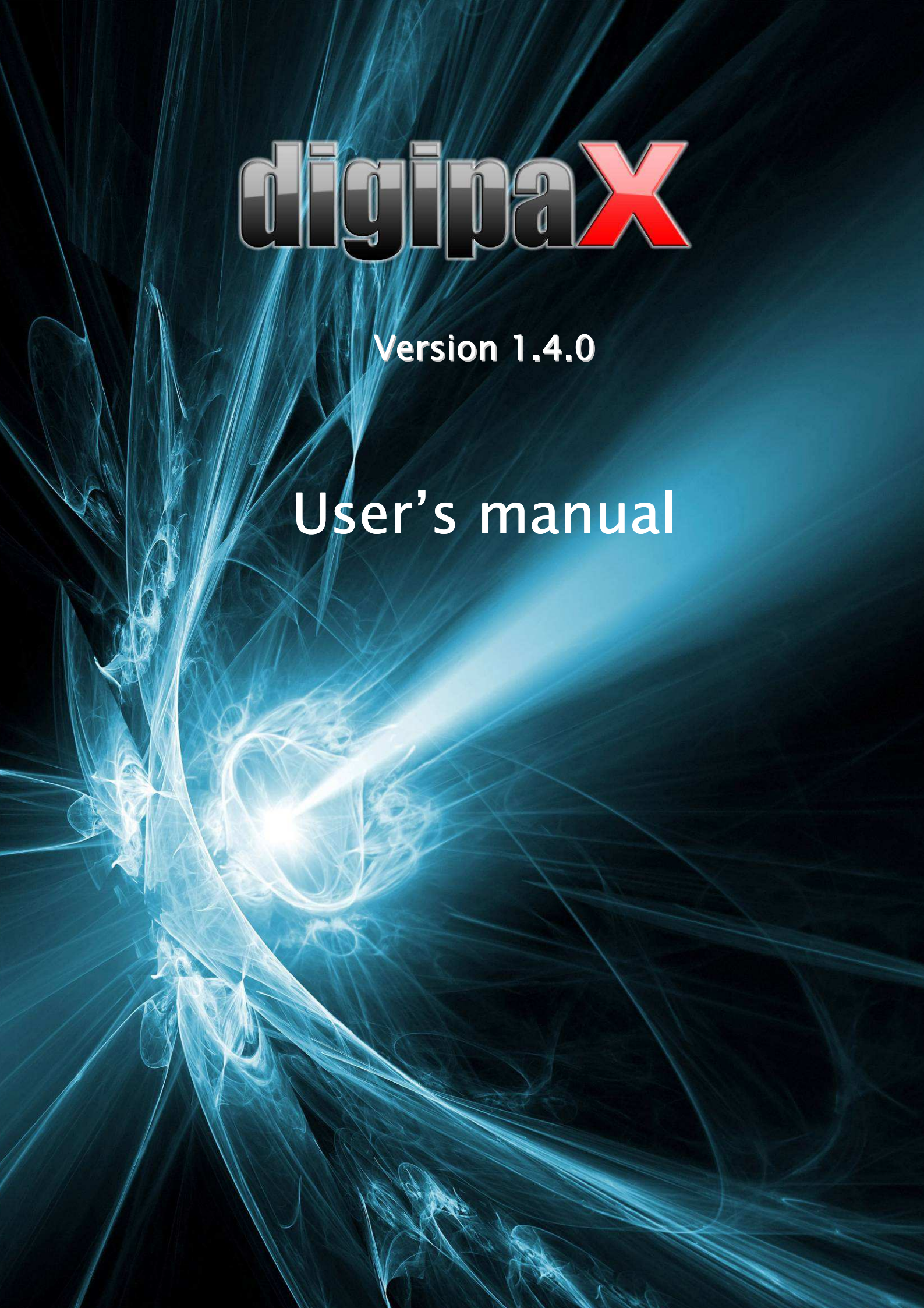

digipaX
Version 1.4.0
User's manual

Table of contents

1 General

Software digipaX is intended for managing, displaying and exporting DICOM images in different modalities (e.g. X-ray images (CR, DR) or CT images). Furthermore, it offers a wide range of useful tools for daily work with the medical imaging techniques for diagnostic purposes.
All technologies and technical procedures (image structure, communication, data storage etc.) are hereby performed in compliance to DICOM 3 standards.
The system can be used as a single workplace with an image archive (PACS). As well it suits the work together with other stations and many archives. It can be easy integrated with the systems of other manufacturers.
Furthermore, by use of worklist the jobs and transmitted data can be interchanged as well as instructions directly form the management systems in the clinics.

2 Symbols and illustrations

Symbol	Meaning
	Note
	Tip

All digipaX illustrations (screenshots) show the program windows in Classic Style. This allows the images to be clearer in the documentation. The program is normally set to Black Style, which is more suitable for viewing medical images.

3 Safety information

3.1 Software

It is not permitted to introduce any modifications to this software without approval of the manufacturer.

3.2 Conditions for use

This product is designed for use on personal computers in residential and commercial premises. The used hardware must be adapted to the prevailing environment conditions. The user of PC must verify if hardware corresponds to requirements prevailing in location of its installation.

3.3 User profile

This product is designed for use by medical personnel. Persons operating this product must have the following qualifications:

- required professional knowledge,
- training in using the X-ray data,
- computer skills,
- knowledge of one of languages used by this system.

3.4 Hardware

The used hardware must be provided with CE and it must meet requirements provided in Electromagnetic Compatibility Directive and Low Voltage Directive. It is necessary to observe restrictions concerning the use and provisions regarding the maintenance and operation of the installed hardware according to the manufacturer's information and standard EN 60950-1.

It is to make sure that the used hardware is installed in a minimum distance of 1,50 m from the patient (so that coevally touch both the hardware and the patient is impossible). Furthermore, it is to pay attention to a safe standing position of the hardware. Monitors should stand stable, so that they cannot be accidentally pulled down. Cables are to be laid in such a way that an accidental getting stuck is avoided.

The hardware shall be located in such a manner to allow for quick and easy disconnection from power supply in emergency situations. The disconnectable power outlet strips with good access may be used as possible alternative.

The keyboard, mouse and monitor shall be located on workplace in such a manner to eliminate their physical impact on environment.

3.5 Redundancy

It remains the responsibility of the user to secure the system redundantly, so that a failure of one of the units does not involve an unreasonable risk.

3.6 System crash

After a failure of the system (blackout or system crash) the tips for restoring the unsaved images are to be followed if necessary (15.4.12 Problems and solutions).

3.7 Messages

You have to inform your system deliverer or attendant immediately about the messages from the hardware (beeps) or messages from software systems (error messages from operating system, drivers/controllers or from the software itself).

3.8 Visual check

The daily visual checks of the devices are necessary, in order to guarantee a quality of a display at the diagnostic workstand(s). For this purpose, a special software program or SMPTE testpattern can be used. If the required specification is not fulfilled, then the monitor is to be readjusted or replaced by technical stuff. The instructions into the procedure follow by the system administrator/attendant.

3.9 Data backup

The weekly backups of all new images on CDs or DVDs are to be made. Media with those backups are to be stored in a separated place from the computer with the image archive (server).

3.10 Checkings

The annual checking of technical safety of the system is to be carried out.

3.11 Service life

The service life of this product amounts 1 year.

4 Installation and maintenance

4.1 Installation

The installation instructions are provided in technical description (Administrator's guide). Persons authorized by the manufacturer only are permitted to conduct operations connected with installation and maintenance. They can be enquiried at the manufacturer.

4.2 Cleaning

The installed hardware may be cleaned by generally commercially available disinfecting agents unless the system administrator/supervisor requires otherwise.

5 Software start-up

Prior it is possible to use this software, it is necessary to start-up computer on which the license file is installed and ensure network connections ready for use. The relevant information will be provided by digipaX system administrator. Start-up your computer and wait for full boot up of Windows. If one or more so-called network switches are used in the clinic, they shall be previously switched on. The relevant information will be also provided by system administrator.

Then in the first place switch on the computer on workstation and wait for full boot up of Windows. Log in on computer (if login is required).

The program may be activated by pushing symbol 

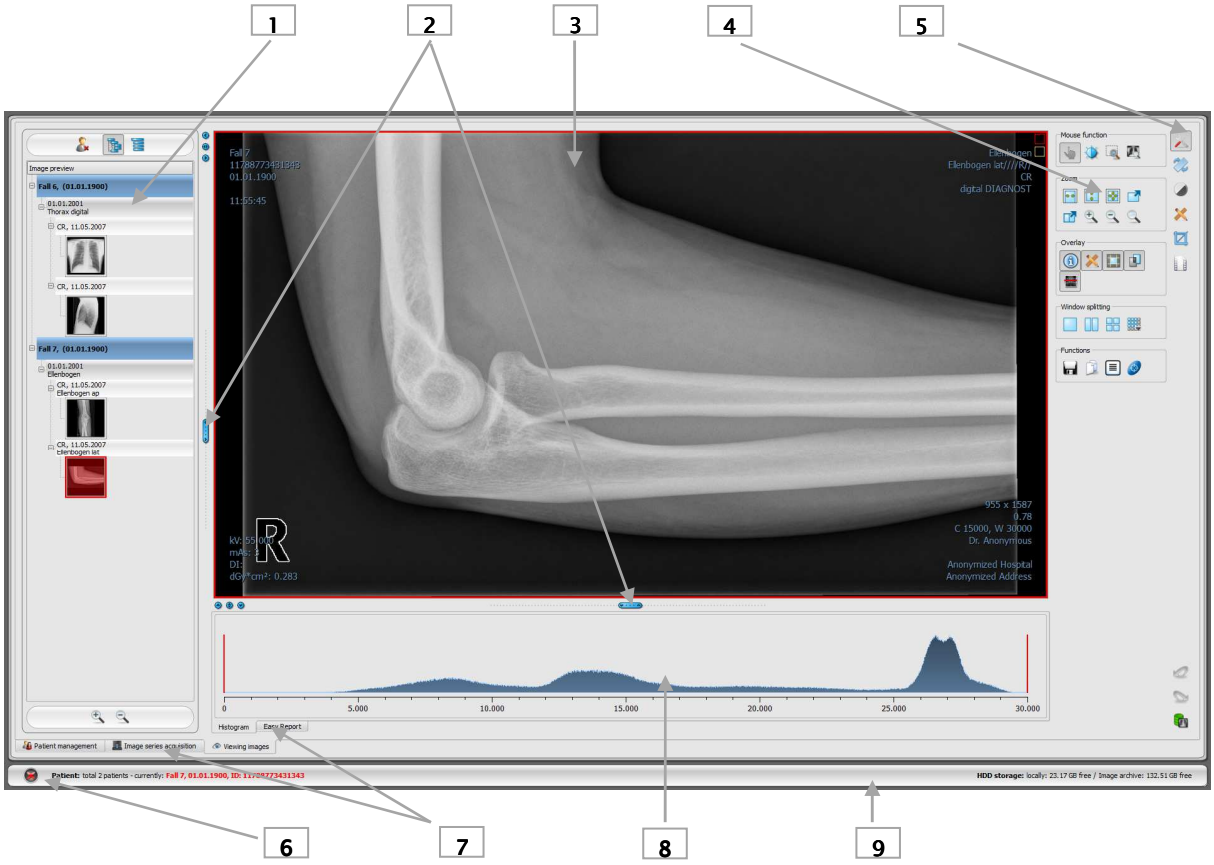
on the desktop or through the program menu. If program is activated automatically with Windows start, then you find the relevant icon is in the lower right corner in the so-called system tray.

When the clinic management software is connected, this program may be also automatically started or activated by such software. This connection can be made by GDT or HL7 interface. These connections must be configured by system administrator.

In case system is hanged up, it shall be again launched by the double clicking on some of the described above connections or through clinic management system. If system is hanged up during image acquiring and images are not saved yet, they can be recovered by automatic backup and then they may be saved. For more see chapters 15.4.8 Backups resp. 15.5.8 Importing of backup.

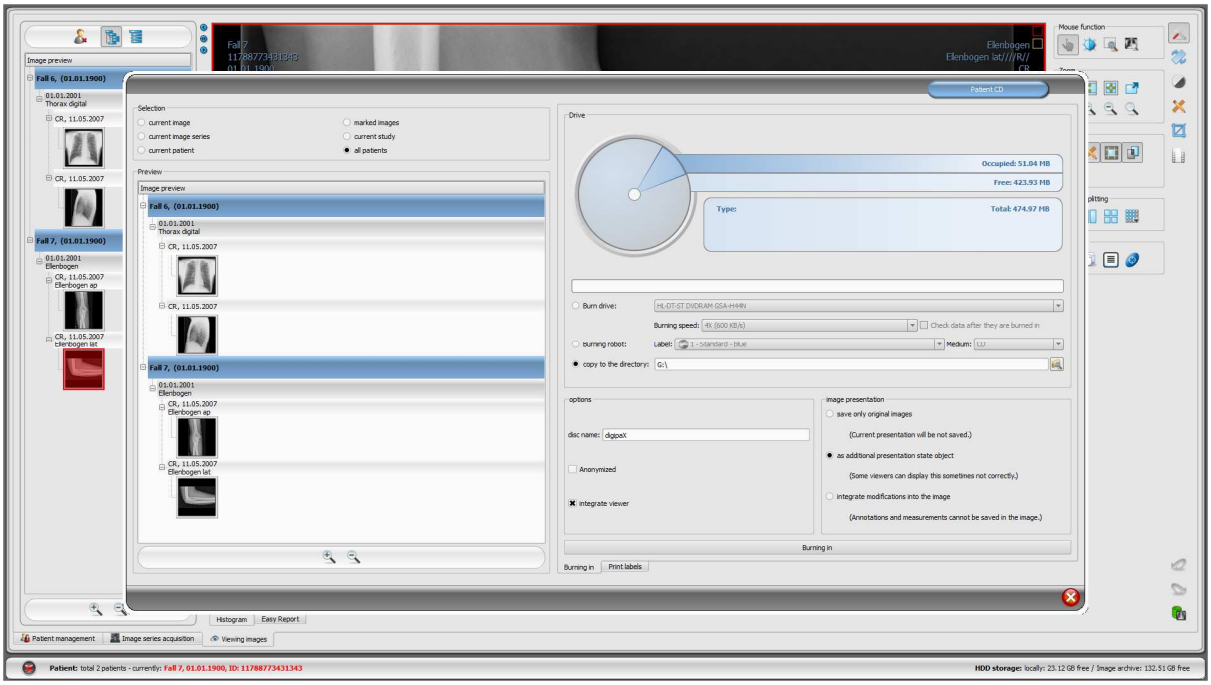
6 Screen layout

Screen layout and splitting



1 – **Thumbnails**: show all images of a selected patient as a preview (tree structure with the studies and series)
2 – **Movable bars** for changing the image division or hiding the windows
3 – **Image space / viewer**: shows an image or more selected images next to each other and one below the other
4 – **Tools** with the functions for processing images (divided into various toolboxes)
5 – **Selecting** various toolboxes
6 – **Start button**: launching various components and closing or minimizing the program
7 – **Various components**: component availability depends on the software package purchased
8 – **Histogram** of the active image
9 – **Baseboard** with information on selected patients and available space in hard disc storage

In order to have key components of the program and tools of the viewer available with one-click access, the header and the toolbar can be additionally activated. In the header, components can be activated directly, while the toolbar contains various tools (described in more detail in chapters 6.1 and 6.4).



An example for screen layout after activating a component – here, a large dialog box for creating a patient CD is shown

Patient management can also be converted to a separate component as the dialog box pictured above. Please refer to chapter 8 for more information.

6.1 Start button/ header (optionally)

The Start button bottom left opens a menu (similar to the start menu of Windows), in that particular program components can be activated and the program can be exited or minimized.

Those components are:

- patient management (only if the patient management tab is inactive, see chapter 16, section User interface)
- import
- print
- patient CDs
- job management (DICOM Worklist Management)
- X-ray journal
- configuration

Optionally, the header can be activated in configuration (chapter 16) under User interface. It is being displayed on the top of the screen. In the header, all functions of the start menu are once more incorporated and allow for access with just one click.

6.2 Image region / viewer

On the left bar the thumbnails are shown, in the middle area the selected images are presented in a large format and on the right bar the functions for processing images are available. Furthermore, there is a histogram for the current image below the image view.

6.3 Baseboard

On the baseboard the information on the patient and available space in the hard disc storage are shown. If multiple patients are selected, there are number of patients and this at the moment active patient displayed, so the one who the active image concerns.
The drives, which available space has to be shown, can be set in the configuration (max. 3 drives). If any of the drives is not available or the set critical value is undershot, the alert message will be output. If the system slowly comes closer to the critical value (available space is smaller than double critical value), the message will be presented in red bold characters, otherwise normally in black.
This baseboard is seen in all parts of the program.

6.4 Toolboxes / toolbar (optionally)

In the toolboxes, various mouse functions, zoom settings and overlay and image splitting functions are available.
Each of the toolboxes can be expanded and collapsed individually.
The toolbar can be activated optionally in the configuration (chapter 16) under User interface. The toolbar is being displayed above the image viewer, it contains once more all functions of the toolbox and makes them available with one-click access.

6.5 Split bars

Between the thumbnails (on the left) and the image area as well as between the lower part of the viewer and the image area adjustable split bars are placed. By dragging these bars to the left or right or to the top or bottom the image panes can be adapted. Also, windows can be hidden in this way completely.

By using small switches the regions above and below the image (or on its left or right side) can be closed, by pressing the middle button they can be restored. Modifications of window panes remain saved after the end of the program.

7 Viewing images / viewer

The component of viewing images covers the areas of screen selection, image display and image handling or manipulation on image.
Both greyscale and colour images are supported. These can be presented uncompressed, RLE- or JPEG-compressed.

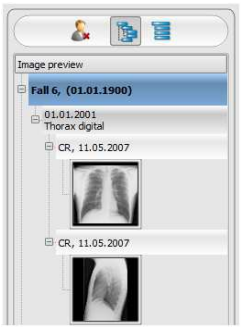
There is an indication shown on the top edge of the images compressed with lossy data compression. Those images are unusable for diagnosis as possibly important information on the image could get lost due to compression.

For greyscale images the information on presentation, like window adjustment, rotation and image annotations, are stored in the adjusted directory as Greyscale Soft Copy Presentation State (DICOM file). At the next opening of an image these are automatically used again.

7.1 Image selection

The image selection follows in a board on the left edge of a display. This is alterable and also completely hideable in its size (width) by the window divider.

The view is changeable between DICOM tree structure and list view.
In the DICOM tree structure, the studies of the selected patients are presented. The patients form in each case a superordinate node. The nodes of the studies can be opened and closed and as subnodes the pertinent series are contained. Within the series nodes the thumbnails are displayed.
In the list view, also information on each selected patient is displayed in a superordinate node. A list of all available images for this patient is arranged underneath of it (in each case nodes with caption and thumbnail), independently from their assignment to series and studies.



The criterion for the sorting, the sorting direction and the text, which can be displayed in the node, can be set in the configuration (default: date and time of the image).

The thumbnails are marked by a red framework, even if this image is displayed in a large image view.
When stopping the mouse over a node (patient, study, series or image) information on it is displayed in a tooltip.
The size of the thumbnails is adjustable by using two switches plus and minus below the tree structure. The size of the images is stored and used at the next program start.

By a double-click on a thumbnail this image can be loaded into the viewer. If there is an image window still free in the viewer (by splitting images in the display area of the viewer in for example 2x2 images, more images can be displayed next to each other in the viewer), it is displayed in this free image window. If no image window is free, the image is replaced in a current image window.

By drag & drop the thumbnails can be dragged into image window of the viewer. Also within the viewer the image can be exchanged with drag & drop in the image windows. So the user can divide very flexibly the images on his display.

The selection of the patients can be reset with the switch "Empty patient selection" over the preview tree. Afterwards no more patients are selected and the preview tree is empty.

7.2 Image display

In the viewer, images are being shown. The viewer can be split into many windows, so that many images can be displayed next to another. Simultaneous display of 1 to 36 images is possible.

For the viewer, there are many functions for image representation available. These functions are contained in the toolbar, which can be unhidden with a button top right. These functions are described in next sections. Some of them are hidden by default. With a right-click on area of the functions a context menu opens. There, the various functions can be shown and hidden. You can shape the buttons more transparently by deactivating the functions that are not needed.

It is also possible to display a constant toolbar at the top of the viewer. For more, please refer to chapter 16 Configuration (section User interface).

