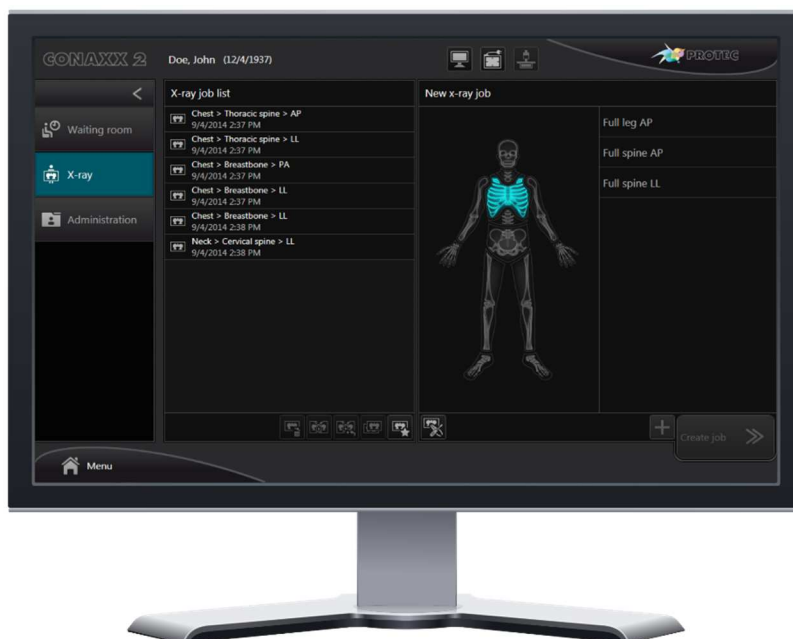


CONAXX 2

User manual

Ident. No.: 5330-0-0002





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Please note:

The CE marking is an EU directive compliance mark and may only be affixed to products for which a directive applies, which provides the CE marking.

At PROTEC these are medical devices that are intended for use in human medicine. For the identical products which are intended for use in veterinary medicine, the CE marking is excluded.


Overview of documents


Please also note the documents below. The current document is highlighted in bold.

- 5330-0-0002 – **CONAXX 2 User manual**
- 5330-0-0004 – CONAXX 2 Installation manual
 - 5330-0-0006 – CONAXX 2 TOUCH Installation manual
 - 5330-0-0010 – CONAXX 2 TOUCH2 Installation manual
 - 5330-0-0020 – CONAXX 2 Additional manual AIP dongle Licensing
 - 5330-0-0022 – CONAXX 2 Additional manual Exposure Indicator Calibration
 - 5330-0-0026 – CONAXX 2 System requirements

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Hint:

For all configuration sections marked with "1" the user role "dealer" is necessary.

All sections marked with "👤" are available for the human version.

All sections marked with "🐾" are available for the vet version.

1. Product Information

1.1 Intended purpose

The product CONAXX is a software for image data acquisition, processing, transmission and diagnosis in the conventional radiology.

1.2 User group

The software CONAXX is intended for use only by professional users who are trained in the operation of diagnostic software in accordance with the respective national regulations and who were instructed in the appropriate handling, use and operation as well as in the permitted connection with other medical devices, objects and accessories.

Appropriate user groups can be e.g. radiographer, radiological technologists, radiologists, surgeons, emergency surgeons, orthopedics and other trained medical staff.

1.3 Correct Use

CONAXX is solely determined for applications according to a.m. intended purpose.

The product is suitable for applications in the human medicine as well as in the veterinary medicine. All sections or figures in this manual which are only relate to the use in the veterinary medicine are marked with the keyword "vet version".

Correct usage involves observance of the manual as well as complying with the installation instructions and system requirements.

Any actions deviating from what is deemed to be correct usage will lead to the guarantee becoming null and void.

The operator is liable for all damage occurring as a result of incorrect usage and faulty operation.

Correct usage also involves the observation of all local rules and regulations concerning safety at work and safety from radiation.

1.4 Incorrect Use

Any other use or use beyond what is specified is deemed to be not for the intended purpose. The manufacturer accepts no liability for damage resulting therefrom. All risk is solely by the user.

1.5 Technical information

The following processes are applied to the original image data: noise suppression, contrast enhancement and grayscale histogram optimization. It is possible to undo these processes at any time to show the original image data. The revision of these process is stored in the DICOM header.

All images created by CONAXX are stored and transferred to other systems in DICOM file format.

The measuring accuracy of the measuring tools contained in CONAXX is determined by the pixel size (e.g., 150µm) of the modality. The measurement results are rounded to two decimal places in the display.

2. Notes

2.1 Conformity

According to the directive for medical devices 93/42/EEC appendix II this product has undergone a conformity test and conforms to all requirements of this directive (appendix I).

2.2 General Notes

This manual forms an integral part of the software. It must be kept available for the user. Precise observance of this manual is a precondition for use of the software for the intended purpose and for its correct operation. This manual should be passed on to any future purchaser or operators.

Although the product was subject to a risk analysis and the design corresponds to the current state of the art, residual risk will remain in clinical use. These are displayed in the following user manual by application limitations, warnings and precautions.

The manual conforms to the current state of the software at time of first use. All procedures, names, software programs and devices named in this document are registered names.

PROTEC® reserves the right to change this information without notice and makes no warranty with respect to this information. PROTEC® shall not be liable for any loss or damage, including consequential damages, resulting from the use of this information.

Any reprinting of the technical documentation, in whole or in part is subject to prior approval of PROTEC® being given in writing.

The names, organizations and incidents indicated in the screenshots are completely imaginary. Any resemblance to existing organizations, names and incidents is pure chance.

2.3 General Safety Notes

The product is a medical software and may only be used by trained personnel or someone who can handle the product safely.

The user himself is responsible for the image quality while accepting the image. In the area "*Image viewing*" you can access the raw image at any time to avoid mistakes caused by automatic or manual image processing.

In any case of mistake or doubt or fault a further exposure should be done before confirming the anamnesis.

All peripherals (PC, monitor, printer) connected to the system must conform to standard IEC 60950 (EN 60950) or must be "UL-listed" and correspond to the system requirements. Not conformable components may cause problems or even an image lost.

PROTEC® is not liable for any incompatibility or other effects which may arise between this software and with any software already installed on the computer system.

2.4 License Conditions

The use of CONAXX underlies the "General Software License Conditions" of PROTEC®, which must be confirmed at the first installation. The license conditions can be retrieved in the CONAXX main menu under the point "*Information*" at any time.

2.5 General Legal Conditions

CONAXX software is not suitable for long term archiving of the images created. (Does not apply when using the module "Diagnostic Viewer")

Legal guidelines in the form of laws, standards and directives have to be explicitly clarified for the respective site where the device is used. This mainly relates for guidelines concerning long term archiving, handling raw data and the use of suitable image viewing devices.

Furthermore, the user/reader of this manual must himself/herself see to it that the guidelines are kept to relating to his/her medical association and the panel union/association which is responsible in such matters. At this point, the use of the crop function, which is contained as a standard feature in CONAXX, should be clarified in particular.

CONAXX conforms to DICOM standard.

2.6 System Requirements

The software can only be run on such systems (hardware and software) that fulfill the following general system requirements:

Recommended system configuration for CONAXX	
CPU	Multi-core processor ≥ 2 GHz
Operating system	Microsoft® Windows 7 32/64 Bit (min. SP1); Microsoft® Windows 8/8.1 32/64 Bit; Microsoft® Windows 10 32/64 Bit;
Environment	Microsoft .NET Framework 4.8 Microsoft Visual C++ Redistributable 2019
RAM	≥ 2 GB
Hard disk	≥ 80 GB (if possible ≥ 7200 U/Min.)
Graphics card	Min. OpenGL Version 2.0. Resolution min. 1200 x 1024, ≥ 128 MB memory Supported chipsets: - NVIDIA at least GeForce 8000 series - ATI at least Radeon X1 series - Intel at least HD Graphics series; no support for GMA series For 10-bit grayscale resolution: 10-bit monitors und 10-bit graphics card
Monitor	Color or grayscale monitor, min. resolution 1200 x 768, for diagnosis please consider the law; particularly suitable: Touch screen monitor
Mouse, keyboard	Standard PS/2 or USB
CD/DVD writer	Required for use of the Patient CD function
Network card	network card with min. 100 MBit/s

Hint:

Please consider that there may be different system requirements, depending on the applied modality.

3. Important start-up information

3.1 User roles and permissions

Each user account is assigned to a user role. CONAXX contains the following roles:

- Restricted user
- User
- Dealer

The user account "Dealer" has more configuration permissions than other accounts. The user account "Restricted user" has no configuration permissions.

3.2 Default user accounts

By default, a CONAXX installation includes one predefined user account:

User name: *demo*
Password: *demo*
User role: *Dealer*

Other user accounts should be configured after installation by the user. It is recommended to delete the predefined user account "demo" in order to ensure secure access to CONAXX.

3.3 Network services (ports)

The following table describes all used network service ports. Setup the system firewall manually when changing these ports in the configuration of CONAXX.

Service	Port
PROPAXX	304
CONAXX TOUCH/TOUCH2 Service	11000
CONAXX TOUCH/TOUCH2 Callback Service	12000

3.4 Image archiving

If CONAXX is used for archiving of the images (e.g. in case of a single user installation without PACS connection), the automatic purging must be disabled in the configuration. Otherwise CONAXX delete after some time all exported images.

4. Quick guide

This chapter gives a brief introduction about the recommended workflow with CONAXX.

4.1 Start CONAXX

At the first step CONAXX has to be started.

You have to enter a user and the corresponding password to the login dialog. You can select the language of the user interface. Check the option *"Stay logged in"* to login this user automatically for the next session.

4.2 Choose patient

In the working area *"Waiting room"* the user can select a patient. To select a patient the user can choose from the patient list or enter a new patient.

4.2.1 Choose patient from list

If the area *"Patient list"* contains the desired patient, he can be selected by choosing the corresponding list entry. To confirm the selection, press the button *"Select patient"*. Now the patient is active.

4.2.2 Create/search patient (👤 human version)

If the area *"Patient list"* does not contain the desired patient the user has to create the patient. To create a new patient the user has to enter the patient data into the area *"New patient"*. Parallel to the input CONAXX searches the patient database. The list *"Search results"* contains all found patients. If CONAXX does not find any suitable patient, the user can select the entry which is marked by a ★ in the first column. This entry stands for a new patient. The button *"Select patient"* confirms the selection.

If the list *"Search results"* contains the desired patient, the user can select him. *"Select patient"* confirms the selection. After the confirmation the selected patient is active.

4.2.3 Create emergency patient (🚑 human version)

To create a new emergency patient, the user has to click the button *"Emergency patient"* in the area *"New patient"*. The predefined patient data for the emergency patient will be entered automatically. The first entry in the list *"Search results"* contains the emergency patient and will be marked with the symbol 🚑 in the first column. By clicking on *"Select patient"* the emergency patient will be the active patient and the software will switch to the working area *"X-ray"* automatically. If there are preconfigured x-ray jobs for emergency patients, these jobs will be created immediately and you can start with the exposure.

4.2.4 Create/search owner/patient (🐾 vet version)



If the area *"Patient list"* does not contain the desired patient the user has to create the patient. To create a new patient the user has to enter the owner data into the area *"New owner"* first. Parallel to the input CONAXX searches the owner database. The list *"Search results"* contains all found owners. If CONAXX does not find any suitable owner, the user can select the entry which is marked by a ★ in the first column. This entry stands for a new owner. The button *"Select owner"* confirms the selection.

If the list *"Search results"* contains the desired owner, the user can select him. *"Select owner"* confirms the selection.


Now you can enter the patient data (animal data). Parallel to the input CONAXX searches the patient database. The list *"Search results"* contains all found patients. If CONAXX does not find any suitable patient, the user can select the entry which is marked by a ★ in the first column. This entry stands for a new patient. The button *"Select patient"* confirms the selection.

If the list *"Search results"* contains the desired patient, the user can select him. *"Select patient"* confirms the selection. After the confirmation the selected patient is active.





4.2.5 Create emergency patient (vet version)

To create a new emergency patient, the user has to click the button "Emergency patient" in the area "New owner". The predefined owner data for the emergency patient will be entered automatically. The first entry in the list "Search results" contains the owner of the emergency patient and will be marked with the symbol  in the first column. By clicking the button "Select owner" the area changes to "New patient". The predefined patient data for the emergency patient will be entered automatically. The first entry in the list "Search results" contains the emergency patient and will be marked with the symbol  in the first column. By clicking on "Select patient" the emergency patient will be the active patient and the software will switch to the working area "X-ray" automatically. If there are preconfigured x-ray jobs for emergency patients, these jobs will be created immediately and you can start with the exposure.

4.3 Create X-ray job

After selecting a patient CONAXX switches to the working area "X-ray". In this area the user can create new x-ray jobs. If the subarea "New x-ray job" is not shown automatically, it can be entered by pressing the button  (New job).








The creation of an x-ray job is being performed in three steps by defining body part, fine part and view position. By selection a "QuickJob" one or more jobs can be created skipping the three steps described before.

The homunculus is used to select the body part (e.g.  chest,  foreleg). After selecting a body part the user has to select a fine part (e.g.  thoracic spine, thorax, ...,  carpus left, ...). Afterwards the desired view positions can be selected. The selection will be confirmed with the button "Create job" and the new jobs appear in the list "X-ray job list".

4.4 Prepare x-ray job

To prepare the exposure of an x-ray job the job has to be selected in the "X-ray job list". After that the subarea "Positioning" appears. The area supports the user to prepare the exposure. It contains an image and text instructions for the recommended exposure positioning for "Patient positioning", "Central ray" and "X-ray settings".




If CONAXX controls the x-ray generator directly, the user will see a subarea "X-ray generator". CONAXX sends automatically the correct x-ray settings to the x-ray generator according to the selected x-ray job. The user can activate different patient anatomies with these buttons:

: "child ", "thin ", "normal  and "thick 
: "extra small ", "small ", "medium  and "large 

To finish the preparations press the button "Start exposure".

4.5 Exposure x-ray image

After starting the exposure by clicking "Start exposure" CONAXX activates the modality. The exposure status of the modality will show with the help of status icons and text:

-  - The modality prepares the exposure.
-  - The exposure is possible and the user can execute the exposure.
-  - The exposure is done and CONAXX is importing the image.

Hint:

Some modalities supports only limited time frames for the acquisition. In that case a time bar visualizes the remaining time. After the time has expired the modality will prepare a new time frame for the acquisition.



Warning:

In case of receiving technical incorrectly images (e.g. missing image content, stripes structures) the complete X-ray system must be restarted. Please make afterwards a test exposure without any patient. For a further regularly usage of the system please ensure that the taken exposure is correct. If not inform your technical contact person.

4.6 Edit x-ray image

After the exposure CONAXX switches to the subarea *"Image viewing"*. In this area the image can be edited (e.g.  or ) and annotated (e.g. , , ).

The button *"Accept"* confirms the editing. If an automatic export has been configured, the processing of the x-ray job will be completed now.

If an x-ray job of an emergency patient is being accepted, a message box with the question whether the patient data should be edited before accepting will appear. Clicking on *"Yes"* opens the edit patient data dialog. If you click on *"OK"* in this window after editing, the emergency patient will change to a normal patient. If you click on *"Cancel"* in this window or click on *"No"* in the dialog before, the x-ray job will be accepted and the emergency patient will remain an emergency patient.

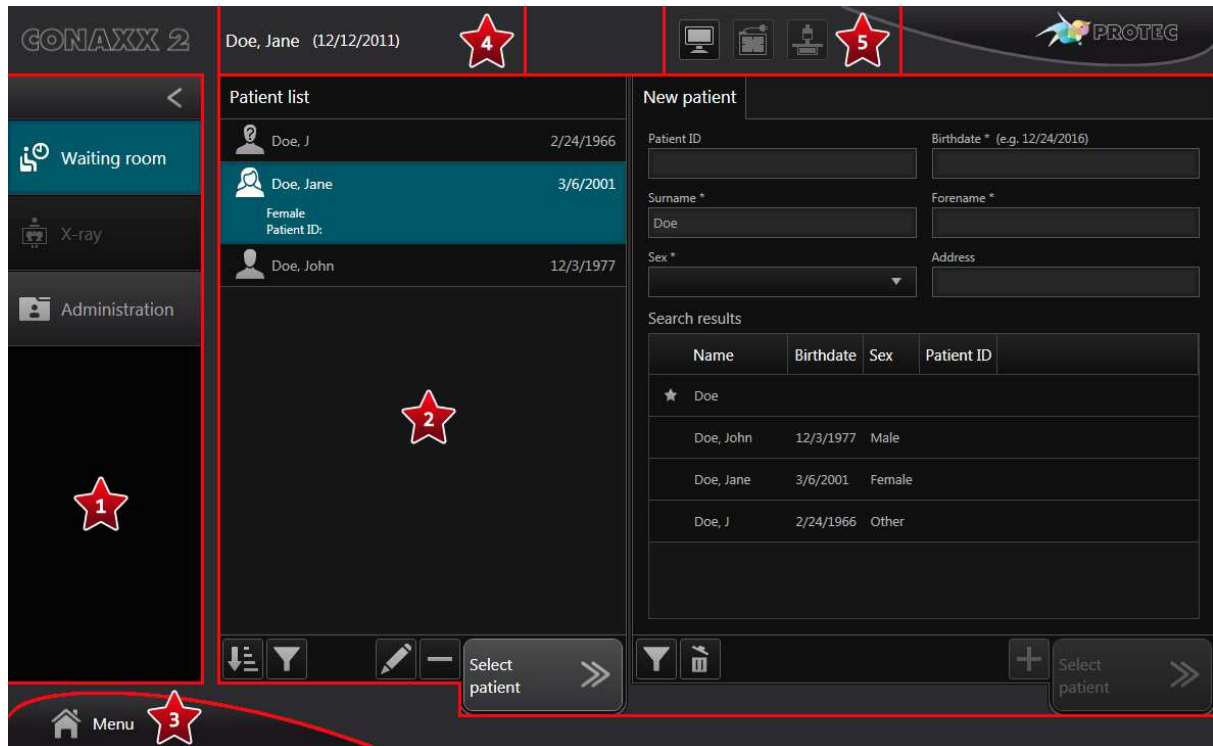
4.7 Export x-ray job






After accepting an x-ray job CONAXX switches to the subarea *"Export"*. This area is used to export the job.

CONAXX supports different export options like *"Send (DICOM) *" or *"Patient CD *".

5. User interface

The CONAXX user interface is separated into the following different areas:



-  - **Navigation area:**
This area enables the navigation between working areas.
-  - **Working area:**
This area shows the content of the current working area, e.g. patient or x-ray job lists.
-  - **Main menu:**
The main menu provides various functions which are required in addition to the normal workflow.
-  - **Active patient:**
If a patient is active, the patient data will be displayed at this position.
-  - **Status area:**
This area provides status information and tools for the components "system", "modality" and "x-ray generator".

5.1 Navigation area

This area enables the navigation between working areas. CONAXX provides the working areas "Waiting room", "X-ray" and "Administration".

With the help of the button " < " the user can collapse the navigation area and provide more space for other areas.

5.2 Main menu

The main menu provides functions in addition to the main workflow. The following functions are provided:



PROPAXX:

This function opens the PROPAXX Viewer.



- **X-ray journal:**

This function opens the X-ray journal. In this journal all exposed x-ray jobs inclusive the used x-ray settings are listed.



- **Information:**

This function shows the information dialog of CONAXX.



- **Help:**

This function shows the user manual of CONAXX.



- **Quick help:**

This function shows the quick help of CONAXX. It contains all executable functions of the current screen.



- **Remote support:**

This function starts the remote support tool. With this tool the support staff can help the user.



- **Configuration:**

This function opens the configuration of CONAXX.



- **Show Desktop:**

This function minimizes CONAXX and shows the Windows Desktop.



- **Log out:**

This function logs out the currently logged-in user.



- **Exit:**

This function quits CONAXX.

5.3 Status area

This area provides status information and tools for different components:



- **System:**
This function shows status information of the system



- **Modality:**
This function opens the tool box for the connected detector. It provides functions to establish or close the connection to the detector, calibration functions or status information for the battery charge level.

Some modalities support special functions, e.g.:

- turn off the modality
- transfer the last acquired image again



or



- **X-ray generator:**
This function opens the x-ray generator control. It can be used for exposures without acquiring the images by the modality.

