous n'êtes pas sûr de l'installation, veuillez interroger votre technicien CPI.

page 268

CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel of the Interpreter or generator console.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué.

page 278

CAUTION/ATTENTION!



EN: Please connect the patch cable (RJ45) only to the Y-adapter, not directly to the generator.

FR: Veuillez connecter le câble patch (RJ45) uniquement à l'adaptateur en Y et pas directement au générateur.

page 278

DANGER!



EN: Protection against Excessive High Contact Voltages

To reduce the risk of electric shock or product damage, do not expose this appliance to rain, splashing, dripping or moisture.

FR: Protection contre les tensions de contact trop élevées

Pour réduire le risque de choc électrique ou de dégradation du produit, n'exposez pas cet appareil à la pluie, aux éclaboussures, aux coulures ou à l'humidité.

page 283

CAUTION/ATTENTION!



EN: If you are unsure, please ask your K&S Röntgenwerk Bochum technician.

FR: Si vous n'êtes pas sûr, veuillez interroger votre technicien K&S Röntgenwerk Bochum.

page 283

CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel of the Interpreter or generator console.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué de la console de l'interpréteur ou du générateur.

page 292

CAUTION/ATTENTION!



EN: The port of the generator connection must be different from the port of the detector connection.

FR: Le port du raccordement du générateur doit être différent du port du raccordement du détecteur.

page 295

<u>^</u>

WARNING!



Using an unformed X-ray tube can cause the unit to break.

page 296

CAUTION/ATTENTION!



EN: If you are unsure, please ask your Sedecal technician.

FR: Si vous n'êtes pas sûr, veuillez interroger votre technicien Sedecal.

page 297

↑ CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel of the interpreter or generator console.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué de la console de l'interpréteur ou du générateur.

page 298

CAUTION/ATTENTION!



EN: If you are unsure please ask your Shimadzu technician.

FR: Si vous n'êtes pas sûr, veuillez interroger votre technicien Shimadzu.

page 298

CAUTION/ATTENTION!



EN: Before carrying out an exposure check the generator settings at the manufactured panel of the interpreter or generator console.

FR: Avant d'effectuer une exposition, vérifiez les paramètres du générateur sur le panneau de contrôle fabriqué de la console de l'interpréteur ou du générateur.

page 305

CAUTION/ATTENTION!



EN: This tool deletes the image database and creates a new empty one!

FR: Cet outil efface la base de données d'images et en crée une nouvelle entièrement vide!

page 326

↑ CAUTION/ATTENTION!



EN: Please note that all images of a study are copied to subsequently created media. It is therefore possible that more than one disk is required.

FR: Veuillez noter que toutes les images d'un examen sont copiées sur les supports créés par la suite. Il est donc possible que plus d'un disque soit nécessaire.

page 346

DANGER!



EN: This will overwrite all generator settings and processing assignments on the target machine!

FR: Cela écrasera tous les paramètres et tâches de traitement du générateur sur la machine cible!

Chapter 27. Notes

Space for notes

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