7.2.1 Mouse functions

In this toolbar the action for the left mouse button can be selected:

- moving (if display size is larger than image window) – this is a default setting
- windowing (brightness/contrast)
  - ➔ horizontal mouse moving: modifying window centre
  - ➔ vertical mouse moving: modifying window width

  In the configuration (category Others) these moves can be also modified
- zoom rectangle
- loupe

The function can be impacted by the following combinations of keys:

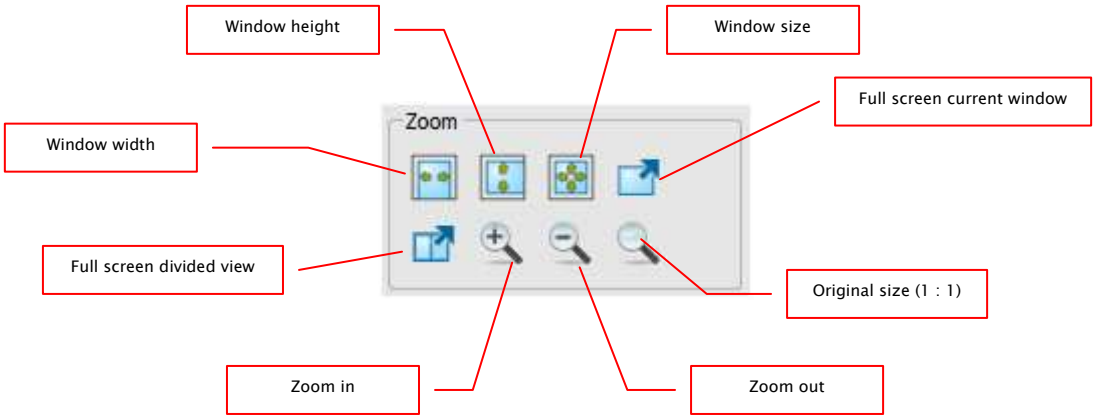
- Alt + left mouse button: windowing
- Alt + Shift + left mouse button: dragging on zoom rectangle
- Alt + right mouse button: loupe

Further mouse functions:

- Shift + left mouse button: marking image

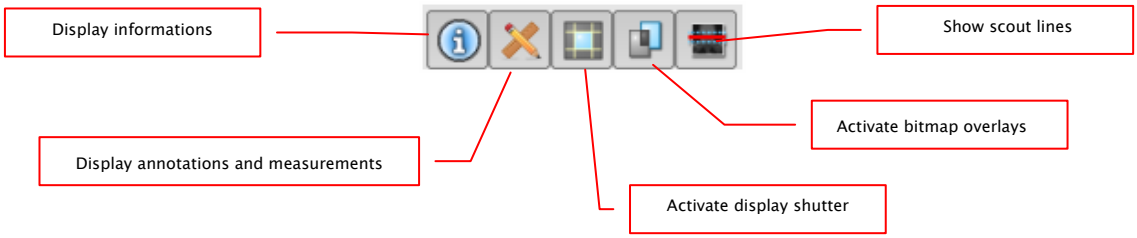
- Ctrl + left mouse button: drag & drop for exchanging the images between the image windows
- right mouse button: zoom in / zoom out (during vertical mouse moving)
- middle mouse button or pushed scroll: windowing
- rotating scroll: next or previous image of the images series, study or the patient (for each setting), if existing

7.2.2 Zoom



The options for zooming images refer in each case to currently active image. According to the standard the image display in a window is initialized in this way, that the image is scaled to the window size. If the size of the window changes in this option, e.g. by division of the image, the zoom factor is adapted accordingly, so that always the full image is seen.
With the exchange of the images between two windows by drag & drop, the zoom factors of the image stay the same.
By single pushing Enter key or using “Full screen current window” switch the full screen mode can be activated. The current image is now scaled to the full screen size. By pushing Shift + Enter keys or using “Full screen divided view” switch all presented windows (by division of images) are scaled to the full screen size. The full screen mode can be quitted by using the Esc key.

7.2.3 Overlay



Overlay divides in the following areas:

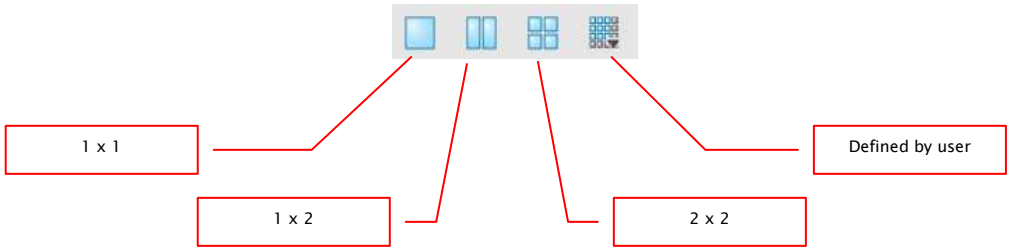
- information (in the image corners),
- annotations + measurements (e.g. measured sections or angles),
- „display shutter“ (blanking everything outside the selection),

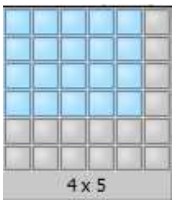
- bitmap overlays (overlay images)
- scout lines (presentation of the position of particular sectional images in CT und MRT series)

For each of these areas there is a switch in the toolbar, with which the area can be unhidden or hidden.

If an image is opened, in which a selection was set, or if a selection range is set by user, then the switch for "display shutter" is automatically set, so on, and user can turn this off or on using the switch.

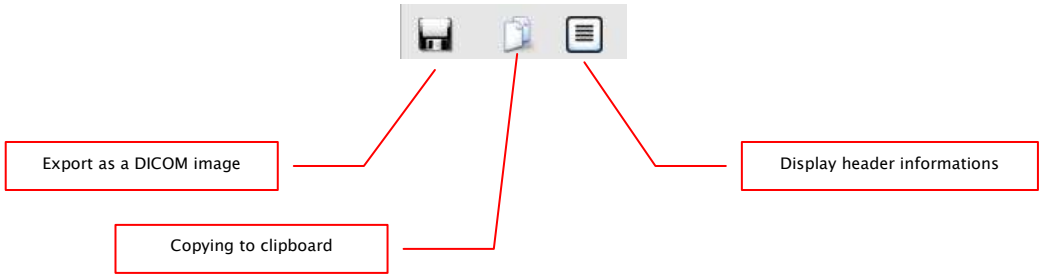
7.2.4 Image splitting





Large image display can present one or more images. How many images will be displayed, this can be selected by using these switches on the toolbar above the image display (1x1, 1x2, 2x2). Additionally the setting defined by user to maximum 6x6 can be selected by using the last switch, which also opens the small window. To edit the image in any of the windows, it is to be activated in the viewer. The active window is then surrounded by a red frame.

7.2.5 Other functions



7.2.5.1 **Exporting images**

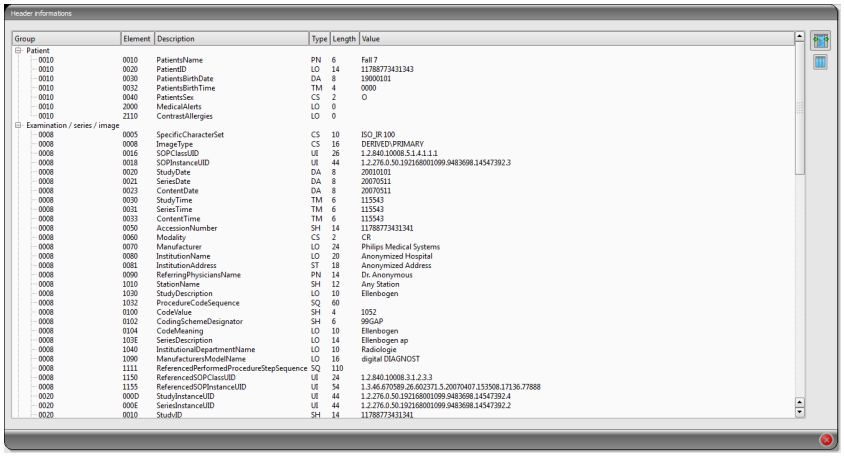
The current image can be also saved as a DICOM file. Select this switch and afterwards the target place in dialog box for saving. The file will be saved at the desired point.

7.2.5.2 **Clipboard**

By using the switch for clipboard the current image in the current presentation form can be copied to clipboard. This means that the overlay objects (information on image, annotations and measurements as well as display shutter) will be copied in the image too, provided that they are unhidden. If clicking this button is accompanied by coevally press on the Shift key, the image will be copied in its original size to clipboard.

7.2.5.3 **Header informations (DICOM Dump)**

By using a switch on the toolbar a dialog box can be opened, in which the DICOM information (tags) of the current image are displayed. These tags are sorted in groups for a better overview.
All tags, also private, are shown.
A modification of the values is not possible.



7.2.6 Marking images

In the right top of each image a small red field is placed. By clicking into this field (or Shift + left mouse button into the image), a red point appears there or disappears again, if it already existed. Each image with a red point is considered as a marked one. Additionally the marking is clarified by a shading over the entire picture, since the small red point is seen sometimes badly (e.g. if more images are presented or also on diagnostic monitors). Hiding the shading can be deactivated in the configuration (category Others). At the selection of images, e.g. for burning a patient CD, all marked images can be used.
The marked image can be recognized on image selection bar on the left by a small red point, right in the top of the thumbnail.

7.2.7 Image protection (lock)

Moreover, a yellow field is also displayed under each red field. By clicking into this area the images can be protected (locked). Manipulations on images, as described here in this user's manual, do not affect the protected images. A lock symbol in the yellow field informs if the image is protected.
Protected image cannot be recognized in image selection.

7.2.8 Context menu

By right-clicking with the mouse into the image a context menu with important functions can be activated:

- mouse function: moving the image, windowing, dragging on the zoom rectangle, loupe
- zoom: window width, window height, window size, activating or quitting the full screen, activating or quitting the full screen divided view, zoom in, zoom out, original size (1:1)
- overlay: displaying information, displaying annotations and measurements, activating display shutter, start-up of bitmap overlays, start-up of scout lines
- image division: 1x1, 1x2, 2x2, user-defined image division
- sending by electronic mail (DICOM)
- sending by electronic mail (JPEG)
- studies: list of studies of the patients and, as a submenu, each time the image series of this study (the first image of this image series is activated by activating the menu item)

The provisions of law require that messages sent by electronic means which include information on patients or their personal data must be coded. Therefore, electronic mail software must be so configured that data is coded and only its recipient can read such data.
There are special extensions for electronic mail programs which provide the message coding.

"The GNU Privacy Guard" is a free cryptographic software. It may be downloaded and installed from http://www.gnupg.org site. Such installation and configuration shall be made by professional.

7.3 Manipulation on images

On the right side of the image display, there are tools for image processing which can be hidden or unhidden by using particular buttons . These are arranged vertically and sorted according to topics.

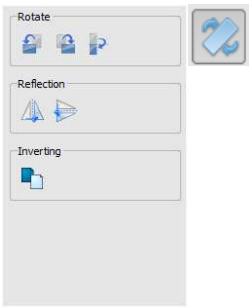
Below the tools, there are switches for undoing the last actions and restoring the undone actions. The actions are displayed as text in tooltips. The actions refer each time to the active image. I.e., if the image is changed, one cannot undo the actions for it considering the circumstances and the switches therefore are deactivated.
By using the last button „Restore original image", all of the modifications performed are being cancelled after prior confirming inquiry by the system and thus the original image is being restored just as it is stored in the image archive.

For CT and MRT images, the operations on images are automatically applied to the entire image series, otherwise always only for an active image.

For greyscale images the modifications on the images are stored.

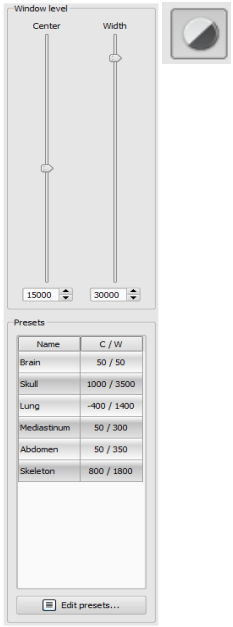
For colour images the modifications are not stored, but they are only temporary. I.e., if you change the patient or close the program, the adjustments/modifications on a colour image are getting lost.

7.3.1 Transformations (rotations, mirroring, inversions)

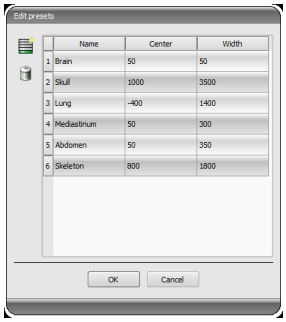


The images can be rotated at the touch of a button 90° to the left, 90° to the right or 180°. They can be mirrored horizontally and vertically and also inverted.
Each operation can be undone as well as redone by using both arrows in the bottom.

7.3.2 Windowing

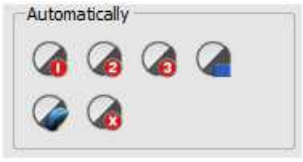


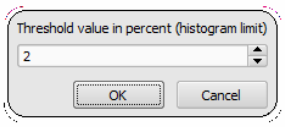
Windowing is a usual method for the preparation of greyscale images. For colour images, windowing is deactivated. By entering window centre and window width, the greyscale range will be selected, which is to be presented. These values are adjustable each time by using the sliders or input fields. Furthermore, the settings can be used quickly from the list of presets.



The modification of these presets or adding the presets defined by user is possible thereby via dialog box, which appears after the button „Edit presets…“ has been pressed on.
Also the contained default settings therein can be modified or deleted by user (they are not write protected).

With the automatic windowing, additional special default settings can be defined which will be then applied to the open image just by one click.





Configurable buttons 1 to 3 are intended to determine automatically appropriate values for windowing using calculation algorithm based on the histogram. For this algorithm, a threshold value must be defined. Click on the button while holding Shift key to define the threshold value for this button. In a subsequently opening dialog box you can enter values between 1 and 49. The higher is the value entered, the sharper the image will be. In this way, you can define default setting for each of the 3 buttons. With one click on the appropriate button the algorithm for calculation and the values obtained out of it for windowing applies immediately to the image.

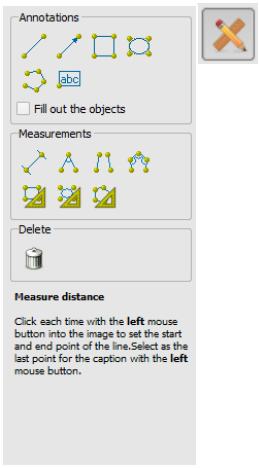
With the button „Insert rectangle”, you can drag a rectangle on the image. From this rectangle the optimum values will be calculated and applied to the image. To do this, first click on the button and then set the rectangle with two clicks on the image. The values will be immediately calculated and applied to the image.

The next button is an interactive rectangle. Click on the button and draw the rectangle along the image. The optimum value is determined automatically inside the rectangle and displayed throughout the entire image. When you have found the appropriate representation, click again to apply the value to the image. With the mouse wheel you can increase or decrease the rectangle size. With “Control” (Ctrl) or “Shift” keys pushed additionally, the rectangle size can be modified, either in its width or height. You can cancel the process with “Esc” key.

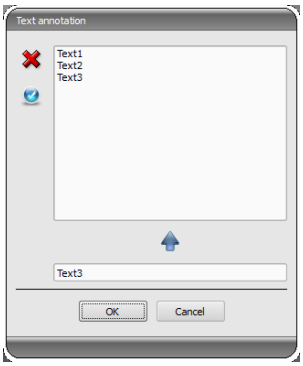
With the button „Whole area”, the entire visible area from the minimum to the maximum of grey levels contained in the image is being displayed.

7.3.3 Annotations / measurements

The misalignments of length and angle measurements may be caused by modality or image acquisition!
Default calibration can be always only as exact as the length evaluation of the imaging modality. Therefore, the length evaluation must be verified for connecting a modality.
However, the misalignments may be also caused by an exposure – particularly if conventional radiography (CR), i.e. of pelvis or ilium is considered. The distance of the exposured part of the body from the imaging plate skews the presentation of length on a 2D radiograph. Also if scale (sphere) is withal x-rayed, there is a misalignment, insofar as the scale at the exposure is not exactly at the same level with the measured part of the body.
If details for pixel size in the images are not specified then the measurement results follow in pixels.



Under the annotations come lines, arrows, rectangles, ellipses, polygons and text. Thereby the rectangles, ellipses and polygons can be also drawn filled out. Explanations how the objects are to be drawn using the mouse, are each time displayed after the selection is made, i.e. after clicking the switch below the buttons.



After the text is selected, first a dialog box appears, in which new texts can be added to the list of standard texts (enter text in the input field and then press a green arrow) or the text from this list can be selected (double-click or click and Ok) or desired text can be entered (enter text in the input field and press Ok), which will be then used and placed on the image. You can specify yourself a standard entry which is then already activated, after you activate the dialog box.

Measurement functions exist only if the adequate module is enabled.

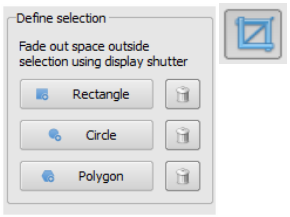
Under measuring comes measuring of the sections and angles as well as measuring of the content of the area of rectangles, ellipses and polygons. The measuring of an angle can follow thereby by entering 3, 4 or n points. For n points, the n angles will be measured.
By clicking the switch „Rectangle“, „Ellipse“ or „Polygon“ at the bottom of the measuring range while pressing the Shift key the densities can be measured. Thereby, an actual average greyscale value from the original pixel values as well as minimum and maximum greyscale value will be required. For colour images, the normal area measurement will be performed.

User can delete the drawn in annotations and measurements with the switch „Delete all“ from the overlay of the image. Deleting or subsequent modifying of particular objects is not possible.

Settings for drawing the graphic objects in the overlay can be set in the configuration, category Overlay.

7.3.4 Display shutter

For each image, the different selections zones in the form of a rectangle, ellipse or polygon can be defined. Thereby, for each type exactly one object is possible, whereby the types can be also used together. Explanations for drawing using the mouse are displayed below the buttons, after the adequate button is pressed on.



Setting up the selection zone of a certain type replaces a potentially already existing selection zone of this type.

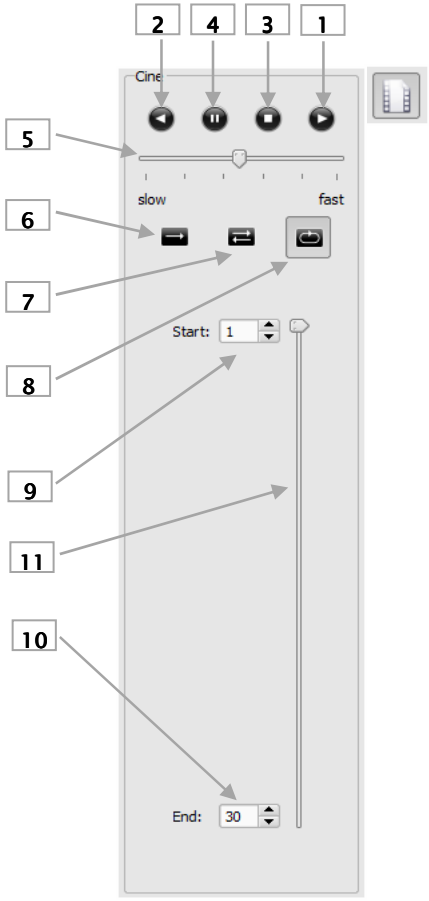
Everything except for the zone that has been defined in this way, can be hidden and unhidden by using the switch in the toolbar („Display shutter“ in the overlay options).

The objects can be individually deleted again.

7.3.5 Cine loop

With this function, the image series can be played automatically. Various control functions such as the play direction or speed are available here. The speed can be set with special controllers. With “Start” and “End” you can determine from which image of the series the play is to be started and on which one it is to be ended. With the vertical scroll bars, individual images can be also selected manually.

1 – Play forward
2 – Play backward
3 – End
4 – Pause
5 – Play speed
6 – Play once only
7 – Automatic play forward/backward
8 – Endless loop
9 – Start play from this image
10 – End play with this image
11 – Manual selection of individual images



7.4 Scout lines

By the scout line (localizer line) the cut edge of two layers (planes) and the position of particular sectional images of the CT and MRT series are presented. The position of images of any other image series in relation to the active image is thereby visualized.

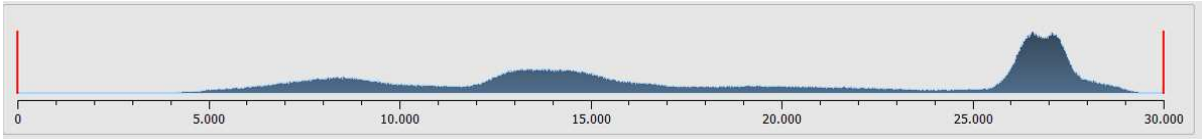
In presentation as projection lines, they do not provide information on angle under which two layers are crossing. These lines do not indicate if two layers are perpendicular or inclined to themselves. Therefore, you can not draw conclusions to mutual position of two layers on the base of projection lines only.

The better idea on mutual position of planes may be obtained in presentation as planes due to the 3-dimensional image. The required presentation form may be set up in configuration User::Overlay / Scout lines by setting the type in “Scout lines / Localizer” group.

Before you open a series, you should modify the image splitting so that you can view the particular series next to each other. Then open each series in a field. If the presentation of scout lines is activated, the scout lines will be shown automatically. Click in a series and scroll with the mouse wheel through the images of this image series. Alternatively you can use „Page up" and „Page down" buttons. The position of the current image is shown in another series as a projection line or as a plane. You find the settings for the presentation of scout lines in the section Overlay / Scout lines in the chapter 16 Configuration.

7.5 Histogram

Below the image or the images, there is a histogram window, which displays always the histogram of an active image. By shutting down the histogram window can be also completely hidden.



For colour images, a red, green and blue curve for the channels R, G and B of the image are displayed. For greyscale images, a blue curve (like presented on the image above) for spreading of greyscale values is displayed.

In the histogram for the greyscale images the current setting for windowing is always displayed and can be here also modified. The left and right zones of the visible window space are thereby lightly coloured, so that this is clarified. The red lines show the edges and are coincidentally the sliders, for modifying window edges. The performance of windowing can be improved with a higher histogram smoothing. The smoothing can be changed in the configuration page user/histogram. See section 16. The window can be completely moved by clicking with the mouse into the space between the red lines and then moving using the mouse.

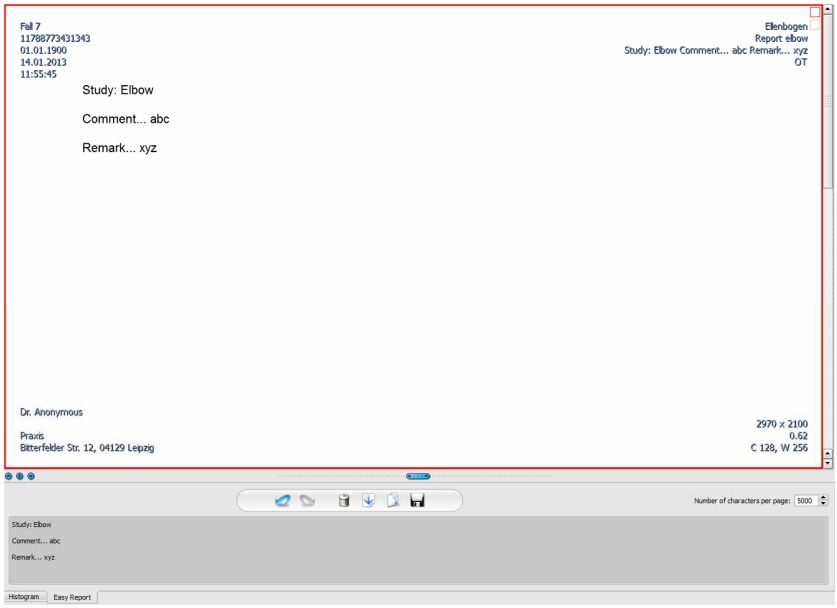
A zoom rectangle for zooming in the histogram can be dragged on by dragging with the mouse with Shift + left mouse button. With the right-click into the histogram the full size can be displayed again.