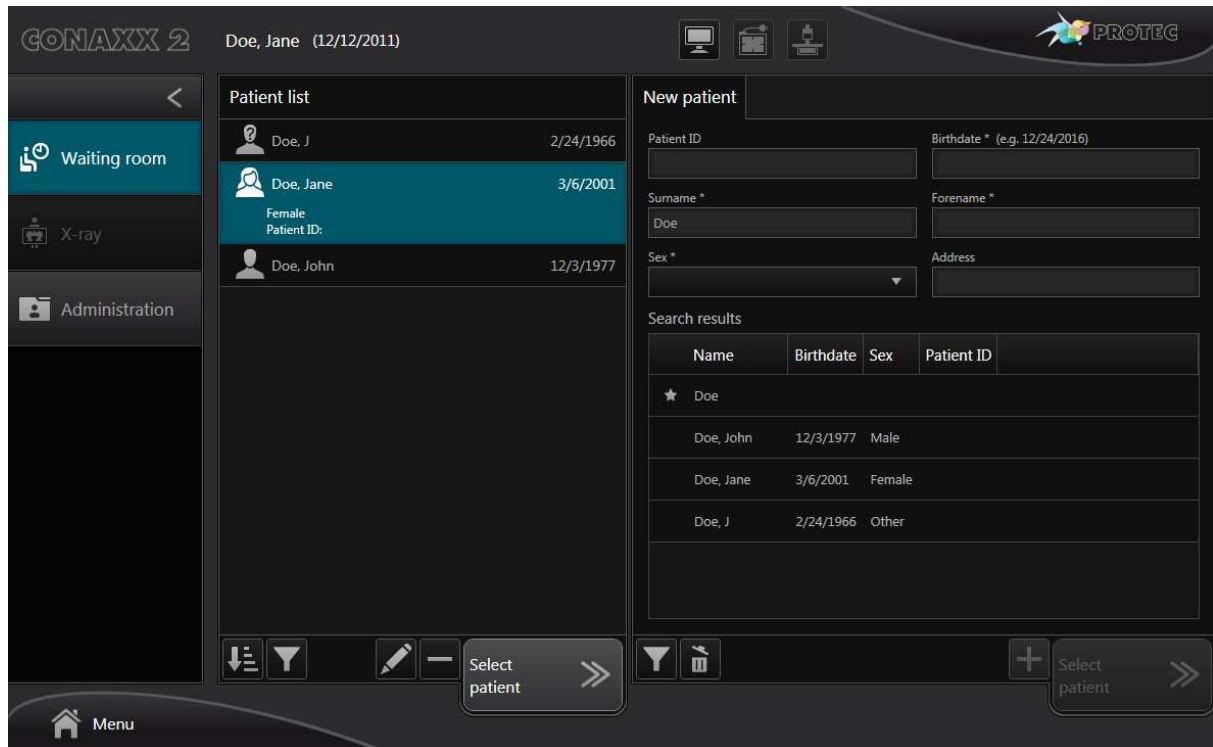
Use this area for the daily warm-up procedure of the X-ray tube.


6. Working areas

CONAXX has three working areas ("Waiting room", "X-ray" and "Administration"). These areas cover the complete workflow of an x-ray job.

6.1 Working area "Waiting room"

This working area is used to select a patient. CONAXX includes the possibility to receive patients directly from other systems. These patients appear automatically in the "Patient list". It is also possible to fill the list manually.



CONAXX 2 Doe, Jane (12/12/2011) 

Patient list

Name	Birthdate	Sex	Patient ID
Doe, J	2/24/1966		
Doe, Jane	3/6/2001	Female	Patient ID:
Doe, John	12/3/1977		

New patient

Patient ID: Birthdate * (e.g. 12/24/2016):

Surname *: Forename *:

Sex *: Address:

Search results

Name	Birthdate	Sex	Patient ID
★ Doe			
Doe, John	12/3/1977	Male	
Doe, Jane	3/6/2001	Female	
Doe, J	2/24/1966	Other	

Menu

6.1.1 Patient list

The *"Patient list"* shows all patients whose x-ray jobs are not processed. *"Not processed"* means the complete workflow for the x-ray job is not finished.

To choose a patient select him in the list and confirm the selection by pressing *"Select patient"*. Now the patient is active.

The *"Patient list"* provides the following functions:



- **Refresh:**

This function queries the DICOM Worklist interface for new patient and job data. New data will be added to the patient list.



- **Sorting:**

Use this function to sort the entries in the list.

The following sort orders are possible:

- Ascending
- Descending

The following sort criteria are possible:

- Name
- Birthdate
- Patient ID
- Sex
- Receive time
- Creation time
- Creation time of recent x-ray job



- **Filtering:**

Use this function to control the list content.

The following contents are possible:

- All patients
- Only internal patients
- Only received patients



- **Edit:**



Use this function to edit the patient data.



Use this function to edit the owner data and/or patient data.



- **Remove:**

Use this function to remove the patient from the list. The patient will be removed only from the list and not from the database. He can be added to the list at any time.

6.1.2 New patient (👤 human version)

To create a new patient the user has to enter the patient data into the area *"New patient"*. Parallel to the input CONAXX searches the patient database. The list *"Search results"* contains all found patients. If CONAXX does not find any suitable patient, the user can select the entry which is marked by a ★ in the first column. This entry stands for a new patient. The button *"Select patient"* confirms the selection.

If the list *"Search results"* contains the desired patient, the user can select him. *"Select patient"* confirms the selection. After the confirmation the selected patient is active and CONAXX switches to the working area *"X-ray"*.

If it is necessary to enter additional patient without starting the workflow for the first patient, the user can use the button **+** instead of *"Select patient"*. In this case CONAXX remains in the working area *"Waiting room"* and the user can enter or select another patient.

To reset the input fields and the search results use the button **↩**.

Columns in the area *"Search results"* can be shown or hidden with the button **▼**.

To create an emergency patient, click the button **🚑 Emergency patient**. This will enter the predefined patient data for the emergency patient automatically. The first entry in the list *"Search results"* contains the emergency patient and will be marked with the symbol **🚑** in the first column. If any patient data is available, it can be corrected in the corresponding input fields. By clicking on *"Select patient"* the emergency patient will be the active patient and the software will switch to the working area *"X-ray"* automatically. If there are preconfigured x-ray jobs for emergency patients, these jobs will be created immediately and you can start with the exposure.

If all patient data is available after clicking on the button **🚑 Emergency patient**, the emergency patient mark can be removed by clicking again on the button **🚑 Emergency patient**. The patient will be then handled as a normal patient.

6.1.3 New owner/patient (vet version)

To create a new owner the user has to enter the owner data into the area *"New owner"*. Parallel to the input CONAXX searches the owner database. The list *"Search results"* contains all found owners. If CONAXX does not find any suitable owner, the user can select the entry which is marked by a **★** in the first column. This entry stands for a new owner. The button *"Select owner"* confirms the selection.

If the list *"Search results"* contains the desired owner, the user can select him. *"Select owner"* confirms the selection.

Now you can enter the patient data (animal data). Parallel to the input CONAXX searches the patient database. The list *"Search results"* contains all found patients. If CONAXX does not find any suitable patient, the user can select the entry which is marked by a **★** in the first column. This entry stands for a new patient. The button *"Select patient"* confirms the selection.

After the confirmation the selected patient is active and CONAXX switches to the working area *"X-ray"*.

If it is necessary to enter additional patient without starting the workflow for the first patient, the user can use the button **+** instead of *"Select patient"*. In this case CONAXX remains in the working area *"Waiting room"* and the user can enter or select another patient.

To reset the input fields and the search results use the button **↩**.

If you want to return to the new owner area from the new patient area you have to use the button **⏪**.

Columns in the area *"Search results"* can be shown or hidden with the button **▼**.

To create an emergency patient, click the **🚑 emergency patient**. This will enter the predefined owner data for the emergency patient automatically. The first entry in the list *"Search results"* contains the owner of the emergency patient and will be marked with the symbol **🚑** in the first column. If any owner data is available, it can be corrected in the corresponding input fields. By clicking the button *"Select owner"* the area changes to *"New patient"*. The predefined patient data for the emergency patient will be entered automatically. The first entry in the list *"Search results"* contains the emergency patient and will be marked with the symbol **🚑** in the first column. If any patient data is available, it can be corrected in the corresponding input fields. By clicking on *"Select patient"* the emergency patient will be the active patient and the software will switch to the working area *"X-ray"* automatically. If there are preconfigured x-ray jobs for emergency patients, these jobs will be created immediately and you can start with the exposure.

If all owner / patient data is available after clicking on the button **🚑 Emergency patient**, the emergency patient mark can be removed by clicking again on the button **🚑 Emergency patient**. The patient will be then handled as a normal patient.

6.1.4 DICOM Query

In this area the user can query patients from external PACS. To start a query the user has to enter search criteria for the desired patient. To start the query process press *"Search"*.

The area *"Search results"* provides a list with all found patients. Select the desired patient and confirm by pressing *"Select patient"*. CONAXX switches automatically to the working area *"X-ray"*.

If it is necessary to import additional patients without starting the workflow for the first patient, the user can use the button **"+**" instead of *"Select patient"*. In this case CONAXX remains in the working area *"Waiting room"* and the user can enter or select another patient.

To reset the input fields and the search results use the button **"🗑"**.






6.2 Working area "X-ray"

This area provides functions to create and process x-ray jobs of a patient. Already existing x-ray jobs are shown in the "X-ray job list".



6.2.1 Status of x-ray jobs

An x-ray job has a unique status. CONAXX supports the following status:






-  - **Status "created":**
Jobs with this status are only created. They contain no image data.
-  - **Status "exposed":**
Jobs with this status are exposed and contain image data.
-  - **Status "accepted":**
Jobs with this status are exposed and the user has already edited and accepted the job.
-  - **Status "exported":**
Jobs with this status are accepted and successfully exported.
-  - **Status "export failed":**
If the automatic export of a job fails, the job gets this status. The export must be repeated manually.

6.2.2 X-ray job list

The "X-ray job list" contains all jobs which workflows are not finished. After exporting a job the workflow is completed but the job remains in the list. The job disappears when the patient is selected a second time.

To choose an x-ray job the user has to select the desired entry in the list. CONAXX shows a subarea according to the status of the job.





The following functions are provided for the "X-ray job list":

-  - **Delete job:**
Use this function to delete an x-ray job.
-  - **Stitching:**
This function stitches multiple exposed x-ray jobs together into one image.
-  - **Revert stitching:**
This function remove an already stitched image and shows the source x-ray jobs..
-  - **Duplicate job:**
Use this function to duplicate the selected job. This is useful to repeat exposures.
-  - **Create new job:**
Use this function to create new x-ray jobs.

6.2.3 New x-ray job

In this area the user can create new x-ray jobs.

The creation of an x-ray job is being performed in three steps by defining body part, fine part and view position. By selecting a "QuickJob" one or more jobs can create directly.

The homunculus is used to select the body part (e.g.  chest,  foreleg). After selecting a body part the user has to select a fine part (e.g.  thoracic spine, thorax,...,  carpus left,...). Afterwards the desired view positions can be selected. The selection will be confirmed by pressing the button "Create job" and the new jobs appear in the list "X-ray job list".

After the creation of the job the new job is selected automatically in the list. CONAXX closes the area "New x-ray job" and shows a new subarea (e.g. "Positioning") according to the workflow.

To remain in the area "New x-ray job" and create more x-ray jobs use the button "+" instead of "Create job".

To create test exposures (e.g. constancy test) use the button .

To return from the fine part selection to the body part screen use the button "«".

6.2.4 Positioning

This area supports the user while preparing the exposure. It contains an image and text instructions for the recommended exposure positioning for "Patient positioning", "Central ray" and "X-ray settings". Optionally it is possible to show an image e from a real acquisition.

If CONAXX do not control the x-ray generator the exposure can be started now with the button "Start exposure".
















6.2.5 X-ray generator








In this area the user can control the x-ray generator. CONAXX sends automatically the correct x-ray settings to the x-ray generator according to the selected x-ray job. The user can activate different patient anatomies with these buttons:

👤: "child 👤", "thin 👤", "normal 👤" and "thick 👤"

🐘: "extra small 🐘", "small 🐘", "medium 🐘" and "large 🐘"

The following functions can be used in this area:

-  - 👤 Organ program "child" / 🐘 Organ program "extra small"
-  - 👤 Organ program "thin" / 🐘 Organ program "small"
-  - 👤 Organ program "normal" / 🐘 Organ program "medium"
-  - 👤 Organ program "thick" / 🐘 Organ program "large"
-  - Work station "free "
-  - Work station "table"
-  - Work station "wall "
-  - Exposure technique "1-point":
kV & measurement chamber
-  - Exposure technique "2-point":
kV & mAs
-  - Exposure technique "3-point":
kV & mA & ms
-  - Focus "small"
-  - Focus "large"
-  - Measurement chamber "left"
-  - Measurement chamber "middle"
-  - Measurement chamber "right"










-  - **Tube energy "low"**
-  - **Tube energy "normal"**
-  - **Density**
-  - **Increase parameter:**
Increases a parameter, e.g. kV.
-  - **Decrease parameter:**
Decreases a parameter, e.g. kV.
-  - **Toggle parameter:**
Toggles through all possible values of a parameter.
-  - **Save:**
Saves the current parameter to an organ program.

Hint:


According to the connected x-ray generator the range of functions differs.

After setting up all required x-ray parameters the exposure can be started by pressing "Start exposure".

Additional information about the inserted grid will be displayed if the grid monitoring is active.

-  - **No grid inside workstation table**
-  **Grid 1 inside workstation table**
-  **Grid 2 inside workstation table**
-  - **Grid 3 inside workstation table**
-  - **No grid inside workstation wall**
-  **Grid 1 inside workstation wall**
-  **Grid 2 inside workstation wall**
-  - **Grid 3 inside workstation wall**
-  - **Grid monitoring failed**

6.2.6 Collimator

Below the patient positioning or the X-ray generator you can find the button for the collimator filter  "Collimator filter". Use this function to toggle through the different filters of the collimator.

This option is only available, if the module "Automatic collimator" is present.

6.2.7 Exposure

After starting the exposure by clicking *"Start exposure"* CONAXX activates the modality. The exposure status of the modality will be shown with the help of status icons and text:



- The modality prepares the exposure.



- The exposure is possible and the user can execute the exposure.



- The exposure is done and CONAXX is importing the image.

Hint:

Some modalities supports only limited time frames for the acquisition. In that case a time bar visualizes the remaining time. After the time has expired the modality will prepare a new time frame for the acquisition.

After importing the exposed image CONAXX will switch automatically to the area *"Image viewing"*.

To abort the exposure, use the button *"Cancel"*.

In case of a stitching x-ray job all single x-ray jobs of the stitching sequence are shown in the exposure dialog. The following additional functions available in this case:



- Full screen of the exposed image



- Repeat exposure

Directly after the exposure CONAXX will create an entry in the x-ray journal. CONAXX tries to fill out all values automatically. If there is missing data the user has to complete them.



Warning:

In case of receiving technical incorrectly images (e.g. missing image content, stripes structures) the complete X-ray system must be restarted. Please make afterwards a test exposure without any patient. For a further regularly usage of the system please ensure that the taken exposure is correct. If not inform your technical contact person.

6.2.8 Image viewing

In this area the image can be optimized and edited.

The following functions can be used:



- **Tool "windowing":**

This tool allows the adjustment of the windowing (brightness and contrast) by moving the mouse around with a pressed mouse button.



- **Tool "magnifier"**

This tool activates the magnifier. The magnifier follows the mouse pointer. By clicking the button again the tool will be deactivated.



- **Full windowing:**

Resets the windowing and show all gray values of the image.



- **Automatic windowing:**

Fits the windowing optimally to the image content.










- **Rotate left 90°:**

Rotates the image 90° counterclockwise.






- **Rotate right 90°:**

Rotates the image 90° clockwise.

-  - **Flip horizontal:**
Flips the image along the vertical axis.
-  - **Flip vertical:**
Flips the image along the horizontal axis.
-  - **Free rotation:**
Rotates the image according to a user defined alignment line.
-  - **Crop:**
Crops the image according to a user-defined cropping frame.
-  - **Electronic shutter:**
The electronic shutter is applied by a user-defined frame. Outside the frame the image will be displayed black.
-  - **Annotation "laterality marker left":**
Inserts the annotation "laterality marker left" at a user defined position into the image.
-  - **Annotation "laterality marker right":**
Inserts the annotation "laterality marker right" at a user defined position into the image.
-  - **Annotation "text":**
Inserts a text annotation at a user defined position into the image. The user can choose between predefined texts or enter an own text.
-  - **Select all annotations:**
Selects all annotations which are placed in the image.
-  - **Delete selection:**
Deletes all selected annotations in the image.
-  - **AIP filtering:**
Provides image optimizations through intelligent filter functions. According to the body part the routine provides different filter strengths from soft to strong (👉, 👉, 👉, 👉). To reset the filter function use the button "↺". To use the current filter for future jobs with the same organ press the button "📄".
The button "🔧" is used to open the Professional Image Tuner. If parameters have been defined for the professional image tuning, these parameters can be activated or deactivated via the button "🔧".
-  - **Grid line suppression:**
Activates the automatic grid line suppression.
-  - **Reset changes:**
Resets all changes which were made by the user.
-  - **Raw image:**
Resets all changes in the image. Also automatic optimizations of CONAXX while importing the image from the modality.

The area "Image viewing" provides the following common functions:

-  - **Delete image:**
Deletes the exposure and image data. After that the x-ray job is ready for a new exposure.
-  - **Fail assignment:**
This function can be used to change the body part of the x-ray job or move the image to another patient. In case of changing the body part CONAXX will re-optimize the image data.
-  - **Create x-ray journal entry:**
Creates an x-ray journal entry for this x-ray job.



- **Image properties:**
Edit image properties, e.g. image comment or image keyword.



- **Exposure index mask:**
The exposure index mask can be displayed and edited.



- **Technician tool:**
This function is available only when a test x-ray job (e.g. Test > Homogeneity > AP) was selected in the x-ray job list. Predefined windowing values can be used, edited and deleted.

The button "Diagnosis" switches into the "Diagnosis" area, where the image can be opened for further editing and optimization. See 6.5 Area „Diagnosis“.

To finish the editing the button "Accept" can be used. If an automatic export has been configured, the processing of the x-ray job will be completed now.

If an x-ray job of an emergency patient is being accepted, a message box with the question whether the patient data should be edited before accepting will appear. Clicking on "Yes" opens the edit patient data dialog. If you click on "OK" in this window after editing, the emergency patient will change to a normal patient. If you click on "Cancel" in this window or click on "No" in the dialog before, the x-ray job will be accepted and the emergency patient will remain an emergency patient.

Afterwards CONAXX select the next x-ray job in the "X-ray job list" automatically. If the next job is already accepted, CONAXX will show the subarea "Export".

6.2.9 Export

This area is used to export the x-ray job. CONAXX supports several export options:



- **Send (DICOM):**
Send the x-ray image via DICOM Store to an external PACS.



- **Send (E-mail):**
Send the x-ray image as an e-mail attachment. The default e-mail client of the operating system will be used for this function.



- **Save as:**
Saves the x-ray image in different image formats (DICOM, DICOM (anonymized), Bitmap, JPEG, PNG, TIFF) to hard disks or mobile media.



- **Print:**
Prints the x-ray image on a Windows printer.



- **Print (DICOM):**
Prints the x-ray image on a DICOM printer.



- **Print (DICOM):**
Adds the x-ray image to print list for the DICOM Print layout.



- **Patient CD:**
Burns all images of the patient on an optical media. After entering the media description the user has to define burn properties e.g. burn device or burn speed.



- **Patient CD (Export):**
Saves all images of the patient into a folder. After entering the media description the user has to define the export folder.





- **Send GDT reply:**
Generates and sends a GDT message as a reply.

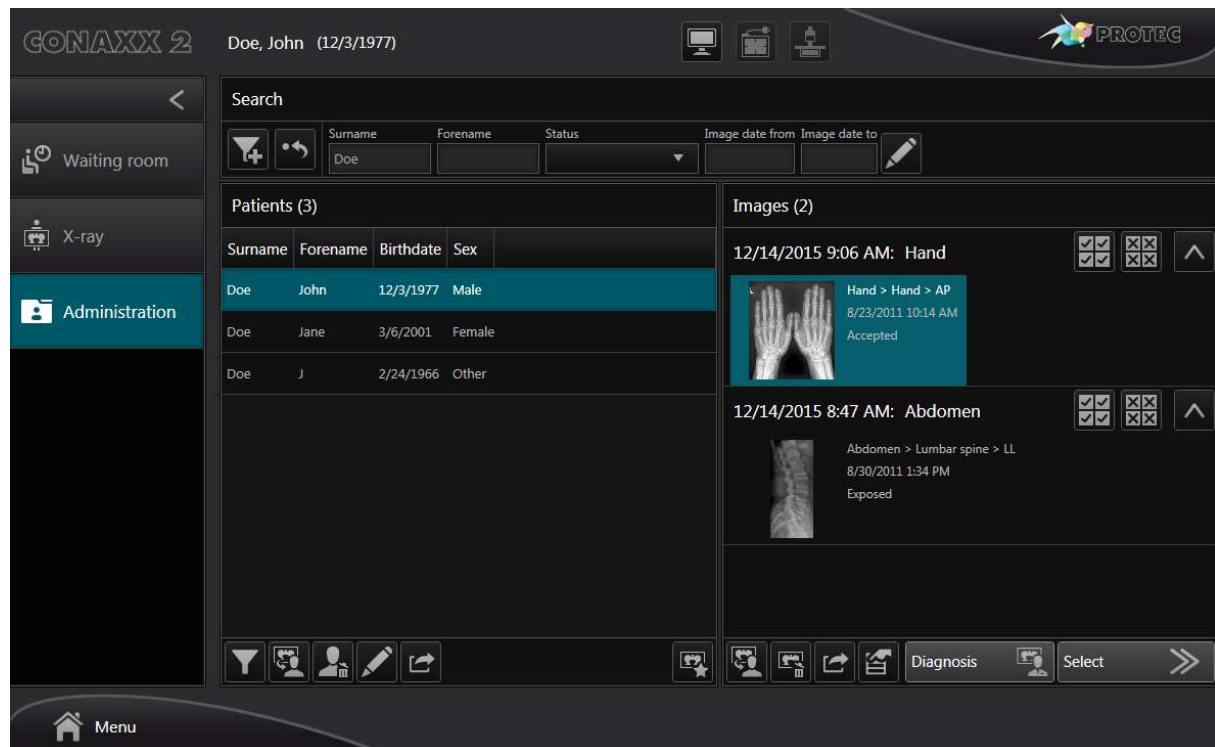
After the successful export the x-ray job is considered to be processed. If this job is the last unprocessed one, the patient will be removed automatically from the "Patient list" in the working area "Waiting room".

