

# 3D HISTECH

**Slide Converter 2.3**

**User's Guide**

April 9, 2019

Rev. 1

# Contents

<b>Disclaimer.....</b>	<b>3</b>
<b>1 System Requirements.....</b>	<b>5</b>
<b>2 Installation.....</b>	<b>6</b>
<b>3 User Interface.....</b>	<b>13</b>
3.1 Settings.....	16
3.2 Information window.....	18
3.3 Workflow.....	18
<b>4 Conversion direction parameters.....</b>	<b>23</b>
4.1 MRXS to MRXS.....	23
4.2 SVS to MRXS.....	24
4.3 NDPI to MRXS.....	25
4.4 Plain TIFF to MRXS.....	26
4.5 IMAGE to MRXS.....	27
4.6 MRXS to DICOM.....	28
4.7 MRXS to ROCHE TIFF.....	29
4.8 MRXS to TILED TIFF.....	30
4.9 MRXS to SVS.....	32
<b>5 Conversion queue.....</b>	<b>33</b>
<b>6 Integration with Scanner control software .....</b>	<b>35</b>

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## **CAUTION**

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1141 Budapest – HUNGARY

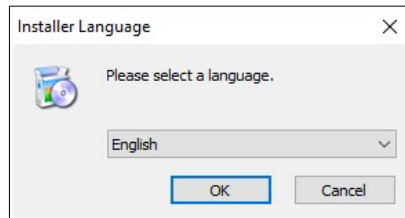
# 1 System Requirements

The following table includes the recommended minimum system requirements:

<b>CPU</b>	Intel Core i5 CPU, 4 core, 2 GHz
<b>RAM</b>	8 GB
<b>Free disk space for temp files in Temp directory</b>	16 GB

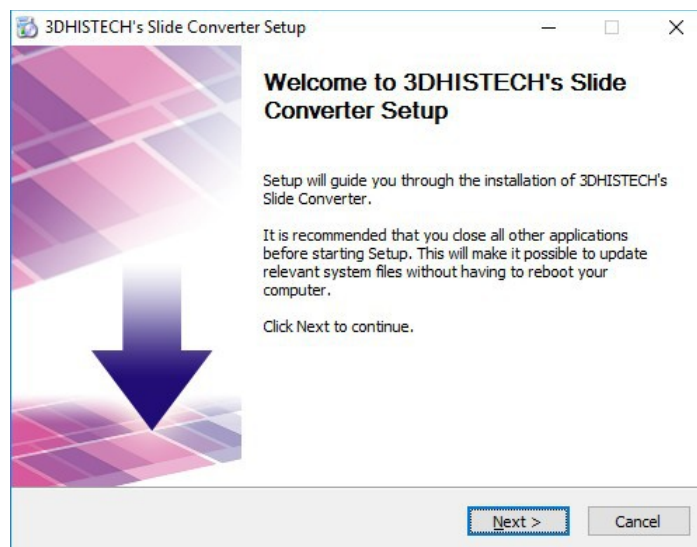
## 2 Installation

1. Upon launching the installer.exe file the installation wizard opens. Select the language used during installation.



**NOTE:** The selected language will be applied for the user interface.

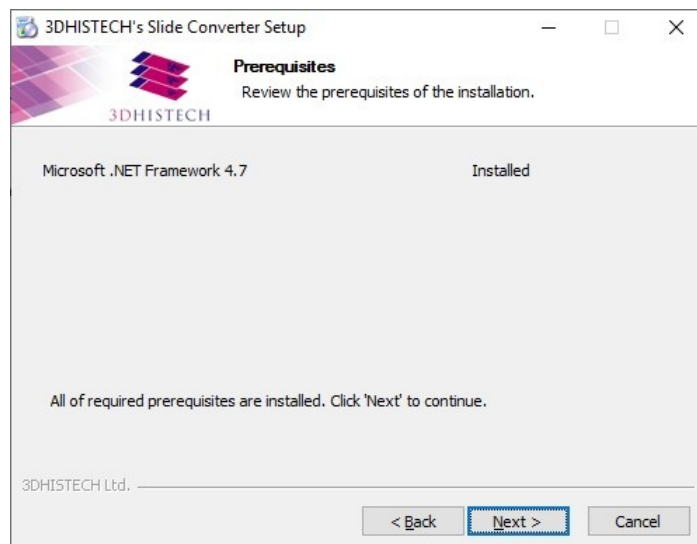
2. Click **Next** to continue.



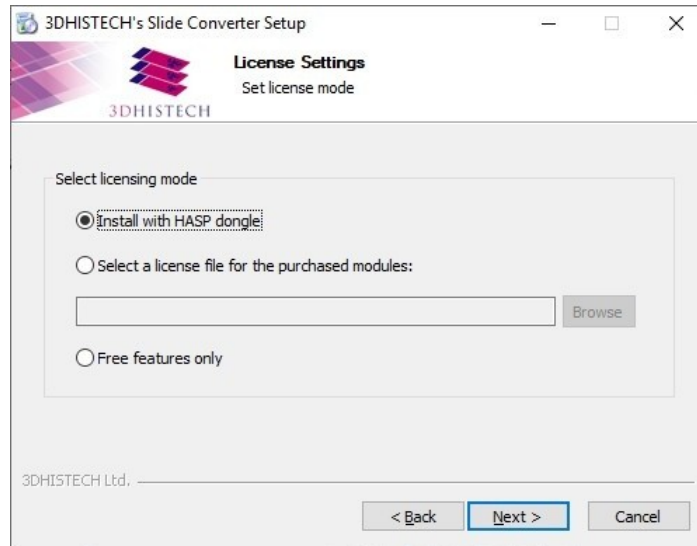
3. Accept the EULA, then click **Next**.



4. Install the missing prerequisite file by clicking **Install**, otherwise, if the prerequisite file has already been installed, click **Next**.