Settings for work with the histogram can be set in the configuration, category Histogram.

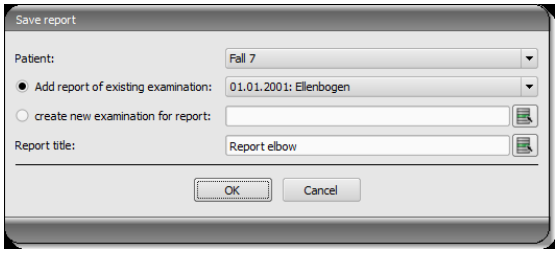
7.6 Easy Report

This module has to be activated by licensing.

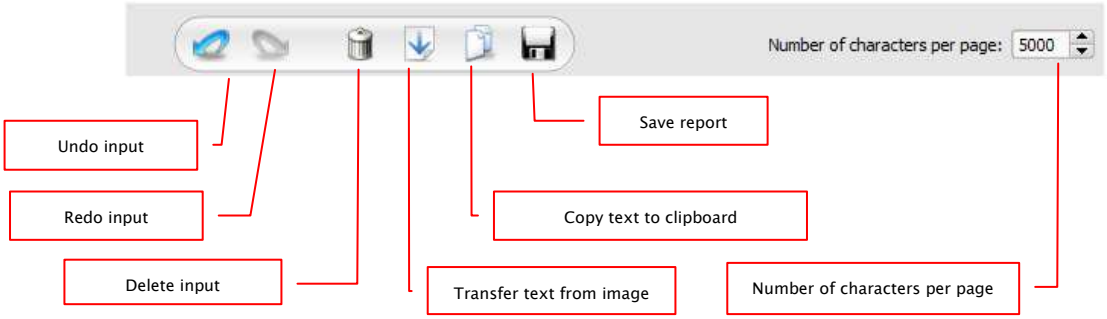
With this module reports, descriptions, comments etc. for the patients can be arranged in text format to the studies or images. The text is entered into input field designated for that purpose underneath the image viewer. The text is converted to a compressed grey image that can be approached just as the same as the other DICOM images. In addition, the text is also resided in the tag „0020,4000 – Comments on image“.



With the switch „Save“, the files of the existent study are added or saved as a new study in the archive. Easy Report is available in the Multi-Patients-Mode. That means that many patients can be opened. First select a patient to whom the Report should be assigned. Afterwards select an existent or new study. Enter the title for the Report and click „OK“. The title of the Report is saved on the tag „0008,103E – Description of a series“.



Description of the toolbar:

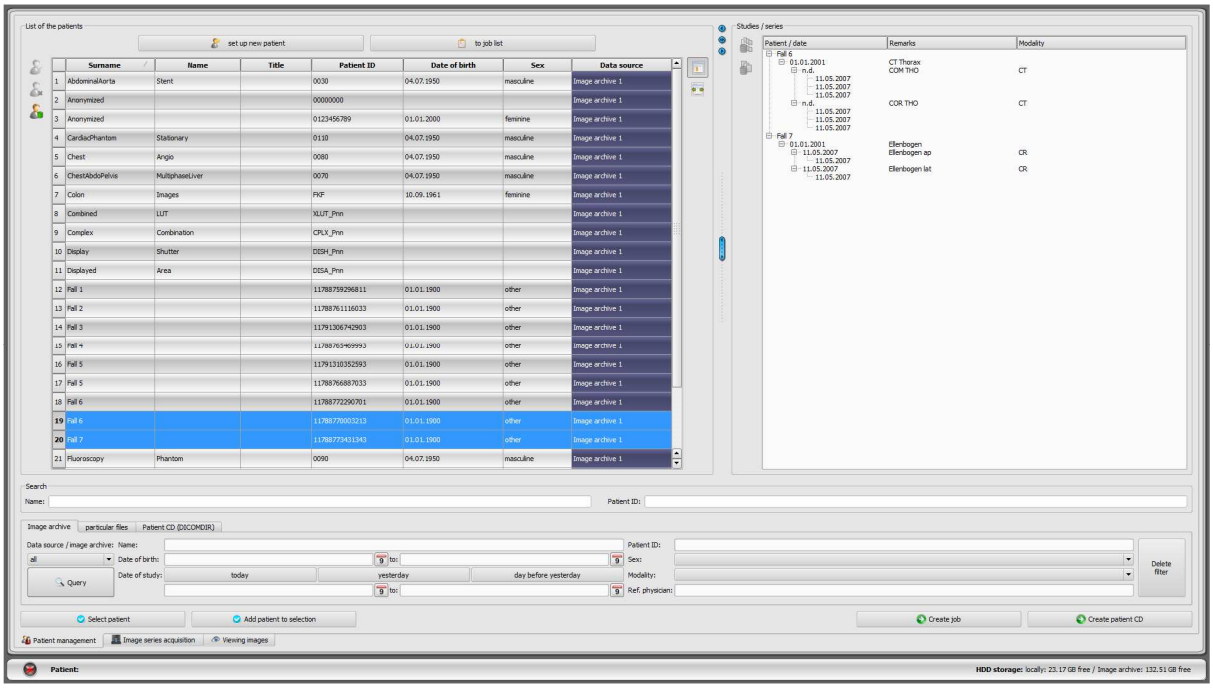


Number of characters per page is setup on 5000 characters by default. Thereafter the page is automatically changed by saving. Thereby a new image in the same series is created. Page is broken at the word boundary. Thanks to this the pages of the Reports are kept as far as possible in A4 format. Number of characters per page can be increased up to 10240 characters.

Text from existent Reports can be transferred with the switch „Transfer text from image“ into input field and used in this way for a new Report. Change of an existent Report is not possible.

You can also process the text from existent Reports further by transferring it first into input fields, then copying to clipboard and afterwards inserting into e.g. Word document.

8 Patient management



If the patient management is to be used as a separate component, the patient management tab must be unmarked in the configuration and „User interface". Then, the patient management is called up via the start menu or the header, if the latter is active.

8.1 Patient data

For each patient the following data are displayed in the table:

- surname
- name
- title
- patient ID
- date of birth
- address
- phone number
- sex
- remarks
- data source

Each column can be shown or hidden. To do it, click with the right mouse button on the headline of the list of patients and activate or deactivate the desired column. You can also move the columns in their order by dragging them with the pressed left mouse button to the desired position.
The columns for address, phone number and remarks are hidden by default and must be activated initially. To show those data, the database has to be possibly adjusted as the first step. Ask your system administrator about that.

Furthermore, the number of studies is a part of each patient data, whereby each series may contain many images.

8.2 Data source

The data from image archive can be queried, as well as local DICOM files can be read. The latter can thereby follow as a scanning for directories or opening single files or importing DICOMDIR, as this is used mostly while burning the patient CDs.
The list of patients shows each time the list of the patients of the currently selected data source, so of the selected tab. If the tab is changed, also the list of the patients displayed overhead will be changed.
After the start of the program the patient management starts automatically if no other action through the GDT connection is required (see 18 GDT interface). User is asked immediately if the list of the patients is to be updated. By „yes“ all image archives without filtering are queried (see 8.2.1 Image archive). This can take some time, depending on the number of patients, the network as well as used data base. This behaviour can be changed in the configuration – category Others. In this way, it can be set that the list of patients is to be or is not to be updated without the inquiry at the start of the program. Therewith first the filter will be set and a faster query will be performed.

8.2.1 Image archive

8.2.1.1 **Query**

On this page for one thing the configured image archives (PACS) can be queried and for another thing the locally set data, which are provided for storing in image archive. Which sources are to be queried exactly, this can be set with a drop-down list box „Data source / image archive“. Therein „all“ can be selected, in order to query all possible sources, „locally“, in order to incorporate only local data or the name of an image archive. Not used image archives (contained in the configuration, but deactivated) are not incorporated in this list and will be not queried.
By clicking the switch „Query“ the sources are queried possibly with use of set filters and the list of found adequate patients is updated.
In order to increase query speed of large archives, the number of data records displayed is limited. If the searched patient is not contained in the list, because the list is cut off, the limiting by filter must follow or the maximum data records must be increased. In the configuration, it is possible to set up the number of data records displayed or deactivate this limitation (see chapter 16 Configuration section Others).

8.2.1.2 **Filter**

The list of patients can be filtered according to different criterions. By filtering all patients which do not meet the filter settings, are dismissed from the list. The criterions which are to be used for filtering, can be activated or deactivated with a checkbox. Thereby, the filters can be also combined as desired. It is also possible to combine various filters freely. All active filters can be reset with the button “Delete filters”.

Local data, so the patients locally set in the system or newly transferred via GDT, are not filtered. These do not appear in the result lists, even when they meet the search criterions.

8.2.1.2.1 Search fields

Additional search fields for patients' names and IDs can be activated in the configuration section Users/Others (see chapter 16).
Enter the first letters of the surname (e.g. "Mey") or the first characters of the patient ID (e.g. "123") in the search field and selection jumps over automatically to the first match result for the data entered.

8.2.1.2.2 Filtering by name

Enter the beginning of the searched surname and a star behind it (e.g. „Sch*"), in order to search all the patients whose names begin with the characters "Sch". The star (wildcard) can be also used at the beginning (e.g. „*mann"), to display all patients, whose surnames end with "mann". You can also enter surname and first name separated by a comma (e.g. Sch, Ma). All patients, whose surnames start with „Sch" and the first names start with „Ma", will be displayed.

8.2.1.2.3 Filtering by date of birth

At the touch of a button the patients can be filtered, whose date of birth is included between the entered dates.

8.2.1.2.4 Filtering by date of study

At the touch of a button the patients can be filtered, which contain the studies with the date or period of time entered. Thereby the studies will be automatically filtered. This means that only one study, which meets the search criterions, will be shown for the patient.

8.2.1.2.5 Filtering by patient ID

Enter first characters of the searched patient ID or search for a part of this patient ID using wildcards (star „*") as for filtering by names.

8.2.1.2.6 Filtering by sex

Filters out all patients of a certain sex.

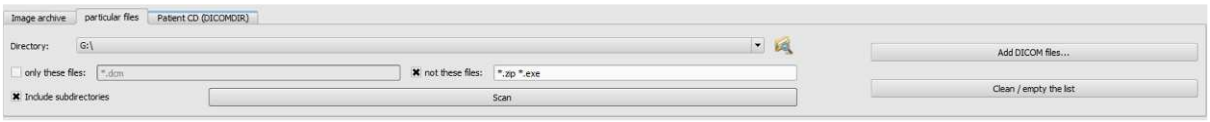
8.2.1.2.7 Filtering by modality

All possible modalities (procedure for image acquisition) are listed in a drop-down list box and one of them can be selected there. Subsequently only the patients will be displayed, which contain the images of this modality. This means that also the image series will be filtered and the corresponding series will be shown.

8.2.1.2.8 Filtering by transferring physician

Like for the filtering by names or patient ID, use here wildcards for filtering by names of transferring physician. Possibly it is necessary to set a star both at the beginning and at the end (i.e. „*sch*“).

8.2.2 Single files

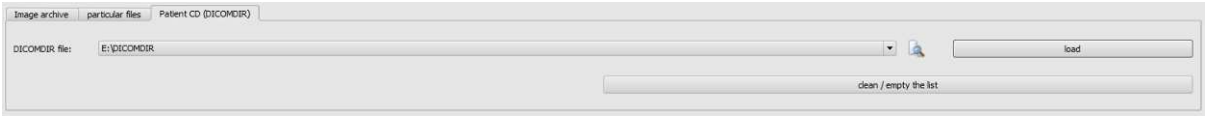


Using this tab the local DICOM files can be fast imported and viewed. Via selection of a directory or a drive and button „Scan“ all files, which meet the filter settings, are being tried to be opened. Filters for the files, which are not to be opened and for the files, which are not to be imported, can be set. First activate the desired filter and enter the file name using wildcards („*“ and „?“). Thereby, many possible file names can be separated with blanks. I.e. in the case of filter setting „*.dcm CT*“ for the option „only these files“ all files with the file end dcm and all files with the names beginning with CT will be found. If you activate the option „not these files“ and use as a filter i.e. „*.exe *.zip“ you eliminate the possibility that the programs or ZIP archives will be co-imported.
If the option „include subdirectories“ is activated all found subdirectories and their subdirectories will be scanned.
If the file, which meets the filter settings, cannot be imported, this will be minuted in the log, which can be optionally viewed if any errors occur.
The selected directory will be stored, so that it can be always selected again fast from the drop-down list box. A new directory can be selected with the switch „…“.

By touching the button „Add DICOM files…“ the single files can be directed opened. Multiple selection of files is thereby possible with the buttons Shift and Ctrl.

By clicking the button „clean / empty the list“ this data source will be emptied. All therein contained images will be then deleted from the system. **The files will be thereby not deleted.**

8.2.3 Patient CD (DICOMDIR)



Often the directories for DICOM files are created in so called DICOMDIR files. Mostly this occurs while creating a patient CD. Such a patient CD can be fast imported to the system using this tab.
DICOMDIR file (filename: „DICOMDIR“ without filename extension) can be selected with „…“. Already used storage places are taken up again in the drop-down list box and can be selected there fast again. By clicking on „load“ this DICOMDIR file is loaded and therein

contained information on patient or patients and storage place of related images are taken up to the data source.

By clicking the button „clean / empty the list“ this data source is emptied here again. All therein contained images will be then deleted from the system. **The files will be thereby not deleted.**

Patients CDs can be imported automatically to the system. If a patient CD is placed while application is opened, the patient CD will be read in on demand from digipaX system. After these data have been read in, they can be optionally immediately stored in image archive. More information concerning data storage in the archive you will find under points 0 and 8.7 Manipulations on patients' data.

8.3 Searching for patients

The table can be sorted ascending or descending after each field (column) by clicking the column head.
In the search fields for the name (surname is compared) and patient CD each time the search term can be entered. The first found patient in the list of patients will be selected each time when the text in any of input fields changes.
If the text is entered in any of the search fields, the text in another one will be again deleted. The search fields are green coloured if at least one match is found, otherwise they are red coloured.

8.4 Recording new patient / modifying patient data

Creating new patients as well as editing patient data is possible only for data source of the image archive. So, this tab must be selected.
To set up a new patient, select the button „Set up new patient”. While recording new patient, data of this patient are entered in a dialog box. The next available patient ID is chosen automatically. This ID can be manually entered, if it has not already been assigned. Through the configuration you can also enter the setting where the patient ID must always be entered manually. In this case the system does not provide an ID. If this dialog box is quitted with „Yes“, the new patient is recorded locally. This means that the patient is still not available in the image archive, because only transfer of complete images and not single data to the DICOM archive is possible. So, when the study, series and image exist for this patient, all can be transferred together as a new DICOM object to the image archive.
Editing patient data is possible only for the local patients. As soon as the data are transferred to a server (image archive), this is not possible any more.
If there is set in the configuration, that an identification (i.e. physician number or company number) is to be added to each patient ID, this identification will be automatically added do your entered patient ID (separated with „-“). If there is set in the configuration, that the patient ID is to be automatically created by the system (from the patient data), the input field for patient ID in the dialog box for recording patient data is deactivated.

The following characters are not allowed in the patient's name or ID: \ / : * „ “ ? < > |.

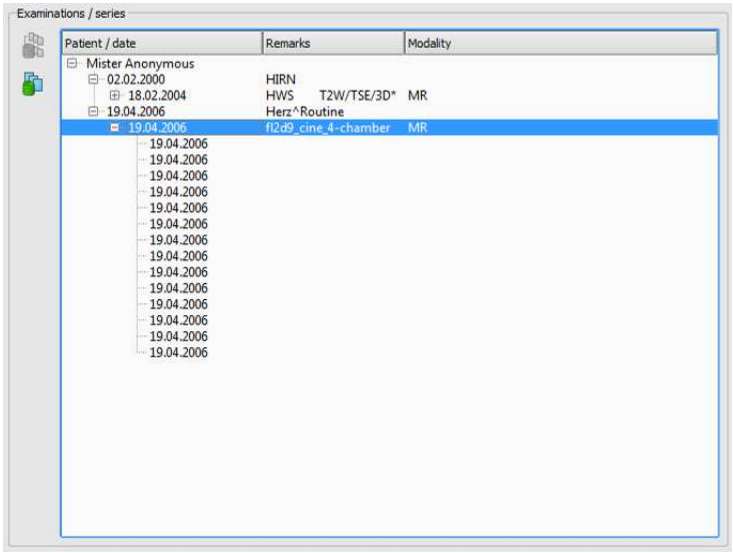
Generally special characters shall be avoided, such as ^ ° : * ? < > | @ € µ ~ ² ³ !. Use simply the actual name of the patient and the incremental numbers for patient IDs. You can start from e.g. 000001.

8.5 Deleting patient

Deleting patients is basically available for all data sources. However, in the case of source of the image archive only local patients can be deleted through the patient management. This means that those patients, who are already stored in the image archive, can be removed only directly in the archive or using the delete function provided by the administrator.
In the case of data sources for single files and patient CDs, marked patient or patients are always removed from the list. **The concerned files are thereby not physically deleted.**

8.6 Sending images of patients to the archive

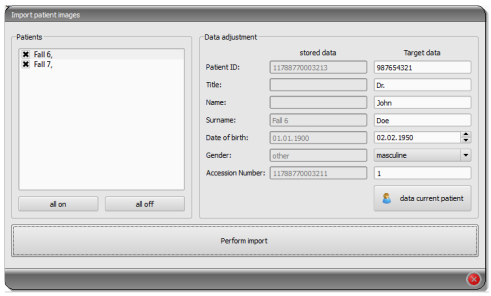
Sending images is possible in all data sources. The series or studies of the data source can also be sent singly to the archive. In order to send the particular study, select the study in the right part and then press the button “Send the study to image archive” beside the tree structure. In order to send the particular series, select the series and press the button “Send the series to image archive”.



Before the images will be sent to an archive, it may be necessary to have some data like i.e. patient ID adjusted. For this please read the point 8.7 Manipulations on patients’ data.
If there are many image archives (PACS servers) configured and activated, a target archive is to be selected in the dialog box. All images of active patients (all studies including all series) will be sent to this archive. If necessary, the list of patients (data source image archive) is to be updated, in order to make all modifications visible.

8.7 Manipulations on patients' data

For this, please select in the dialog box the patient(s) and adjust the required data in the box on the right. Then click on "Perform import" in order to transfer the images of the selected patient(s) into the archive. If you would like apply data of the already opened patients or the patients that have been forwarded via GDT, please select the switch "Data current patient".
Please notice: If there are several patients open, always data of the first patient will be applied.



8.8 List of studies, series and images

Parallel to the list of patients the studies of the selected patient or patients are displayed. Studies, series and images are presented as a tree structure. Recording, remarks and modality for the series are presented each time. Many patients can be selected at one time – in the tree structure the top nodes are then the information on patient and thereunder his/her studies.

8.9 Quitting patient management

Selection of a patient follows by clicking an adequate row in the table. By a double-click into the table or with the button „select" patient is selected, dialog box closed and viewer according to image data of this patient conditioned. Furthermore, a multiple selection in the table is possible, so that more patients can be processed at one time.
With a double click to a study in the study list you can open exclusively this study for the patient.
Patients can be also added to a current patient selection. Use the button „Add selection" for this.

If the Shift key is pressed, the dialog box will be not closed if you press the switch „Add selection". The patient will be added to the selection and the dialog box stays opened. So, many patients can be searched for and selected.

Alternatively, the following buttons can be used in order to get directly to another component after activating the patient:
To job list ➔ Opening job management
Create job ➔ Creating a new job in job management (possible only for single selection)
Create patient CD ➔ Burning patient CD (many patients can be selected)

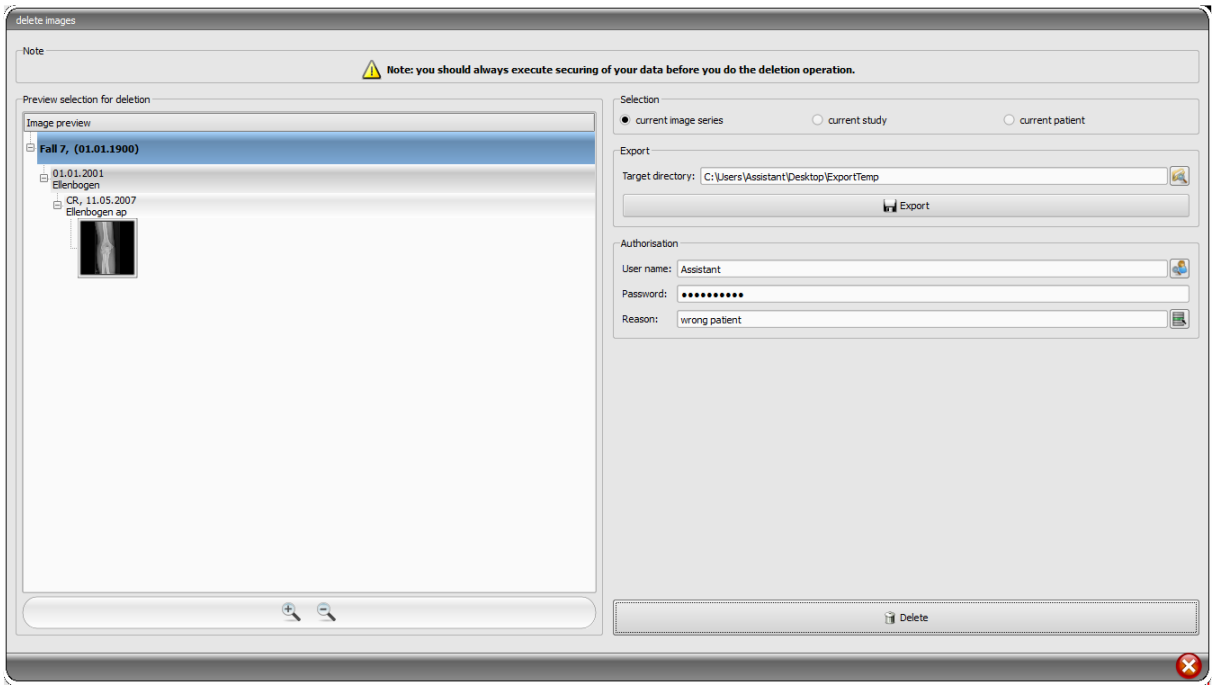
8.10 Delete function

8.10.1 Deleting images

If the delete function is enabled by the administrator, it is possible to delete images from the archive.