Use the button *"Next job"* to select the next job in the *"X-ray job list"* and start the workflow with this job.



Use the button *"Edit"* for reviewing an already accepted job. CONAXX will show the area *"Image viewing"* again and the user can edit and optimize the image.

6.3 Working area "Administration"

-  This area provides functions to manage patients and images. It is possible to search for patients and images. Found patients and images can be edited or exported.
-  This area provides functions to manage owners, patients and images. It is possible to search for owners, patients and images. Found patients and images can be edited or exported.



6.3.1 Search








The area "Search" provides functions to search for patients and images. It covers different search criteria. The button  is used to reset search criteria and results. To add another search criteria use the button .

While entering search criteria the searching will be performed automatically. The search results appear in the lists "Patients" and "Images".

6.3.2 Patients

The area "Patients" provides a list with patients. In case of entering search criteria only patients that match the search criteria are shown.

The following functions are provided:

-  - **Filtering:**
Add or remove columns in the list "Patient".
-  - **Move patients images:**
 -  This function moves all images of the patient to another patient.
 -  This function moves all images of a patient to another patient. It is also possible to move the patient to another owner.
-  - **Delete patient:**
This function delete the patient and all of his images.
-  - **Edit:**
 -  Use this function to edit patient data.

 Use this function to edit owner data and patient data.





- **Export:**
This function exports all images of the selected patient. There are various export options available (see 6.2.9 Export).



- **Create new x-ray job:**
With this function the user can switch into the working area "X-ray" and create additional x-ray jobs.

6.3.3 Images

This area provides a list of all images of the selected patient. In case of entering search criteria only matching images are shown.

All images are grouped in studies. Use the button "**^**" to collapse or expand studies. The functions "**Select all**" () and "**Deselect all**" () are available for the elements of each study. With the help of the "Ctrl" key individually selections of images are possible.

The following functions are provided for the selected image:



- **Move image:**
This function moves the selected images to another patient.



- **Delete job:**
This function deletes all selected x-ray jobs.



- **Export:**
This function exports all selected images. There are various export options available (see 6.2.9 Export).



- **Image properties:**
Use this function to view or edit image properties.



- **Diagnosis:**
Use this function to switch into the "Diagnosis" area.



- **Select:**
With this function the user can switch into the working area "X-ray". CONAXX shows a subarea according to the status of the job.

6.4 Area „X-ray journal“

This area represents the x-ray journal. This journal contains details of all exposed x-ray jobs including its x-ray parameters.

The “X-ray journal” is accessible at any time in the “Main menu” of CONAXX.

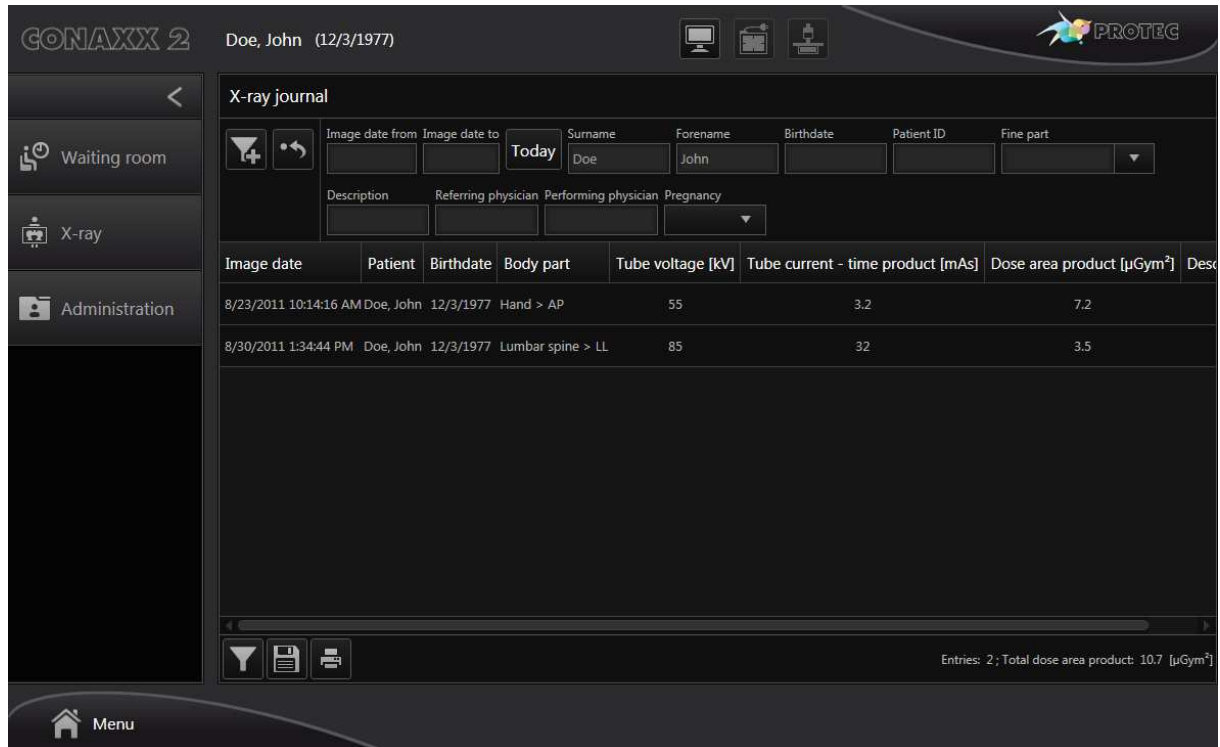





Image date	Patient	Birthdate	Body part	Tube voltage [kV]	Tube current - time product [mAs]	Dose area product [μGym²]	Desc
8/23/2011 10:14:16 AM	Doe, John	12/3/1977	Hand > AP	55	3.2	7.2	
8/30/2011 1:34:44 PM	Doe, John	12/3/1977	Lumbar spine > LL	85	32	3.5	

The upper area provides search functions. To reset the search criteria use the button “↺”. To add another search criterion use the button “+”.

The list area shows all x-ray journal entries which match the entered search criteria. If no search criterion is specified, all entries will be shown in the list. The number of the entries found and their total dose area product are displayed under the result list.

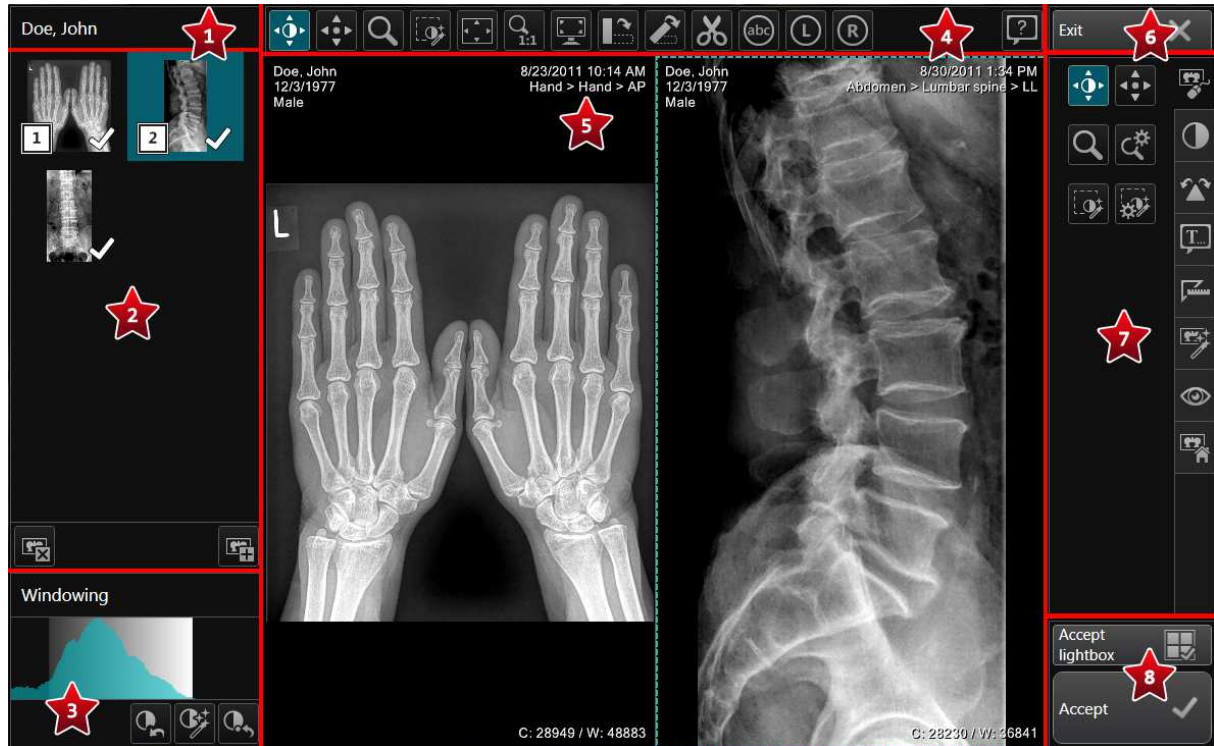
The following functions are provided for the listed entries:

-  - **Filtering:**
Use this function to hide/show columns of the entry list.
-  - **Save as:**
Use this function to save the shown x-ray journal entries. CONAXX supports different formats.
-  - **Print:**
Use this function to print the shown x-ray journal entries.

6.5 Area „Diagnosis“

This area allows optimization, processing and diagnosis of an x-ray image. The area could be opened with the buttons „Diagnosis“ (🔍) in the image viewing area and the administration.

The diagnosis area is separated into the following subareas:



- 1 Active Patient:**
The patient data of the active patient will be displayed at this position.
- 2 Image bar:**
This area shows a list of images.
- 3 Histogram:**
This area shows the histogram of the selected image.
- 4 Quick access bar:**
In this area the main functions are accessible at any time.
Use the button "🔍" to open the quick help.
- 5 Lightbox:**
In this area the open images will be shown. For simultaneous display of multiple images the light box can be subdivided into up to four subareas (tiles).
- 6 Exit:**
Closes the "diagnosis" window
- 7 Functions:**
This area provides different functions to optimize and edit the images.
- 8 Accept:**
Images can be accepted in this area. The button "Accept" accepts the selected image in the lightbox. The button "Accept lightbox" accepts all images in the lightbox.

6.5.1 Image bar

When opening images, they appear first as a small preview image in the image bar. If an image is shown in a tile of the lightbox the number of the tile is displayed in the left lower corner of the preview image.

By clicking on a preview image in the image bar, a context menu opens. Here, a tile can be selected in which the image will be loaded. If you don't want to load the image you can close the context menu by clicking the button "Cancel". When only one tile is set, the image will be loaded automatically without showing the context menu.

An image can be removed from the image bar by selecting the image in the image bar and clicking the button "Close image" (🗑️).

One or more images can be added to the image bar by clicking the button "Open image" (📁). A new dialog appears in which all images of the active patient will be shown. By clicking on the preview images you can select or deselect the images. You can also use the buttons "Today", "Select all" (👉) and "Deselect all" (👈). Confirm the selection with the button "OK".

6.5.2 Histogram

The histogram shows the greyscale distribution of the selected image in the lightbox. As well as displaying, the histogram area also enables the interactive modification of the window values, the greyscale threshold values, in which the image should be displayed. This function corresponds to the "Windowing" function. Additionally the functions "Reset windowing" (🔄), "Automatic windowing" (📊) and "Full windowing" (📊) are available.

6.5.3 Functions

The functions are divided into categories. An overview of the available keyboard shortcuts for the functions can be found in Appendix 5. The following categories and functions are available:



Category tools:



- **Tool „windowing“:**
This tool allows the adjustment of the windowing (brightness and contrast) by moving the mouse around with a pressed mouse button.



- **Tool „Move image“ (Panning):**
If the image is larger than the predefined tile or if it has been enlarged by zooming, you can move it within the tile where it is loaded, by pressing and holding the left mouse button.



- **Tool „magnifier“**
This tool activates the magnifier. The magnifier follows the mouse pointer. By clicking the button again the tool will be deactivated.



- **Settings „magnifier“**
The magnifier size and the magnifier factor can be configured here.



- **Tool „Region windowing“**
Other than the standard windowing function, where the window leveling is applied immediately to the whole image, the user of the region windowing function defines an area (region) of the image where contrast is optimized first. The settings of this area are later applied to the complete image. If the tool is active a rectangle which defines the region will be shown if you click and hold the left mouse button. If you click the button "Region windowing" again the region windowing tool will be deactivated.



- **Settings „Region windowing“**
The size of the rectangle can be configured here.



Category windowing:



- **Full windowing:**
Resets the windowing and show all gray values of the image.



- **Automatic windowing:**
Fits the windowing optimally to the image content.



- **Reset windowing:**
Resets the windowing values to the values stored in the database.



Category rotate/mirror:



- **Cropping:**
Crops the image according to a user-defined cropping frame.



- **Electronic shutter:**
The electronic shutter is applied by a user-defined frame. Outside the frame the image will be displayed black.



- **Rotate left 90°:**
Rotates the image 90° counterclockwise.



- **Rotate right 90°:**
Rotates the image 90° clockwise.



- **Free rotation:**
Rotates the image according to a user defined alignment line.



- **Flip horizontal:**
Flips the image along the vertical axis.



- **Flip vertical:**
Flips the image along the horizontal axis.



Category annotations:



- **Annotation "text":**
Inserts a text annotation at a user defined position into the image. The user can choose between predefines texts or enter an own text.



- **Annotation "laterality marker left":**
Inserts the annotation "laterality marker left" at a user defined position into the image.



- **Annotation "laterality marker right":**
Inserts the annotation "laterality marker right" at a user defined position into the image.












- **Annotation "arrow":**
Hold down the left mouse button and drag the mouse pointer over to image to draw an arrow.



- **Annotation "ellipse":**
Hold down the left mouse button and drag the mouse pointer over to image to draw an ellipse.










- **Annotation "rectangle":**
Hold down the left mouse button and drag the mouse pointer over to image to draw a rectangle.

-  - **Annotation "freehand":**
Hold down the left mouse button and drag the mouse pointer over to image to draw a freehand annotation.
-  - **Color of the annotation:**
Use this function to select the color of the annotation.
-  - **Line width of the annotation:**
Use this function to select the line width of the annotation.
-  - **Select all annotations:**
Selects all annotations which are placed in the image.
-  - **Deselect all annotations:**
Deselects all annotations which are placed in the image.
-  - **Delete selection:**
Deletes all selected annotations in the image.
-  - **Delete all annotations:**
Deletes all annotations.
-  - **Undo:**
With this function you can revoke a step.
-  - **Redo:**
With this function you can repeat a step.



Category measuring:

-  - **Distance:**
Mark the start point of the distance with a left click. The next mouse click defines the end point of the distance.
-  - **Angle:**
Mark the start point of the first axis with a left click. Then mark the point of the angle with a second click and finally mark the end point of the second axis with a third click.
-  - **Circle measurement:**
Define the center of the circle with a left click. The next mouse click defines the radius of the circle. Finally the diameter will be displayed.
-  - **Angle between two lines:**
Mark the start point of the first line with a left click. The next mouse click defines the end point of the first line. Now, the start point and end point of the second line can be drawn in the same way.
-  - **PennHIP measurement:**
Define the center of the circle for the first angle with a left click. The next mouse click defines the radius of the circle. Now, the circle for the second angle can be drawn in the same way. Finally the distraction index ($DI = d/r$, with d = distance between the center of the femoral head and the center of the acetabulum, r = radius of the femoral head) will be displayed.
-  - **HD angle:**
Define the center of the circle for the first angle with a left click. The next mouse click defines the radius of the circle. Now, the circle for the second angle can be drawn in the same way. The last click defines the direction of the angle.
-  - **Cardiothoracic ration:**
Mark the start point of the first line (heart) with a left click. The next mouse click defines the end

point of the first line (heart). Now, the start point and end point of the second line (thorax) can be drawn in the same way.

- **Vertebral Heart Score (VHS) (🐾 only vet version):**



This function allows the measuring of the vertebral heart score (VHS). This is done in a series of steps. After selecting the tool, the mouse pointer changes to a cross with a line, a heart, a "1" and a "L". Now you have to define the starting point of the first line (longitudinal axis measurement). This is done by making a left click on a position in the image. The next mouse click defines the end point of the first line (longitudinal axis measurement). Once the first line is defined, the mouse pointer changes to a cross with a line, a heart, a "1" and a "S". Now, the second line (short axis measurement) can be drawn in the same way. Once the second line is defined, the mouse pointer changes to a cross with a line, a heart, a "1" and a "T". Now, the reference point must be marked on the spine (T4). The direction can be defined with the next click. Once the last action has been carried out, the longitudinal axis measurement and the short axis measurement will be drawn automatically on the reference point T4. Also a label "VHS = " will be displayed. By clicking on the edit icon (✎) an input window appears. Count the number of vertebrae that fall within the caliper points and enter the number in the field "L". The "S" (short axis measurement) value and the sum ("VHS") will be calculated automatically. To enter the result of the short axis measurement manually the option "Manual input" must be activated. The additional window will be closed by clicking on the "OK" button.

- **Tibial Plateau Angle (TPA) (🐾 only vet version):**



This function allows the measuring of the tibial plateau angle (TPA). This is done in a series of steps. After selecting the tool, the mouse pointer changes to a cross with a line and a "1". Now you have to define the starting point of the first line (tibial plane - right point). This is done by making a left click on a position in the image. The next mouse click defines the end point of the first line (tibial plane - left point). Once the first line is defined, the mouse pointer changes to a cross with a line and a "2". Now, the second line (axis from top to bottom) can be drawn in the same way. Once the last action has been carried out, the angle can be read off.

Vertebral Left Atrial Size measurement (VLAS) (🐾 only vet version):



A Vertebral Left Atrial Size measurement can be selected and placed above the image using the mouse. This function can be used to calculate a Vertebral Left Atrial Size (VLAS). This measurement is applied in several steps. After selecting the tool, the mouse pointer changes to a cross with a line, a "1" and a "V". Now you have to determine the starting point of the first line (bifurcation of the trachea). This is done by a left mouse button click on a position in the image. With the next mouse click you define the end point of the first line (point at which the caudal edge of the left atrium crosses the dorsal boundary of the vena cava caudalis). As soon as the first line is completed, the mouse pointer changes into a cross with a line, a "1" and a "T". Now the reference point on the spine must be marked (T4). With a second click, the direction can be defined. If the last action has been performed, the first line is automatically drawn to the reference point T4 and a label "VLAS" is displayed. By clicking on the edit icon (✎) an input window appears. Count the number of vertebrae along the line and enter the value in the input field. This value corresponds to the VLAS value. The additional window will be closed by clicking on the "OK" button.

Radiographic Left Atrial Dimension (RLAD) (🐾 only vet version):

An RLAD measurement can be selected and placed above the image using the mouse. This function can be used to calculate the Radiographic Left Atrial Dimension (RLAD). This measurement is applied in several steps. After selecting the tool, the mouse pointer changes to a cross with a line, a heart, a "1" and an "L". Now you have to define the starting point of the first line (longitudinal axis measurement). This is done by a left mouse button click on a position in the image. With the next mouse click you define the end point of the first line (longitudinal axis measurement). As soon as the first line is completed, the mouse pointer changes into a cross with a line, a heart, a "1" and an "S". Now, the second line (short axis measurement) can be drawn in the same way. As soon as the second line is completed, the mouse pointer changes to a cross with a line, a "1" and an "R". Now another point is defined at the dorsal edge of the left atrium. If this point is drawn, the mouse pointer changes into a cross with a line, a heart, a "1" and a "T". Now, the reference point must be marked on the spine (T4). The direction can be defined with the next click. Once the last action has been carried out, the longitudinal axis measurement, the short axis measurement and the additional line (R) will be drawn automatically on the reference point T4. Also a label "VHS | RLAD" will be displayed. By clicking on the edit icon (✎) an input window appears. Count the number of vertebrae that fall within the caliper points and enter the number in the field "L". The "S" (short axis measurement) value, the sum ("VHS") and the RLAD value will be calculated automatically. To enter the result of the short axis measurement and the RLAD value manually the option "Manual input" must be activated. The additional window will be closed by clicking on the "OK" button.



Tibial Tuberoses Advancement (TTA)- (🐾 only vet version):

A Tibial Tuberoses Advancement measurement can be selected and placed at a location above the image using the mouse. This function can be used to calculate the Tibial Tuberoses Advancement measurement (TTA). This measurement is applied in several steps. After selecting the tool, the mouse pointer changes to a cross with a circle and a "1". Now you have to determine the center of the first circle. This is done by a left mouse button click on a position in the image. With the next mouse click you define the radius of the circle. Once the first circle is complete, the mouse pointer changes to a cross with a circle and a "2". Now the second circle can be drawn in the same way. As soon as the second circle is completed, the mouse pointer changes to a cross with a "P". With a mouse click, the tip of the patella is defined. Then the mouse pointer changes to a cross with a "T". With one mouse click, the point at the tibial tuberosity is defined. If the last action has been performed, the TTA can be read. After finishing the drawing, it is possible to readjust the individual components of the TTA measurement.