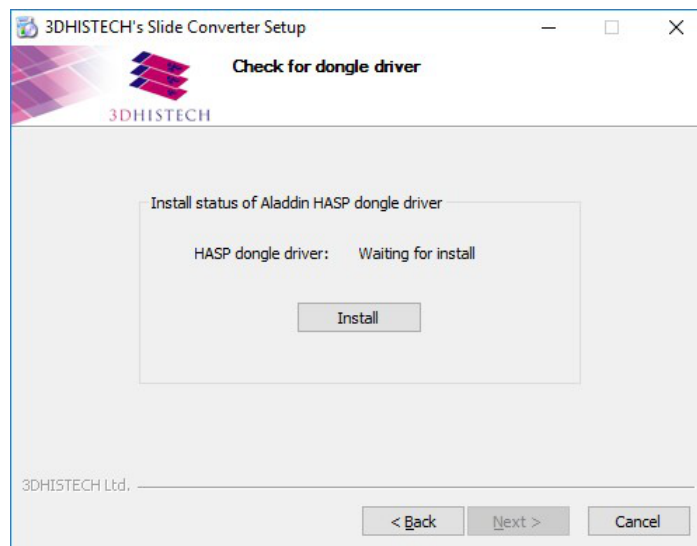


5. Select licensing mode (dongle or license file), then click **Next** to continue.



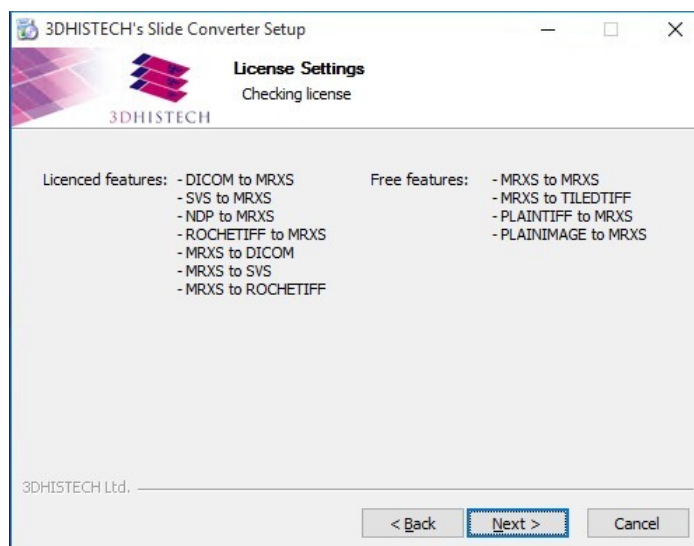
If the **Free features only** option is selected, licensing is not required for using free features of the software.

6. If you selected to use dongle for licensing, then click **Install** first to install HASP dongle driver.





7. The license information is displayed based on the selected license file or the dongle. Click **Next** to continue.

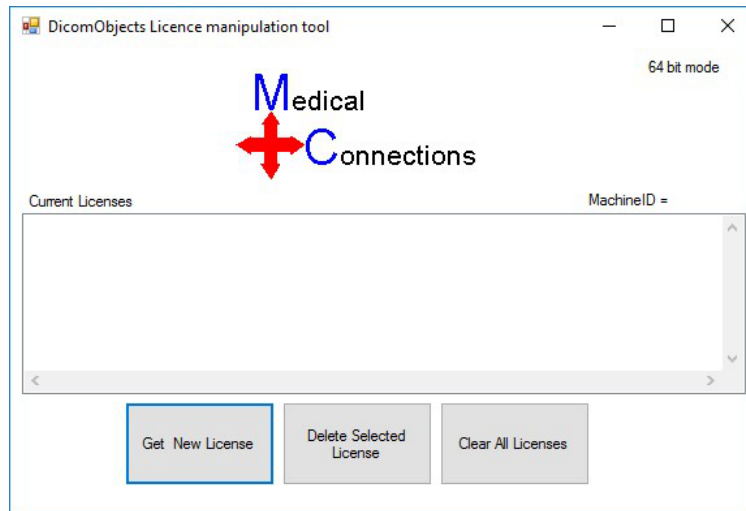


- Licensed conversion options are the following:
  - SVS to MRXS (Aperio -> 3DHISTECH)
  - NDP to MRXS (Hamamatsu -> 3DHISTECH)
  - ROCHETIFF to MRXS (Roche -> 3DHISTECH)
  - MRXS to DICOM (3DHISTECH -> Dicom)
  - MTXS to SVS (3DHISTECH -> Aperio)
  - MRXS to ROCHETIFF (3DHISTECH -> Roche)

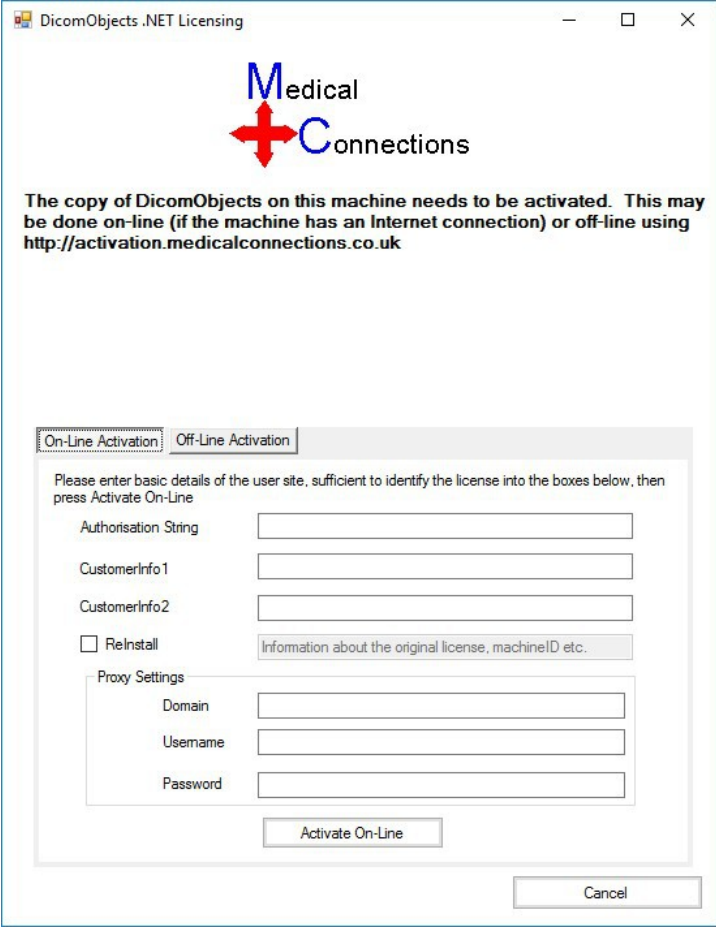
If no licensed conversion option is listed, the converter tool can be used for the following conversion types:

- MRXS -> MRXS conversion (de-overlapping)
- MRXS to TILEDTIFF (3DHISTECH -> TIFF image, separate image files are created for each FL channel and z-stack layer)
- PLAINTIFF to MRXS (TIFF image -> 3DHISTECH)
- PLAINIMAGE to MRXS (JPG, PNG, BMP, and TIFF image with a resolution smaller than 4096x4096 -> 3DHISTECH)

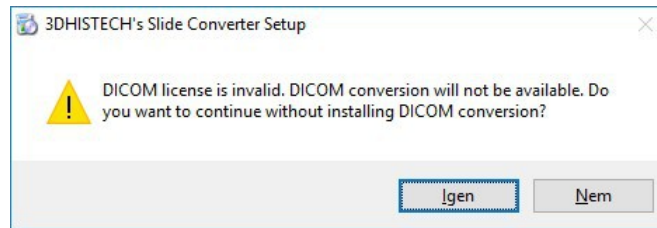
- If MRXS to DICOM or MRXS to DICOM license was listed on the previous display, then the Medical Connections DicomObjects window for registration will open (only if this component was not registered yet). For the operation of Dicom writer this license is necessary too, which must be purchased by the user, and the necessary information must be entered in this window. Add license by clicking **Get New License**.