Prior to launching of this operation make sure you have a current backup of your data. After successful execution of deletion operation you should update the backup, so that the modifications are also done there accordingly.

The delete function is applicable to entire series of images, entire study or complete patient. This means, it is not possible to remove individual images from the series but the entire series only. Usually, each X-ray image constitutes its own series. In the case of image series (CT or MRT), all images belong to the series. Only in exceptional cases, a wrong image is present in the series. Should this occur, please contact your administrator.
Load the wrong image resp. the image of the series or examination in question into the viewer and click on the “Delete” function tool. The current patient is being updated and the image deletion dialog box appears.



Now select the series, study or complete patient to be deleted.
Specify possibly the right path to the export directory and export the images into this directory before their deletion.
Enter the username, password and the reason why the images are to be deleted. You obtain the password from your administrator. The administrator must specify the password when activating this function.
Click on deletion to start the process. The images are being deleted from the archive.

If you happen to forget to export the images prior to their deletion: All images are being secured before they will be deleted. Ask attendant of your system to restore the images deleted from the backup.

8.10.2 Changing assignment of images

Assignment of the images to the patient may require a change if the images that had been mistakenly assigned to an incorrect patient in the acquisition, for instance, when the previously processed patient was still active in the system. These images must then be assigned to the correct patient. To do this, the wrongly assigned images must first be exported from the archive, then deleted from the archive and assigned through re-import to the appropriate patient.

To assign the mistakenly assigned images to a proper patient, proceed as follows:
First create a directory to which the images will be exported prior to deletion (e.g. on the desktop „Export Temp"). Select the required patient (from the appropriate image archive). Delete according to the instruction in chapter 8.10.1 Deleting images, exporting them at the same time to a newly created directory.
Now, the exported images are to be assigned to a proper patient. Open the required patient as usually in the clinic management system, select the patient directly in the digipaX patient management or set a patient manually (see chapter 8.4). After the patient is selected, return to digipaX patient management and to the tab "Single files" there and open the exported images. This procedure has been already described in chapter 8.2.2. After the images are loaded, perform the steps "Sending images of patients to the archive" from chapter 8.6 and „Manipulations on patients' data" from chapter 8.7.

9 Import

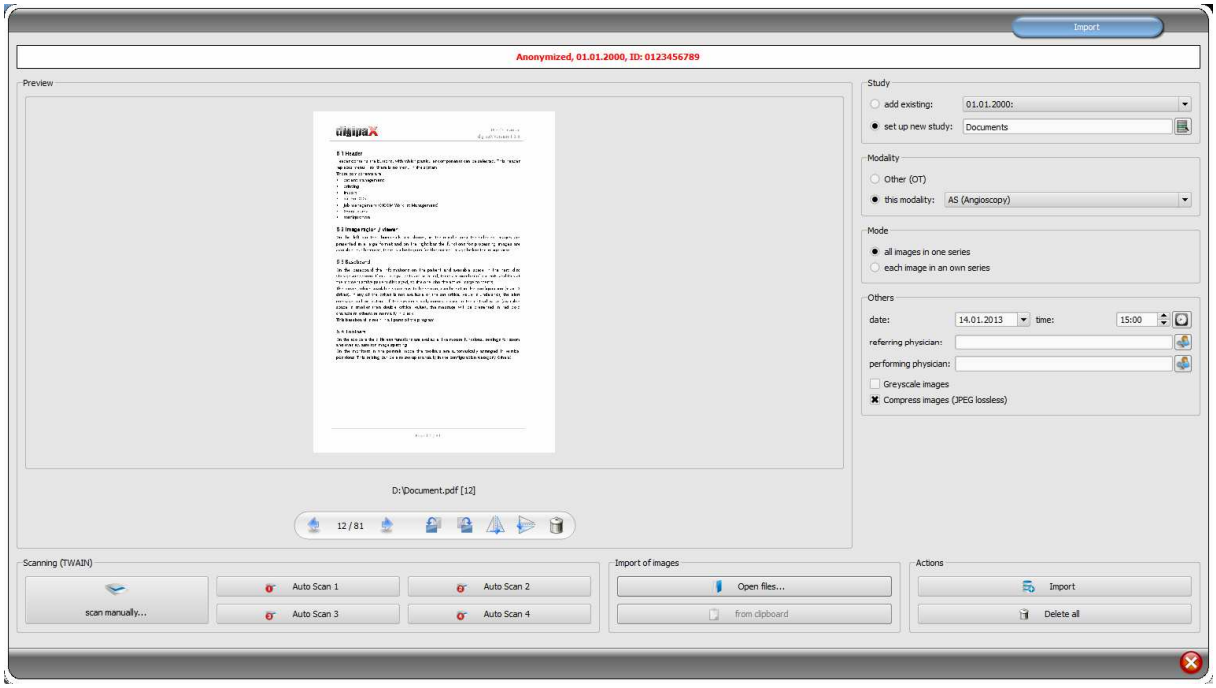
9.1 General

Both pixel graphics from image files and images (through TWAIN interface) can be scanned for the active patient in the import component. The switches for scanning are available only if the relevant module is launched.

The import of images through TWAIN interface is not designed for import of X-ray diagnostic images. The designed purpose of use is restricted to import of photographs and documents which will be further assigned to patients in DICOM format and then they will be available together with other patient's image data.

Import of image data through TWAIN interface is limited, in case of colour images to 32-bit and in case of greyscale images to 8-bit (256 levels of grey) colour depth.
The documents must be scanned with "Greyscale" or "Colour" setting set up just on the scanner. The documents scanned with "black-white" setting cannot be imported.

9.2 Import dialog box



Only exactly one patient can be opened (activated) in order that this dialog box can be opened. You can read in the header of the dialog box the activated patient for that the images should be imported.
With „Open files..." one or more image files can be opened. Those will be imported not immediately, but they will be first saved on a list. With the scan-switches the images can be

retrieved in the scanner via TWAIN-interface. Those will be also first added to the list. With the use of the "from clipboard" you can add to the list images from other image processing programs by copying them to the clipboard.
The list can be emptied again with the switch „delete all“.
On the left side the added images to the list are displayed as a preview. You can navigate throughout the images with the arrows. Each image can be rotated and reflected separately as well as deleted from the list with the switches in the toolbar.
On the right side the settings for the import of those images are made. The images can be either added to an already existing study of the patient or resided in a new study. For the first option, please highlight the option „add to existing“ and select the required study from the drop-down list box. For the latter Option, please select „set up new study“ and enter description for this study in the inputbox standing behind. Here you can also set up and then use your own defined list with the descriptions.
Select modality (type of images), that should be entered for new images. Usually „OT“ should be used but you can select other modalities, which correspond with the opened images.
Specify in the group „Mode“, whether all images should be saved in one series (recommended) or each image should be saved in a separate series.
Define under „others“ date and time, that should be entered for the point of time of creating in the DICOM files, as well as referring and performing physicians who will be entered if a new study setup involved. Optionally you can convert all images explicitly in greyscale images before they will be saved. To save storage space in the archive and transfer the images quicker, the images can be compressed lossless by activating the option „Compress images“ in the import. No information is subsequently lost.
Saving the images follows by „Importing“. Withal all images existing in the list will be converted in DICOM files (according to options) and sent do image archive. All successfully saved images will be deleted from the list.
The 8-bit DICOM images are created while importing. From the images, which already have 16-Bit format (DICOM, TIF), 16-bit DICOM-images are created while importing.

Once the images have been imported, they cannot be modified or deleted any more (this is possible only by admin's intervention in image archive).

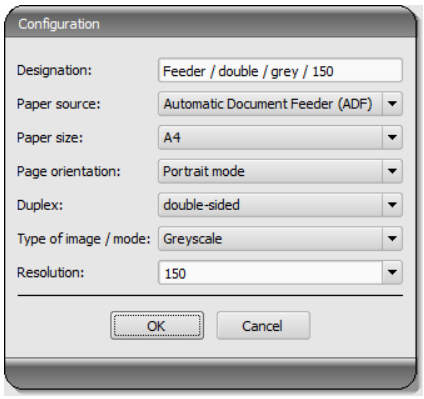
If set up by admin, a GDT file will be created after the import, that can be i.e. loaded into the management system of the clinic in order to generate also an entry in patient's file.

9.3 Document scanning

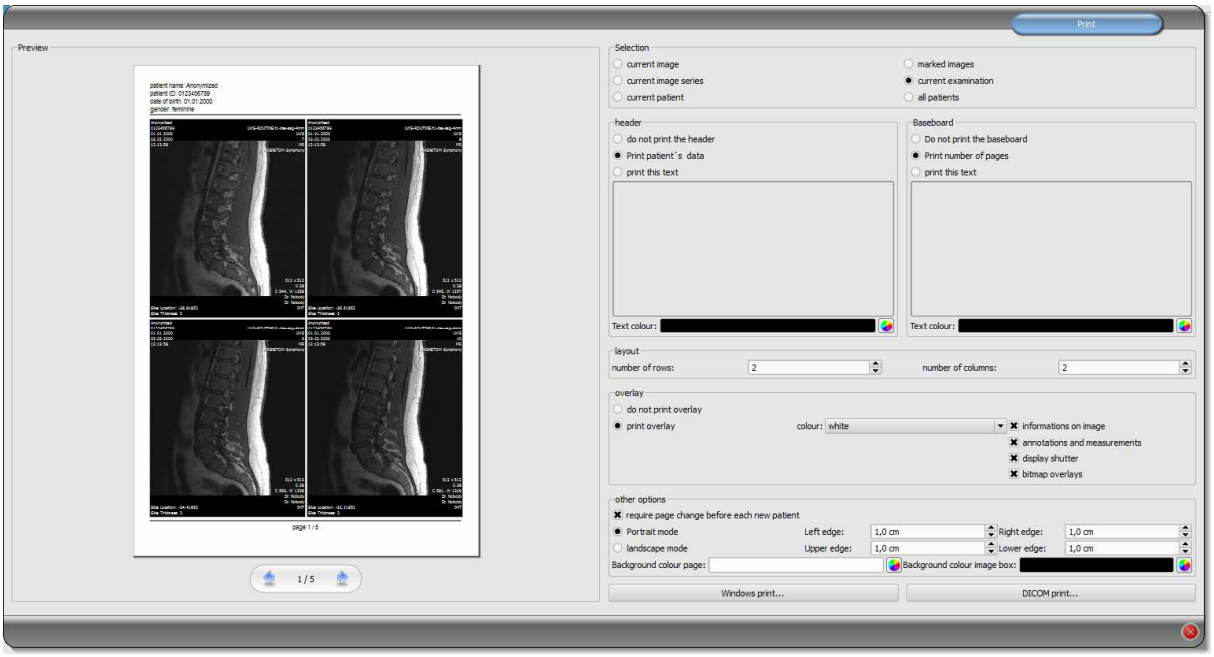
The “scan manually” and automatic scanning options are available by means of four programmable buttons. If “scan manually...” option is selected, the scanner dialog box is opened and it is possible to define manually the required settings for resolution, colour, etc., prior each scanning process. This dialog box is not the component of digipaX software, it belongs to scanner software. You shall read the scanner documentation to obtain more detailed information. If several TWAIN units are installed or the given equipment is provided with several TWAIN drivers, it is possible to select the specific device or driver holding down the Shift button and simultaneously clicking on “scan manually…” button.

There are furthermore four buttons available, to which different settings may be assigned. Such parameters will be then automatically transmitted in printing to the scanner and documents will be automatically scanned with such settings. In this case it is enough to set once the required parameters, such as colour, resolution, etc.

In order to set parameters for the automatic scanning button it is necessary to push simultaneously the given button and Shift button. Then you must provide description of such button and set the required parameters. It can happen that your equipment does not handle all functions and some parameters may be unavailable. If several devices are used it is necessary to select with "scan manually" button – according to above description – device, for which the automatic scanning buttons will be used. Scanner, which was selected in this setting box as the last, is always activated.



10 Print



If about printing, current image and many images can be printed at a time as well. This is determined in the group „Selection“.
The header row, if activated, will be always printed at the top edge of the page, in a fixed defined size and fixed defined font type. These cannot be modified. Standard image information with the patient data can be printed as well as self defining text. Colour of the text is selectable.
If activated, the baseboard will be always printed at the lower edge of the page in a fixed size and in a fixed type of font. Those also cannot be changed. The number of pages or a self defined text can be printed. Here also colour of the text is selectable.
Many images per page can be printed. Number of rows and columns can be set thereby in the group „Layout“.
For overlay it can be selected, whether this is to be printed over the image or images, or not. Overlay objects can be possibly difficult seen if printed, so it can be selected, whether overlay is to be printed black, white or unmodified. Unmodified means hereby that overlay will be printed in such way, like it is presented on the monitor. Display shutter will be always presented in the set colour (configuration). Bitmap overlays will be presented in the same colour like on the screen.
If the images of different patients are to be printed, the changing page before each new patient can be required (recommended). In this way, it cannot come to mistaking as patient data of the patient, which belongs to the first image on the page, are always displayed. Thus on each page the correct patient data are shown.
Furthermore, the page alignment and the page edges can be defined in other options as well as the colour of background of a page or background of image boxes into which the images are to be integrated.

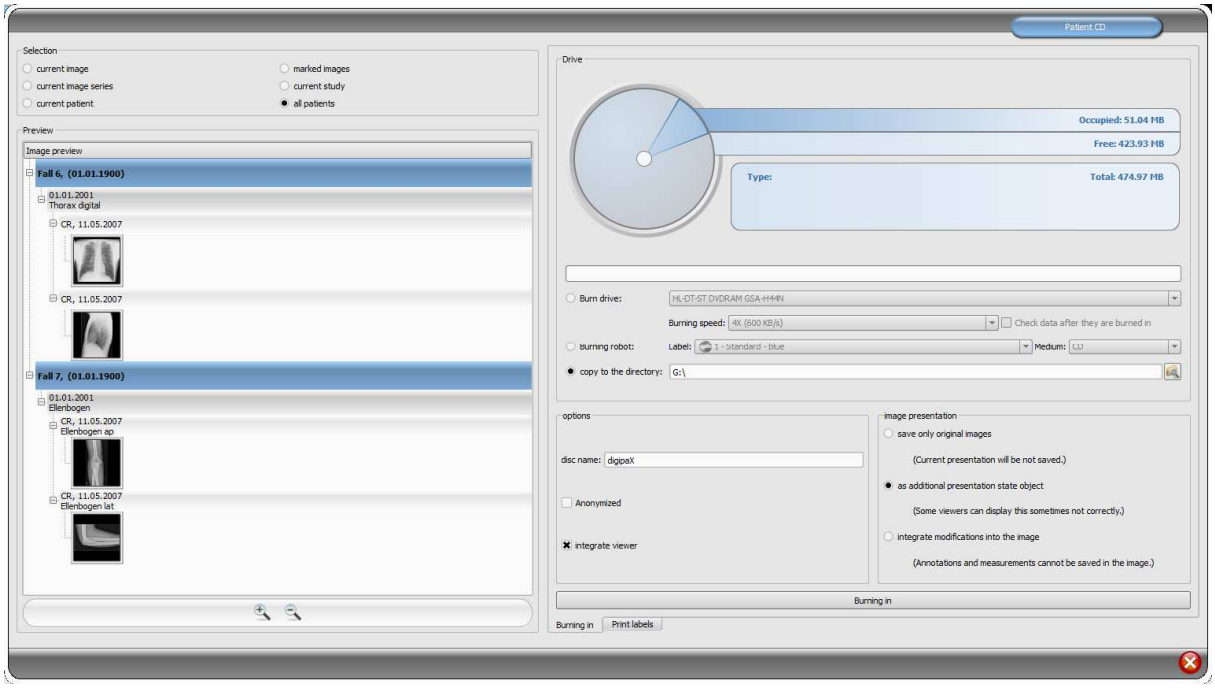
All modifications made on the right side of settings, act immediately on the presentation on the left side of the preview. Number of pages is always updated too. You can navigate with the arrow-switches between the pages. All settings are stored, so that these settings will be used equally at the next selection of printing components (also after restarting the program).
With the button „Windows-Print…“ follows the printout on a usual Windows printer. This can be selected in the following thereafter print dialog box and also the pages that are to be printed can be defined optionally if the print job contains more pages.
With the button „DICOM-Print…“ follows the printout on one of the configured DICOM printers. This button is only available if the DICOM-Print-Module is activated. In the following thereafter print dialog box a desired printer, film size and medium type can be selected. Afterwards the pages will be output on this DICOM printer
During the preparation and transferring print data a progress bar is displayed. If many pages are to be printed, this process can be cancelled with the button „Cancel“. After the print order is ready, an adequate message appears.

11 Patient CD

11.1 General

digipaX offers several possibilities for creating patients CDs/DVDs. The most common way is to directly burn data to a CD or DVD. For this purpose, the software "Nero," from "Nero AG" may be necessary. Please contact your system manager in this regard. If CD/DVD burning is not possible, another option is to copy data to a destination directory or an external storage medium, such as a USB memory key. With it you can directly access the data on another system or burn it to CD/DVD.
Another possibility is to use the burning robot (Disc Producer). With the help of the burning robot, CD/DVD can be automatically burned and automatically printed. The module to connect to the burning robot has to be activated and is available only with the "Print CD labels" module.

11.2 Selecting images



In the "Select" group you can choose which images are to be burned to the CD/DVD. The preview below displays again in a tree the selected images in the "Select" group (divided by patients, studies and series).

11.3 Drives / data storage media

In the "Drive" group you can select the drive to burn a CD or DVD to, and the information about the media are displayed in a graphical form: the media type (CD, DVD), size (total available memory), free and used memory space after burning the currently selected images. This information is constantly updated during the burn.

The drive's burn speed can be set. This speed depends on the drive and the blank media used for the data.
With the option "Check data after burning" the burned data are checked after burning.

If the burning robot is available, you can select it here. In addition, the label must be selected to be printed on the medium, and the type of storage media. The available labels are created and located in the "Print labels" tab and are immediately available for the burning robot. Chapter 12 Label print describes how to create and edit your own label. Usage of the burning robot is described in chapter 11.6.

If the data is only copied to the target directory, the value „Capacity" shows the total free space in the memory of a given drive, while „Occupied" refers to storage space that new data will occupy and „Free" to available space in memory after copying data. In this case, the type is not shown.

11.4 Options

Data can be stored anonymized. This means that data are exchanged in the following way:

- Name: "Anonymous" or "Anonymous1", "Anonymous2" etc. if there are many patients
- Date of birth: 01.01.2000
- Sex: O (other)
- ID: 0 or number if there are many patients

The following tags are deleted while anonymizing:

- Patients Address
- Patients Telephone Numbers
- Referring Physicians Name
- Referring Physicians Address
- Referring Physicians Telephone Numbers
- Referring Physician Identification Sequence
- Performing Physicians Name
- Performing Physician Identification Sequence
- Operators Name
- Operator Identification Sequence
- Requesting Physician
- Scheduled Performing Physicians Name
- Scheduled Performing Physician Identification Sequence
- Institution Name
- Institution Address
- Institution Code Sequence
- Institutional Department Name

Optionally the digipaX viewer can be also burned on CD / DVD, so that after placing the CD in computer this viewing program will be automatically performed for the stored images.

In the group Image presentation one of the following 3 options can be selected:

1. Original images
   The images are burned like they are stored in the archive. This means like they have been created primary by recording unit.
2. Additional Presentation State Object
   Additionally a DICOM file (Greyscale Softcopy Presentation State) for each greyscale image will be added to the original image, which contains the information on windowing, rotating, mirroring, inversion, graphic annotations and display shutter. Not every DICOM viewer can interprete in this way correctly. Use this option if you have burned the viewer on CD or you know that the CD recipient uses the software, which can evaluate this form correctly.
3. Integrating modifications
   For each image a new image is created and modifications are transferred (windowing, rotation, reflection, display shutter). The image type is set on „SECONDARY“ and new SOP Instance UID is generated for this new image. The new created image is stored and transferred into the patient CD.

As far as possible, variant 2 with additional Presentation State files is recommended.

11.5 Burning/copying data

After the button for burning is pressed, the files are assorted (images are compressed and anonymized if necessary). Now the statements for the occupied storage space also can be updated. If the option for burning is activated, data are written on CD / DVD and this is ejected, otherwise these are copied to a specified target directory. The progress is always displayed in progress bar while running the process.