- **Settings measurement:**

Here the unit can be configured. You are also able to run a manual calibration based on a reference distance in the image. An input dialog appears, where the unit (mm, cm, inch) and the length that is to be defined can be selected. After confirming with the "OK" button, the mouse pointer changes to a drawing tool for the distance measurement, which is used to describe the corresponding distance in the image.



- **Color of the annotation:**

Use this function to select the color of the annotation.



- **Line width of the annotation:**

Use this function to select the line width of the annotation.



- **Select all annotations:**

Selects all annotations which are placed in the image.



- **Deselect all annotations:**

Deselects all annotations which are placed in the image.



- **Delete selection:**

Deletes all selected annotations in the image.



- **Delete all annotations:**

Deletes all annotations.





- **Undo:**
With this function you can revoke a step.



- **Redo:**
With this function you can repeat a step.



Category filter:



- **AIP Filter soft:**
Provides image optimizations through intelligent filter functions.



- **AIP Filter medium:**
Provides image optimizations through intelligent filter functions.



- **AIP Filter strong:**
Provides image optimizations through intelligent filter functions.



- **AIP Filter ultra:**
Provides image optimizations through intelligent filter functions.



- **AIP Fallback filter:**
Allows the use of fallback filter, if the AIP filters do not provide an satisfying result.



- **Professional Image Tuning:**
Allows the use of the individually generated image optimization parameters.



- **Change default AIP Filter:**
Use this button to use the current filter for future jobs with the same organ (e.g. Human > Head > Skull > AP).



- **Professional Image Tuner:**
Opens a window where the user can adjust the image optimization parameters.



- **Filter 1:**
Provides image optimizations through filter functions.



- **Filter 2:**
Provides image optimizations through filter functions.



- **Filter 3:**
Provides image optimizations through filter functions.



- **Filter 4:**
Provides image optimizations through filter functions.



- **Filter 5:**
Provides image optimizations through filter functions.



- **Filter 6:**
Provides image optimizations through filter functions.



- **Filter 7:**
Provides image optimizations through filter functions.



- **Filter 8:**
Provides image optimizations through filter functions.



- **Grid line suppression:**
Activates the automatic grid line suppression.



- **Invert:**
Inverts the grey scale values of the image.



Category viewing:



- **Fit to screen:**
The image is modified to the size of the tile.



- **Zoom 1:1:**
The image is shown in a 1:1 ratio, i.e. one pixel in the image corresponds to one pixel on the screen.



- **Zoom out:**
The image will be scaled down.



- **Zoom in:**
The image will be scaled up.



- **Zoom factor:**
The image will be enlarged or reduced to the selected factor.



- **Zoom region:**
By pressing and holding the left button on the mouse, you can pull a rectangle over the area that should be enlarged. When you release the mouse button, the selected area of the image is shown enlarged.



- **Full screen:**
The image is shown as a full screen image. You can return to normal view with a double-click or by pressing the "ESC" key.



- **Tiling 1, 1:**
Sets the tiling to 1x1.



- **Tiling 2, 1:**
Sets the tiling to 2x1



- **Tiling 1, 2:**
Sets the tiling to 1x2.



- **Tiling 2, 2:**
Sets the tiling to 2x2.



- **Show grid:**
If the button is active a grid will be shown.



- **Settings grid:**
The color, the unit and the scale of the grid can be configured here.



- **Show ruler:**
If the button is active a ruler will be shown.



- **Settings ruler:**
The color and the unit of the ruler can be configured here.



- **Show overlays:**
If the button is active overlays will be shown.



- **Settings overlays:**
The color of the overlays can be configured here.



- **Interpolation:**
Activates and deactivates the interpolation of the image display.



Category global:



- **Image properties:**
Edit image properties, e.g. image comment or image keyword.



- **Reset changes:**
Resets all changes which were made by the user.



- **Raw image:**
Resets all changes in the image. Also automatic optimizations of CONAXX while importing the image from the modality.



- **New job:**
Use this function to create new x-ray jobs.



- **Repeat exposure:**
Use this function to duplicate the selected job. This is useful to repeat exposures.



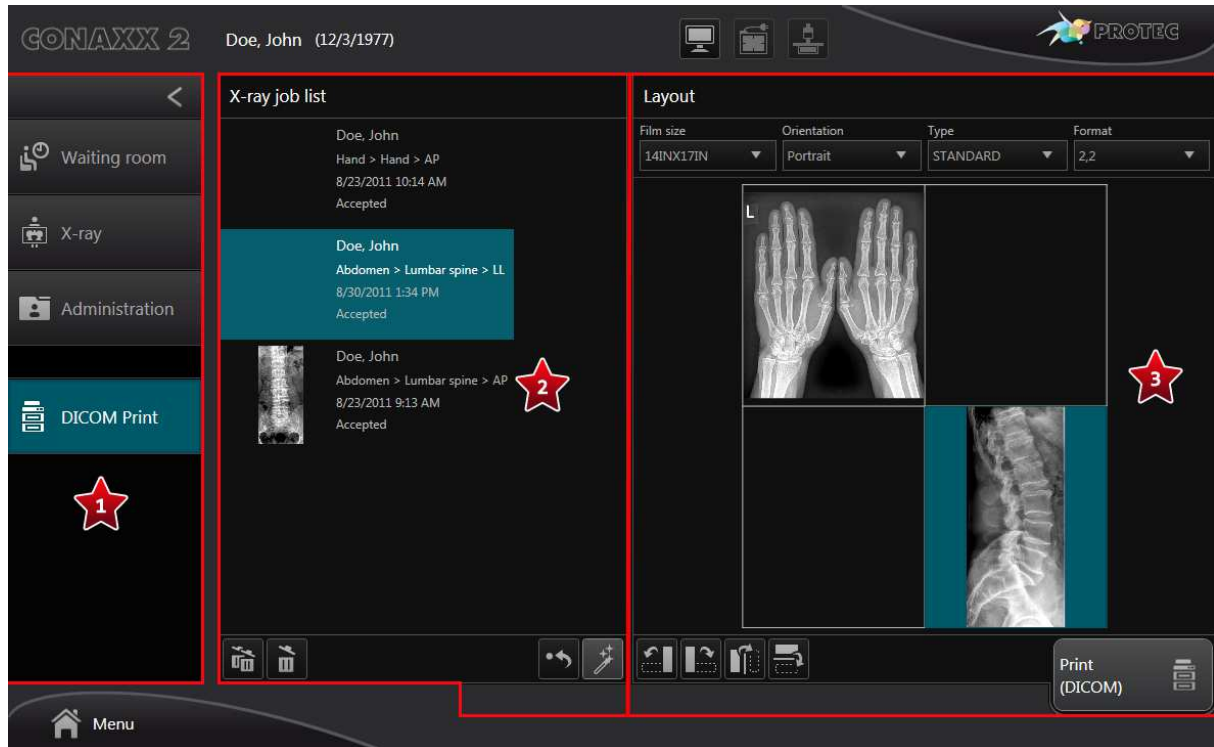
- **Delete job:**
This function deletes the selected x-ray job.




To finish the editing the button “Accept” can be used. Afterwards CONAXX select the next not yet accepted x-ray job from the image bar.

6.6 Area “DICOM Print”

If the user adds an x-ray image to the DICOM Print layout, an additional button (“DICOM Print”) will appear in the navigation area (see chapter 5 User interface). To open the DICOM Print layout area click on this button.

The DICOM Print layout area is separated into the following subareas:



-  **Navigation area:**
 - In the navigation area an additional button “DICOM Print” will appear if the user adds an x-ray image to the DICOM Print layout.
-  **X-ray job list:**
 - This area shows a list of images.
-  **Layout area:**
 - This area shows the layout.

6.6.1 X-ray job list

All x-ray jobs added to the DICOM Print layout image list will appear in this area. The following functions are provided:



- **Delete all:**

Removes all images from the DICOM Print layout image list. The DICOM Print layout area will be closed automatically.



- **Delete selected:**

Removes the selected image from the DICOM Print layout image list.



- **Reset:**

Removes all images from the layout.



- **Generate automatically:**

Fill the layout with images automatically.

The list in this area is cleared after the print is completed or when you change the active patient.

6.6.2 Layout area

A layout can be created here. The following functions are provided:

DICOM printer:

Selection of the DICOM printer if more than one DICOM printer is configured.

Film size:

List of all configured film sizes.

Orientation:

Select "Portrait" or "Landscape".

Type:

Select the type of the layout.

Format:

List of all configured formats for the selected "Type".



- **Rotate left 90°:**

Rotates the selected image 90° counterclockwise.



- **Rotate right 90°:**

Rotates the selected image 90° clockwise.



- **Flip horizontal:**

Flips the selected image along the vertical axis.



- **Flip vertical:**

Flips the selected image along the horizontal axis.

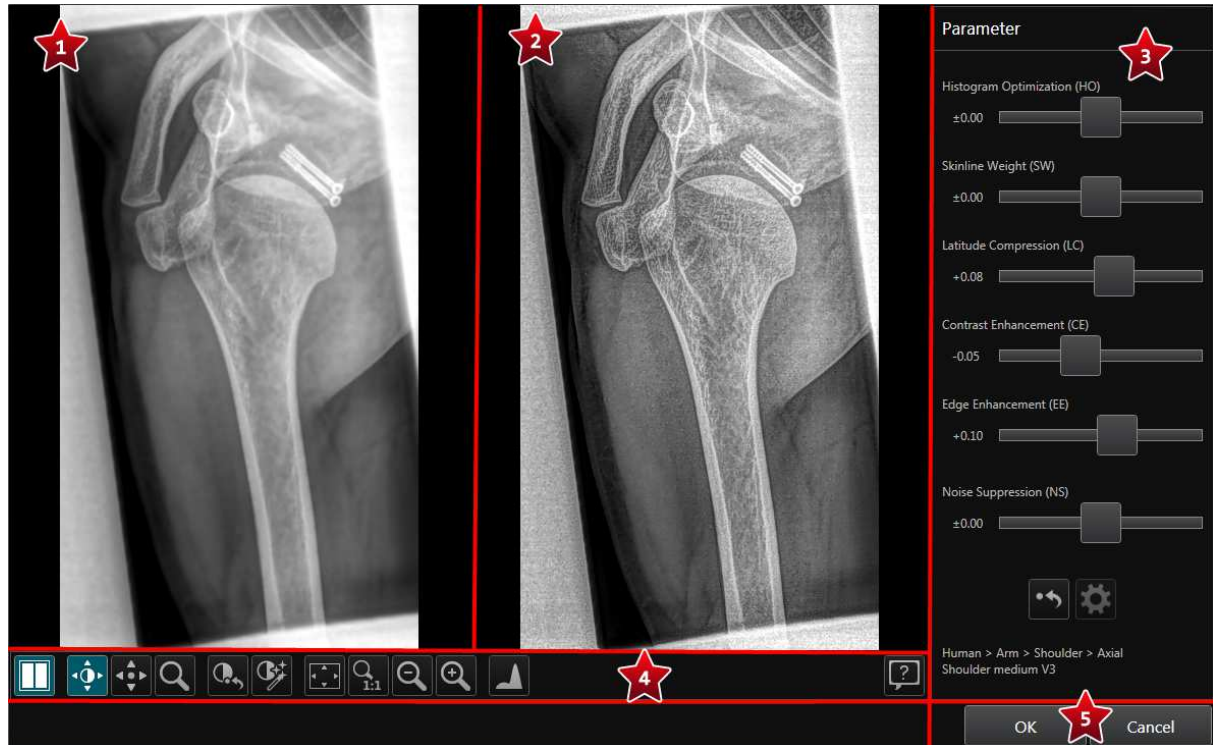
The user can fill the layout with images by using drag and drop function. Click on an image in the x-ray job list and hold down the left mouse button. Drag the mouse pointer over a tile in the layout. To remove an image from a layout tile click on an image in the layout tile and hold down the left mouse button. Drag the mouse pointer to the x-ray job list.

If the layout is ready click the button "Print (DICOM)". Afterwards a window will appear in which you can make additional print settings. Click "Print" to send the print job to the DICOM printer.

6.7 Area „Professional Image Tuner“

This area provides allows the individual adjustment of the image optimization parameters. The area could be opened with the button “Professional Image Tuner” (PT) in the image viewing area and the in the diagnostic window.

The Professional Image Tuner area is separated into the following subareas:





- 1** - **Original image:**
This area shows the original image. It is for comparison with the working image.
- 2** - **Working image:**
This area shows the working image on which the current applied parameter settings are visualized.
- 3** - **Parameter:**
In this area the parameters can be changed.
- 4** - **Functions:**
This area provided different viewing functions.
- 5** - **OK and Cancel:**
“OK” saves the currently applied parameter settings for this image. At the same time, the “Professional Image Tuner” window will be closed.
“Cancel” will close the “Professional Image Tuner” window without applying the current parameter settings.

6.7.1 Parameter



There are six parameters available which can be adjusted by sliders. The sliders can be changed with the left mouse button or the keyboard (arrow keys, pos 1, end, picture up, picture down). Next to each slider, a label indicated the currently applied value. Double-clicking on the label resets the value to “0.00”.

Depending on the used modality, either parameter set 1 or parameter set 2 is available.

Parameter set 1:

- HO** - **Histogram Optimization:**
Controls the visualization of the image, with respect to available grayscale levels and type of tissue to display.
- SW** - **Skinline Weight:**
Controls how much of the soft tissue towards the skin line that is visualized in the image.
- LC** - **Latitude Compression:**
Controls the ability to visualize both translucent and dense areas simultaneously.
- CE** - **Contrast Enhancement:**
Controls the local contrast of medium and large objects and the strength of vague structures.
- EE** - **Edge Enhancement:**
Controls the sharpness of finer structures, such as trabecular structures for bones.
- NS** - **Noise Suppression:**
Controls the suppression of unstructured noise, often apparent in soft tissues or dense areas.
-  - **Reset:**
All parameters values will be set to "0.00".
-  - **Reset to default settings:**
If parameters are stored in the configuration, they can be loaded here.

Parameter set 2:

- GB** - **Global Brightness:**
This parameter controls the overall brightness of the depicted object.
- GC** - **Global Contrast:**
This parameter controls the overall image contrast.
- LC** - **Latitude Compression:**
This parameter controls the ability to visualize both translucent and dense areas simultaneously.
- NR** - **Noise Reduction:**
This parameter controls the suppression of unstructured noise, often apparent in soft tissues or dense areas.
- SE** - **Small structure Enhancement:**
This parameter controls the sharpness of finer structures, such as trabecular structures for bones.
-  - **Reset:**
All parameters values will be set to "0.00".
-  - **Reset to default settings:**
If parameters are stored in the configuration, they can be loaded here.

6.7.2 Functions

The following functions are available:

Original image:



- **Show/Hide original image:**
The original image can be displayed or hidden.

Tools:



- **Tool "Windowing":**
This tool allows the adjustment of the windowing (brightness and contrast) by moving the mouse around with a pressed mouse button.



- **Tool "Move image" (Panning):**
If the image is larger than the predefined tile or if it has been enlarged by zooming, you can move it within the tile where it is loaded, by pressing and holding the left mouse button.



- **Tool "Magnifier":**
This tool activates the magnifier. The magnifier follows the mouse pointer. By clicking the button again the tool will be deactivated.

Windowing:



- **Full windowing:**
Resets the windowing and show all gray values of the image.



- **Automatic windowing:**
Fits the windowing optimally to the image content.

Viewing:



- **Fit to screen:**
The image is modified to the size of the tile.



- **Zoom 1:1:**
The image is shown in a 1:1 ratio, i.e. one pixel in the image corresponds to one pixel on the screen.



- **Zoom out:**
The image will be scaled down.



- **Zoom in:**
The image will be scaled up.

Viewing:



- **Show histogram:**
A histogram will be displayed in the image.

Schnellhilfe:



- **Quick help:**
Opens the quick help

6.7.3 Set parameter values as default

The applied parameter values can be stored in the configuration as default for this type of exposure (e.g. human > head > skull > ap). As a result, these parameter values will be executed automatically on new exposures of this type.

The "Professional Image Tuner" window was called from the image viewing area:

- Save the currently applied parameter values by clicking the "OK" button in the "Professional Image Tuner". The "Professional Image Tuner" window will close automatically and you are back in the image viewing area.
- Click on the button "AIP" (🔧) to call the context menu of AIP.
- In the context menu, click on the entry "Set current as default" (🔧).
- If there are other view positions of the current fine part selection using the same AIP filter, a selection window appears. In this window the current view position is preselected. You can apply the changes to other view positions by activating the respective line. Confirm your selection with the "OK" button. The selection window will be closed and an additional window appears.
- Enter your name in the input field. The modification date and the name of the person who set the current as default will be visualized in the configuration.
- Confirm with the "OK" button. The window closes automatically.
- As soon as the storage has been carried out, an information window will appear which you can confirm with the "OK" button.

The "Professional Image Tuner" window was called from the diagnostic window:

- Save the currently applied parameter values by clicking the "OK" button in the "Professional Image Tuner". The "Professional Image Tuner" window will close automatically and you are back in the diagnostic window.
- Click on the button "Set current as default" (🔧) in the category filter.
- If there are other view positions of the current fine part selection using the same AIP filter, a selection window appears. In this window the current view position is preselected. You can apply the changes to other view positions by activating the respective line. Confirm your selection with the "OK" button. The selection window will be closed and an additional window appears.
- Enter your name in the input field. The modification date and the name of the person who set the current as default will be visualized in the configuration.
- Confirm with the "OK" button. The window closes automatically.
- As soon as the storage has been carried out, an information window will appear which you can confirm with the "OK" button.

7. CONAXX TOUCH2

This chapter describes the module „CONAXX TOUCH2“.

7.1 Configuration in CONAXX






See chapter 12.2.8 CONAXX TOUCH¹.

7.2 Configuration in CONAXX TOUCH2

See document “CONAXX 2 TOUCH2 Installation manual”.

7.3 User interface



-  - **Patient and x-ray job information area:**
Patient information and x-ray job information are available in this area.
-  - **Working area:**
This area shows the content of the corresponding working area, e.g. patient positioning or preview image.
-  - **X-ray generator area:**
This area provides various functions to control the x-ray generator.
-  - **System area:**
Depending on the used x-ray system different system information and functions are available.
-  - **Status area:**
This area provides status information. Additional functions are available depending on the active working area.

7.3.1 Area „Patient and x-ray job information“



Patient information:

- If a patient is active, the patient data is displayed here. A click in this area opens a message box with further patient data. If there is no active patient, this area remains empty.



X-ray job information:

- If an x-ray job with the status "created" or "exposed" (see 6.2.1 Status of x-ray jobs) is selected in CONAXX2, it will be displayed here. Otherwise this area remains empty.



Number of x-ray jobs with the status "created":

- The number of x-ray jobs with the status "created" of the active patient will be displayed here. A click in this area displays a list of these x-ray jobs in the working area (see 7.3.2.1 X-ray job list).

7.3.2 Working area

This area displays the following different contents.

7.3.2.1 X-ray job list



All x-ray jobs of the active patient with the status "created" will be displayed in this list. To select an x-ray job, click on the corresponding entry.

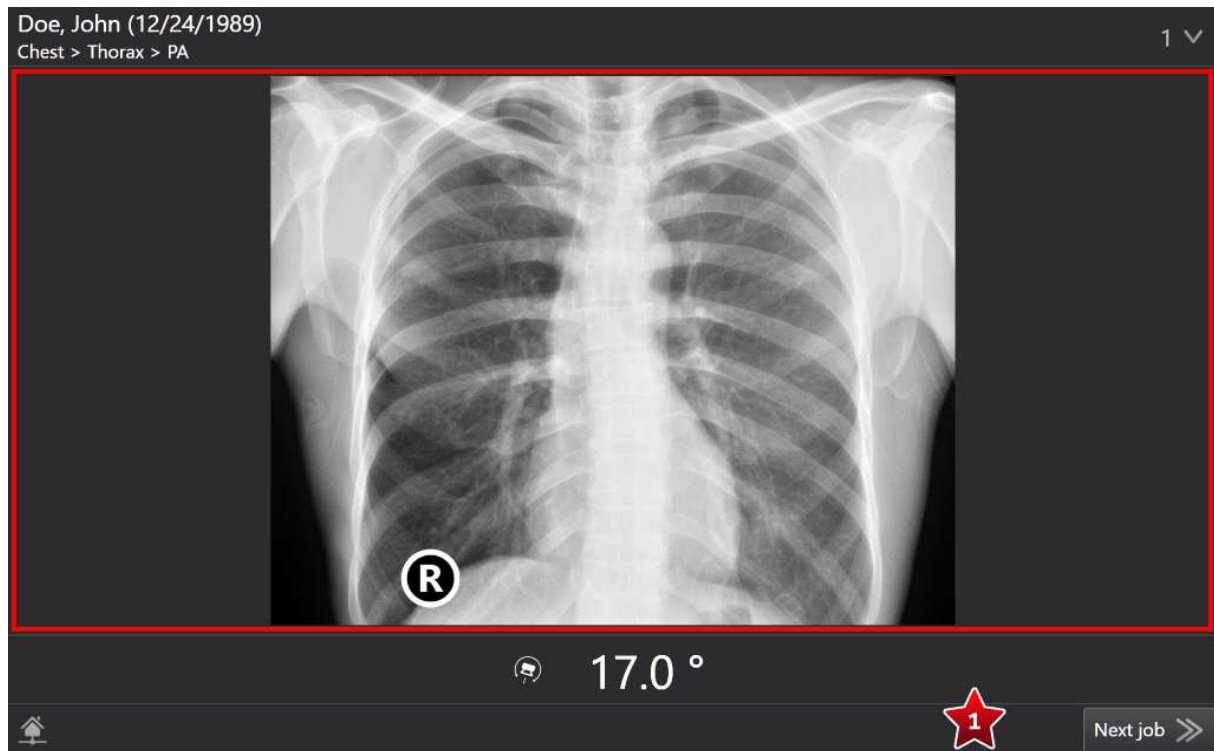
7.3.2.2 X-ray job with the status "created"



If the active x-ray job has the status "created", this area provides additional information represented by an image (★) and text instructions (★) for preparing and executing the exposure. By clicking on the image (★) it will be displayed full screen for a configured period of time. Click again to return to the normal view.