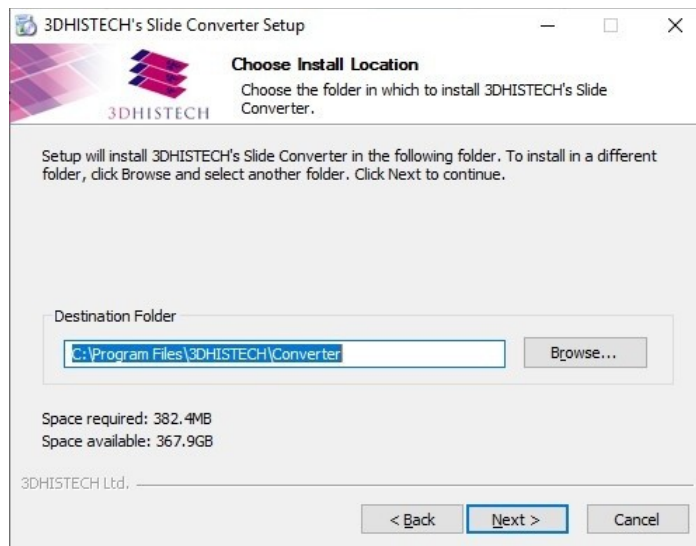
- Register Dicom writer by filling the form presented in the next window.



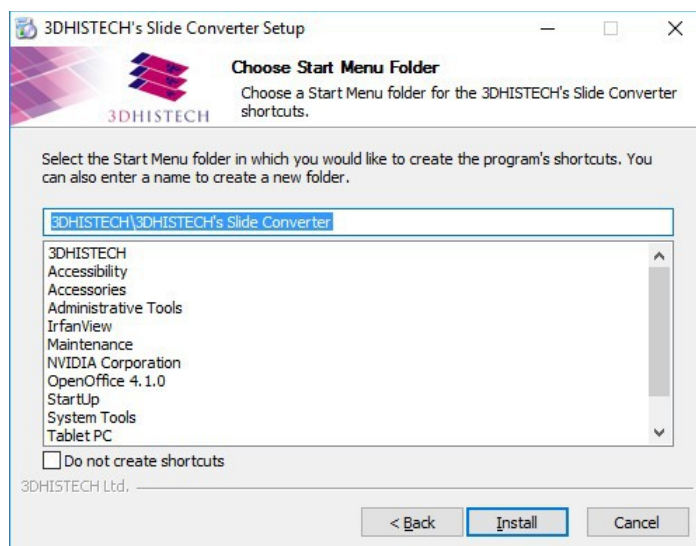
- 10. Should the Dicom license be invalid, or the above window is closed by clicking **Cancel**, the installer notifies you that MRXS to DICOM conversion will not work. In spite of this the installation of Slide Converter can be continued, but bear in mind that in this case components required for Dicom conversion will not be installed.



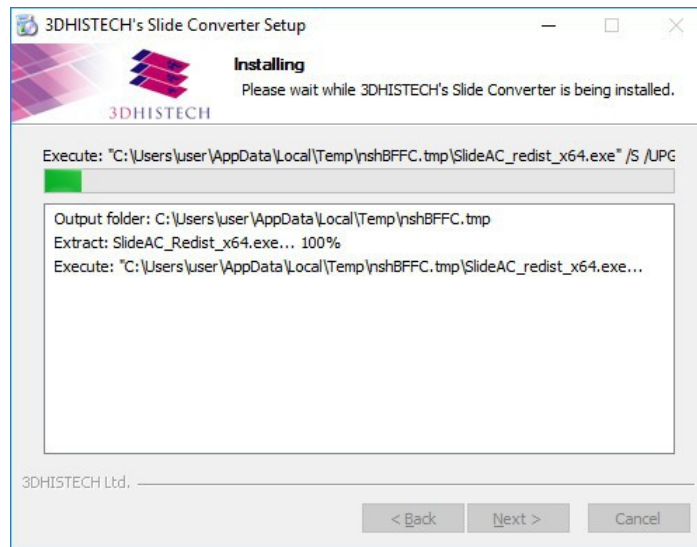
- 11. Choose program folder, then click **Next**.



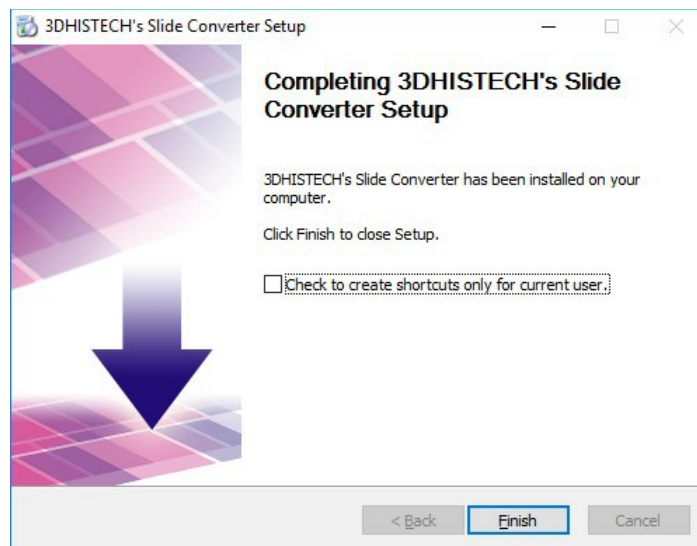
- 12. Select Start menu folder, then click **Install**.



13. Installation process is displayed with a progress bar.



14. In the final window you can activate the option to create shortcuts only for the current user. Click **Finish** to close installation wizard.