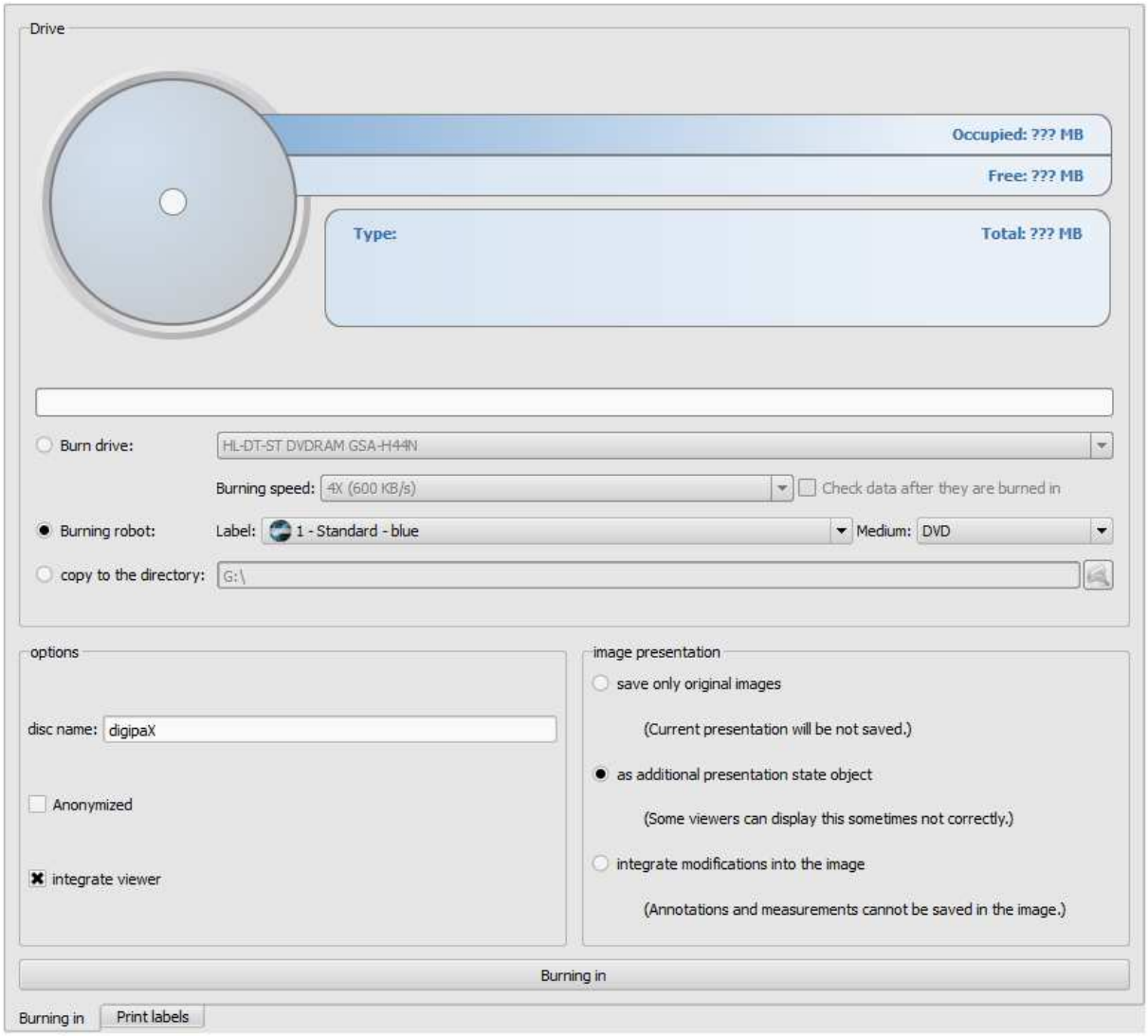
11.6 Creating a patient CD with a burning robot

11.6.1 EPSON PP-100 / PP-100N

11.6.1.1 General

When data for recording on a CD/DVD is compiled and you press the „Burn” button, a job is being sent to the burning robot. The burning robot is able to receive several jobs and processes them autonomously one after another. The jobs are managed by software included in the delivery of the burning robot. The software must be priory installed and configured. Furthermore, it is necessary to configure special settings in digipaX in order to be able to use the device.
Call in the attendant of your digipaX system to install and configure the device and read the appropriate manufacturer’s documentation.
The device must be turned on before the first job will be created. Otherwise, the job will be cancelled with an error and it will not appear on the job list of „EPSON Total Disc Monitor“.

11.6.1.2 **Creating a patient CD**



In the dialog box for creating a patient CD, select the option „Burning robot". The label to be used is to be selected from a drop-down list, as well as type of the data storage medium.
The possible labels are created and edited in the "Label print" tab and subsequently they are immediately available to the burning robot.
After everything is ready, push the button "Burn". Thereupon, data is being compiled and transferred to the burning robot (that is, copied to the transfer directory). The viewer files are being stored in the "SharedData" folder and reused. Therefore, they do not have to be copied repeatedly.

Tip:
To ensure proper completion of the job, digipaX waits for processing of the job files. Processing of these job files by EPSON software takes place always subsequently and not simultaneously. As a result, in the case of simultaneous creation of burning jobs at different stations or quick generating the jobs, this verification may take a longer time. This happens certainly rarely but leads to waiting time lasting up to 60 seconds (depending on the job size and computer performance).

11.6.1.3 Job management

"EPSON Total Disc Monitor" or „Total Disc Net Administrator" programs allow for reviewing the job list. Here, it is possible to withhold or delete the jobs as well as to change their order (only Disc Monitor). The "Net Administrator" is available only for device type PP-100N; however, it can be used on all stations.

11.6.1.4 Deleting data

In the transfer directory set, job files as well as data to be burnt on the CD/ DVD are stored. In this directory, the digipaX software creates the „SharedData" folder in that the files needed for the viewer are stored automatically. The folder can be deleted manually, if needed, for instance, to remove the older viewer versions. The files required are re-transferred upon the next use.
The DICOM files for burning orders are re-deleted automatically. The check takes place upon starting the digipaX stations. Data folders, that are already older than 2 hours, are deleted. This is the same period of time which is also used by the EPSON system for deletion of old job files from this folder.

12 Label print

Label print is possible only when the associated module has been activated.

12.1 General

Using the "Label Print" tool, you can print patient information on the CD/DVD, such as patient's name, date of birth, patient ID, etc. This information is automatically read from images (DICOM header) and does not need to be entered manually. The program uses the guidelines from the DRG (German Society for X-ray), outlined in the "DRG Guidelines for Handling Media Containing Patient Information" http://www.dicom-cd.de/specs.php.de.
There are different templates available for use. These templates can be modified and you can also create your own templates.
To get to this module press the "Patient CD" button and select the "Label Print" tab.

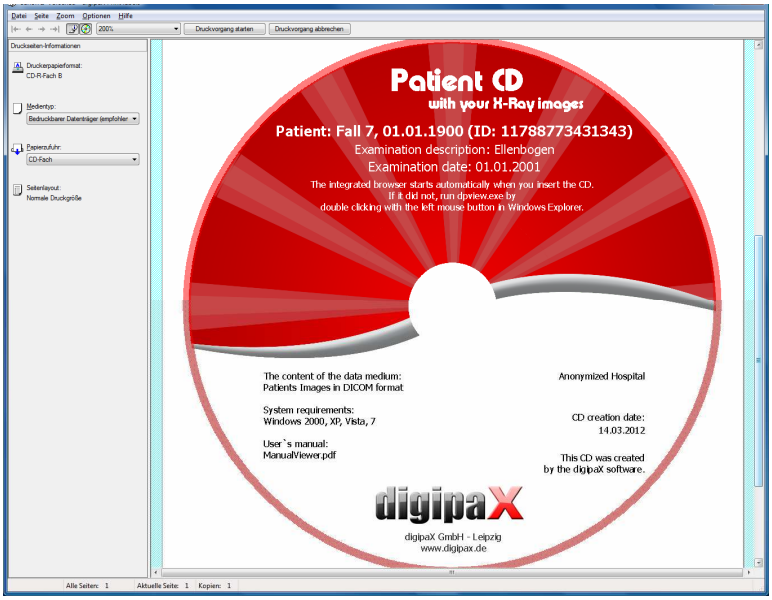
12.2 Printers and media

It is necessary to have a special printer that can print directly on CDs, such as the Canon PIXMA. These types of printers are offered by many manufacturers. There are no special recommendations for your printer model. The only requirement is that the printer is compatible with the Windows operating system. A printer driver must be installed for the appropriate operating system. Additional software is not required.
Printable media are also offered by various manufacturers. You can use both CD and DVD. **It is recommended to adhere to the requirements of DRG directory, which at present does not yet officially support DVDs.**
On the part of digipaX, there are no specific recommendations on storage media. It may be that not all media is supported by your printer model. Please refer to your printer documentation. The "Label Print" module is dedicated exclusively to direct CD/DVD printing. The system does not support sticker labels.

12.3 Template selection and printing

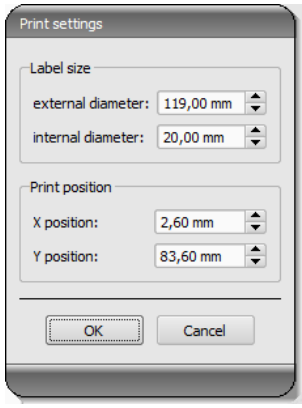
The prerequisite is to have the correct printer driver installation and a fully functioning printer. Described here are examples of prints made using the Canon PIXMA iP4000 printer.
Included with the installation of digipaX, various CD templates are installed with the images of one patient and for the CD, images of several patients.
Select the patient and click on the patient CD. Usually first you burn the patient CD with the desired images and the desired settings. Then you go to the "Label Print" tab as an available feature for printed media.
By clicking the mouse on the left and right side of the thumbnails, you can browse different templates. They are sorted alphabetically. Names are displayed at the bottom.

Select the chosen template and click on "Print“.
A dialog box opens to choose a printer. There, select the correct printer, through the "Properties" you can activate the preview dialog box and then continue by pressing "Print".
In the next dialog a preview of the data media is displayed. Here you can see how the patient data are automatically loaded from images and applied. This preview may look differently depending on the printer model.



After pressing "Start printing" the data media is printed with the information.

12.4 Printer settings



At this point, you can set the size and position of the data media.

The size of the label refers to the size of the data media. The outer diameter of the printed surface of the CD is usually 118 or 119 mm. The inner diameters of the unprintable area are different. Depending on the manufacturer and version of the media the correct value must be set.

The print position varies depending on printer model and must be set only once, so that while printing on the medium would be exact. By changing the value, the printed image can be shifted to the left / right (item X) and up / down (position Y). With the help of the preview, you can move the printed image with millimetre precision into the right place.

Sample values:

Printer model	**Position X**	**Position Y**
Canon PIXMA iP4000	*2,60 mm*	*83,60 mm*
Canon PIXMA MG5250	*2,60 mm*	*87,50 mm*
Canon PIXMA iP4850	*2,80 mm*	*87,50 mm*
Canon PIXMA iP4950	*2,60 mm*	*87,50 mm*
Canon PIXMA iP4950	*2,60 mm*	*87,50 mm*

12.5 Creating a template

By pressing "New", a new blank print template opens up. First, at the top line you must enter a name for your new print template.
You can set a background image, insert images (or symbols), text boxes, rectangles and lines.

12.5.1 Inserting, editing and deleting elements

The label can have various graphic elements. These elements are always placed and positioned using the mouse. On the right side of the dialog box a page with the properties of the active element is always displayed. Changes in properties are immediately visible on the image. By clicking with the left button, an element is activated.

Background image:
As a background image, you can use any graphic. Recommended graphics are in the "png" format with size of min. 500 x 500 pixels.
To create your own background images you can use the template Photoshop CD-Template.psd from the "Label Print" folder in the installation directory.
Press the "Find File" button and navigate to the desired image. The selected background image will be automatically inserted into the template.
Press the "Remove Background" button and you can delete the image. The background is then back to white.

Insert a text field:
Click on "Insert text box". Then click somewhere on the template and drag the text box to the required shape and size. Using the mouse, you can also move an object in all directions.

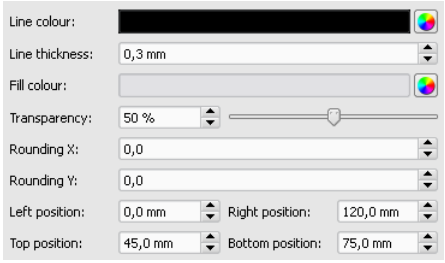
The text box functions are described in detail later in this manual, under Point 12.5.2 Editing text fields.

Position and size can also be adapted with millimetre precision using the properties page.

Insert image:

As with the background, you can insert any image. Click on the "Insert image" and navigate to the desired image. Using "Open" the graphic is applied. With the mouse you can move the object in all directions and adjust the size.

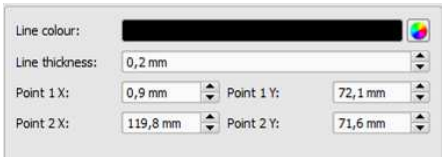
Insert rectangle:



Inserting a rectangle is an operation just like inserting a text box. Click on "Insert rectangle" and drag a rectangle with the mouse. You can also move the rectangle in all directions and scale with the mouse.

Using editing elements, you can change the properties of the rectangle. There, you can customize the colour and thickness of the border, fill colour, opacity and round corners. The position and size can be customized with millimetre accuracy.

Insert line:



Click on "Insert line" and drag the mouse on the template.

On the page with the properties, you can set the colour and thickness of the line and move the line with millimetre accuracy.

Delete elements:

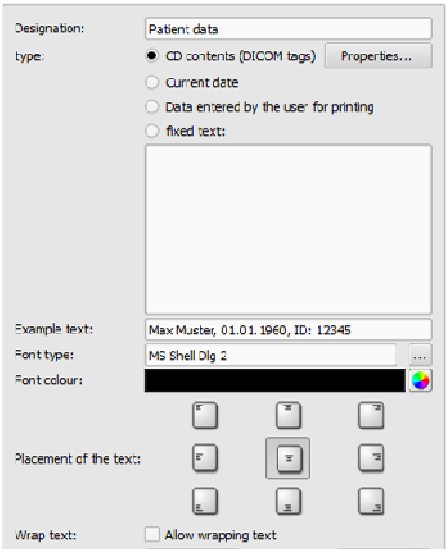
Click on an element you wish to delete and click the „Delete” button to remove that element.

12.5.2 Editing text fields

12.5.2.1 Functions

Description

- serves only to describe the text field, it is not printed (it may be displayed on the edited picture)



Type

- contents of the CD (DICOM tags): content tags are automatically transferred when printing on the field, properties: see point 12.5.2.2 **Guidelines and properties of the CD contents (DICOM tags) in the text box**.
- current date: into the text box the current date is placed
- the data entered by the user when printing: request to enter text before printing
- fixed text: defined static text is placed in the field

Example text:

- enter sample text, for example, what will be displayed on the label preview

Font type and colour:

- adjusting type, colour and size of font

Placement of the text:

- placement of text inside the text box (e.g. left or right justify)

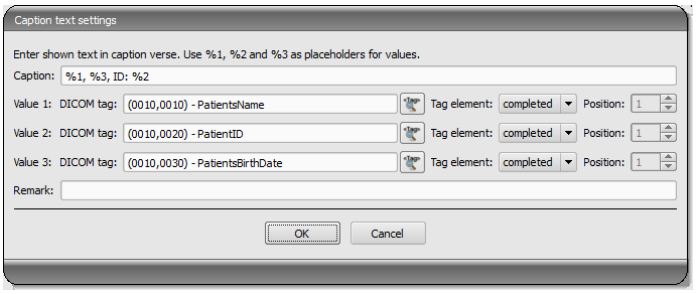
Word wrap:

- when this option is enabled, automatic line wrapping at the end of the text field will be applied, otherwise the text is truncated at the front, rear or both sides

12.5.2.2 Guidelines and properties of the CD contents (DICOM tags) in the text box

Every DICOM image contains information about patient, study and image. All those information is in the so called tags in the DICOM Header of each image. The contents of those tags such as patient name, study, institution are also displayed in the image corners. The DICOM tags are numbered (e.g. tag „0010,0010“ for patient name). How the information can be displayed, is described in the chapter 0.

In the text field you can use values from different tags. If, for example, a name, date of birth and patient ID are entered, then tags (0010.0010) (0010.0020) and (0010.0030) must be loaded. To do this, set the tags for values 1 to 3. Some tags have more elements (e.g. first name, last name, title). If you want to display only one specific element, you can set this option in the tag element. In the signature line, enter the text to be displayed. Where the %1, % 2 and % 3 act as variables. They are replaced with the actual contents of the tag.
In the example below, the text box looks as follows: Max Mustermann, 01.01.1960, ID: 12345.



You can create lists for the values of multiple images. This is needed, for example, if there are to be the names of all patients who were saved to a media. For this, the LIST keyword is used on the signature line.
Syntax:

LIST{<DICOM tags>|<separator>}

The value for <DICOM tags> is compiled the exact same way as described above for a single row. <Separator> is inserted between each individual data. You should use:

- „nl“ for the new line
- „tab“ for tabs
- any other character, such as a semicolon or a comma

The row looks like the following example: LIST{%1, %3, ID: %2|nl}.

12.6 Editing, duplicating and deleting templates

In order to edit a template, you must find it, then click on "Edit". Editing is done in the same manner as creating a template.
The "Duplicate" button creates a copy of the template. The copy has the original name with the addition of "Copy 1" at the end of the name. A copy can be modified and its name changed. The "Delete" button removes the template from the system. Note: This action is irreversible.
All templates are located in the digipaX installation directory in the "Label Print". Each template has its own separate subdirectory with the name of the template. To move a template to another system, you must copy the template folder on that system.

12.7 Requirements for information on data mediums

It is recommended that the instructions contained in the requirements catalogue for data storage media with DRG patients' information is followed accordingly. There, in Section 2.4 a description of how label storage media is provided.
Source:
http://www.dicom-cd.de/docs/DRG-Anforderungskatalog-2006.pdf

2.4 Labelling data media

2.4.1 External labelling

In order to label and uniquely identify the data medium, it must have an external description about the contained information that is human readable.

Tip: when using burning robots which can label the data storage media without user intervention, this labeling is mandatory. Systems that cannot label the data storage device must support the user in correct manual labeling of the media, for example, displaying the proposed description in a dialog shown on the screen when ejecting data media.

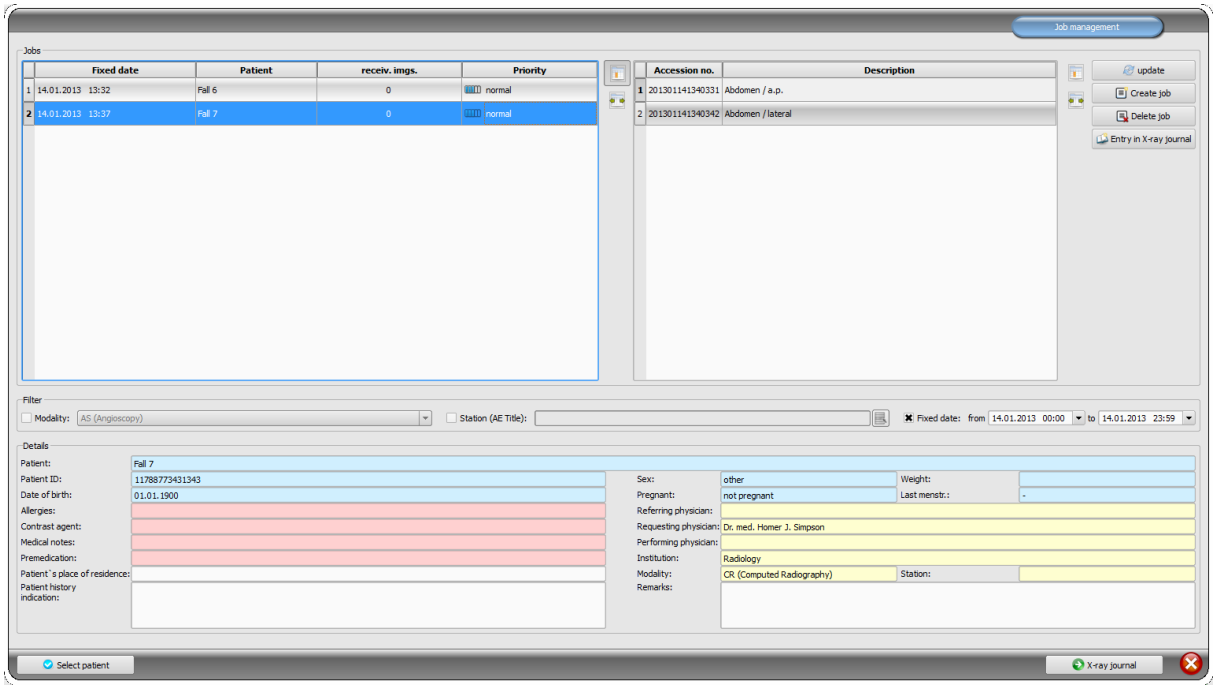
2.4.2 Content of external labeling (recommendation)

It is recommended to put on the data medium the name and date of birth of the patient, patient ID, date the medium was created, the examination dates and the names of institutions which created the data medium. If on the same data medium many patients are included, it is recommended that you use the appropriate annotations externally on the media. Moreover, it is recommended to put the information about the type of data content on the medium (DICOM, network, DICOM browser, etc.).

13 Job management

REMEMBER!
To avoid unnecessary X-ray screening and any unnecessary radiation exposure to the patients, you should ask the patients if they don't have any previous X-ray images before creating a new job

Via job management (DICOM-Worklist-Management) the jobs can be exchanged between different DICOM systems. MPPS (Modality Performed Procedure Step) for using the job status is thereby not supported.



13.1 Presentation of the job and update of the job list

The list will be updated according to time interval which is set in the configuration (category Job management – available only for administrators). In the configuration this automatic updating can be also deactivated.
By using the switch „update" the update of the list is required.
In the left list all patients are displayed, for which at least one job exists. If you select a patient from this list, then all the jobs for this patient will be displayed on the right side of the list. Thereby each job has its unique accession number.