The exposure can be started by pressing "Start exposure" (★).

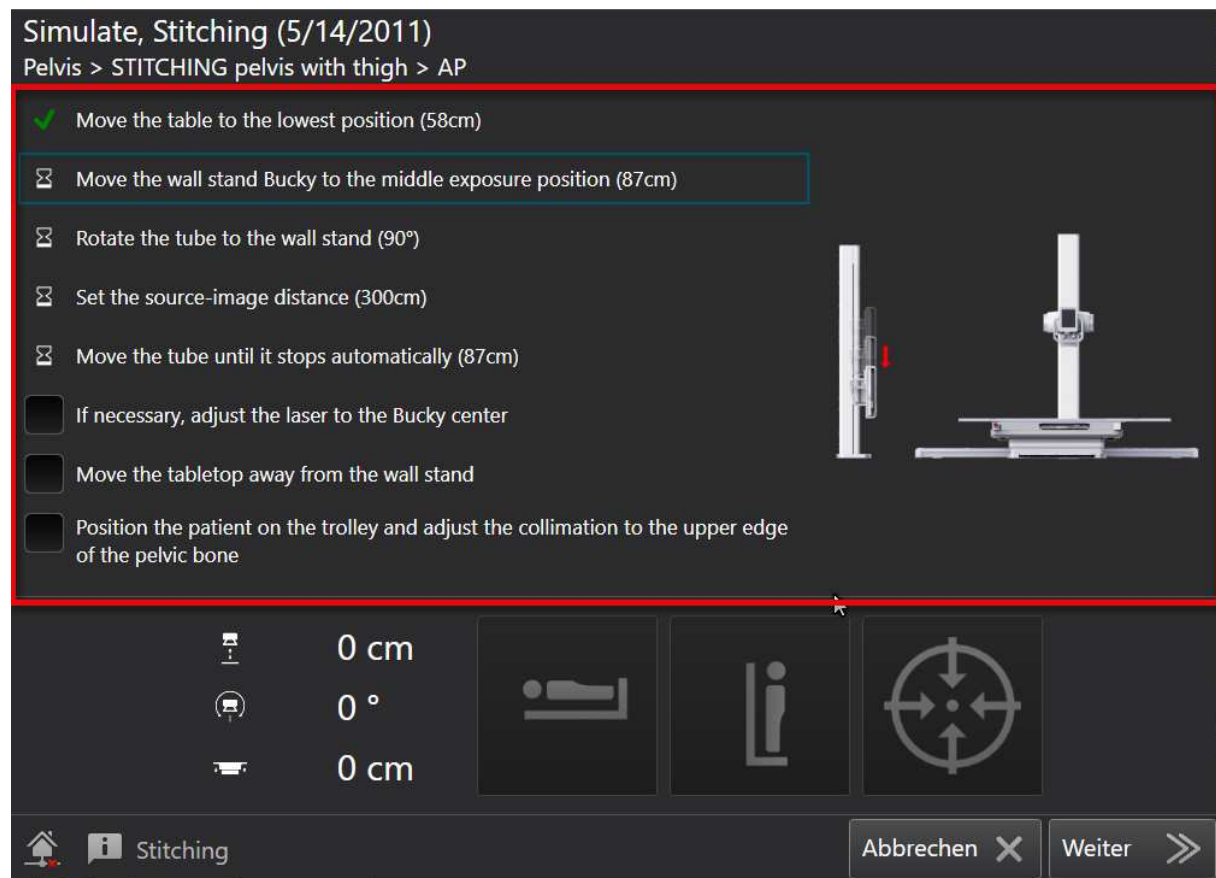
7.3.2.3 X-ray job with the status “exposed”



If the active x-ray job has the status “exposed”, this area provides the preview image. By clicking on the image, it will be displayed full screen for a configured period of time. Click again to return to the normal view. If the active patient has further x-ray jobs with the status “created”, the next x-ray job can be selected by using the button “Next job” (★).

7.3.2.4 Area „Stitching“

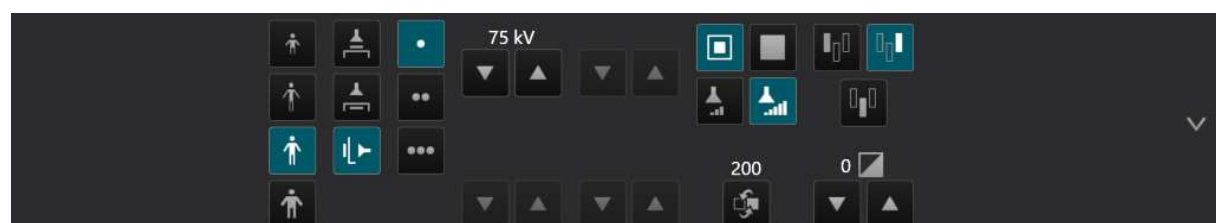
When using the X-ray system “PRS 500 B” for stitching exposures (stitching with auto tracking) this area will be shown. This area provides the stitching assistant, which is already described in chapter 11.





7.3.3 Area „X-ray generator“






















In this area the user can control the x-ray generator. By clicking on the button (★) the area can be extended.



The following functions can be used in this area:

-  - Organ program “child”
-  - Organ program “thin”

- | | |
|---|--|
|  | - Organ program "normal" |
|  | - Organ program "thick" |
|  | - Work station "free " |
|  | - Work station "table" |
|  | - Work station "wall" |
|  | - Exposure technique "1-point":
kV & measurement chamber |
|  | - Exposure technique "2-point":
kV & mAs |
|  | - Exposure technique "3-point":
kV & mA & ms |
|  | - Focus "small" |
|  | - Focus "large" |
|  | - Measurement chamber "left" |
|  | - Measurement chamber "middle" |
|  | - Measurement chamber "right" |
|  | - Tube energy "low" |
|  | - Tube energy "normal" |
|  | - Density |
|  | - Increase parameter:
Increases a parameter, e.g. kV. |
|  | - Decrease parameter:
Decreases a parameter, e.g. kV. |
|  | - Toggle parameter:
Toggles through all possible values of a parameter. |

Hint:

According to the connected x-ray generator the range of functions differs.

7.3.4 Area "System"

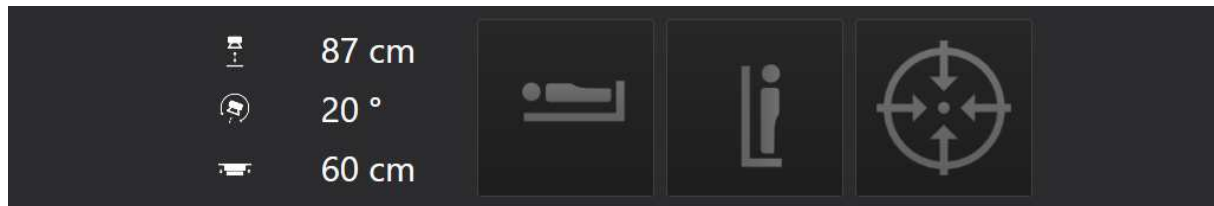
Depending on the used x-ray system, different system information and functions are available.

7.3.4.1 PRS 500






When using the system „PRS 500“, the current angle of the tube will be displayed.

7.3.4.2 PRS 500 B



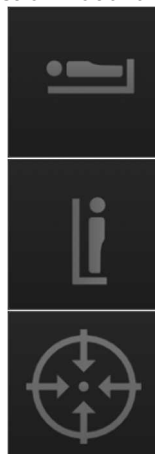
When using the system „PRS 500 B“, the current SID and the current table height are also displayed in this area in addition to the current angle of the tube.

Furthermore, the autotracking can be controlled with the following three buttons.

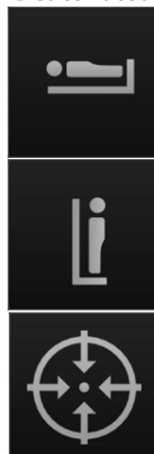
-  **Autotracking table:**
 - Clicking in deactivated state activates the autotracking table. Clicking in activated state deactivates the autotracking.
-  **Autotracking wall stand:**
 - Clicking in deactivated state activates the autotracking wallstand. Clicking in activated state deactivates the autotracking.
-  **Pause autotracking / resume:**
 - Clicking in activated state pause the autotracking. Clicking in deactivated state resumes the autotracking.

The following overview shows the colors of the icons regarding their condition.

Function not available



Deactivated



Activated



7.3.5 Area "Status"



This area provides information about the status.

7.3.5.1 Connection state

The connection state is displayed via an icon.

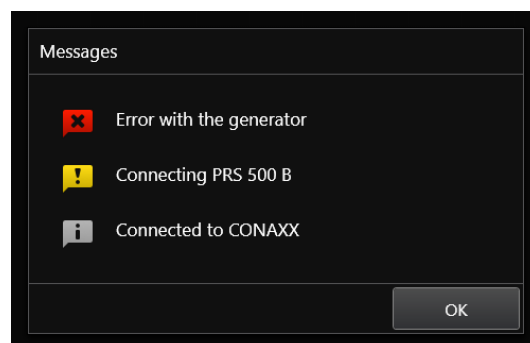
- | | | |
|--|---|---|
| | - | Connection state CONAXX: Connected
Connection state PRS 500: Connected |
| | - | Connection state CONAXX: Connected
Connection state PRS 500: Disconnected |
| | - | Connection state CONAXX: Disconnected
Connection state PRS 500: Connected |
| | - | Connection state CONAXX: Disconnected
Connection state PRS 500: Disconnected |

7.3.5.2 Status messages

Status messages are additionally categorized by the following icons.

- | | | |
|--|---|--|
| | - | Information |
| | - | In addition to the displayed information, there are more messages. |
| | - | Warning |
| | - | In addition to the displayed warning, there are more messages. |
| | - | Error |
| | - | In addition to the displayed error, there are more messages. |

By clicking on the status message or the icon, a window will appear in which all status messages are displayed.



8. CONAXX TOUCH

This chapter describes the module „CONAXX TOUCH“.

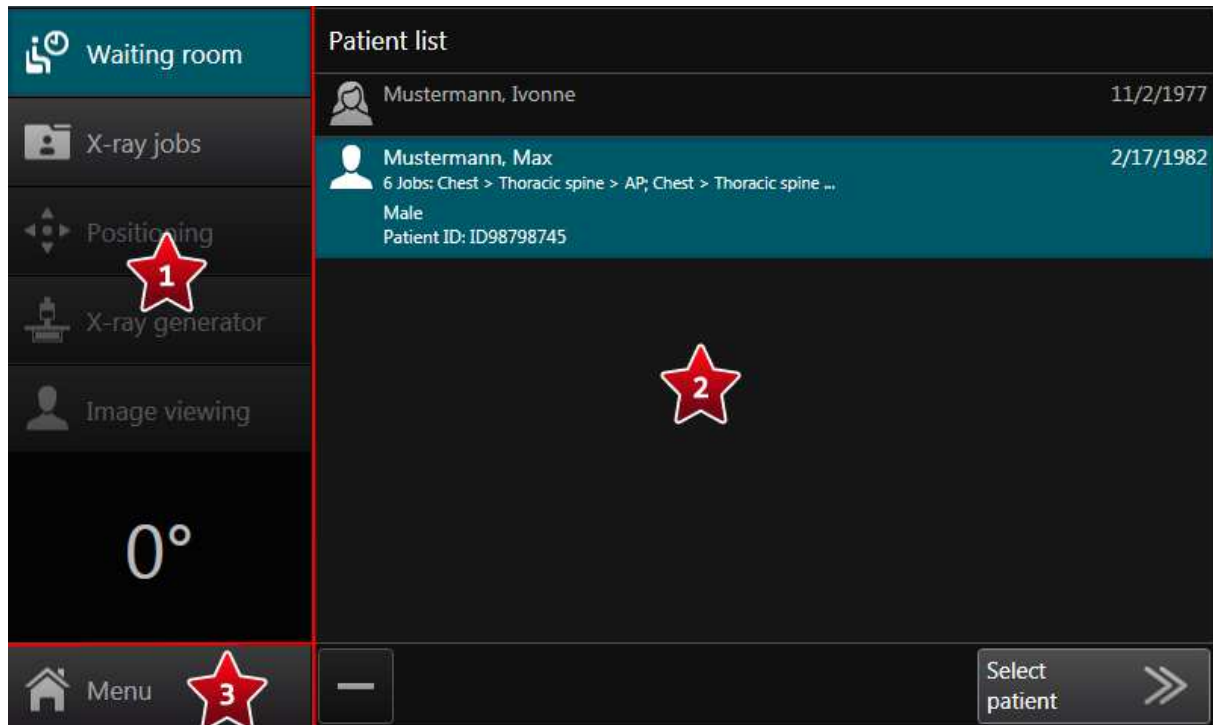
8.1 Configuration in CONAXX

See chapter 12.2.8 CONAXX TOUCH¹.


8.2 Configuration in CONAXX TOUCH

See document “CONAXX 2 TOUCH Installation manual”.

8.3 User interface




Navigation area:

-  - This area enables the navigation between working areas. Furthermore, a degree label will be displayed which indicates the slope of the swivel arm system.

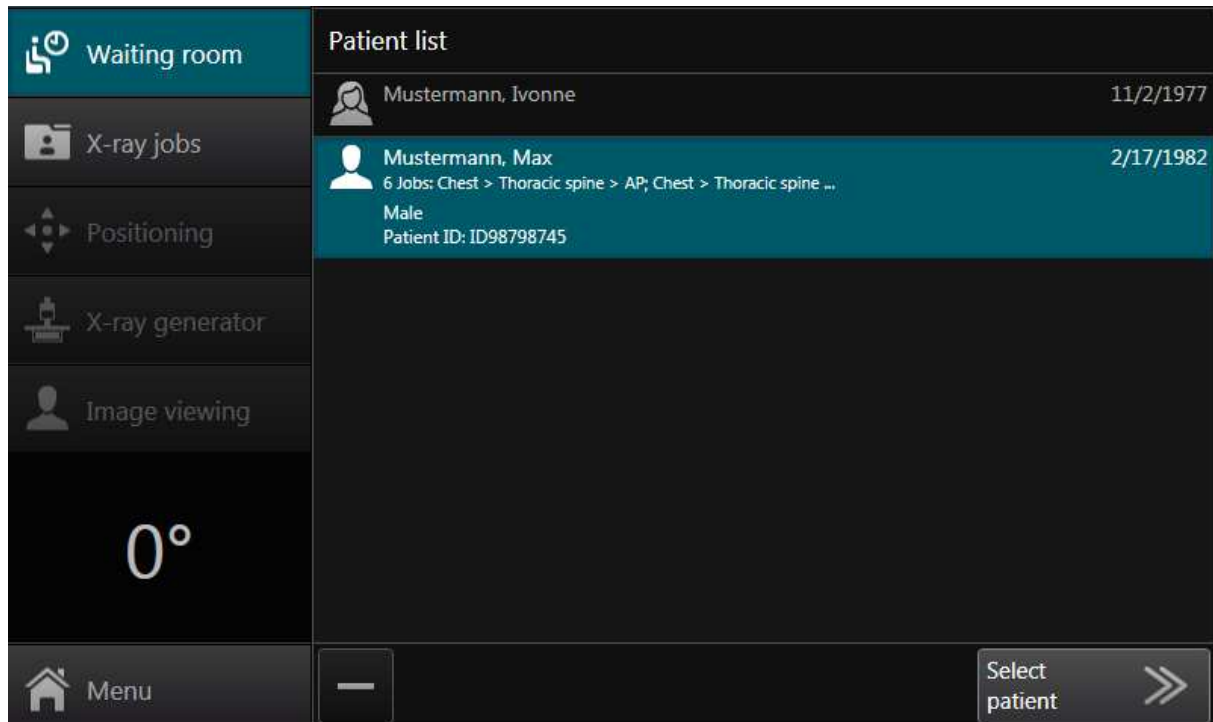
Working area:

-  - This area shows the content of the current working area, e.g. patient or x-ray job lists.

Main menu:

-  - The main menu provides various functions which are required in addition to the normal workflow.


8.3.1 Working area “Waiting room”



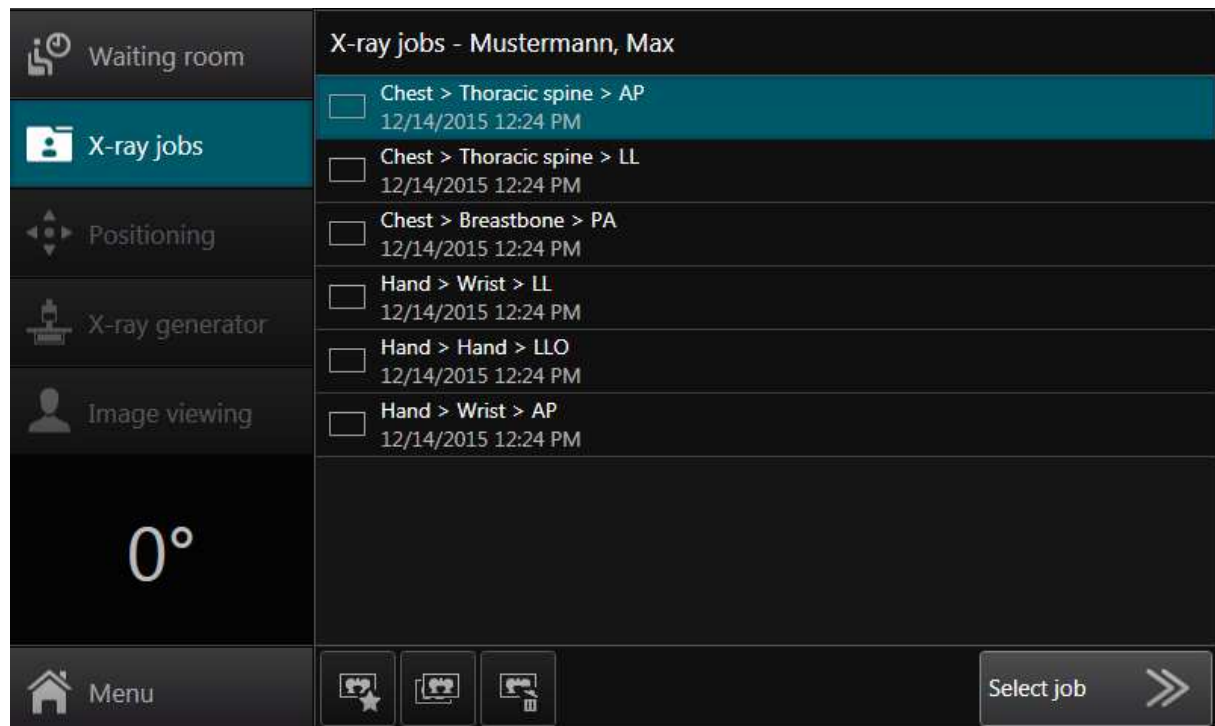
The “Patient list” shows all patients whose x-ray jobs are not processed. “Not processed” means the complete workflow for the x-ray job is not finished.

To choose a patient select him in the list and confirm the selection by pressing “Select patient”. Now the patient is active.

The “Patient list” provides the following functions:

-  - **Remove:**
Use this function to remove the patient from the list. The patient will be removed only from the list and not from the database.

8.3.2 Working area "X-ray jobs"



The "X-ray job list" contains all jobs of the active patient, which workflows are not finished. After exporting a job the workflow is completed, but the job remains in the list. The job disappears, when the patient is selected a second time.

To choose an x-ray job the user has to select the desired entry in the list. After selecting an x-ray job click on "Select job" to show the positioning area. CONAXX enters one of the the working areas "Positioning" or "Image viewing" according to the status of the job.

The following functions are provided for the "X-ray job list":



- **Create new job:**
Use this function to create new x-ray jobs.



- **Duplicate job:**
Use this function to duplicate the selected job. This is useful to repeat exposures.



- **Delete job:**
Use this function to delete an x-ray job.