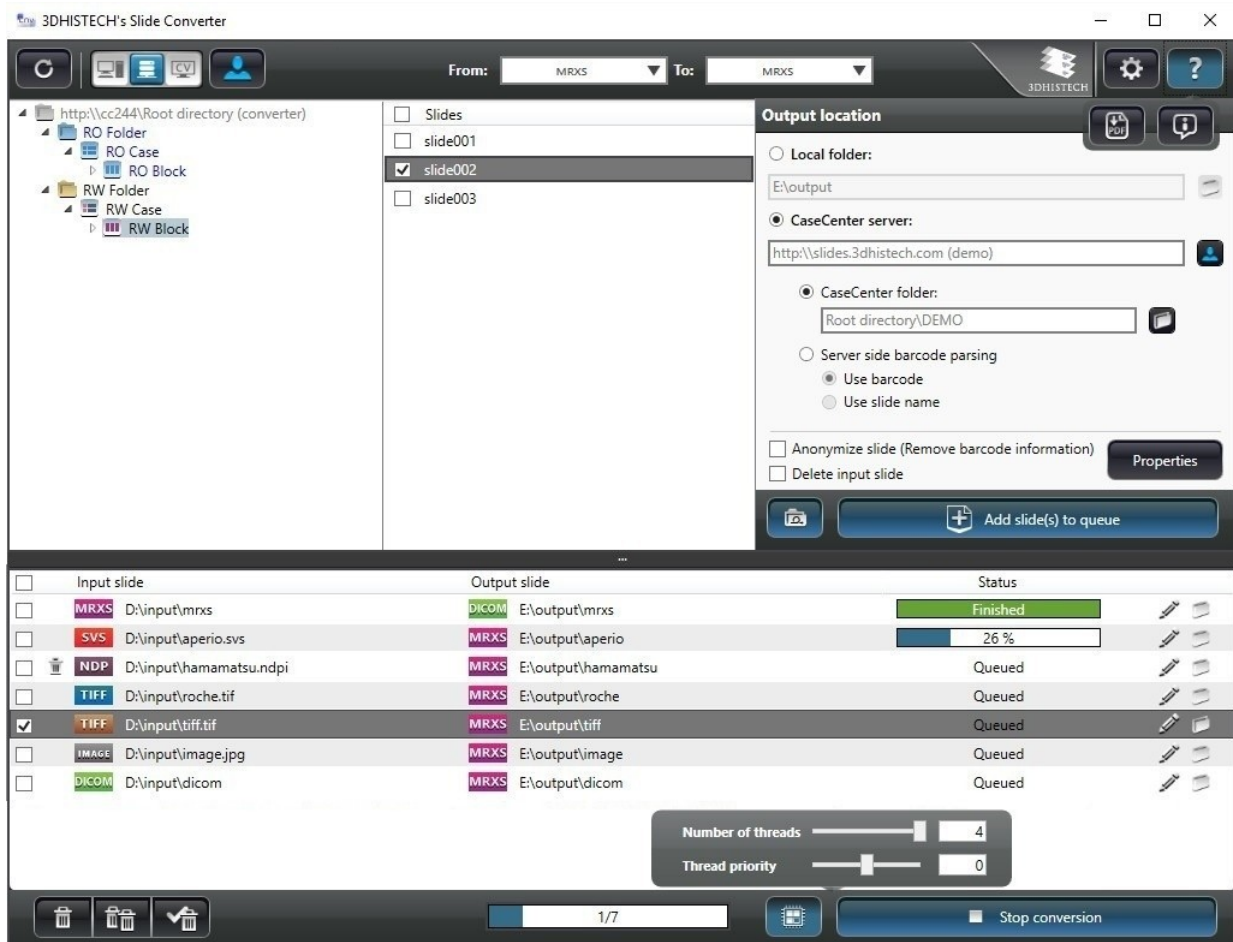


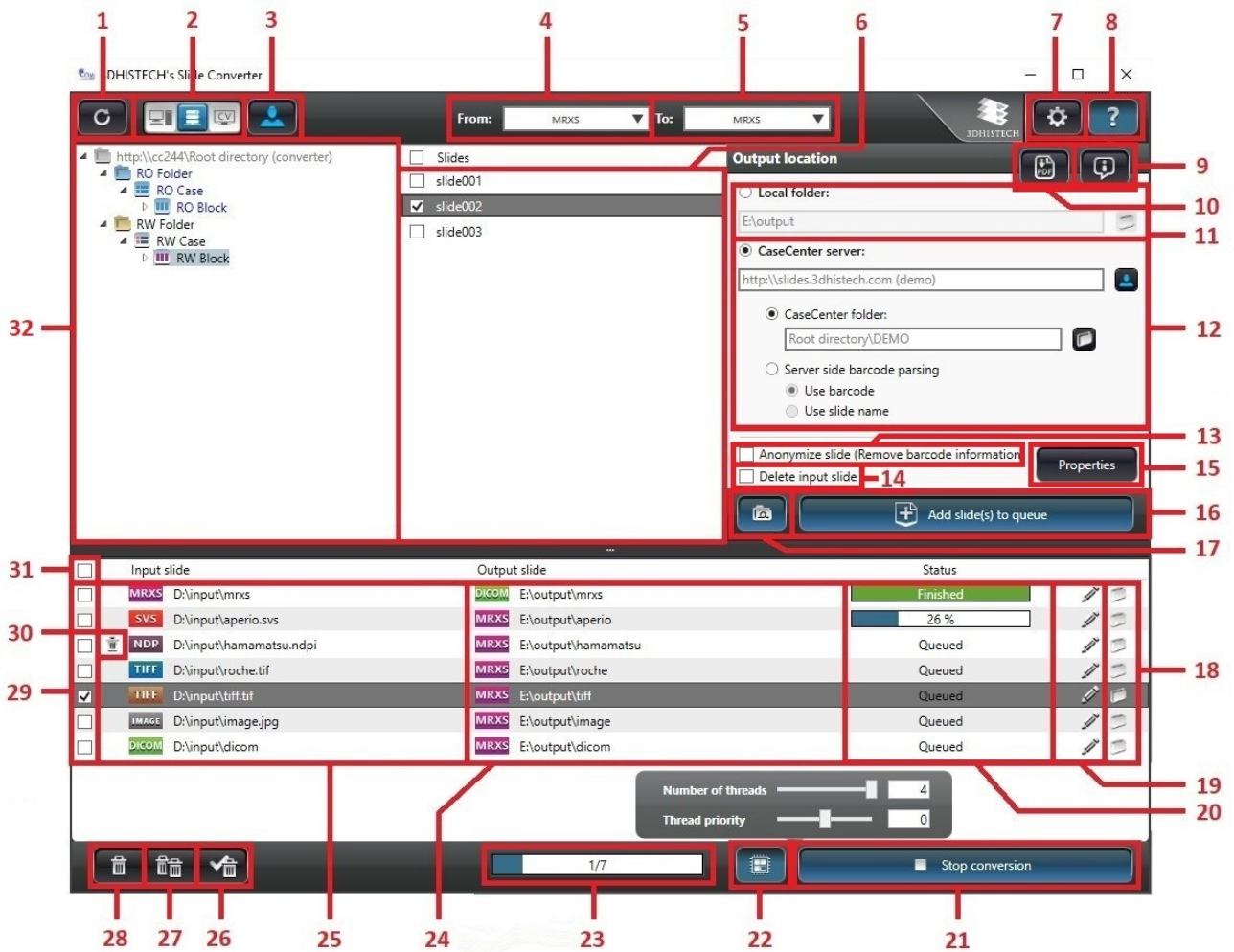
### 3 User Interface

Launch Slide Converter tool by double-clicking the desktop shortcut.



The main window of Slide Converter is opened.