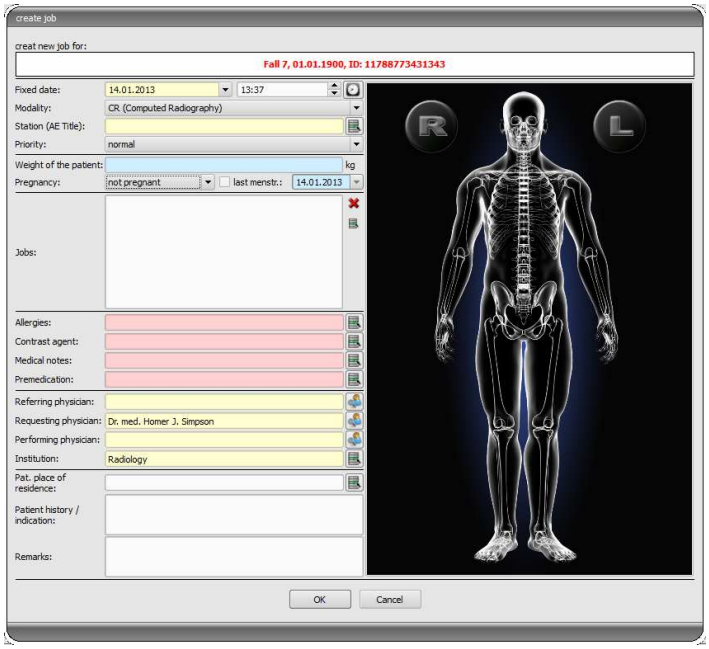
13.2 Filtering the job list

You can select a desired modality as a filter, so i.e. CR for X-ray images or US for ultrasound images, or an AE title of the station, at which the job is to be performed, or a fixed date, on which the study is to be performed. For this, first activate the selection field and then select the desired modality or enter the desired station name or define the beginning and end date.

By using the button „update“ (at the top on the right) the job list is recalled, whereby only the jobs, which meet the filter settings, are queried. The settings are saved and will be used again at the next selection of the worklist components.
Please bear in mind that on the stations, on that the image acquisition is run, the job list upon selection of a patient is filtered according to the settings in the configuration. It may vary depending on deviating filtering criteria.

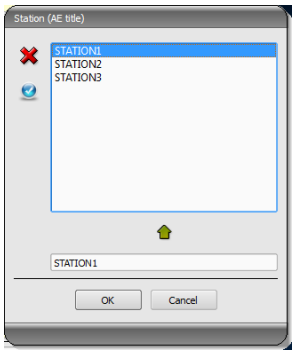
13.3 Creating a job

A new job is always created for at present selected, current patient in the system. If many patients have been selected in patient management, no new job can be created.

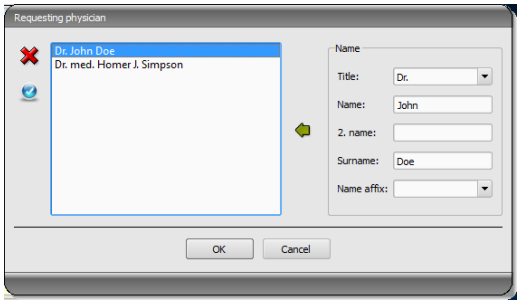


The data of the patient, for whom the job is just now being created, are displayed in header zone of the dialog box, however they cannot be modified.
On the left side of the dialog box there is an input field for defining the jobs. Part of the body and levels can be defined also through the image on the right side of the dialog box. For this, move the mouse over the image to the desired region of the body till this is colour-marked. Click wit the left or right mouse button into this region, in order to display the menu of possible refinements. Select the desired refinement and activate desired levels (ray paths) in the opening submenu. You can mark many levels at once and confirm the selection with the menu item „Ready“. Thereupon the selected part of the body, selected refinement and selected level are taken over to the list on the left side of the dialog box. You can add the entries to the list manually, too. For this, click per double-click into the next free entry in the list and enter the desired organ. In the same way, you can edit already existing entries in the list (only if the Procedure Code is backed). Entries can be removed from the list by a small red X (at the top on the right by the side of the list). Per switch underneath „Select from the list“ predefined entries or descriptions can be selected from a stored list. In this dialog box for selection of the description new descriptions can be also added to the list.

If you click the background zone of the image, a menu with all available parties of the body will appear. This list contains possibly further definitions, which none regions of the body are assigned to. Refinements always form submenus.
If you click into the context menu into the menu item „Manage…“ you can adjust the lists of the refinements und ray paths (see for this the chapter 13.4 Managing the table of organs and Procedure Codes).

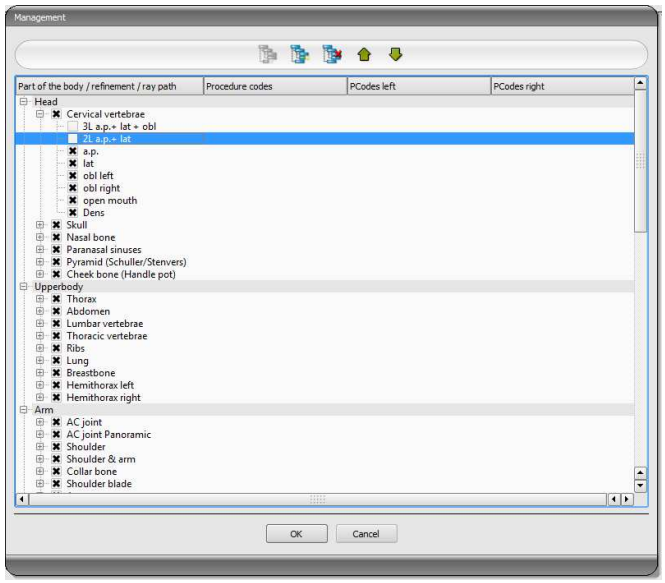


By using the small switches behind the input fields you get each time to a dialog box, in which the defined terms can be fast used again. These can be added with the green arrow to the list, deleted with the red X or selected for use per double-click.
One of the entries can be defined as a default one. This is then already entered in the adequate input field for the job definition, when the dialog box will be activated. For the patient names, this happens in the same way.



When the dialog box for creating the job is confirmed with „Ok“, the job is transferred to the set worklist server. If more worklist servers are configured, the desired one is to define in the selection dialog box. If more levels have been entered, one job will be created for each level. This is necessary, because the images are taken on also singly and for each one a new entry is performed in the digital X-ray journal.

13.4 Managing the table of organs and Procedure Codes



In the context menu of the image you reach via menu item „Manage…“ to the dialog box for processing the table of organs. The dialog box shows the hierarchically arranged elements for part of the body, refinement and ray path. Both latter can be thereby deactivated. Deactivated entries are not displayed in the context menus for the selection of organs.

The elements for refinements or ray paths can be freely added or deleted. For adding refinement, activate the adequate part of the body or already existing refinement within this part of the body and click on the switch „Add refinement“. A new node will be put on and you can process the designation of the node. For adding a new ray path, activate the adequate refinement or already existing ray path therein and press the switch „Add ray path“. Also for this specify the desired designation. Using the switch „Delete selected element“ the active node, including possibly contained subelements, will be deleted. The nodes for the parts of the body cannot be deleted thereby.

The entries can be sorted by using the switches with the arrows.

For each ray path so called „Procedure Codes“ can be specified. These are transferred during the transmission and are again accordingly evaluated at the target station. These Codes must be thereby adjusted to the target station as each manufacturer uses his own Codes for the accession to his predefined settings. By a double-click on the adequate cell right in the tree structure you can define the Code for the ray path of this row. Maximal three Codes can be entered for each ray path. The Codes thereby are to be separated with a semicolon („;“). You have to pay attention that as well before as behind the semicolon no blanks are entered, unless these belong to the Code. Thus the Codes can be coevally transferred to many devices. The configuration of the transfer of these Codes and the setting or linking to adequate devices is performed by your administrator.

In the dialog box for job creating the Procedure Code is displayed as a tooltip of the entry in the job list (is displayed if you hold the mouse over that without clicking it). The description of the job cannot be modified in this case. If you enter the jobs manually, so without selecting in the image, you cannot forward any Procedure Codes.

13.5 Deleting job

The selected (marked) job in the list can be deleted with the button „Delete job“ **without a confirmation message**.
Furthermore, the jobs can be automatically deleted after a certain period of time is run out. Deleting of the jobs can be performed only by digipaX systems (depending on the set worklist server) and therefore cannot be performed in certain circumstances at the station at which the jobs are performed, so the images are made, this is a reasonable option in order to automatically delete the jobs. The period of time is thereby to select in this way that all jobs can be surely done in this time.

13.6 Entry in X-ray journal

If there is no X-ray journal activated in this system, the switch for a new entry is missing.

In the dialog box for creating new entry in X-ray journal the values can be already transferred, in order to simplify the work and to obviate the mistakes. According to set configuration 3 different modes are possible:

1. takeover of data from the worklist job
2. takeover of data from the automatically received images
3. no takeover of data

Furthermore, takeover of data of a connected generator is possible. If the system is accordingly established by the administrator, the generator values can be taken over by a double-click from the table of received values.

13.6.1 Data from worklist job

First mark a job, for which you want to create an entry in the X-ray journal. As far as this is possible the data, like i.e. patient’s name and date of birth, are already taken over from the job and entered in the fields of the dialog box for recording entry. The remaining fields are to be filled out accordingly and the entry is to be taken over to the journal by clicking Ok.

13.6.2 Data from received images

As well as for creating a new entry directly in the X-ray journal (see 14 X-ray journal) the automatic image receipt must be activated and correctly configured. New images are forwarded from the image archive to this station and can be used over here as a template for the entry in the journal. First select from the list of the newly taken images an image, for which the entry is to be created. All possible, already in DICOM image existing data are taken over to the dialog box. Also here the remaining data are to be filled out and the dialog box is to be quitted with Ok, in order to take over the data to the journal.

13.6.3 Without data transfer

The dialog box with the mask for creating a new entry is fully empty in this case. All data are to be completely entered and to save with Ok in the X-ray journal.

13.7 Display of received images

If image routing is correctly set as well in the image archive as at the digipaX station, the digipaX station can automatically receive the acquired images in the background. If this is the case and the option „Mark with the colour the column with number of received images and entry in the list when image comes in“ in the configuration for job management is activated by the administrator, you will get as user the possibility to control the processing of the jobs. If at the station, which makes the images, no jobs can be deleted, this is a reasonable possibility to recognize, when the jobs are processed ready. If the jobs are deleted at the station (digipaX), which takes on the images, these fall out automatically from the list on this station.

13.8 Quitting the job management

If you have marked a patient in the list of patients, you can use the option „Select patient“ bottom left (or also per double-click into the entry in the list of patients), in order to take over the marked patients to the patient selection (the old selection will be replaced thereby) and subsequently to close the component. If this patient does not exist yet in the list of your patients (data source image archive) he will be created newly and locally.
Moreover, you can jump over directly to the patient management from over here. If you have before selected a patient in the list, this patient will be also selected first as an active patient.
If the X-ray journal is installed and activated, you can jump over directly to the journal. No patient will be selected thereby.

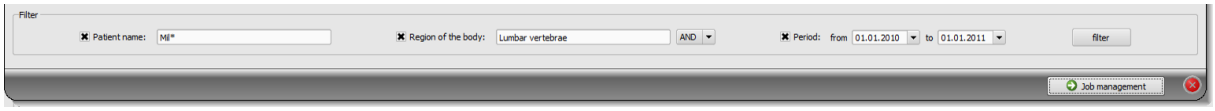
14 X-ray journal

14.1 New entry

While adding a new entry to the X-ray journal the value from a received image can be taken over if the image receipt is correctly configured in the background. For this, select from the list of images an image, for which the entry is to be created. In the dialog box for recording values the fields are then pre-occupied accordingly with the values from the image. If no image has been selected or the image receipt is not established, all fields are empty. Enter the values in the fields provided and confirm with OK, in order to take on the entry to the journal.

If the generator is connected directly to the system and the settings have been accordingly established by the administrator, the received values of the generator from the table, which is displayed additionally in the dialog box, can be taken over per double-click or with the symbol of an arrow in the input fields. Already used values pairs of the generator are not displayed again at the next activating of this dialog box.

14.2 Filtering



In the bottom of the dialog box you can set the filter for patient names, parts of the body and record date. Each time you activate the desired control box (many control boxes can be activated), in order to apply the filter.
Deactivate all control boxes and press the button „filter“, in order to display again the full list of all entries.
The settings are saved and used again for filtering at the next activating the X-ray journal.

14.2.1 Patient name

Enter a part of searched name using wildcards („*“) as place holders (i.e. „Sch*“).

14.2.2 Region of the body

Specify one or more terms or parts of words in the input field for regions of the body. In the drop-down list box behind it you can determine, if the description of a region of the body must contain all terms (AND) or only one term (OR). By pressing the button „filter“ the entries of the X-ray journal are filtered and only entries are displayed, which contain the determined term(s).

14.2.3 Period of time

Specify in the field „from“ the date, on which the filtered list should begin and in the field „to“ the end date of the entries. After pressing the button „filter“ only the entries are

displayed, which X-ray date is larger, equal to the start date and lesser, equal to the end date.

14.3 Exporting

You can export complete journal as a CSV file (text file with semicolon as separator between the values), in order to i.e. read in to Excel.
If you have set a filter, this will be applied also for exporting. In this way, the entries will be saved, which also be displayed in the table.
On demand, you can open immediately the exported file with the standard software provided (i.e. Excel) and process further or print out.

14.4 Emptying (deleting)

For emptying the journal entering the deleting password is necessary.

Password: digipax

Enter the password and subsequently all entries will be deleted from the X-ray journal.

15 Image acquisition

15.1 General

Three different modules are designed for image acquisition and only one module may be activated for each station.

The X-ray image acquisition module may be used for acquisition of digital X-ray images from the connected devices, such as CR-Readers or detectors.

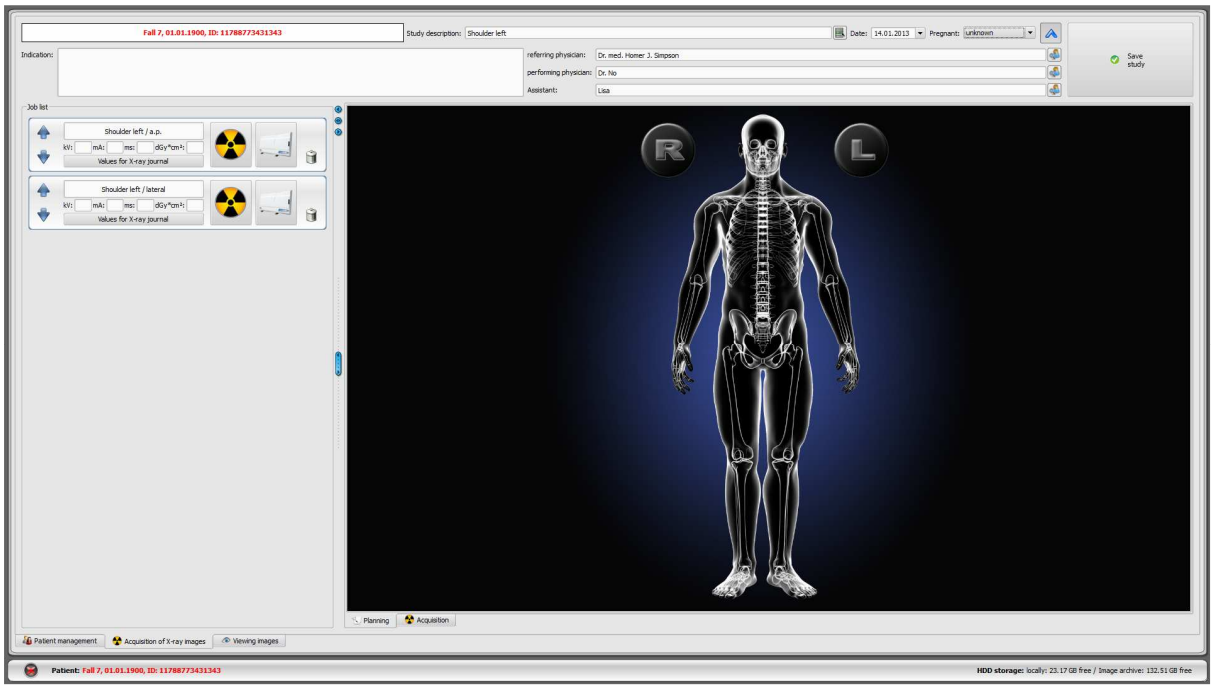
The frame grabber/video image module is designed for acquisition of images or sequences of images from devices which use video outputs and are connected to the system by the proper hardware. They can include e.g. endoscopes, ultrasound instruments, etc. The foot switches may be used as well for acquisition control.

The further devices may be connected by means of image series acquisition module. This is an interface for devices which do not need to be directly connected with digipaX station but independently store image data in the previously specified folder on PC or in the network. These images are then received by digipaX and they are further processed there.

It is necessary to put attention on safe arrangement of cables in installation of hardware to eliminate the risk of accidents or damages of hardware. The foot switches operate with low voltage and they are not dangerous.

15.2 Course of image acquisition/ image receiving with job management

Generally the steps of image acquisition or image receiving are the same for all modules. Select a patient from the component „Job management“, for which you would like to perform the next acquisition. For this, highlight the patient name in the list of patients, get the overview of the details of requests at the bottom of the dialog box and press the switch „Select patient“ (or by double click on the patient’s name).



A patient is selected, the program switches over to job planning, in which the jobs assigned to the patient are shown as a list on the left. Holding the mouse over the entries (without clicking it) you can view all details for this job in a tooltip. Now sort the jobs in the order, in which you would like to perform the acquisitions.
On the upper edge there are input fields for recording information on physician, assistant, indications for the patient. If you do not need these details (for instance, in a veterinary surgery), you can leave these input fields blank or hide them with a blue arrow top right . Beside it there is a button for transfer of new images into the image archive.

15.2.1 Planning jobs

Now, you have opportunity to sort the jobs in such order, in that you want to perform the tasks.
If not all jobs are visible, that means the administrator had set up a filter.
You can add next jobs directly to the job planning or delete the jobs. There are also here the same types of organs formatted in tabs available as in the job management. The course of action for selection of body parts and organs for creation of a job is just the same as described in the chapter 13.3. However, no additional details can be entered here. Additionally, the values predefined by the administrator apply automatically to modality and target station (AE title). If different values or further specifications are necessary, use the job management to add next job. In the job planning, also tables of organs and Procedure Codes can be managed (see chapter 13.4).

Tip: If a visual selection of organs is not activated in your system and therefore you have no graphic support for creation of a job available, the job planning is unavailable too. In such case, you can only re-sort the jobs at this point. Please ask the attendant of your system for more information.

Particular jobs can be deleted by use of the wastebasket icon.

From the next step the image acquisition or image receiving is getting started. The further steps vary depending on the module being used.

After the new images are saved, the completed jobs can be finally deleted if needed. This depends on the selected configuration.

The individual acquisition and receiving steps and image/series processing in each module are described below in this guide. More information on this issue you can find in chapters 15.4 X-ray image acquisition or 15.5 Framegrabber / acquisition of image series.

15.3 Course of image acquisition/ image receiving without job management

The job planning is also available without job management if visual selection of organs is enabled in your system. The jobs can be created prior to acquisition through the job planning. However, the jobs will not be saved and they will be deleted when closing digipaX if the worklist server is not active.
Select the patient in you clinic management software or in digipaX patient management. The system initiates the job planning. Now, you can create, delete and sort the jobs as described in chapter 15.2.1. Then, start image acquisition/receiving. If you do not want to create jobs, you can switch over directly to image acquisition. In case of acquisition of X-ray images you have to activate the acquisition button in the context menu in the right toolbar. Depending on imaging equipment software it may also be necessary to select manually the organ and beam projection. Acquire image or series and conduct the relevant steps for their processing. You can find them in chapter 15.4 X-ray image acquisition or 15.5 Framegrabber / acquisition of image series.
Prior the saving new images the missing data such as description of study, image or series must be given. Use a general study description that will apply to all images of that study, as e.g. „LS, TS“ or “Shoulder, right”. Add a detailed designation for each acquisition as a comment for particular images as e.g. „LS/ap“. Then, enter the further parameters of the acquisition and name or abbreviation of the assistant.
When all data are complete, save the study with the button in the upper right corner .

15.4 X-ray image acquisition

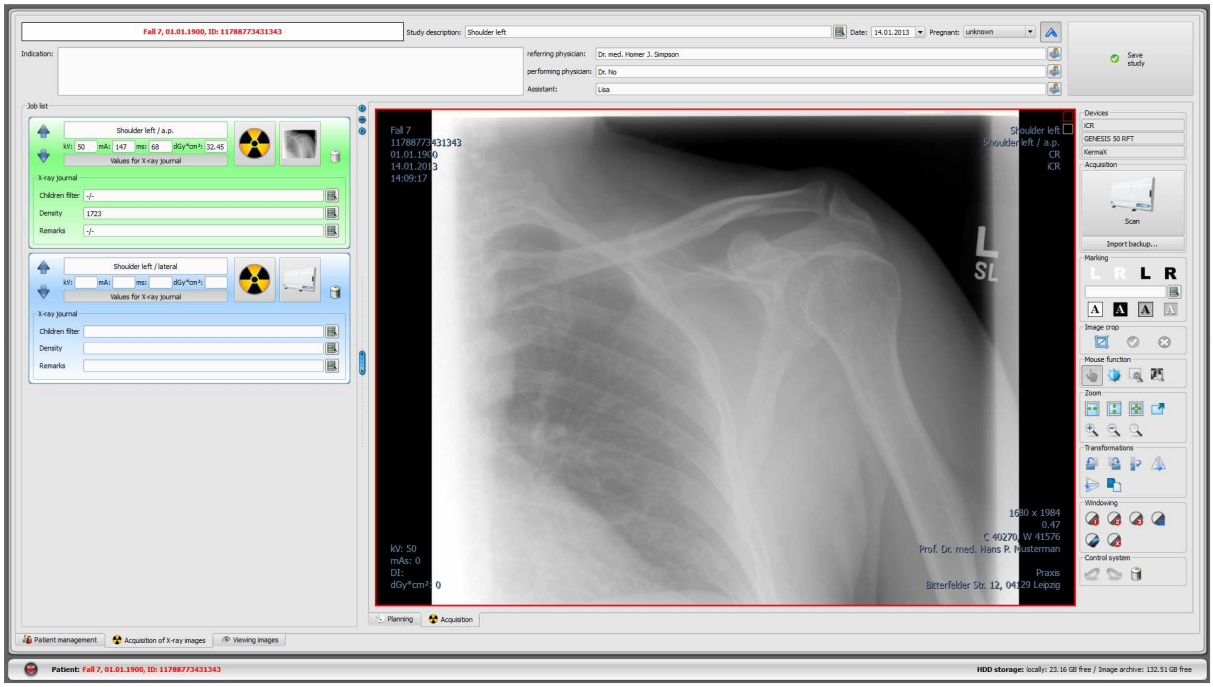
15.4.1 General

If the module for acquisition of X-ray images is activated, an additional tab „X-ray image acquisition“ will be displayed. It consists of the parts Planning (if activated) and Acquisition. X-ray image acquisition contains additional functions for acquisition and processing of images.
To the right of this tab the connected devices are shown (this display may require additional activation in the context menu of the toolbox). These fields are temporarily colour-marked during transferring the values (yellow while transferring, green once transferred successfully, red if transfer failed).