8.3.2.1 *New x-ray job*

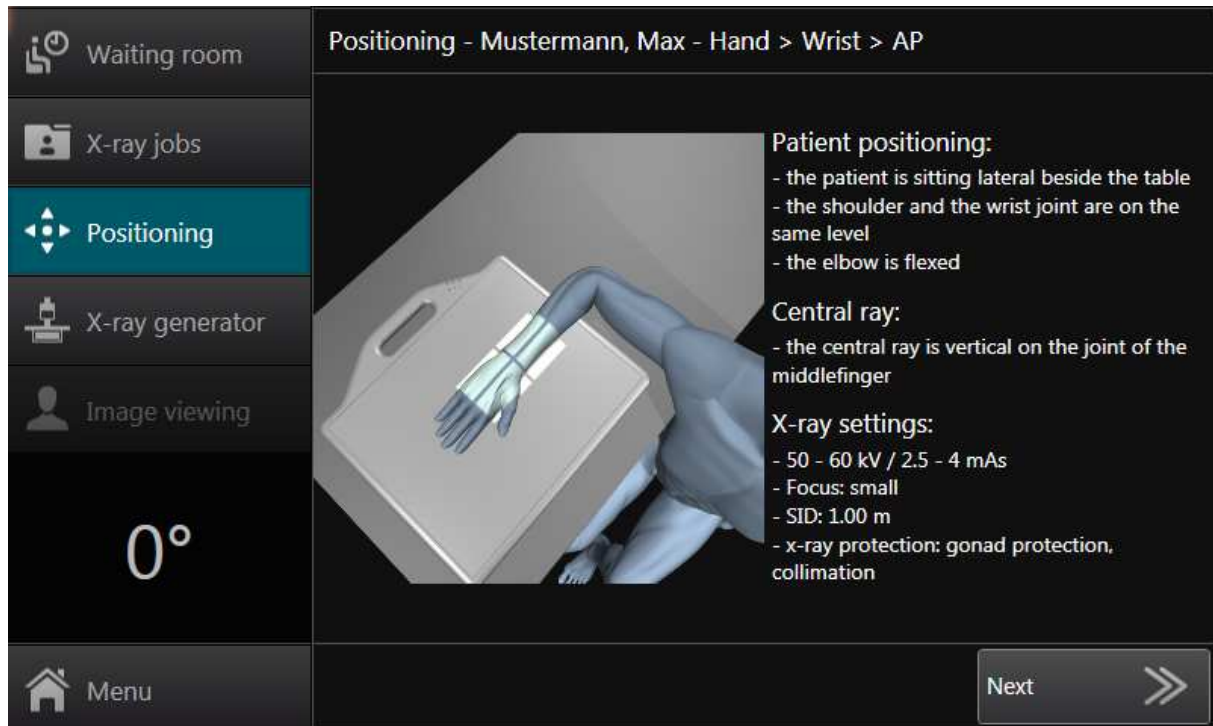
In this area the user can create new x-ray jobs.

The creation of an x-ray job is being performed in three steps by defining body part, fine part and view position. By selecting a *"QuickJob"* one or more jobs can create directly.

The homunculus is used to select the body part (e.g. 🧑 chest, 🐾 foreleg). After selecting a body part the user has to select a fine part (e.g. 🧑 thoracic spine, thorax,..., 🐾 carpus left,...). Afterwards the desired view positions can be selected. The selection will be confirmed by pressing the button *"Create job"* and the new jobs appear in the list *"X-ray job list"*.

After the creation of the job the new job is selected automatically in the list. CONAXX closes the area *"New x-ray job"* and shows a new subarea (e.g. *"Positioning"*) according to the workflow.

8.3.3 Working area "Positioning"



This area supports the user to prepare the exposure. It contains an image and text instructions for the recommended exposure positioning for "Patient positioning", "Central ray" and "X-ray settings".

The user can enter the working area "X-ray generator" with the button "Next".













8.3.4 Working area "X-ray generator"
















In this area the user can control the x-ray generator. CONAXX sends automatically the correct x-ray settings to the x-ray generator according to the selected x-ray job. The user can activate different patient anatomies with these buttons:

- 👤: "child 👤", "thin 👤", "normal 👤" and "thick 👤"
- 🐶: "extra small 🐶", "small 🐶", "medium 🐶" and "large 🐶"

The following functions can be used in this area:

-  /  - 👤 Organ program "child" / 🐶 Organ program "extra small"
-  /  - 👤 Organ program "thin" / 🐶 Organ program "small"
-  /  - 👤 Organ program "normal" / 🐶 Organ program "medium"
-  /  - 👤 Organ program "thick" / 🐶 Organ program "large"
-  - Work station "free "
-  - Work station "table"
-  - Work station "wall "
-  - Exposure technique "1-point":
kV & measurement chamber

-  - **Exposure technique "2-point":**
kV & mAs
-  - **Exposure technique "3-point":**
kV & mA & ms
-  - **Focus "small"**
-  - **Focus "large"**
-  - **Measurement chamber "left"**
-  - **Measurement chamber "middle"**
-  - **Measurement chamber "right"**
-  - **Tube energy "low"**
-  - **Tube energy "normal"**
-  - **Density**
-  - **Increase parameter:**
Increases a parameter, e.g. kV.
-  - **Decrease parameter:**
Decreases a parameter, e.g. kV.
-  - **Toggle parameter:**
Toggles through all possible values of a parameter.




Hint:

According to the connected x-ray generator the range of functions differs.

After setting up all required x-ray parameters the exposure can be started by pressing *"Start exposure"*.

8.3.4.1 Exposure

After starting the exposure by clicking *"Start exposure"* CONAXX activates the modality. The exposure status of the modality will be shown with the help of status icons and text:

-  - The modality prepares the exposure.
-  - The exposure is possible and the user can execute the exposure.
-  - The exposure is done and CONAXX is importing the image.

After importing the exposed image CONAXX will switch automatically to the area *"Image viewing"*.

To abort the exposure, use the button *"Cancel"*.

8.3.5 Working area "Image viewing"



In this area the image can be optimized and edited.

The following functions can be used:



- **Category windowing:**



- **Full windowing:**

Resets the windowing and show all gray values of the image.



- **Automatic windowing:**

Fits the windowing optimally to the image content.



- **Category rotate/mirror**



- **Rotate left 90°:**

Rotates the image 90° counterclockwise.



- **Rotate right 90°:**

Rotates the image 90° clockwise.



- **Flip horizontal:**

Flips the image along the horizontal axis.



- **Flip vertical:**

Flips the image along the vertical axis.



- **Cropping:**

Crops the image according to a user-defined cropping frame.



- **Category annotations:**



- **Annotation "laterality marker left":**

Inserts the annotation "laterality marker left" at a user defined position into the image.



- **Annotation "laterality marker right":**

Inserts the annotation "laterality marker right" at a user defined position into the image.



- **Delete selection:**

Deletes all selected annotations in the image.



- **Category viewing:**



- **Fit to screen:**

The image is modified to the size of the tile.



- **Zoom 1:1:**

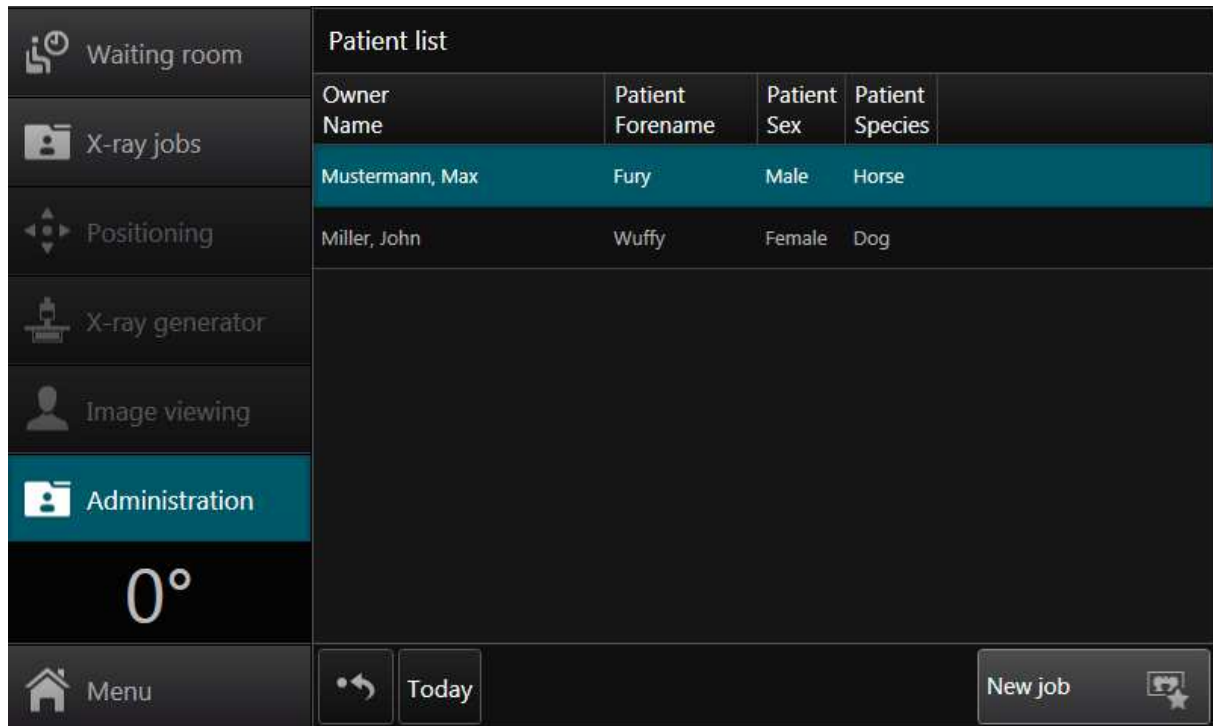
The image is shown in a 1:1 ratio, i.e. one pixel in the image corresponds to one pixel on the screen.

Note:

All optimizations must be accepted by the user using the button "✓". If an automatic export has been configured, the processing of the x-ray job will be completed now.

Click on the button "Next job" to enter the working area "X-ray jobs". The next x-ray job is selected automatically.

8.3.6 Working area "Administration" (only vet version)



Owner Name	Patient Forename	Patient Sex	Patient Species
Mustermann, Max	Fury	Male	Horse
Miller, John	Wuffy	Female	Dog

This area provides a list with all patients. On entering this area all patients with images from today will be displayed in the patient list. The button "↺" will reset the patient list and all patients will be shown. Use the button "New job" to create a new x-ray job for this patient.

8.3.7 Main menu

The following functions are provided:



- **Remote support:**

This function starts the remote support tool. With this tool the support staff can help the user




- **Exit:**

This function quits CONAXX TOUCH.

9. PROSLIDE 32-DR Touch

9.1 Operation in battery mode


9.1.1 Battery of the generator

Use the button "" in the status area to see the charging level of the battery.

Hint:

Without enough battery charge it is not possible to make X-ray exposures. Please ensure that the PROSLIDE is connected to power socket so that the charging process can be continued.

9.1.2 Battery of the computer

The computers battery allows the operation without being connected to a power socket. To see the status of the battery use the button "" in the status area.

You can use the computer with a fully charged battery for a maximum of 90 minutes. The system informs the user with a message box immediately when the power line connection interrupts. Furthermore the status of the power line connection is shown in the status area:



- **Power line connected (green icon):**
In this status the system is fully useable. The user can perform X-ray exposures.



- **Power line connected (gray icon):**
In this status the user cannot perform X-ray exposures.
Reasons for that are: no connection to the detector, no connection to the X-ray generator or insufficient battery charge level.



- **Power line disconnected:**
In this status only the computer is useable. It is not possible to perform X-ray exposures.

Hint:

If the charging level of the computers battery gets very low the computer will shutting down independently. To use the system establish the power socket connection.

9.2 Start-up of the system

To start the system connect the system to the power socket. After connecting the computer starts automatically. The system is ready for use when the area "Waiting room" is shown on the screen.

9.3 Transport of the running system

To transport the system to another X-ray location switch of the generator. Disconnect the power line. The computer remains switched on and is useable while transportation. Before moving the system to the new location bring the swivel arm in the transport position.

At the new location connect the PROSLIDE to a power socket and switch on the generator. CONAXX reestablish the connection to all connected devices automatically. The system is now ready to use.

9.4 Shut-down of the system

To switch off the system execute the function "Exit" from the main menu of CONAXX. CONAXX will turn of the computer automatically. Shut down the generator afterwards.

10. Exposure index

The exposure index is a measure of the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system. It will be calculated automatically while creating an image. The exposure index allows the user to judge if an image was taken at a detector exposure level suitable for the intended level of image quality.

“The exposure index also has limitations. It is important to understand these to avoid misinterpretation and misuse of exposure index values. This is particularly true if exposure index values from different digital x-ray imaging systems or for images acquired with significantly different technical factors are to be compared” [IEC 62494-1]

“With otherwise identical technical factors (kV, filtration, SID, grid) and subject, the exposure index of a particular digital x-ray imaging systems is linearly proportional to the image receptor air kerma. For example, doubling the mAs will result in a doubling of the exposure index.” [IEC 62494-1]

10.1 Exposure index overlays

The following overlays with information regarding the exposure index can be configured:

- | | | |
|-------------|---|--|
| EI | - | Exposure Index:
Measure of the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system. |
| EI-T | - | Target Exposure Index:
Expected value of the exposure index when exposing the x-ray image receptor properly. |
| DI | - | Deviation Index:
Number quantifying the deviation of the actual exposure index from a target exposure index. |

10.2 Interpretation of the exposure index values

The user should verify with each exposure the deviation index. Based on the value of the deviation index the user should decide whether a dose reduction is necessary for this kind of x-ray job (e.g. Head > Skull > AP). We recommend the following interpretation of the deviation index:

- | | | |
|--------------------|---|---|
| Green area | - | The deviation index is between -2 and +2 |
| Yellow area | - | The deviation index is between -5 and -2 or between +2 and +5 |
| Red area | - | The deviation index is less than -5 or greater than +5 |

If the deviation index is a part of the yellow or red area, the user should check the exposure index mask (see the following chapter). If the deviation index is still in the yellow or red area and if it is positive (e.g. +5.2), so this is an indication that the dose can be reduced for this kind of x-ray job without losing image quality elementary. If necessary please contact your dealer.




In principle, negative values are negligible if the image quality is diagnostically satisfactory.


10.3 Drawing the exposure index mask

10.3.1 Exposure index window user interface

The user interface of the exposure index window is subdivided into several sections:



-  - **Active x-ray job:**
Displays the description of the current active x-ray job.
-  - **Area "Raw image":**
In this area the raw image of the active x-ray job will be displayed.
-  - **Mask functions:**
This area provides various functions for the creation of the exposure index mask. See below.






Global functions:
This area provides global functions.
The button "Cancel" discards all changes and closes the window.
-  - The button "Save" saves the changes in the exposure index mask and closes the window.
The button "Q" resets the windowing and show all gray values of the image.
The button "G" fits the windowing optimally to the image content.

Mask function: target value

This area provides the target value for the active x-ray job.

Mask function: Automatic mask

This area provides information and functions for the automatic mask. Automatic mask is being displayed always in the color "red".

- Exposure index** - Displays the exposure index value of the current applied automatic mask.
- Deviation index** - Displays the deviation index value of the current applied automatic mask.
- Gray value** - Displays the gray value of the current applied automatic mask.
-  - **Current saved automatic mask:**
Shows the current saved automatic mask. At the same time the current saved values for the exposure index, deviation index and gray value will be displayed.
-  - **Automatic mask 1:**
Calculates the automatic mask based on deposited filter. The values for the exposure index, deviation index and gray value will be calculated.
-  - **Automatic mask 2:**
Calculates the automatic mask based on deposited filter. The values for the exposure index, deviation index and gray value will be calculated.
-  - **Automatic mask 3:**
Calculates the automatic mask based on deposited filter. The values for the exposure index, deviation index and gray value will be calculated.
-  - **Automatic mask 4:**
Calculates the automatic mask based on deposited filter. The values for the exposure index, deviation index and gray value will be calculated.






Mask function: Manual mask

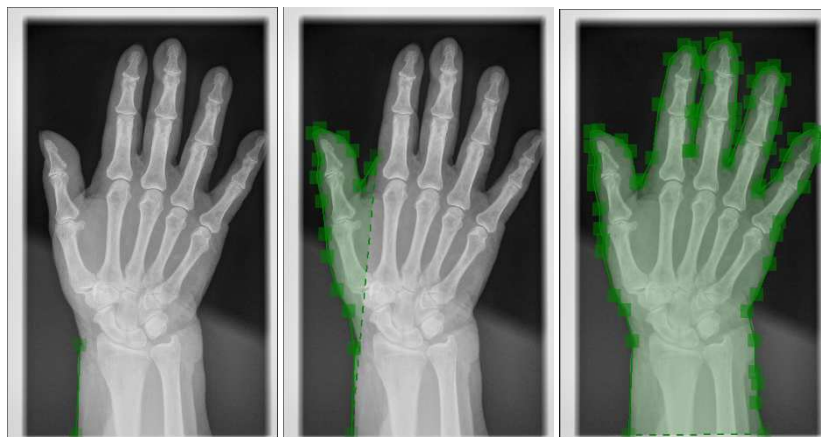
This area provides information and functions for the manual masks. The manual mask is being displayed always in the color "green".

- Exposure index** - Displays the exposure index value of the current drawn manual mask
- Deviation index** - Displays the deviation index value of the current drawn manual mask
- Gray value** - Displays the gray value of the current drawn manual mask
- Show mask** - Shows the manual mask.
- Paint mask** - Activate or deactivate the drawing mode of the manual mask.
- Delete mask** - Deletes the current manual mask.
- Calculate values** - Calculates the values for exposure index, deviation index and gray value for the current drawn manual mask.

10.3.2 Drawing exposure index mask procedure

The recommended procedure for drawing the exposure index mask is described below. The mask should be drawn in this way that the relevant image area is covered. The relevant image area is the examination-specific sub-area or sub-areas of the image containing the diagnostically relevant information. [IEC 62494-1]

- Step 1:
While opening the exposure index mask window the application tries to load the current stored automatic exposure index mask. If an automatic mask exists, it will be displayed on the raw image (red mask). At the same time the button  is active. Check whether the drawn mask covers the relevant image area. In this case the calculated exposure index values are correct and you can close the exposure index mask window by clicking the button "Cancel". Otherwise continue with the step 2.
If there is no stored automatic exposure index mask, no mask will be displayed on the raw image and the button  is disabled. Continue with the step 2.
- Step 2:
Try the automatic masks 1 to 4 (, , , ). At each mask check whether the drawn mask covers the relevant image area. In this case save the new calculated exposure index values by clicking the button "Save". A question dialog will appear. Please select the entry "Save automatic mask values". The dialog and the exposure index mask window will be closed automatically.
If none of the automatic masks covers the relevant image area please continue with step 3.
- Step 3:
Draw a manual mask that covers the relevant image area optimally. Therefore click on the button "Paint mask". If the function "Paint mask" is active the mouse cursor will change if you move to the raw image. Find a starting point of the relevant image area and click with the left mouse button. A green square is drawn in the raw image. Move the mouse to another point along the relevant image area. Make sure that a straight line can be drawn between the current mouse position and the previously drawn green square. A second green square can be drawn by using the left mouse button. The two green squares will be connected by a green line automatically. Repeat that process until you have enclosed the relevant image area. A dashed green line will be drawn from the last green square to the first green square. The enclosed area is easily recognizable by a green coloration. Once you have finished the mask click on the button "Calculate values". Click on the button "Save". A question dialog will appear. Please select the entry "Save manual mask values". The dialog and the exposure index mask window will be closed automatically.



10.4 Exposure index of test x-ray jobs

To ensure that for test exposures (signal normalization, homogeneity etc.) no irrelevant or false areas are used for calculating of the, the calculation of the exposure index will not be performed automatically. The exposure index must be calculated manually by using the exposure index mask (see chapter 10.3).

Hint:

To get a deviation index for test jobs you have to define the Target Exposure Index in the configuration.

11. Stitching with autotracking


The following chapters describe the process of “full leg” and “full spine” examinations.

Hint:

A full leg examination consists of 2 or 3 exposures. This means a height from approx. 65cm to approx. 120cm (the exact details result from the used modality).

A full spine examination consists of 2 exposures. This means a height from approx. 45cm to approx. 84cm (the exact details result from the used modality).


11.1 Procedure “full leg”

1. Select the quick job “Full leg AP” and click “Create job”. As a result, three x-ray jobs will be created in the x-ray job list.
2. Select the first x-ray job “Pelvis > STITCHING pelvis with thigh > AP” and click “Start exposure”. A warning dialog appears.
3. Please ensure that no person is on the table or in close vicinity to the system. Confirm the warning dialog with “OK”.
4. Observe the warning regarding the handling of the stitching trolley. Confirm the warning dialog with “OK”.
5. A wizard will appear, which guides you through the necessary settings.
 - a. Move the table to the lowest position
(this step is done automatically by the system)
 - b. Move the wall stand Bucky to the middle exposure position
(this step is done automatically by the system)
 - c. Rotate the tube to the wall stand
 - d. Set the source-image distance
 - e. Move the tube until it stops automatically
 - f. If necessary, adjust the laser to the Bucky center
 - g. Move the tabletop away from the wall stand
 - h. Position the patient on the trolley and adjust the collimation to the upper edge of the pelvic bone
6. After all the settings have been made, confirm the steps f), g) and h) by ticking the respective check box. If all steps are ticked off with a green tick, you can continue by clicking on “OK”.
7. The system will show the complete collimation of all exposures. Confirm it by clicking on “OK”.
8. The exposure dialog appears. The bucky of the wall stand automatically moves to the first exposure position and the collimation will be adjusted for the first exposure. Wait until the bucky has reached its position and the collimation is set. Check the generator settings. As soon as the generator and the detector are ready, the status changed from “Preparing exposure...” to “Please perform the exposure”.
9. Perform the exposure with the hand switch of the generator. After the image has been transferred from the detector, the bucky of the wall stand automatically moves to the second exposure position and the collimation will be adjusted for the second exposure. After the image optimization is completed, the image must be checked. Therefore you can use the full screen mode (). If the exposure has to be repeated click on “Repeat”, otherwise on “Next”.
10. The exposure dialog for the second exposure appears. Wait until the bucky has reached its position and the collimation is set. Check the generator settings. As soon as the generator and the detector are ready, the status changed from “Preparing exposure...” to “Please perform the exposure”.
11. Perform the second exposure with the hand switch of the generator. After the image has been transferred from the detector, the bucky of the wall stand automatically moves to the third exposure position and the

collimation will adjusted for the third exposure. After the image optimization is completed, the image must be checked. If the exposure has to be repeated click on *"Repeat"*, otherwise on *"Next"*.