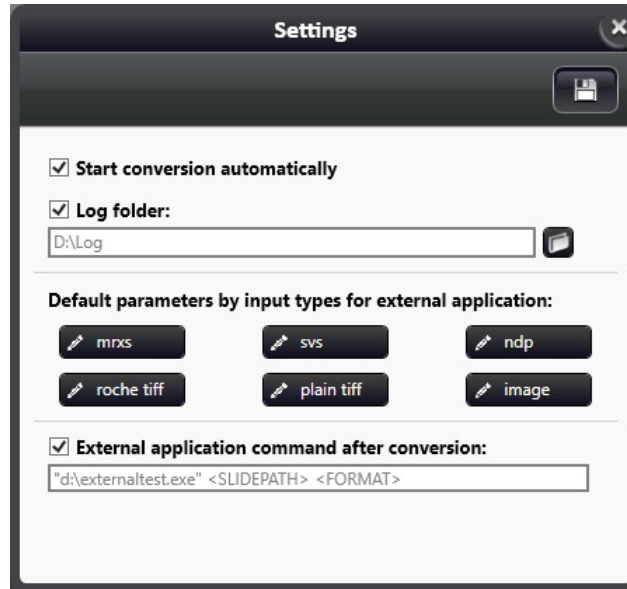


1. Update folder tree
2. Select input source (local, CaseCenter, or CaseViewer). CaseViewer cannot be selected manually, and active only if slides are received from CaseViewer.
3. Switch CaseCenter server (works only if CaseCenter has been selected as source)
4. Format of Input slide
5. Format of output slide (the list of selectable values varies according to the input format)
6. Slides included in the folder selected in the tree (slides of the selected format are displayed only).  
 If Recursive slide display is ON, then the program searches for slides of the selected format within sub-folders of the folder as well (slides are displayed with their paths), otherwise slides in the selected folder will be displayed only.
7. Settings menu
8. Help drop-down menu
9. Open Info window

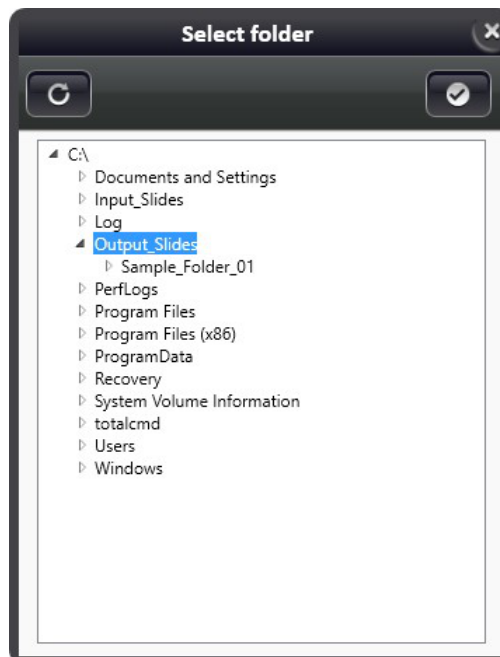
10. Open User's Guide in PDF
11. Select output destination (local folder)
12. Select output destination (CaseCenter server and folder, or automatic slide upload through barcode parsing)
13. Anonymize slide (Removes barcode information): if checked, the image recorded of the label area and the barcode string will be removed from the slide
14. Delete input slide
15. Define conversion parameters
16. Add selected slides to queue
17. Add complete folder (with all slides and subfolders) to queue
18. Open converted slide (MRXS file opens with CaseViewer, other formats are opened with the assigned external program, folder is opened when slide is folder type)
19. Modify parameters of slides in the queue
20. Progress bar (for actual slide)
21. Start/Stop conversion
22. Multi-threading support (set the number of threads used during conversion process)
23. Progress bar (for total queue)
24. List of slides in the queue, displayed with their destination path and output formats.
25. List of slides in the queue, displayed with their source path and input formats.
26. Remove converted slides from the queue
27. Remove all slides from the queue
28. Remove selected slides from the queue
29. Select slide
30. Trash bin for input slides being deleted after conversion
31. Select all slides
32. Folder tree for the selection of the source slide

## 3.1 Settings

Click  to open Settings window.



- **Start conversion automatically** – Conversion is started upon adding the slide to the queue if this option is checked.
- **Log folder** – Turn on logging activity by checking and selecting the location of log files.






Log files are created on a daily basis, and the name of a log file consists of the following components: „converter\_log\_yyyymmdd (for example, converter\_log\_20190317.xml)


A log file includes the data of every slide converted that specific day:

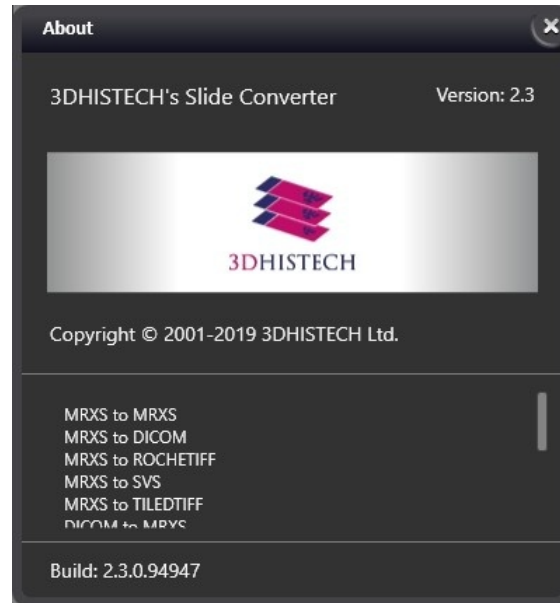
- conversion status
- input slide
- input format
- output slide
- output format
- conversion parameters (including switches used for the specific conversion)
- start of conversion
- end of conversion
- duration
- error message(s)
- conversion steps and their time

**NOTE:** Log files older than 30 days will be automatically deleted. Conversion logging enabled by default; log files are stored in the Documents folder of the user, but the destination folder can be modified if necessary.

- **Default parameters for external application call** – If an external program calls the converter (converter.exe with the path of the convertible slide in the parameter, for example: "c:\Program Files\3DHISTECH\Converter\Converter.exe" "d:\slide"), then the input slide is transferred to the converter queue. The parameters used can be defined here, in separate input formats (see **Section 4** for more details).
- **External application command after conversion** – It is available for you to set an application that the software calls with which slides can be opened after conversion. The following parameters can be forwarded to the external application:
  - <SLIDEPATH> : path of the newly converted slide
  - <FORMAT> : format of the slide, can have the following values:
    - mrxs : 3DHISTECH MRXS slide
    - dicom : DICOM slide
    - rochetiff : Roche TIFF slide
    - svx : Aperio SVS slide
    - tiledtiff : Tiled TIFF
- Click  to save settings.

## 3.2 Information window



This window can be displayed by clicking the  button from the help menu.





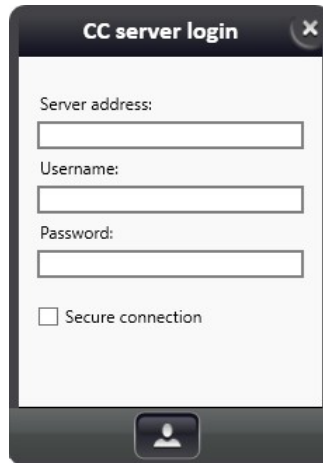
Version information and licensed conversion features are listed on this panel based on the license file or dongle and the registered DICOM.