Below the tab, there are operational controls for image acquisition and tools for image processing. You can hide resp. unhide unneeded functions and tools via the context menu. To do this, click with the right mouse key on area of the tools and activate or deactivate the functions in the menu displayed.
To the left, there is a job list for the current patient.

15.4.2 Course of X-ray image acquisition

You can start acquisition of images after selection of patient. Select required job and click on the acquisition icon. If you are operating a generator that uses Procedure Codes for default settings and transfer of these Codes is supported by digipaX, start the acquisition along with the transfer of the Procedure Codes by pressing the “Send settings to generator” button. After that, take a shot of the patient. For the shot, it is also necessary to enter the exposure parameters in the appropriate fields, if there are not entered automatically. When entering values, use decimal separator set in the region and language settings of Windows (usually a comma). For entering the mAs value, decimal numbers (decimal places) are not allowed according to DICOM standard. However, the administrator may activate the option “Allow for mAs as decimal number” in the configuration.
Afterwards, you can read the image in the job and send it to digipaX by pressing the “Start image transfer” button.
Optionally, an additional large button for image acquisition can be activated via context menu in the right toolbar. If you want to use it, make sure that the job required has been marked in blue priory (by a single click on the job) so that the acquired image is assigned correctly. If no job is marked in blue or the marked job contains already an image, the new image will be assigned to the first job without an image. When working with jobs, it is recommended to perform all tasks directly through the switches of the jobs and hide the right button. Preferably follow exactly to the order of the steps to ensure the proper assign of jobs, Procedure Codes, exposure parameters and images.



After you start the acquisition process, the acquisition program of the manufacturer of the device opens, with which the image data is transferred.

Caption and Symbol on the button for image acquisition may differ on your installation. It depends on the system configuration.

If the first image is a read-in image, it is assigned to the appropriate job and displayed as a small thumbnail in the job as well as in a large format in the window. While reading and transferring image data, next acquisition can be already performed in certain circumstances. Software for reading the image data (not digipaX) is to be closed after each acquisition.
The images are being assigned to a new study and each of them is being stored in its own series. The examination name is created automatically through the jobs or you enter the name manually.
Specify X-ray technician's name. After you have processed all the jobs and all the data has been completed, you can finish the procedure. To do this, click on "Save study" button to transfer the new images to the archive.

15.4.3 Markings

Markings are available only if the adequate module is activated.

Before saving an image, the markings can be made on it (in the configuration on page „Image acquisition" the markings must be activated). Select i.e. one of virtual lead characters (L or R) by clicking with the left mouse button and move then the mouse over the image. You see the image of the character, which can be modified in its size using the mouse scroll or the keys plus and minus on the keyboard. Move the symbol to a desired position in the image and place this there by new clicking the left mouse button. The symbol will be then solidly burned into the image and will be solidly bounded with it. You can undo the operation directly ongoing (buttons with arrows below the toolboxes) – if the image is saved, the marking cannot be removed again.
You can burn also the texts into images. For this, enter a desired text in the box „free text" or select the text from the list of already defined texts. With the 4 buttons for set up you have the possibility to place black text on white background, white text on black background, black text with no background or white text with no background, depending on that which setting is offered for the current image. Also the text field can be modified in its size in the same way like virtual lead characters.

15.4.4 Image splitter

Image splitter is available only if the adequate module is activated.

Before the images will be saved they can be split so that their edges will be cut away. This has the following advantages:

- only the interesting range of an image can be seen, while the images do not need to be zoomed therefore
- less wastage of memory
- faster data transfer
- faster displaying and processing of an image (i.e. windowing)

Nevertheless, there is also a danger that the important information on image might be split withal.

The original image is available only as a backup in the list of newly acquired images. If the split image is saved in image archive the cut edges cannot be reproduced again for it.

For splitting the displayed image press firstly the button “Mark the image”. Afterwards click with the left mouse button twice in the image, in accordance to mark the edge points of the received range. Now you see a preview for the range which is to be split in the image. **Check this preview once again, whether the important information on image has not been cut away while splitting**. By clicking on the button „Accept“ you confirm the splitting and the operation will be made. The image is thereby still not saved, this means not automatically transferred into the image archive. You can undo the performed operation by clicking the button “Undo” as well as other operations. By clicking the button “Reject” you cancel the marking and you can set a new marking. On this way, you can always delete a false set marking.

15.4.5 Image transformations / windowing

You can transform (rotate/mirror) the newly scanned images before saving them or modify the window. Rotations, mirroring, windowing etc. are being saved directly in the image and co-transferred to the image archive. These modifications are displayed immediately on other stations, on that the image is obtained.
In the configuration (page „Image acquisition“), automatic rotations and mirroring can be set, which then apply immediately to all new images.

15.4.6 Rejecting images

Particular images can be rejected. This means that they are not transferred to image archive, but deleted. Click on the thumbnail in the job to display it in a large format in the viewer, and then click on “Reject” button bottom right in the toolbox . A confirmation message

appears, which is to be answered with „Yes“. The generator values or the dose area product values, which had been already assigned to the image, are being also removed.

15.4.7 Additional devices

As described above, the further devices, like i.e. X-ray generator or dose area measuring device can be connected to the system. These transfer automatically new values to the system or the system asks the devices cyclically, if new values exist. As soon as new values are available, they are assigned either to the current (marked in blue) job resp. image or to the subsequent one on the list that still contains no values. Otherwise, an empty job is created and the values are assigned to it.
Therefore, please pay attention to the order of the jobs if you want to acquire several images one after another with the X-ray device and yet afterwards transfer them to the digipaX. If incorrect values had been assigned to an image, you have to enter correct values manually in the fields before you send the image to the archive.

15.4.8 Backups

For each image, which will be scanned, creating backup is the first action before the image will be further processed. If there are connected the additional devices, their values will be also withal saved in the backup.
For restoring an image from the backup, first activate a patient, to whom these images are assigned. Next use the button „Import backup…“ below the switch for image acquisition. In the dialog box the thumbnails as well as date and time of the acquisition will be displayed. Select the record, which is to be imported, and confirm with „Ok“. The image is imported as if it had been just read-in . A new job in a new study is created. If you are still working on a study that has not been saved yet, the job will be attached to this study. Now, fill out the input fields with required values in the usual manner. After you have acquired all the images or imported them from the backup, save the complete study using the button in the right upper corner.

15.4.9 X-ray journal

If the X-ray journal module is enabled on the station, on that new images are being loaded, new entries in the X-ray journal are made after saving the study. Generating the X-ray journal entry is doing automatically. In the display box of a job, there is a switch „Values for X-ray journal”. By clicking on this button, further input fields are shown. Here, you can add the values which are to be entered along with this acquisition in the journal. If a required mandatory entry is missing, a warning message appears prior to saving the study and the study cannot be completed. It is necessary to complete missing entries and click again on “Save study“.

15.4.10 Problems and solutions

What to do when the cassettes have got mixed up and the order of images is not correct?
The jobs can be resorted prior to saving in required order and then they will be saved in this order. The description for the image and all acquisition values can also be modified

manually. Therefore, please make sure that the descriptions, values and order are modified accordingly before the study will be saved.

What happens if a false patient was still activated?
If new images have been assigned to a false patient, they can be first deleted (rejected). For this, reject individual images and delete the jobs. Next, the right patient will be opened and one of the last acquisitions will be imported by using the switch „Import backup…“. See 15.4.6 Rejecting images and 15.4.8 Backups.
If the images have been already saved, you can also import these for a new patient from the backups and save once again, false saved images of the first patient must however be deleted from the image archive by your system attendant or administrator or using the delete function (see chapter 8.10).

What happens if the device data have been already transferred before the patient is opened?
Device data are also protected in backups. Therefore, first activate a desired patient and import the device data from the backups. Next read also the image data as usually in and save them.

What happens if it is tried to exchange a patient or close a program although not all images of the active patient are saved?
A message appears, that first all images of the active patient are to be saved or rejected. The patient cannot be exchanged and the program cannot be closed if the unprotected images still exist.

What happens if the system has a crash during acquisition process?
Start the application again. If you are not sure, if possibly already started saving followed successfully, activate the patient from the patient management and check the images of this patient.
First open the list of backups and check if the image or images exist as a backup, in order to restore not saved images. If yes, then import the backup for already correctly selected patient and perform the saving once again. If there are no backups, then on next click on image acquisition button a dialog is shown which allows to import this images once again. If you select import than existing images are imported and can be saved normally. If no image data are imported, the user's manual of the device is to be used, in order to restore the image data, and contact the system attendant (service), if necessary.

15.5 Framegrabber / acquisition of image series

15.5.1 General

The “Frame grabber” module allows acquiring of single images or the entire image series from the external source by video converter and their transfer to the image archive. The prerequisite for frame grabber is an image source with a video interface such as Composite or a S-Video connector that for connecting the video connector. This converter processes the image data and transmits them to computer. The equipment which operates so-called

DirectShow or is provided with WDM driver, can be used. The system administrator will provide information on technical details and will assist you in selection of the most appropriate equipment.
There are devices which must be embedded in computer permanently and such which may be connected through the external USB. They may be operated by keyboard, mouse or external foot switch. The best solution is a foot switch with two programmable pedals. "F5" key on computer keyboard shall be assigned to the first pedal, and "F9" key – to the other pedal, and you may freely select to which pedal – right or left – will be assigned which of these both keys. Programming is generally made using the software delivered with the switch. Information how to connect and install the device is provided in documentation attached by the manufacturer. Such installation must be absolutely made by professional.
With the "Acquisition of image series" module, the image data is created by a third-party system and transferred to the digipaX for further processing. The program receives then this data and processes it further.

15.5.2 System requirements for frame grabber

The computer with adequate capacity is required for processing of images with several images per second speed. The following table presents the minimum requirements which must be met by computer to operate the frame grabber with digipaX.

Processor	Dual Core or Quad Core Processor min. 2,5 GHz or higher
Operating memory	2 GB RAM or higher
Operating system	Windows XP Prof. (32/64bit) or Windows 7 Prof. (32/64bit)
Software	DirectX 9c or higher
Graphics	min. 128 MB DVI (Dual), min. 1280 x 1024
Hard disk	System disk min. 60 GB
Network	1000BaseT (Gigabit Ethernet)
Device interface	free USB 2.0 port for external devices or free plug-in socket (most frequently PCI or PCIe) for devices embedded in computer

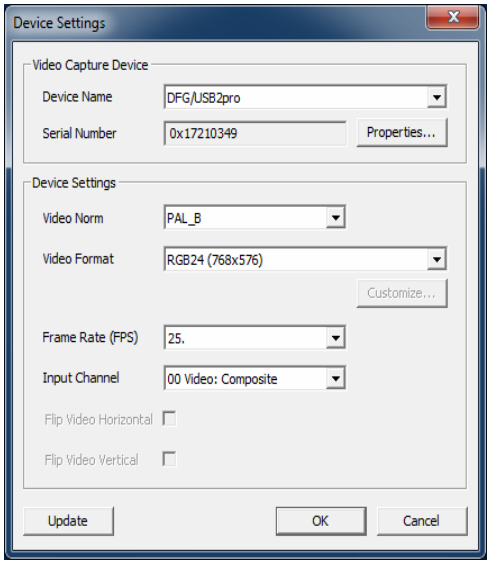
15.5.3 Frame grabber setup in digipaX

The "Frame grabber" module must be licensed and launched to be available in digipaX system. Also configuration in digipaX shall be made by professional. If this module is activated, new toolbar for device configuration and control is available.
The "Video source" and "Configuration" buttons are used for selection and configuration of the connected device. The elements of configuration and operation become active only when exactly ONE patient is opened. If more patients are opened, these elements are inactive. The image data can not be assigned to wrong patients in this way.

15.5.3.1 **Video source**

- ***Device Name:*** if video device is installed correctly, "Device name" appears on the list. If this list is empty then device was installed incorrectly or it does not meet the requirements specified above. If several devices are on this list, you shall select one of them.

- ***Serial Number:*** provides series number for the selected device.
- ***Properties:*** opens the dialog box for various, exact device adjustments. You can find more information in manufacturer's documentation.
- ***Video Norm:*** sets the video standard. This standard depends on video source or image source. PAL standard is commonly used in Europe.
- ***Video Format:*** it is recommended to use the highest image resolution in connection with the best colour depth available in device.
- ***Frame Rate:*** specifies how many images per second is delivered by video source. With 25 images per second speed the new image is transmitted by video source every 40 milliseconds.



- ***Input Channel:*** video interface at video converter to which the video source is connected.

There are no generally binding values for each of these settings. They always depend on the used hardware and they can differ. More information on this issue may be found in documentation delivered by manufacturers of hardware, video converter and image source or video source.

15.5.3.2 Configuration

The same dialog box is opened there for various exact settings as for "Video source/Properties". The difference is that the dialog box may be opened and settings may be made also with the active live image transfer.

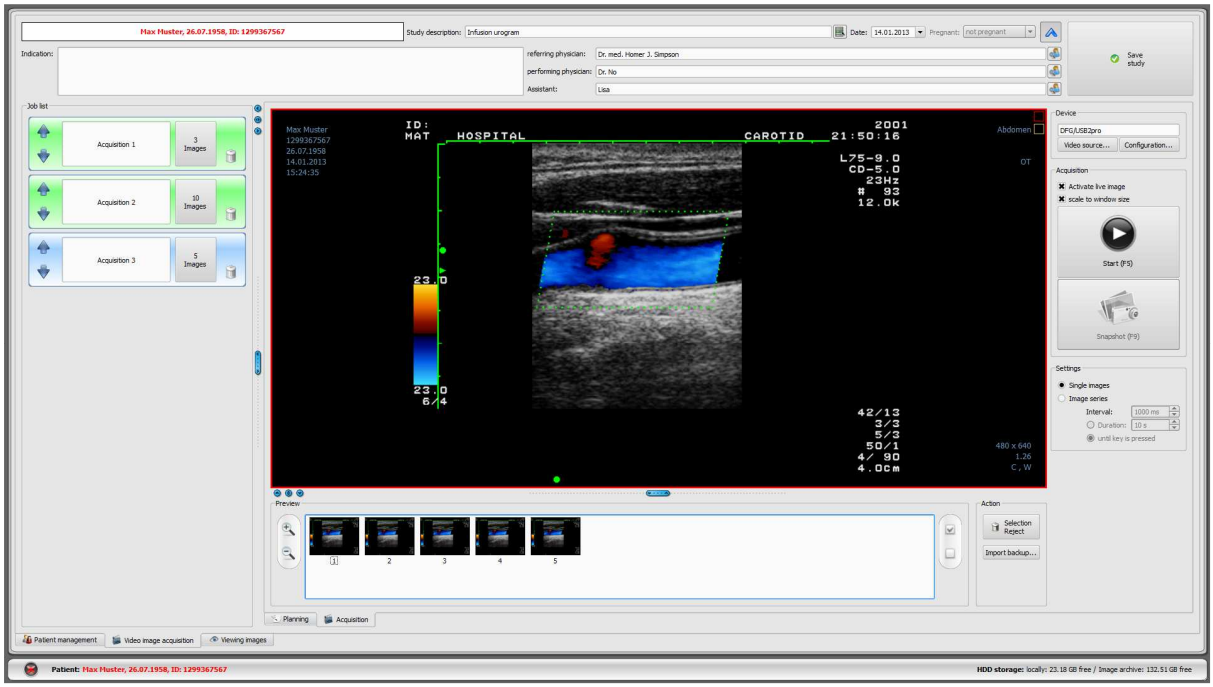
15.5.4 Frame grabber operating elements

The mouse or keyboard may be used for operation. Furthermore, it is possible to connect the external foot switch to the computer. This allows that the device can be operated with feet, with hands free for video source operation. “F5” key (Activate live image) and “F9” key (Release snapshot) may be freely assign to the foot switch pedals, for the most convenient device operation for you.

- ***activate live image:*** shows image with active live transmission in browser.
- ***Scale to window size:*** increases or decreases image to window size.
- ***Start (F5):*** activates live image transmission. This action may be activated by mouse clicking, pushing the “F5” key on keyboard or by the proper foot switch pedal. The again pushing will stop transmission.
  It must be remembered that the acquired images or series may be processed after stopping the live transmission only.
- ***Snapshot (F9) at single image setting:*** the snapshot of current video transmission is made by mouse clicking, pushing "F9” key or relevant foot switch pedal.
- ***Acquisition (F9) at image series setting:*** the sequence of images is acquired for the specific period of time by mouse clicking, pushing “F9” key or relevant foot switch pedal. More information – in point “Image series“.
- ***single images:*** switches the acquisition switch into snapshots. Only single images are always acquired.
- ***image series:***
  - interval: – determines in how many milliseconds the image is acquired. It shall be remembered that the maximum number of images per second depends on both the installed frame grabber and computer capacity.
  - duration: – acquisition will be automatically finished after the set time. The activation of acquisition by mouse clicking or once pushing of “F9” key or relevant foot switch pedal.
  - until key is pressed: – acquisition is activated by mouse clicking, pressing the “F9” key or relevant foot switch pedal and it is activated as long as the key is kept pressed.

15.5.5 Acquisition by frame grabber

If the job management is active, a tab for job planning and management is also displayed here. To load an image series, start the live image transmission by clicking on the appropriate icon in the job or mark the job in blue and press the „Start” button in the toolbox to the right or the „F5” key resp. the foot-operated switch (if used).
The acquired single images or sequences of images appear as candidates in preview in the bottom while the number of single images is displayed in the job. As soon as the live image transmission has been stopped, the acquired images may be processed further.



After activation of single images, with each snapshot a new image is being acquired and added to the list of candidates of an active job. With every new start of the live image transmission next job is being approached. The job after job may be processed in this way using the job management. If no jobs had been created before, they are being created automatically upon start the live image.

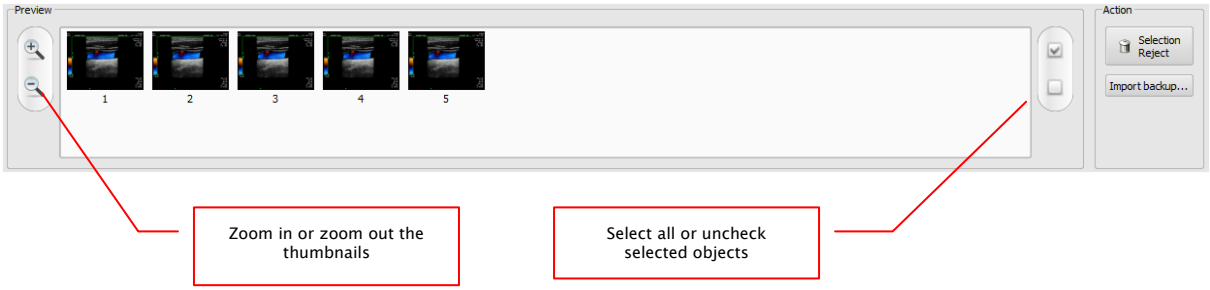
Also when “image series” option is set, all acquired images are put into single series and this series is closed when live image transmission is stopped.

The further data processing and storing in archive are described in chapter 15.5.7 Processing and storing acquired images.

15.5.6 Acquisition with image series acquisition module

The images are acquired from a third-party system and transmitted to the computer and software receives this data. With transmission of the first image, digipaX waits for waiting period set by the system administrator. If no further images are acquired within this period, the acquired images are automatically added to the list of candidates of the activated job and stored in the new series. If you intentionally want to acquire multiple series for single patient, the best possible method is to acquire images by series in the third-party system and then transmit the closed series to digipaX and wait for series importing by digipaX. Then you can continue the procedure without previous storing of the acquired series with the next series. You can finish with proper processing of images and storing them in archive.

15.5.7 Processing and storing acquired images



The candidates are displayed in preview when you click on series in the left job list. The thumbnails can be zoomed in or out for better representation. By double-clicking on a thumbnail, it is being displayed in a large format in the viewer. You can check the images prior to saving them and eliminate those that are not to be saved. Mark the images that are not to be saved with a single click on the thumbnail (it is now marked in blue) and then click on the "Reject selected" button. By clicking on "Unmark selected", all images will be unmarked again. If you want to reject complete series, click once on "all selected" and "Reject selected".
When you are finished with post processing of all series, put in necessary data in the appropriate fields and then click on „Save study" to transfer the series to the archive.

15.5.8 Importing of backup

The backups of acquired snapshots or image sequences are created for each live image or image series transmission. They may be recovered from backups if necessary. For this, you must previously activate the patient to which images shall be assigned. Click on "Import backup...". The acquisition thumbnails, with date, time and number of images appear in the opened dialog box. Select acquisition which shall be imported and confirm with "OK" button. The snapshots or sequences of images are re-imported and assigned to the new job. Alternatively, you can assign the backup to an existing job, marking it previously in blue and then importing the backup.

15.5.9 Problems and solutions

What happens if a false patient was still activated?

If new images have been assigned to a false patient, they can be first deleted (rejected). Next, open the appropriate patient and import again one of the latest acquisitions by means of „Import backup…“ button. For more see 15.5.7 Processing and storing acquired images and 15.5.8 Importing of backup.

If the images have already been saved, they can also be imported for the appropriate patient from the backup and re-saved for that patient. Incorrectly saved images of the first patient must be, however, deleted from the image archive by your system attendant or admin or using the delete function (see chapter 8.10).

What happens if the device data have been already transferred before the patient is opened?

This can happen only when using the image series acquisition module.

If no patient is opened, the image data remain in the specified transfer folder. As soon as a patient is opened, these image data are imported and assigned to this patient. You can subsequently continue with usual storing procedure of images.