12. The exposure dialog for the third exposure appears. Wait until the bucky has reached its position and the collimation is set. Check the generator settings. As soon as the generator and the detector are ready, the status changed from *"Preparing exposure..."* to *"Please perform the exposure"*.
13. Perform the third exposure with the hand switch of the generator. After the image has been transferred from the detector and the image optimization is finished, the image must be checked. If the exposure has to be repeated click on *"Repeat"*, otherwise on *"Next"*.
14. You will automatically redirected to the X-ray area. There the single exposures will be automatically stitched to one exposure.

11.2 Procedure "full spine"

1. Select the quick job "Full spine AP", "Full spine LL" or "Full spine RL" and click "Create job". As a result, two x-ray jobs will be created in the x-ray job list.
2. Select the first x-ray job ("Chest > STITCHING T-spine with C-spine > AP", "Chest > STITCHING T-spine with C-spine > LL" or "Chest > STITCHING T-spine with C-spine > RL") and click "Start exposure". A warning dialog appears.
3. Please ensure that no person is on the table or in close vicinity to the system. Confirm the warning dialog with "OK".
4. Observe the warning regarding the handling of the stitching trolley. Confirm the warning dialog with "OK".
5. A wizard will appear, which guides you through the necessary settings.
 - a. Move the table to the lowest position
(this step is done automatically by the system)
 - b. Rotate the tube to the wall stand
 - c. Set the source-image distance
 - d. If necessary, adjust the laser to lower border of the active area format
 - e. Position the patient in the trolley and adjust the wall stand Bucky to the upper edge of the ears
 - f. Move the tube stand to the height of the lower border of the active area format
(this step is done automatically by the system)
 - g. Move the tabletop away from the wall stand
 - h. Adjust the lower collimation to the height of the coccyx
6. After all the settings have been made, confirm the steps d), f), g) and h) by ticking the respective check box. If all steps are ticked off with a green tick, you can continue by clicking on "OK".
7. The system will show the complete collimation of all exposures. Confirm it by clicking on "OK".
8. The exposure dialog appears. The collimation will be adjusted for the first exposure. Check the generator settings. As soon as the generator and the detector are ready, the status changed from "Preparing exposure..." to "Please perform the exposure".
9. Perform the exposure with the hand switch of the generator. After the image has been transferred from the detector, the bucky of the wall stand automatically moves to the second exposure position and the collimation will be adjusted for the second exposure. After the image optimization is completed, the image must be checked. Therefore you can use the full screen mode (). If the exposure has to be repeated click on "Repeat", otherwise on "Next".
10. The exposure dialog for the second exposure appears. Wait until the bucky has reached its position and the collimation is set. Check the generator settings. As soon as the generator and the detector are ready, the status changed from "Preparing exposure..." to "Please perform the exposure".
11. Perform the second exposure with the hand switch of the generator. After the image has been transferred from the detector and the image optimization is finished, the image must be checked. If the exposure has to be repeated click on "Repeat", otherwise on "Next".
12. You will be automatically redirected to the X-ray area. There, the single exposures will automatically stitched to one exposure.

12. Configuration

In the configuration the user can configure CONAXX. The configuration is always accessible in the “Main menu” of CONAXX.

Common > View

Common	View
System	Handling
Body parts	Messages
Image processing	Text templates
Import	Institution
Export	Dealer
	User management

☐ Full screen

Image viewing

Relative size of text annotations
5

Relative size of laterality markers
5

Relative size of handles
5

Overlays

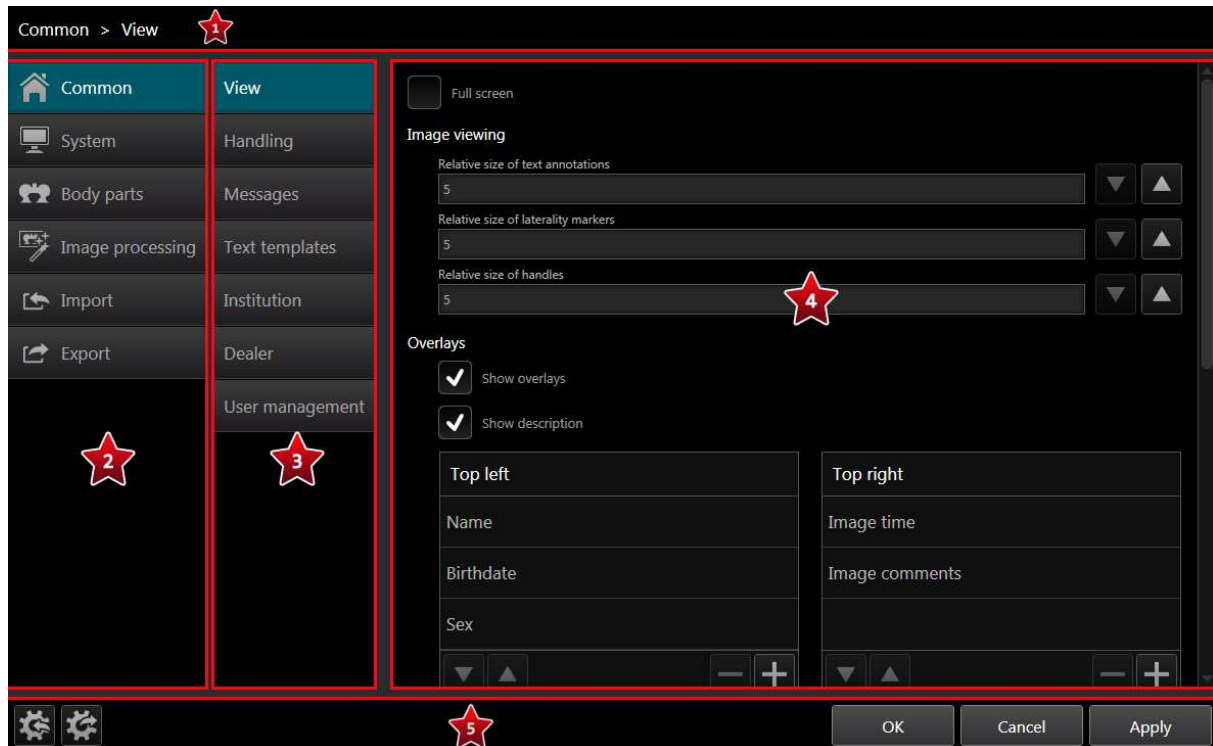
☒ Show overlays

☒ Show description

Top left	Top right
Name	Image time
Birthdate	Image comments
Sex	

OK Cancel Apply

The user interface of the configuration is separated in the following areas:



Current section:
Shows the currently active section.



Navigation area "main section":
Shows a list with all main sections.



Navigation area "sub section":
Shows a list with all sub section of the current selected main section.



Configuration area:
In this area all configuration options are displayed.

Functions:

The button "OK" saves all changes and closes the configuration.
The button "Cancel" discards all changes and closes the configuration.
The button "Apply" saves all changes without closing the configuration afterwards.



With the button "⚙️" the user can import a previous exported configuration or a previous exported body part configuration¹.
With the button "⚙️" the user can export the complete configuration or only the body part configuration.

Hint:

The content of the configuration sections is depending on the user role of the logged-in user.

For all configuration sections marked with "1" the user role "dealer" is necessary.

12.1 Common

In this section the user can configure common settings.

12.1.1 View

When activating the option *"Full screen"* CONAXX will start in full screen mode.

In the section *"Image viewing"* the user can configure the size of *"text annotations"*, *"laterality markers"* and *"resize handles"*. The option *"Visual size"* can be used to configure how large the handles are displayed regardless of the active area that can be configured with the option *"Relative size of the handles"*. Furthermore, the *"Zoom step"* can be configured.

Use the option *"Show overlays"* to configure the displayed overlays. To add an overlay to one of the four overlay areas use the button **+**. To remove an overlay use the button **-**. To change the order of the overlays use the buttons **▲** and **▼**. Activate the option *"Show description"* to display the descriptions of the overlays.

When activating the option *"Full screen"* CONAXX will start in full screen mode.

In the section *"Waiting room – Patient list"* the user can configure the visibility of additional information in patient list of the waiting room.

The "X-ray - New x-ray job - QuickJob list" area offers two display modes for the QuickJobs list. With the option *"Show only QuickJobs containing different body parts"* only QuickJobs that combine x-ray job definitions of different body parts are offered for selection next to the homunculus when creating new x-ray jobs. *"Show all QuickJobs"* lists all configured QuickJobs regardless of their content.

12.1.2 Handling

When the option *"Show cropping recommendation"* is activated CONAXX will show the cropping frame automatically as soon as the user opens an image.


For a fixed cropping frame activate the option *"Fix cropping frame"*.

To make annotations resizable activate the option *"Resizable annotation"*.

 When the option *"Exposure series"* is activated CONAXX select the next x-ray job with the status *"Created"* immediately after the current x-ray job gets the status *"Exposed"*. This will continue until there is no x-ray job in the x-ray job list with the status *"Created"*.

 When the option *"Use acoustic signals for the image acquisition"* is activated the program will play different sounds while the image acquisition. These sounds reflect the state of the modality.

When activating the option *"Use On-Screen keyboard"* the program will open the keyboard automatically. This option is available for devices with touch screen.

 If the option *"Show fullscreen preview"* is active a full screen preview of the current exposed image will be displayed for a configured time period.

To allow the user to edit the radiographic positioning in the working area *"Image viewing"* you have to activate the option *"Allow edit radiographic positioning"*¹.

With the option *"Remove patient automatically from waiting room"* you can configure under what condition a patient is automatically removed from the waiting room.

12.1.3 Messages

In this section notification windows can be enabled or disabled.

12.1.4 Text templates

In this section the user can predefine text templates for *"Text annotations"*, *"Image comments"*, *"Keywords"*, *"Referring physician"*, *"Performing physician"*, *"Station"* and *"X-ray journal descriptions"*.

 The option *"Color"* provides a list for user defined colors.

To add text to the lists use the button “+”. To remove a text use the button “-”. To edit text use the button “✎”.

12.1.5 Institution¹

In this section the institution (“*Institution name*” and “*Institution address*”) can be configured.

Use the fields “*Department name*” and “*Station name*” to specify the installation more detailed.

12.1.6 Dealer¹

In this section the dealer can enter his data.

12.1.7 User management¹

This section covers the user management of CONAXX.

To add a new user account use the button “+”. To remove the selected user use the button “-”. To edit the user account use the button “✎”.

12.2 System¹

In this section the user can configure system settings.

12.2.1 Common¹

To change the character of all DICOM files generated by CONAXX change the option "Character set".

Also configurable at this point are following options:


- "Start program when computer starts"
- "Shut down computer after closing the program"
- "Display "Show Desktop" button in main menu"
- "Use 10 bit image display"


Activating this option 10 bit grey scales will be used for the image display instead of 8 bit gray scale (10 bit support of monitor and graphic card required).

- "Generate patient ID automatically"


Activating this option the patient ID will be automatically filled in with a numerical value by creating the patient. The start number for the IDs can be defined.

- "Emergency patient"


If this option is activated, the button  will be available in the section "New patient" to create emergency patients.



In the  vet version there are the additional options "Adjustment for easyVET/easyIMAGE", "Generate owner ID automatically" and "Create no new DICOM UID when re-accepting an image" available.


12.2.2 Mandatory fields¹


In this section the user can configure mandatory fields for patient data (in the  vet version additional owner data.), x-ray jobs and x-ray journal data. Further, the visibility of these fields can be controlled.

Use the buttons "▲" and "▼" to change the order of the fields.

The  button can be used to configure predefined values for the data of an emergency patient. After clicking on this button a window will appear in which you can enter the value. In addition, the buttons "Date" and "Time" are available. Clicking on these buttons a placeholder for the date or time will be inserted. While creating an emergency patient, the current date or time will be entered.

No emergency data can be configured for the fields "Age" and "Sex" (in the  vet version additionally not for the field "Neutered"). The additional buttons "Date" and "Time" are not available for the fields "Birthdate" (in the  vet version additionally not for the field "Species").

User-defined fields can be added, removed or edited via the buttons "+", "-" and . Furthermore it can be configured in which DICOM-Tag the values of the fields will be stored.

The  button is also available for the field "Pregnancy" in the "X-ray jobs" list. It allows adjusting the age range of female patients, where this field is considered mandatory.

12.2.3 Visible functions¹

In this section the user can configure which functions will be not visible in the software. To hide a function in the surface of the software, the equivalent button must be deactivated.

12.2.4 Diagnosis¹

In this section the user can configure settings for the diagnosis area.

The option "Use extra lines at the end points for measurement distance" can be activated or deactivated.

Also the quick access bar can be configured.

Whether the quick access bar appears on the top, left, right or bottom can be defined with the option "Position".

Beneath this option the current configured quick access bar is shown. Use "drag & drop" to add a button to the quick access bar. Therefore, press the left mouse button on a function button and drag it to the quick access bar while holding the left mouse button. If you release the left mouse button, the function button will be added to the quick access bar. You can remove a function button from the quick access bar by selecting a function button and clicking "—" afterwards.

In order to change the position of the function buttons in the quick access bar you can use "drag & drop".

12.2.5 Modality¹

The section "Selected modality" controls the connected modality of CONAXX. According to the selected modality different options appear. For further details see the installation manual of the modality.

To activate an automatic rotation of images define this in the option "Rotations".

The connection mode for the x-ray generator control must be selected in the section "Interface box". The options "Bucky start" and "Hand switch" are available.

In the section "Cropping" can be defined, if the images are to be cropped automatically after acquisition.

The "automatic connection" to a WiFi detector can be activated in the "Wireless Network" section. After activation, the **SSID** of the detector WLAN must be selected in the "SSID" box.

12.2.6 X-ray generator¹

To control an x-ray generator by CONAXX activate the option "Active". The option "X-ray generator" specifies the controlled generator model. According to the model different options are displayed.

The option "Port" specifies the used serial port where the x-ray generator is connected.

In case of not using all work stations deactivate the unused with the option "Work stations".

To send child organ program automatically to the generator activate the option "Use child organ program automatically for young patients". In that case specify the age limit in the field "Years".

12.2.7 X-ray journal¹

To control a "Dose area product measurement" device by CONAXX activate this with the option "Active". Specify the model in the field "Device". According to the model different options appear. To check the correct connection settings you can use the button "Test communication".

12.2.8 CONAXX TOUCH¹

To connect CONAXX TOUCH/TOUCH2 with CONAXX activate this by checking "Active". In that case further settings have to be checked by the user.

The following option is only available for a specific product configuration. CONAXX can automatically switch on the computer, where CONAXX TOUCH is installed. Please enter the MAC address of the network adapter of the CONAXX TOUCH computer in the input field "MAC address". You find the MAC address on the sticker, which is placed on the TOUCH-head and the delivered product documentation.

12.2.9 Purging¹

The automatic purging of exported x-ray jobs can be configured in this area. There are the following possibilities to control the purging:

"Number of jobs":

Defines the limit at which purging should begin. The *"Purge level"* defines the percentage that should be purged.

"Used disk space":

Defines the limit (in gigabytes) at which the purging begins. The *"Purge level"* defines the percentage that should be purged.

"Number of days":

Defines the limit (in days) at which purging should begin. 60 means that all images which have been successfully exported and which are older than 60 days old should be purged.

12.2.10 Registration¹

This section shows information regarding the current license. It is possible to initiate a license request in the section *"Generate hardware key"*.

Use the button *"Import license"* to import a new license into CONAXX.

12.2.11 Paths¹

To store the image data in another file path change the option *"Path for image folder"*.

12.2.12 PRS 500 B¹

If CONAXX 2 is operated together with a PRS 500 B system, it can be configured here.

The option *"Wallstand position"* defines whether the wall stand stands to the left or right of the x-ray table.

If tube angle monitoring is to take place, the option *"Active"* must be activated in the *"Tube angle monitoring"* area.

If grid monitoring is to take place at the workstations *"wall"* and *"table"*, the option *"Active"* must be activated in the *"Grid monitoring"* area. This option can only be used if the system is equipped with a bucky with grid detection.

The monitored workstations can be activated with the options  and .

A maximum of three different grids can be configured. A name of the grid can be specified in the field *"Grid name"*. This name will be displayed in the X-ray area. The tolerance of the source image distance can be defined in the fields *"Minimum"* and *"Maximum"*. The grid is accepted within the range between the minimum and maximum.

If the option *"Show warning in case of wrong/missing grid"* is activated, the user gets a warning message if a wrong grid is inserted, or no grid is inserted. An exposure will not be prevented.

In order to display a warning message for young patients if a grid is inserted, the option *"Show warning when grid is inserted for young patients"* can be activated. In this case, the age limit must also be specified in the *"Years"* field.

If a patient is younger or the same age as the age limit, the message *"Please check if a grid for this young patient is required before proceeding."* appears when starting the recording.

12.2.13 Collimator¹

In the section *"Automatic Collimator"*, the option *"Active"* activates the automatic collimator. The option *"Collimator"* can be used to select the connected collimator. The option *"Port"* specifies the used serial port where the automatic collimator is connected.

If the option *"Always reset the collimator filter when changing x-ray jobs"* is active, the collimator filter is reset when changing jobs (no collimator filter).

In order to display a warning about the use of a collimator filter, the option *"Show warning for using a collimator filter"* can be activated. In this case, the age limit must also be specified in the *"Years"* field. If a patient is younger or the same age as the age limit, the message *"Check if you need a collimator filter for this x-ray job."* appears when starting the recording. The collimator filter can also be set in this dialog.

This section is only available, if the module *"Automatic collimator"* is present.

12.2.14 PRS 500¹

If CONAXX 2 is operated together with a PRS 500 system, it can be configured here.

The option *"Wallstand position"* defines whether the wall stand stands to the left or right of the x-ray table.

If tube angle monitoring is to take place, the option *"Active"* must be activated in the *"Tube angle monitoring"* area.

If grid monitoring is to take place at the workstations *"wall"* and *"table"*, the option *"Active"* must be activated in the *"Grid monitoring"* area. This option can only be used if the system is equipped with a bucky with grid detection.

The monitored workstations can be activated with the options  and .

A maximum of three different grids can be configured. A name of the grid can be specified in the field *"Grid name"*. This name will be displayed in the X-ray area. The tolerance of the source image distance can be defined in the fields *"Minimum"* and *"Maximum"*. The grid is accepted within the range between the minimum and maximum.

If the option *"Show warning in case of wrong/missing grid"* is activated, the user gets a warning message if a wrong grid is inserted, or no grid is inserted. An exposure will not be prevented.

In order to display a warning message for young patients if a grid is inserted, the option *"Show warning when grid is inserted for young patients"* can be activated. In this case, the age limit must also be specified in the *"Years"* field.

If a patient is younger or the same age as the age limit, the message *"Please check if a grid for this young patient is required before proceeding."* appears when starting the recording.

12.2.15 PEDS 600¹

If grid monitoring is to take place at the workstations *"wall"* and *"table"*, the option *"Active"* must be activated in the *"Grid monitoring"* area. This option can only be used if the system is equipped with a bucky with grid detection.

The monitored workstations can be activated with the options  and .

A maximum of three different grids can be configured. A name of the grid can be specified in the field *"Grid name"*. This name will be displayed in the X-ray area. The tolerance of the source image distance can be defined in the fields *"Minimum"* and *"Maximum"*. The grid is accepted within the range between the minimum and maximum.

If the option *"Show warning in case of wrong/missing grid"* is activated, the user gets a warning message if a wrong grid is inserted, or no grid is inserted. An exposure will not be prevented.

In order to display a warning message for young patients if a grid is inserted, the option *"Show warning when grid is inserted for young patients"* can be activated. In this case, the age limit must also be specified in the *"Years"* field.

If a patient is younger or the same age as the age limit, the message *"Please check if a grid for this young patient is required before proceeding."* appears when starting the recording.

12.2.16 PRS 500 C¹

If CONAXX 2 is operated together with a PRS 500 C system, it can be configured here.

The option "*Port*" specifies the used serial port for the communication with the PRS 500 C system.

The option "*Wallstand position*" defines whether the wall stand stands to the left or right of the x-ray table.

If tube angle monitoring is to take place, the option "Active" must be activated in the "Tube angle monitoring" area.









12.3 Body parts

In this section the user can configure body part settings.

12.3.1 Common¹


In this section all body parts and body part depending settings (e.g. filtering or rotations) can be made.

The lists "*Species*", "*Body part*", "*Fine part*" and "*View position*" show already created entries. The following functions for these lists are available:

- | | | |
|---|---|--|
|  | - | Add a new entry |
|  | - | Delete the selected entry |
|  | - | Rename the selected entry |
|  | - | Show more function |
|  | - | Move the selected entry to the top of the list |
|  | - | Move the selected entry up |
|  | - | Move the selected entry down |
|  | - | Move the selected entry to the bottom of the list |
| Duplicate | - | Duplicate the selected entry |
| Duplicate
(Move) | - | Duplicate the selected entry and move the duplicate to another body part |

To configure body part depending settings select a species, a body part, a fine part and a view position. After that body part depending settings can be made for the selected combination of species, body part, fine part and view position:

12.3.1.1 AIP¹

For executing an AIP filter, check the option "*AIP*". The desired filter has to be selected in the drop-down list. The button "" resets the complete AIP mapping for all body parts.