## 3.3 Workflow


1. Select the source of input slides

- **Local source:** 
  - Select folder containing source slides at the top left corner.
  - Refresh tree by clicking .

- **CaseCenter source:** 
  - Click  to connect to the CaseCenter server.
  - Fill in the fields displayed in the **CC server login** window. Activate **Secure connection** to connect to the server through HTTPS.



- If connection is active the  button turns blue. Click this button if you want to connect to another server.

- **CaseViewer source:** 
  - Cannot be activated manually, the program switches to this mode automatically when transferring slide from CaseViewer. The tree view disappears at the left, and the slide list will include slides or annotations received from CaseViewer.

## 2. Select slides you want to convert according their types

- You can filter for the format of the source slide from the drop-down list at the top right corner of the panel.
- Selectable formats on the list depend on the license (non-licensed slide formats are grayed out)
- Format types:
  - mrxs (3DHISTECH slide)
  - dicom (DICOM slide)
  - svx (Aperio slide)
  - ndp (Hamamatsu slide)
  - roche tiff (Roche slide)

- plain tiff (TIFF image)
- image (JPG, PNG, BMP, or TIFF image smaller than 4096x4096 pixel size)


### 3. Select type of output slide

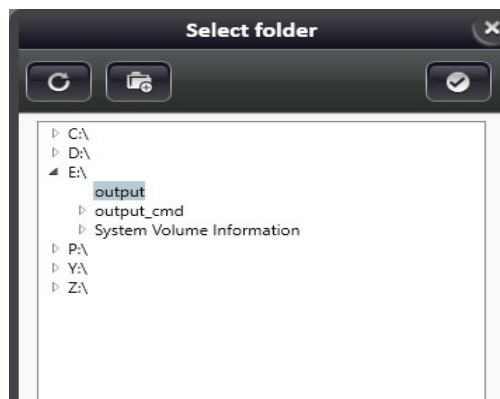
- The output formats listed depend on the type of the input slide and the license (non-licensed formats are inactive on the list)
- Slides of the same format type only can be selected for conversion at a time


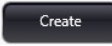
### 4. Select output destination path

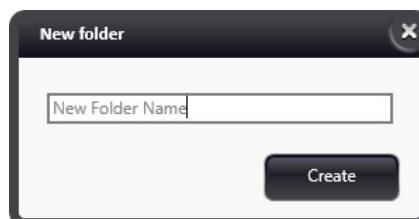
In the event of non-recursive slide selection, the converted slide is created in the set output folder. Otherwise, if recursive slide selection is active, the input folder structure is created under the selected output folder automatically, and the final converted slide is generated within the identical location within the structure.

- Output slide inherits the name of the input slide, and if a slide with the same name already exists in the output directory, a date code is appended at the end of the slide name.

- Click  to define a **Local** destination folder.

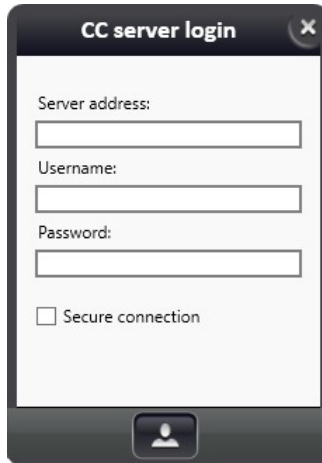


- Create new folder by clicking , then type the folder name into the field. Click  to create folder.



If CaseCenter destination has been selected, the following login data must be entered to establish connection: server address, user name, password, and protocol type (http/https).

- Click  to connect.



- Server side barcode parsing

When uploading a slide to CaseCenter with the Slide Converter, it is possible to place slides based on barcode parsing. Select which of the following data is sent to CaseCenter by the Converter as barcode when uploading:

- Use barcode: the barcode information written into the slide by the scanner software (onward from version 2.0) during barcode reading. This option is available for MRXS input slides only.
- Use slidename: slide name is sent as barcode. Only this option is available for other input formats than MRXS.

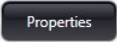
If the source slide is taken from CaseCenter, or if an XML file containing metadata is available for the local slide, then barcode information originated from CaseCenter will be sent to the destination server.

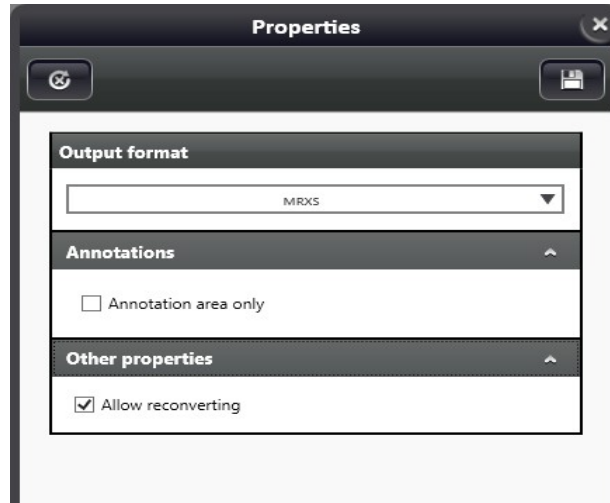
- CaseCenter metadata transfer



If you download a slide or a complete folder from CaseCenter, the metadata of slides and folders (excluding permission information) will be saved into an XML file. When uploading to CaseCenter, if a previously created XML is available, then all the data are taken by the destination server.

When converting to CaseCenter directly from CaseCenter, Organ and Staining information will be uploaded only if the designated switch is activated (see MRXS->MRXS conversion parameters), and with Administrator permission on the destination server.

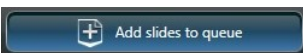
5. Set conversion parameters

- Click  to define conversion parameters that will be applicable for the actual conversion.





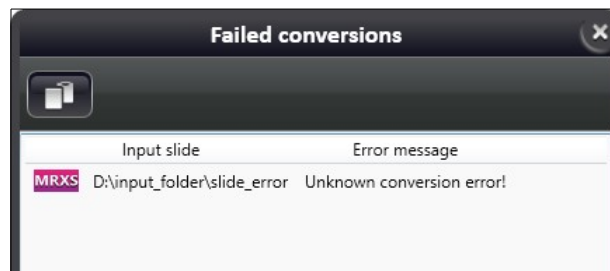
- Click  to restore default settings of the specific conversion direction.
- Click  apply parametrization settings.


6. Add slides to list

Click  to select slides to be added to conversion queue. Multiple slides of the same type with identical parameters can be added at a time. After conversion, input slides can be deleted without confirmation (works also for slides received from CaseCenter)

7. Add the complete folder (with all slides and subfolders) to queue

Click  to add the folder and its subfolders and all the included slides (that match the input format criteria) to the queue. The added folder is listed as one item in the queue, and if any of the contained slides in the folder cannot be converted, a  icon is displayed next to it. Click this icon to view a list of the erroneous slides in the particular folder.