What happens if one's trying to change patient or shutdown the program although not all images of the active patient are yet saved?

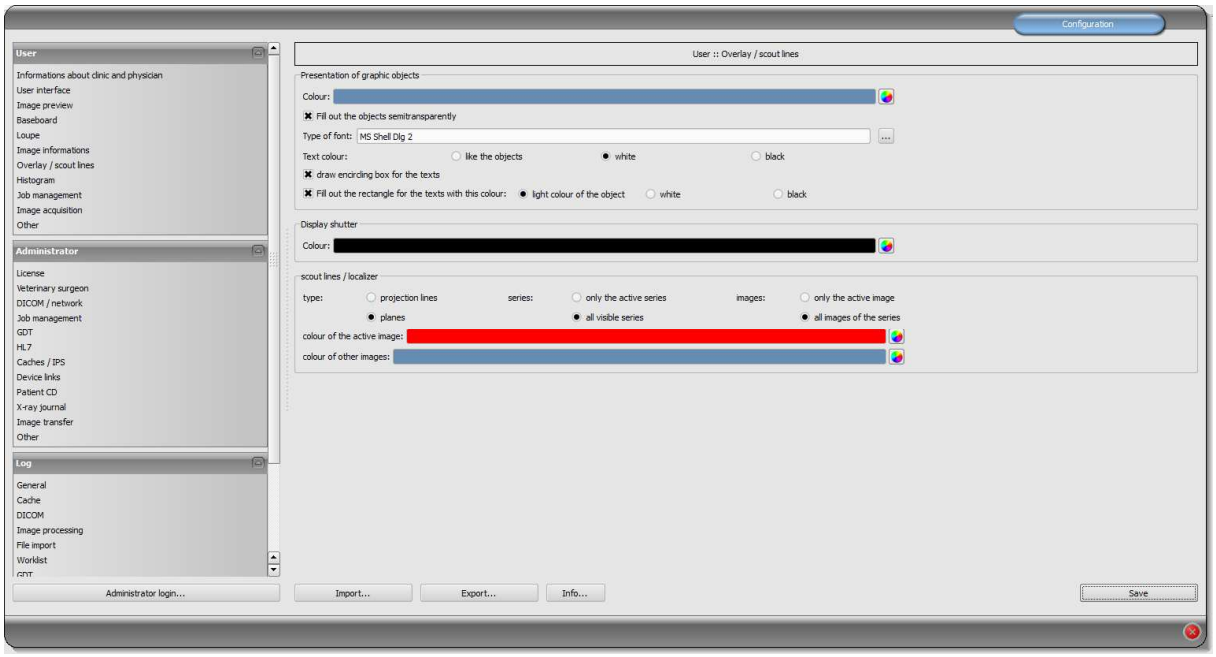
A message appears that all images of the active patient must be stored or rejected first. The patient cannot be changed and the program cannot be quitted until unsecured images exist.

What happens if system crashes during acquisition?

Re-launch the application. If you are not sure whether possibly started storing process could be successfully completed, activate the patient via patient management and check the images of this patient.

When using the image series acquisition module, all still not completely imported images are read once again for the patient and you can proceed with the storing procedure as usually. If this does not happen or you work with the frame grabber module, you must first import the images from backup. In order to do this, open the list of backups and import the backup for the already properly selected patient, afterwards proceed with storing images.

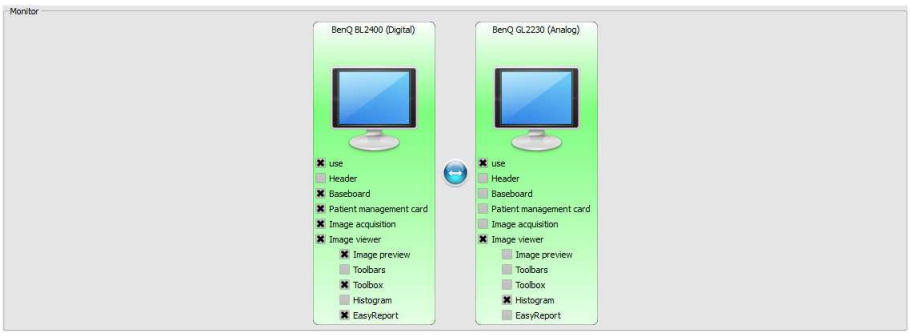
16 Configuration



There is a central place for the program configurations. The configurations and also the different log outputs are thereby divided in adequate groups user, administrator and log. Configurations for the group administrator are modifiable only with the administrator rights. The administrator must log in at each selection of these components using the „Administrator login…“. Users, which are logged in as administrators, can load the full configuration or it's part from INI file or save in such a file by using „Import…“ or „Export…“. By using the switch „Info…“ the information on product can be displayed.

Following settings can be made in the configuration:

- **Information on clinic and physician**
  Institution: name of a clinic, hospital etc.
  Address: location of the clinic
  Physician name: name of the physician of this station
  Physician number / company identification number: identification number of the physician in the case of clinics or company identification number (may be empty)
- **User interface**
  Monitor: settings and placement of monitors. If you are using multiple monitors, the specific components of the individual settings can be displayed on all or only on certain monitors – histogram and EasyReport can be turned off on all monitors (including also acquisitions and the job table, when the acquisition module is inactive) – the patient management tab can be displayed on only one screen – you can adjust the placement of monitors



Multi-monitor module is covered by an additional license and requires separate launching – after launching, the number of used monitors depends on the installed hardware – without a license digipaX can only be displayed on one of the available monitors

Design: different possibilities for presentation
Position of toolbars: for the monitors in portrait mode the placing on the left is recommended – this happens automatically or can be determined explicitly (displaying toolbars must be activated for each screen)
Toolbox height (window placing): for the monitors in portrait mode a short toolbox and wider bottom working bar (histogram) is recommended – this happens automatically or can be determined explicitly
Font: setting up font size and type for descriptions of the buttons and windows as well as for tables, tips and information etc. in the program
Symbol size: setting up symbol size on the program buttons

- **Image preview**

List view preview tree: selection of tags, according to which the images are to be sorted, sorting direction and definition of a displayed text in image nodes (the same principle as for information on image)
The following tags can be used for sorting or displaying:

0x0008, 0x0016	SOPClassUID
0x0008, 0x0018	SOPInstanceUID
0x0020, 0x0013	InstanceNumber
0x0008, 0x0023	ContentDate
0x0008, 0x0033	ContentTime
0x0028, 0x0008	NumberOfFrames
0x0008, 0x0022	AcquisitionDate
0x0008, 0x0032	AcquisitionTime
0x0028, 0x0002	SamplesPerPixel
0x0028, 0x0010	Rows
0x0028, 0x0011	Columns
0x0028, 0x0101	BitsStored
0x0008, 0x0008	ImageType
0x0054, 0x0400	ImageID

Drop-down mode: expand latest study: only images of the latest study are being expanded; expand all: after a patient is selected, all study nodes and image series nodes

are being expanded in the tree structure, in this way all images of the patient are displayed in the preview; collapse all: all study nodes are being collapsed and no image preview is displayed – it will be directed the study and image series selected, which is to be viewed; automatically: without activated latest study node is expanded and all thumbnails are displayed, if image record is activated the study nodes are closed and only newly created study is being expanded
new studies first: sorting order in the thumbnail preview so that the latest studies are displayed on the top; old studies first: sorting order in the thumbnails preview so that the oldest studies are displayed on the top
Display mode image series: alternatively, all images of one image series are displayed in a preview tree or only one image of the series is displayed (this is adjustable separately for each type of image) – first select on the left an adequate modality, i.e. CT, and then on the right, which settings for this type of image are to be applied (all images or only the first, middle or last image of the series)
Others: loading study structure in the background that upon recall of a patient retrieval of the nodes (studies, series and images) runs in the background and the system is ready sooner (if this option is deactivated, the retrieval of all DICOM information is conducted first before a display in the preview tree is generated)

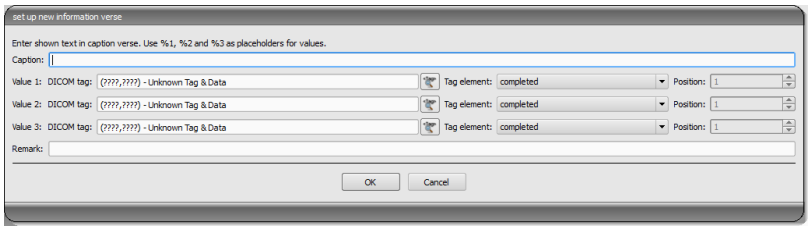
- **Baseboard**
  Monitoring: with the tick mark monitoring for this drive can be switched on or off; select any directory for the drive on the disc, which is to be monitored (this can be also network path); with the prefix a displayed text in the baseboard can be preceeded; if the free capacity of the drive exceeds a critical value, a warning is emitted once a session, if the capacity is lower than the double critical value, the value is signalled in red, otherwise normally black
  Update interval: interval in seconds, in which the displayed free storage space is to be updated

- **Loupe**
  Rectangle: usage of a rectangle loupe in the viewer with the specified pixel measures or automatic size
  Circle: usage of a circle loupe in the viewer with the specified diameter or automatic size
  Automatic size: width and height of the rectangle or diameter of the circle will be set for a third of a current window width or window height of the image window, depending on that which value is smaller
  Zoom factor: zoom factor for the image cutout, which is presented in the loupe (referring to original image)

- **Information on image**
  Text colour: colour with which the information in the image corners is to be shown
  Font type: font type for presentation
  Zoom factor: with it font type can be adapted (font size adapts also automatically to window size)
  Shaded: the writ can be possibly poorly seen on the images with the white background,

so with this option a shadow can be backed – if the images are black or dark, this is not hardly seen

Group elements: for each type of image (modality) you can determine which information is to be shown in the overlay corners. First select the desire type and next the option „use these settings“, if the default settings are to be used. Click into the desired box, in order to determine the corner of the displaying and next the switch „new entry in active field“, in order to add an element to this box. In the caption row you can enter any desired text, which should appear on the images. Use %1, %2 and %3 as „Variables“ (place holders). These will be exchanged by the defined DICOM tags in the display. You can also let display only a part of the tags if needed, i.e. a part of the person name or the value at the determined place for tags, which allow many values (multiplicity). By a double-click into the entry in the list fields or with the switch „process active entry“ you can delete these. Use the switch „delete active entry“, in order to remove this from the list. If you want to move or copy the entries within a list field or between the list fields, you can move these with the pressed left mouse button (drag & drop). For this, hold the Shift key pressed on, in order to move the entry. Without Shift this will be copied.



- **Overlay / scout lines**

  Presentation of graphic objects:

  Colour: the colour for drawing the graphic objects

  Fill out the objects semitransparently: while drawing filled out image objects, these will be drawn semitransparently, if this option is activated, so that you can recognize the image behind it, otherwise they will filled out fully with the above colour

  Font type: font type, which is to be used for text objects

  Text colour: with the above selected colour, white or black

  Draw encircling rectangle for texts: if this option is activated, an encircling rectangle for the texts in the above selected colour for graphic objects will be drawn; thereby these can be better read in certain circumstances

  Fill out rectangle for text with this colour: if this option is activated, the encircling rectangle for text objects will be filled out with the selected colour (the above selected semitransparency will be also used), otherwise the rectangle will not be filled out an the image will be seen; the same colour can be used like fort he objects (lighter), white or black

  Display shutter:

  Colour: the colour, with which the hidden areas are to be overlaid

  Scout lines:

  Type: “Projection lines” – with this option, only intersection lines of the images resp. projections of edges are presented; “Plane” – with this option the images are shown as sectional plane three-dimensionally.

Series: "Only active series" – with this option, only projection lines resp. planes of an active series are shown; "All visible series" – with this option projection lines resp. planes of all visible series are shown – **Note:** This option works not until the option "All images of the series" is activated.
Images: "Only active images" – with this option, only projection lines resp. planes of an active image are shown; "All images of the series" – all projection lines resp. planes of the series are shown.
Colour: colour, with that the active image, and colour, with that other images are presented.

- **Histogram**
  Shorten left and right: with this options, the values in the left and right edge of the histogram will be set on the maximum value between them, so that the display of the whole histogram is well possible in the window. If the important areas will be thereby cut off or the values between these limits are still presented too small, the size can be accordingly reduced or enlarged.
  Sooth histogram for display: smoothes the histogram for displaying with the set number of runs. The images will be not smoothed thereby. This is used only for better presentation of the histogram.
  Values: on the x-axis only the values will be shown, which are actually used in the image, or all values, which could appear based on the colour depth of the image

- **Job management**
  Fields of the job management: select all fields, which you want to use during the work with the jobs. Deactivate the fields, which you do not want to use.
  Use colour-marking of the fields: if this option is activated, the data fields will be backed in the different application ranges according to their meaning. If this option is deactivated, no colours will be used (white).

- **Image acquisition**
  Delete worklist job: deletion of jobs asking the user or automatically after image/image series storing or the jobs are not deleted
  Status message saving: setting the message display time duration (in seconds) or entering 0, if message shall be not displayed (status message displays information on conducted operations for the just stored image)
  Backups: number of the backups which are to be created (the oldest one is always deleted, when this number is exceeded)
  Markings: activating markings; selecting image types of virtual characters; setting font type for free texts
  Automatic image transformations: for each new acquired image these transformations are made automatically
  Image acquisition button: it is possible there to set another description and another symbol for X-ray image acquisition.

- **Others**

Archive data: after opening the program this setting is used for retrieving the list of patients (Initializing) and if an update of the data is needed
Mouse function windowing: synchronic with the below displayed histogram or transposed, in order to retain the usage from another system
Scroll mode images: images can be changed with mouse scroll or the “Page up” and “Page down” keys. This setting specifies, whether thereby only one image series can run, change also over the limits of an image series can follow and therefore all images of an study can run or even over all images of a patient, so over the limits of an study to the next study
Presentation of zoomed images: if this option is activated, the pixels will be zoomed in and no smoothing follows (the images operate pixelated, details can be seen better in certain circumstances); if the option is activated, the strongly enlarged images will be smoothed (the images operate milder; details can blur in certain circumstances)
Presentation of marked images: showing or not the blur for marked images (if not, only a red point in the top right corner)
Information / messages: for some actions the tips in a small window in the bottom right monitor edge are output – display duration can be set here or these messages can be deactivated completely
Units of measurement: use this option to set whether the measurement values to be used are in "mm/mm²", or "cm/cm²"
Patient management/ additional search field: when this option is activated, two additional search fields for the name and patient-ID are available in the patient management in that, by entering the first letters or digits of the surname or ID you can jump over directly to the required patient in the table
Patient management/ maximum number of match results: setting of the maximum number of data records that will be displayed at archive query (standard value is 500, a too high value may slow down the archive query); when this option is deactivated, all match results are shown

For the view of the log outputs select in the group „log“ the desired category. After that the log outputs of this category are displayed on the right of the window. The outputs in the log window can be marked with the mouse and Ctrl + A and copied to clipboard with Ctrl + C. Then they can be inset again and also saved there in any editor. Moreover, a log file global.log is led in the installation directory, in which all activities of the application are minuted.

17 Taking out of operation

17.1 Exiting the program

You exit the program with the symbol  in the top right corner of the headline or with the red X in the Windows frame for closing the main window (depending on configuration). Thereby the application is minimized only to a System Tray Icon, which you find on the bottom right (red X as a symbol), unless otherwise set by the administrator. The application

is still active in the background and can be opened again via context menu of the System Tray Icon. Via this context menu the application can also be explicitly completely exited.
You can safely let the application run in the background and do not have to exit it before you shut down your computer.
If you hold any of the control keys (Shift, Ctrl or Alt) pressed on while closing the main window (red X in the top right corner), then the application will be immediately completely closed and not reduced to the System Tray Icon. The same happens if closing with Alt + F4.

17.2 Hardware shutdown

It is necessary for full system shutdown to disconnect devices and computer from power supply. The disconnectable power output strips may be used for this purpose.

The Windows system must be correctly shut down prior switch-off of the computer. Otherwise, system may be damaged and become useless.

18 GDT interface

GDT identification: GDT-D-11

Anytime, so as well at the program start as during the operation, a GDT file can be forwarded to the program. The forwarding follows thereby in the set communication directory and in the set format. The settings are made by your administrator.

GDT record type	Action
6301: delivery of master data	▪ patient to the GDT file forwarded is set up locally, if he does not yet exist in the set image archive ▪ at the program start or if no other components are opened, the patient management will be opened
6302: request for a new study	▪ first, a patient is set up locally, if he does not yet exist in the system ▪ next, he will be selected for work ▪ at the program start or if no other components are opened: A) only the patient is activated, if the module image record is activated and the record thereby is performed directly at this or B) a worklist component has been started and a dialog box for creating a new job is activated, if the image record is not activated ort he application has been started with /w as a parameter
6311: show study data	▪ patient is also here first set up locally, if necessary and selected ▪ no component is started, but all available studies of this patient are displayed in a preview tree and can be viewed immediately in a viewer ▪ the first image of study is displayed (if a date of study has been forwarded and an study with this date will be found) ▪ the component patient CD is loaded if the application was started with „/pcd“ parameter

Data can be also passed back to other systems, i.e. when the study is ready. This follows also via GDT files in the set communication path.

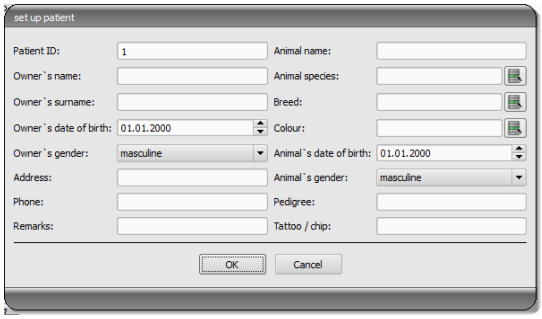
19 Veterinary version

The system can operate as a veterinary version. Thereby the special settings will be made by your administrator and you can work with animals as patients. Thereby data of animal and its owner will be recorded, modified and displayed as your patient data.
Hereafter the parts of the program are explained, which change by doing this. Basically structure of the program stays the same.

Note: saving data of animals is not provided by international DICOM standard (on which the architecture of the system bases). Hence the special settings will be made by your administrator, in order to save the values of other DICOM tags. The images, which will recorded in this way, are therefore not or only conditionally „compatible“ with other systems (i.e. animal name or animal species will not be displayed correctly in another system ort his value will appear in another place in the system). However, operative performance of the systems is not endangered.

19.1 Patient management

The table of patients contains the following columns: animal name, owner’s name, animal species, patient ID, owner’s date of birth and data source.
The following search fields can be used, in order to search for a patient in the table: animal name, owner’s name and patient ID.
For the data source „image archive“ it cannot be filtered by sex of a patient, like in a normal program version, but by animal species. Enter animal species in this input field, like you use it also for recording the animals and next use the button „Query“, in order to update the table of patient.



While recording or modifying the patients as well owner’s data as animal data are queried. Maybe some fields are not available on your system. These have been disabled by your administrator, as they are irrelevant and the system is easier in operating.
While sending images to image archive, the data in the veterinary version cannot be manipulated.

19.2 Job management

In the table of patients of the upcoming jobs animal name (owner’s name), animal species and number of received images, if necessary, are displayed. So, the owner’s name is in the brackets behind the animal name. In the detailed view for a job the further animal data are shown.
The dialog box for creating job does not show an image for organ selection, unless separately established. Entering data follows therefore fully manually as a text.

19.3 Print

For print, a standard header is accordingly adapted. Always a patient ID is shown. The remaining values depend on data fields, which are activated in configuration. If animal sex has been activated by your administrator, this row will be output with the standard header at the printing.

19.4 Patient CD

If you have selected the option for anonymizing for creating patient CD, first the values will be exchanged like in a normal program version (see 11 Patient CD) and next as follows:

- owner's name: "AnonymOwner" or "AnonymOwner1", "AnonymOwner2" etc. for many patients
- owner's date of birth: 01.01.2000
- owner's sex: O (other)
- animal name: "AnonymAnimal" or "AnonymAnimal1", "AnonymAnimal2"

If the viewer is to be integrated with the patient CD, the setting for veterinary version will be forwarded to it. So, the viewer uses the same settings like the ones used in your system.

19.5 Others

Information, which will be shown in so called tooltips (short info fields shown with the mouse without clicking it after a short waiting time), contain as well owner's data as animal data. These tooltips are used in the preview tree of the selected patient (left) and in the tree views for studies. The preview tree shows also animal name and owner's name in brackets.
Also animal name and owner's are shown in brackets on a baseboard.

20 Enabling LOCALITE OrthoPlaner

Enabling is only possible if the adequate module was activated.

With digipaX, the co-operation with LOCALITE OrthoPlaner software is possible. For forwarding an image to LOCALITE please open it and press an appropriate button in the function field or top right in the toolbar (if it is on). This switch is available only if the module is enabled.

Once you have the processing ready done, send the image into the archive and close LOCALITE. Afterwards update the digipaX data of the patient and a new image will be available

21 Others

21.1 Tables

Many tables can be adapted. By dragging a column head the columns can be changed. By right-clicking into an entry in a head row the columns can be unhidden or hidden in appearing context menu.

21.2 Tooltips

The most buttons, data or configuration fields contain so called „tooltips“. If you move the mouse over a field without clicking it, after short while a small help-window at the mouse position appears. In this way you receive the information on this field – action, which can be performed via this field or meaning of the configuration possibilities.

21.3 Exiting program

You exit the program by pressing the Start button bottom left and then „End” button or icon in the right upper corner of the header (if it is displayed) or by pushing Alt + F4 keys. If your system is configured to be minimized only into system tray upon closing, in addition to the actions described you have to push and hold the Shift key or click with the right mouse key on the red symbol right in the system tray and then on “End”.

21.4 License

The software is protected by a license protection. Activation of the system follows by administrator. The administrator requests a license file from a manufacturer and brings it in into the system.

Product: digipaX

Manufacturer: digipaX GmbH
Bitterfelder Str. 12
04129 Leipzig

This product is CE approved: CE 0494

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