12.3.1.2 Professional Image Tuning¹

In this area the configured parameter values for the Professional Image Tuning are displayed. The column "Changed" documents when the change was made. You can view the name of the person who made the changes using the tooltip function (remain on the entry with the mouse).

The button "" can be used to reset all values for all body parts.

12.3.1.3 Exposure index¹

For calculating the exposure index, check the option "*Exposure index*". The desired calculation type has to be selected in the drop-down list. In addition the "*Target value*" can be configured.

The button "" resets the complete exposure index filter mapping including the target values for all body parts.

12.3.1.4 Grid suppression¹

To suppress grid lines in the images activate the option "*Grid suppression*".

12.3.1.5 *Windowing*¹

To use specific windowing parameters for a body part activate the option *"Windowing"*. The windowing is specified by *"Lower value"* and *"Upper value"* as percentage values. They control the not displayed gray scale range on the lower and upper histogram edge.

12.3.1.6 *Rotations*¹

To use specific rotations/mirrors for a body part activate the option here.

12.3.1.7 *X-ray parameters*¹

To show default x-ray parameters in the x-ray journal entry configure them in this option.

12.3.1.8 *Radiographic positioning*¹

In this area you can define the support information for every body part. It contains an image and text instructions for recommended exposure positioning. Following options are configurable: *"Image"*, *"Sample image"*, *"Patient positioning"*, *"Central ray"* and *"X-ray settings"*. The button **"↺"** resets the complete settings for the radiographic positioning for all body parts.

12.3.1.9 *Organ program*¹

To send body part depending organ programs to the generator activate the option *"Organ program"*. The number and type of organ program parameters can differ between different x-ray generator models. For each body part you can configure four different organ programs according to the anatomy *"child"*, *"thin"*, *"normal"* and *"thick"*. The total number of organ programs in CONAXX can exceed more than 1.000 because there is no limitation. The button **"↺"** resets all organ programs for all body parts.

12.3.1.10 *Collimator*

Body part-dependent settings can be configured to control the automatic collimation.

The display can be specified by entering *"length"* and *"width"*. The setting can be checked with the **"📺 Test"** button.

With the *"Filter"* option, a collimator filter can be defined that is automatically set when a job is selected. If the generator control is activated by CONAXX, it can also be defined for which organ program this predefined filter should be set. The options *"child"*, *"thin"*, *"normal"* and *"fat"* are available. In the **🐾 VET** version, there are the values *"very small"*, *"small"*, *"normal"* and *"large"*.

The entire settings for all body parts can be reset using the **"↺"** button.

This section is only available, if the module *"Automatic collimator"* is present.

12.3.2 *Procedures codes*

In this section procedure codes can be defined for the automatic job creation when using GDT/BDT and DICOM Worklist. Unlimited number of x-ray jobs can be stored under each procedure code. When patient data with defined procedure code send to CONAXX, the system creates automatically all x-ray jobs assigned to this procedure code.

Activate the option *"Use procedure codes as DICOM study description (0008,1030)"* to take over the procedure code for the study description.

In case of receiving concatenated procedure codes, you can define the separator for the codes under *"Separator for procedure codes"*.

12.3.3 QuickJobs

The section is used to configure QuickJobs.

In the list *"QuickJobs"* all existing QuickJobs are listed. Use the button "+" to add a QuickJob. Use the button "-" to remove the selected QuickJob. The button "✎" renames the selected QuickJob.

When selecting a QuickJob the second list shows all contained x-ray jobs. Use the button "+" to add another x-ray job to the QuickJob. The button "-" removes the selected x-ray job from the QuickJob.

The *"Emergency X-ray Job"* list can be used to create a QuickJob that runs automatically whenever an emergency patient is selected in the waiting room and the button *"Select patient"* is clicked. Use the button "+" to add another x-ray job to the QuickJob. The button "-" removes the selected x-ray job from the QuickJob.

12.3.4 Breed (only vet version)

The section is used to configure breeds.

In the list *"Species"* all existing species are listed. When selecting a species the second list shows all contained breeds. Use the button "+" to add another breed. The button "-" removes the selected breed. The button "✎" renames the selected breed.

12.4 Image processing¹

In this section the user can configure settings for the image processing.

12.4.1 AIP¹

To execute the AIP filters automatically activate the option *"Activate automatic image processing"*.

In order to use the Professional Image Tuning the option *"Activate Professional Image Tuning"* has to be activated. If the option is deactivated, all associated buttons, even in the configuration, are not visible.

12.4.2 Exposure index¹

Use this section to calibrate the exposure index. In case of having exposure index calibration data for the modality you can enter them into the two columns *"Microgray"* and *"Gray value"*. Confirm the calibration by pressing *"Create"*.

To create a new calibration activate the option *"Expert mode"*. You can find further details regarding this calibration in the document *"Exposure index calibration instructions"*.

12.4.3 Windowing¹

In case of adjusting the windowing of new images automatically activate the option *"Activate automatic window level"*.

The default values for the windowing can be configured by the fields *"Lower value"* and *"Upper value"* which are percentage values. They control the not displayed gray scale range on the lower and upper histogram edge.

12.4.4 Grid suppression¹

To suppress grid lines automatically activate the option *"Activate automatic grid line suppression"*.

12.4.5 Auto learning¹

In this section the auto learning function *"Rotations"* can be activated.

Learned values are saved directly in the body part depending settings in the configuration section *"Body parts"*.

12.4.6 Stitching¹

The used quick jobs for the stitching function are defined in this section (list *"Automatic stitching"*). In addition it can be configured, how the DICOM Store function have to handle stitched x-ray jobs (subsection *"DICOM Store"*).

In the section *"Autotracking"*, the *"Active"* option can be used to activate the stitching autotracking. Furthermore the following system settings can be configured:

- Height of the top edge of the Stitching Trolley standing plate (1/10 mm)
- Source image distance (1/10 mm)
- Detector width (pixel)
- Detector height (pixel)
- Detector pixel size (µm)

For entering the detector data you can also use the button *"Import"*. If at least one image has been taken with the detector, the software can use this function to read out and enter the values for *"Width"*, *"Height"* and *"Pixel size"*.

Make sure that the last exposure was taken with the detector located in the wall stand. This option is only available, when CONAXX 2 operates with a PRS 500 B system.

12.5 Import¹

In this section the user can configure import actions of CONAXX. CONAXX can handle the import of patient data and the import of x-ray job data.

12.5.1 DICOM Worklist¹

The option "Active" activates the DICOM Worklist import action.

After configuring common setting the area "DICOM Worklist SCP" describes the used server. CONAXX queries this server periodically and adds new entries directly into the "Patient list" in the working area "Waiting room". The delay between the requests is configured by the "Polling time (seconds)".

To control the Worklist request CONAXX provides different "Request criteria". The option "DICOM tag for examination description" specifies the used data for the automatic creation of x-ray jobs in CONAXX. When more than one description send at the same time, the used separator can be configured under "Separator for procedure codes".

To activate the DICOM MPPS status messages, the option "DICOM MPPS SCP" must be activated.

12.5.2 DICOM Query¹

To activate the DICOM Query import action activate the option "Active".

Specify the details of the "DICOM Query SCP" in the following fields.

12.5.3 PROPAXX¹

For activating of the PROPAXX import the option "Active" have to be checked. After that the host and port for the PROPAXX receive service have to be set.

12.5.4 GDT/BDT/EMR¹


In this section GDT/BDT/EMR import actions can be configured.

The delay between processing of single GDT/BDT/EMR files can be defined in the text field "Import delay (1-30 seconds)".

The button "+" is used to add new observed folders. The button "-" removes the selected import action. With the button "✎" the user can change the observed folder of the selected import action. CONAXX will observe the folder only, if the column "Active" is checked.

For each import action the field "File extension" and "Encoding" has to be configured. You can get the encodings for the most common patient information systems from your service partner. Furthermore the "Mapping" between CONAXX data fields and imported data files has to be specified. When more than one description sent at the same time in the field "StudyComment / Procedure codes", the used separator can be configured under "Separator for procedure codes".

To activate the reply function activate the option "Activate reply". In this case the "File name" and "Export folder path" is necessary. The area "Mapping" specifies the content of the reply message.


In the  VET version there is the additional option "Activate reply (VETERA)" available in this section. This enables the export of a reply message that is adapted to the VETERA software. If this option is activated, the "Export Folder (.gdt)" for the reply message itself and "Export Folder (.jpg)" for the referenced JPEG images in it must be specified.

12.6 Export¹

In this section the user can configure export actions.

12.6.1 Common¹

To save images with the same fine part into the same series the user has to activate the option *"Save images with same fine part in the same series"*. Normally every image will be saved in its own series.


If the option *"Write patient field 'Chip' into DICOM Tag 'Other Patient IDs (0010,1000)'"* is activated, the chip will be additionally recorded in the DICOM Tag *"Other Patient IDs (0010,1000)"*. (only  vet version)

In the section *"Show overlays"* the user can configure, if the overlays will be shown in the following file formats: *"Bitmap"*, *"JPEG"*, *"PNG"* and *"TIFF"*. This option will be considered in the function *"Save as"*. If the option *"JPEG"* is active it is also considered in the function *"E-mail"*.

In the section *"File name"* a file name for the export (*"Save as"*) can be defined. Using the **+** button, placeholders can be inserted into the file name. These placeholders will be replaced accordingly during export.

12.6.2 DICOM Store¹

In addition to common settings the user can configure one or more DICOM Store SCPs in the according area.

The button **+** is used to add a DICOM Store SCP. The button **-** removes the selected SCP. With the button  the user can change properties of the DICOM Store SCP. In case of activating the property *"Send raw images too"* CONAXX will send both accepted and raw images to the DICOM Store SCP. The option *"DICOM Storage Commitment"* activates the storage commitment requests for the server. It is used by the purging procedure of CONAXX. If the option is checked, an image will be purged only if the server, that has been received it per DICOM Store, confirms the successful storage.

12.6.3 DICOM Print¹

In this section the user can configure the DICOM Print settings.

In the section *"DICOM printer"* the user can add one or more DICOM printer. The button **+** is used to add a DICOM printer. The button **-** removes the selected DICOM printer. With the button  the user can change the name of the DICOM printer. The button  duplicate a DICOM printer entry with all settings.

After selecting a DICOM printer communication settings such as *"Remote AE title"*, *"Host"* and *"Port"*, can be done in the section *"DICOM Print SCP"*. Please check the supported *"Bits per pixel"* of the DICOM Printer and whether the DICOM Printer supports a status request.

In the section *"Print settings"* and *"Advanced print settings"* the user can configure the print settings. Please check the DICOM Conformance Statement of the DICOM Printer.

In the property *"Image Display Format"* the user can define different layouts:

- *"STANDARD"* means the film contains equal size rectangular image boxes with R rows of image boxes and C columns of image boxes.
- *"ROW"* means the film contains rows with equal size rectangular image boxes with R1 image boxes in the first row, R2 image boxes in second row, R3 image boxes in third row, etc.
- *"COL"* means the film contains columns with equal size rectangular image boxes with C1 image boxes in the first column, C2 image boxes in second column, C3 image boxes in third column, etc.

12.6.4 Automatic Export¹

CONAXX supports automatic export actions. These actions are executed directly after accepting an x-ray job.

The button “+” is used to add new export action. The button “-” removes the selected export action. CONAXX executes only those actions whose column “Active” is checked.

Export action “DICOM Store”:

This export action sends the image automatically via DICOM Store to an external PACS. To configure this action select a previous created DICOM Store SCP.

Export action “Save as”:

This export action saves the image automatically on hard disk or mobile media. To configure this action select a “File format” and the “Export folder path”.

Export action “DICOM RDSR”:

This export action generates and sends automatically a DICOM RDSR (Radiation Dose Structured Report) for the respective x-ray job. The parameters of the target system defined in “12.6.5 DICOM RDSR¹” will be used while configuring this kind of export action.

Export action “DICOM Print”:

With this type of export, the X-ray image is automatically added to the list for the DICOM print layout. The added images of the active patient can then be printed in the “DICOM Print” area (see 6.6 Area “DICOM Print”).

12.6.5 DICOM RDSR¹

This configuration section offers the possibility of defining a target system for sending a DICOM RDSR (Radiation Dose Structured Report) report. The parameters of the target system are entered in the input fields „Remote AE title“, „Host“ and „Port“. These settings can be used to configure the automatic export (see “12.6.4 Automatic Export¹”).

13. FAQ, Tips

13.1 *Backup of database and image data*

To backup CONAXX you can back up the complete installation folder or the following data containing areas:

- **Image data**
The image data is saved in the folder "*Images*" in the CONAXX installation folder.
- **Databases**
The databases are saved in the folder "*Databases*" in the CONAXX installation folder.

13.2 *Hardware configuration*

Please pay attention on disk space of the hardware configuration. CONAXX saves each image in three versions on the hard disk.





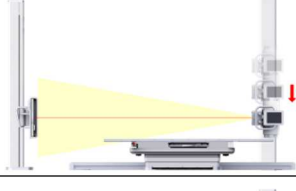
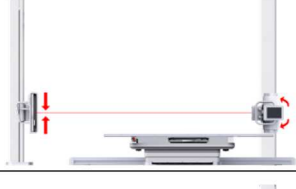
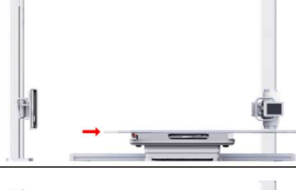
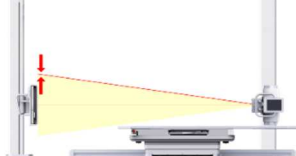
13.3 *Error "OutOfMemory"*

Causes of this error are too many opened images at the same time or too large images. Check the system requirements of CONAXX and upgrade the computer if necessary.



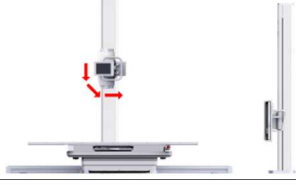

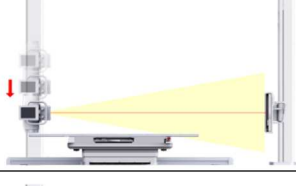
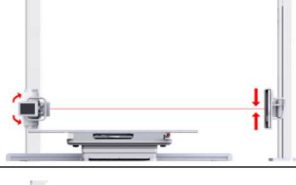
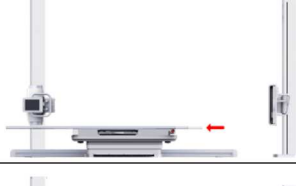
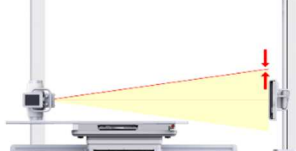
The following troubleshooting actions are also possible:

- Restart CONAXX or
- Restart the computer






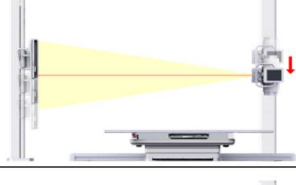
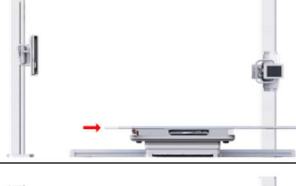
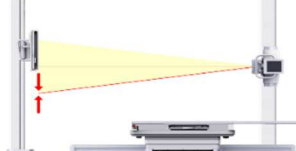
Appendix 1: Checklist stitching “Full leg” (wall stand left)

1. Move the table to the lowest position <i>(this step is done automatically by the system)</i>	
2. Move the wall stand Bucky to the middle exposure position <i>(this step is done automatically by the system)</i>	
3. Rotate the tube to the wall stand (90°)	
4. Set the source-image distance (300 cm)	
5. Move the tube down until it stops automatically	
6. If necessary, adjust the laser to the Bucky center	
7. Move the tabletop away from the wall stand	
8. Position the patient on the trolley and adjust the collimation to the upper edge of the pelvic bone	


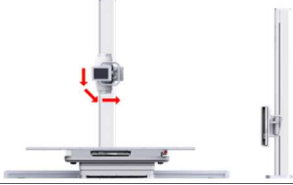
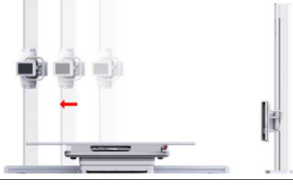
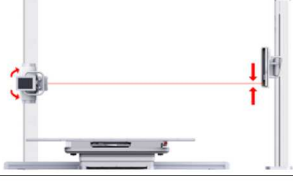

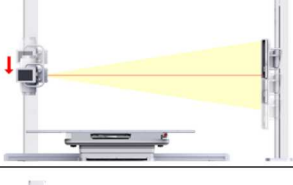
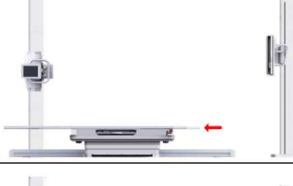
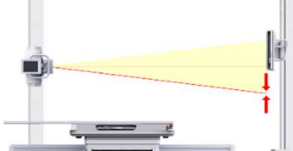
Appendix 2: Checklist stitching "Full leg" (wall stand right)

1. Move the table to the lowest position <i>(this step is done automatically by the system)</i>	
2. Move the wall stand Bucky to the middle exposure position <i>(this step is done automatically by the system)</i>	
3. Rotate the tube to the wall stand (-90°)	
4. Set the source-image distance (300 cm)	
5. Move the tube down until it stops automatically	
6. If necessary, adjust the laser to the Bucky center	
7. Move the tabletop away from the wall stand	
8. Position the patient on the trolley and adjust the collimation to the upper edge of the pelvic bone	

Appendix 3: Checklist stitching "Full spine" (wall stand left)

























































1. Move the table to the lowest position <i>(this step is done automatically by the system)</i>	
2. Rotate the tube to the wall stand (90°)	
3. Set the source-image distance (300 cm)	
4. If necessary, adjust the laser to lower border of the active area format	
5. Position the patient in the trolley and adjust the wall stand Bucky to the upper edge of the ears	
6. Move the tube stand to the height of the lower border of the active area format <i>(this step is done automatically by the system)</i>	
7. Move the table top away from the wall stand	
8. Adjust the lower collimation to the height of the coccyx	

Appendix 4: Checklist stitching "Full spine" (wall stand right)

1. Move the table to the lowest position <i>(this step is done automatically by the system)</i>	
2. Rotate the tube to the wall stand (-90°)	
3. Set the source-image distance (300 cm)	
4. If necessary, adjust the laser to lower border of the active area format	
5. Position the patient in the trolley and adjust the wall stand Bucky to the upper edge of the ears	
6. Move the tube stand to the height of the lower border of the active area format <i>(this step is done automatically by the system)</i>	
7. Move the tabletop away from the wall stand	
8. Adjust the lower collimation to the height of the coccyx	

Appendix 5: Keyboard shortcuts

The following table provides an overview of the keyboard shortcuts that are available in the area "Diagnosis".

Keyboard shortcut		Function	Keyboard shortcut		Function	Keyboard shortcut		Function
F2		Quick help				ALT + F4		Close Diagnostic Viewer
F11		Full screen						
1		Tool "windowing"	CTRL + 1		Tiling 1, 1			
2		Tool "Move image (Panning)"	CTRL + 2		Tiling 2, 1			
3		Tool "magnifier"	CTRL + 3		Tiling 1, 2			
4		Tool "Region windowing"	CTRL + 4		Tiling 2, 2			
			CTRL + 5		Show grid			
			CTRL + 6		Show ruler			
			CTRL + 7		Show overlays			
8		Full windowing	CTRL + 8		Zoom region			
9		Automatic windowing	CTRL + 9		Zoom 1:1			
0		Reset windowing	CTRL + 0		Fit to screen			
I		Invert	CTRL + A		Select all annotations	ALT + A		angle measurement
P		Professional Image Tuner	CTRL + D		Deselect all annotations	ALT + C		Circle measurement
R		Free rotation	CTRL + E		Annotation rectangle	ALT + D		Distance measurement
S		Electronic shutter	CTRL + F		Annotation freehand	ALT + H		HD angle
X		Cropping	CTRL + L		Annotation laterality marker left	ALT + L		Angle between two lines
			CTRL + M		Annotation arrow	ALT + P		PennHIP measurement
			CTRL + O		Open image	ALT + R		Cardiothoracic ration
			CTRL + Q		Annotation rectangle	ALT + T		Tibial Plateau anlge (TPA)
						ALT + U		Radiographic Left Atrial Dimension (RLAD)
			CTRL + R		Annotation laterality marker right	ALT + V		Vertebral Heart Score (VHS)
			CTRL + T		Annotation test	ALT + W		Vertebral Left Atrial Score (VLAS)
			CTRL + W		Close image			
			CTRL + Y		Redo			
			CTRL + Z		Undo			
Del		Delete selection	CTRL + Del		Delete all annotations			
			CTRL + "-"		Zoom out			
			CTRL + "+"		Zoom in			
			CTRL + Arrow left		Rotate left 90°			
			CTRL + Arrow up		Flip horizontal			
			CTRL + Arrow down		Flip vertical			
			CTRL + Arrow right		Rotate right 90°			