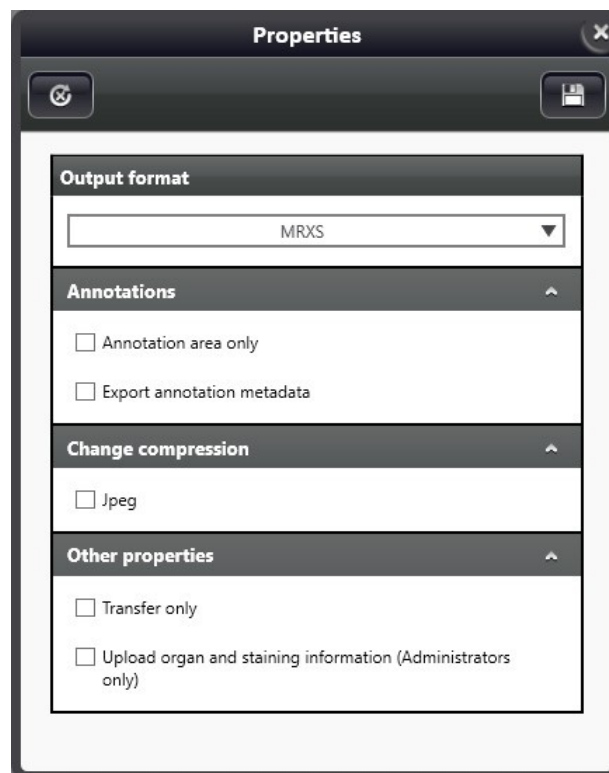
Click  to copy the list to clipboard.

## 4 Conversion direction parameters

### 4.1 MRXS to MRXS

- De-overlapping of MRXS (3DHISTECH) slides
- The names of input and output slides are identical

Parameters:



- **Annotations**
  - **Annotation area only:** only annotated area is selected as the source of the converted slide
  - **Export annotation metadata:** name, type, pixel coordinate data of the annotations are written into an XML file to supplement the created slide
- **Change compression**
  - By selecting **Jpeg** option, the result of conversion is a JPEG-coded MRXS file if this option is selected (compression factor value can be defined between 1 and 100)

- **Other properties**
  - **Transfer only** (enabled for both CC and local destinations by default): Slide moving is performed without conversion and de-overlapping.
  - **Upload organ and staining information** (available only when uploading to CaseCenter): This option can be selected by a user with Administrator permission only. If selected, the Organ/Staining information is uploaded to the slide, if an XML file of the local slide is existing, or conversion is performed directly from another CaseCenter server. If Organ/Staining enum does not exist on the destination server, it will be created.

## 4.2 SVS to MRXS

- Convert SVS (Aperio) slides into MRXS slides
- The name of output (MRXS) slide inherits the name of the SVS slide without the extension.

### Parameters:



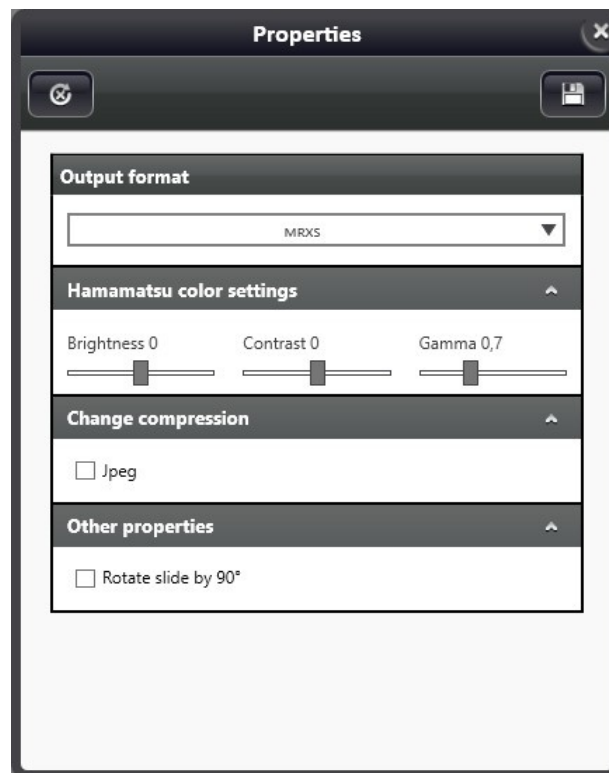
- **Change compression:** select **Jpeg** option to create a JPEG-coded MRXS file (compression factor value can be defined between 1 and 100)
- **Other properties:** select **Rotate slide with 90°** to rotate slide by 90° degrees during conversion (option is disabled by default)



## 4.3 NDPI to MRXS

- Conversion of NDPI (Hamamatsu) slides to MRXS slides
- The name of output (MRXS) slide inherits the name of the NDPI slide without the extension.

### Parameters:

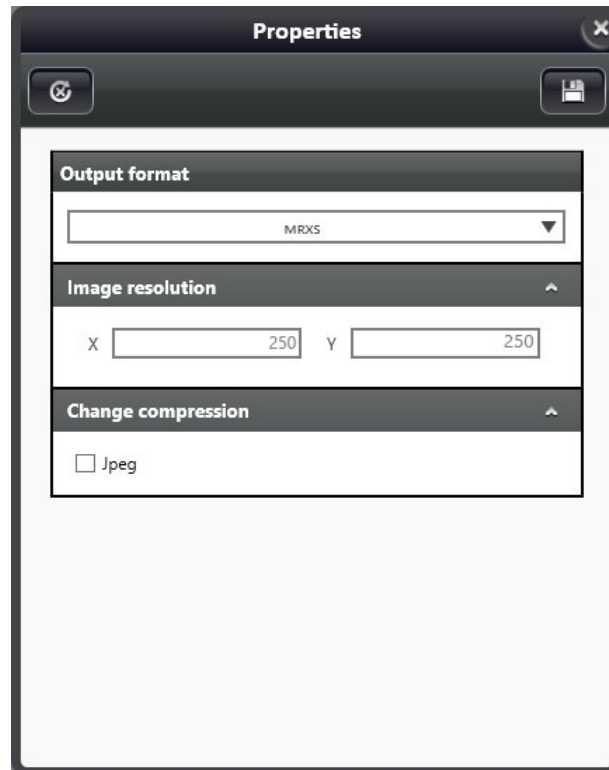


- **Hamamatsu color settings**
  - **Brightness** (default 0)
  - **Contrast** (default 0)
  - **Gamma** (default 0.7)
- **Change compression**
  - By selecting **Jpeg** option, the result of conversion is a JPEG-coded MRXS file if this option is selected (compression factor value can be defined between 1 and 100)
- **Other properties**
  - **Rotate slide with 90°** (disabled by default): slide will be rotated by 90° degrees during conversion

## 4.4 Plain TIFF to MRXS

- Plain TIFF files will be converted to MRXS slides
- The name of output (MRXS) slide inherits the name of the TIFF file without the extension.

### Parameters:

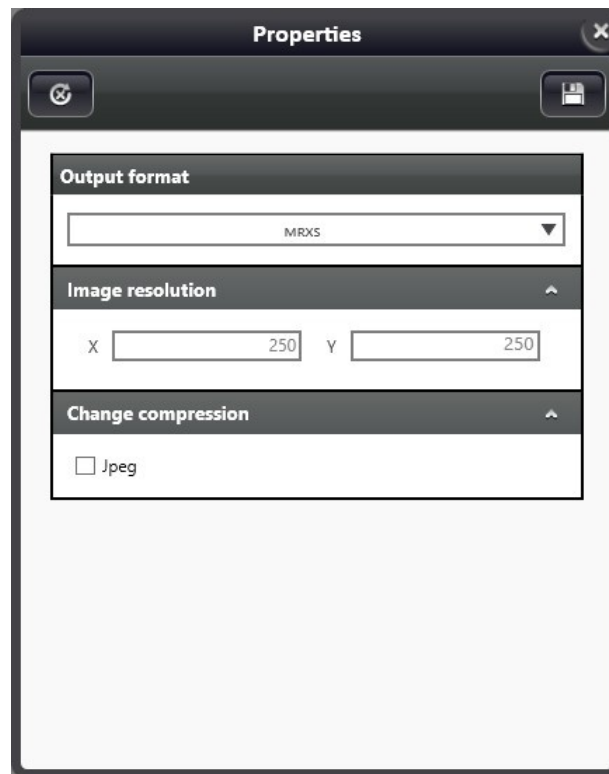


- **Image resolution**
  - Set horizontal and vertical image resolution values (x and y values – DPI)
- **Change compression**
  - By selecting **Jpeg** option, the result of conversion is a JPEG-coded MRXS file if this option is selected (compression factor value can be defined between 1 and 100)

## 4.5 IMAGE to MRXS

- Converts image files (BMP, JPG, PNG, JPEG2000, JPEGXR, and TIFF smaller than 4096x4096) to MRXS slides
- The name of output (MRXS) slide inherits the name of the image file without the extension.

### Parameters:

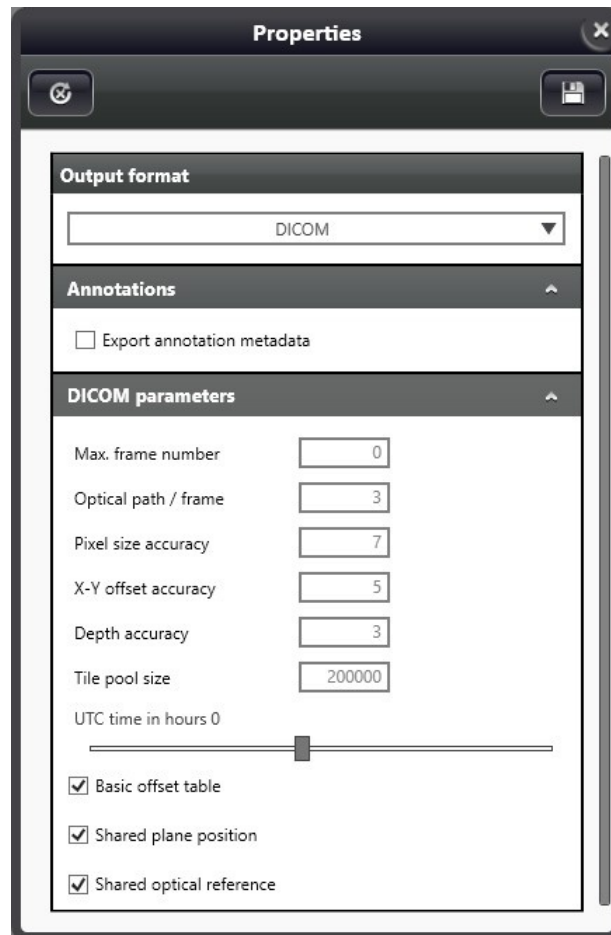


- **Image resolution**
  - Set horizontal and vertical image resolution values (x and y values – DPI)
- **Change compression**
  - By selecting **Jpeg** option, the result of conversion is a JPEG-coded MRXS file if this option is selected (compression factor value can be defined between 1 and 100)

## 4.6 MRXS to DICOM

- Conversion of MRXS slides to DICOM slides
- The folder containing DICOM files will be named after the MRXS slide name

### Parameters:



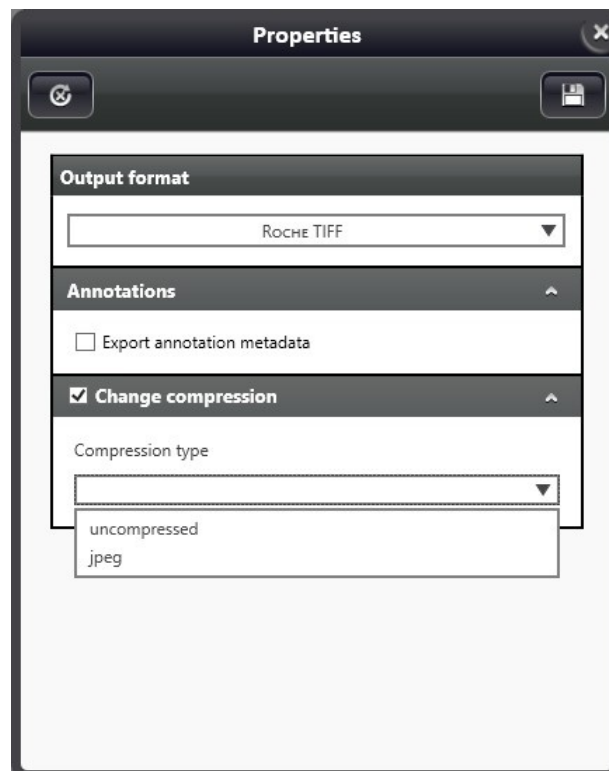
- **Annotations**
  - **Export annotation metadata:** name, type, pixel coordinate data of the annotations are written into an XML file to supplement the created slide
- **DICOM parameters**
  - **Frame number maximum** (default: 0)
  - **Optical path / frame** (default: 3)
  - **Pixel size accuracy** (default: 7)
  - **X-Y offset accuracy** (default: 5)
  - **Depth accuracy** (default: 3)
  - **Tile pool size** (default: 1000)

- **UTC time in minutes** (default: 0)
- **Basic offset table** (active by default)
- **Shared plane position** (active by default)
- **Shared optical reference** (active by default)

## 4.7 MRXS to ROCHE TIFF

- Converts MRXS slides to Roche TIFF file
- The name of output slide inherits the name of the MRXS slide with TIFF extension.

### Parameters:



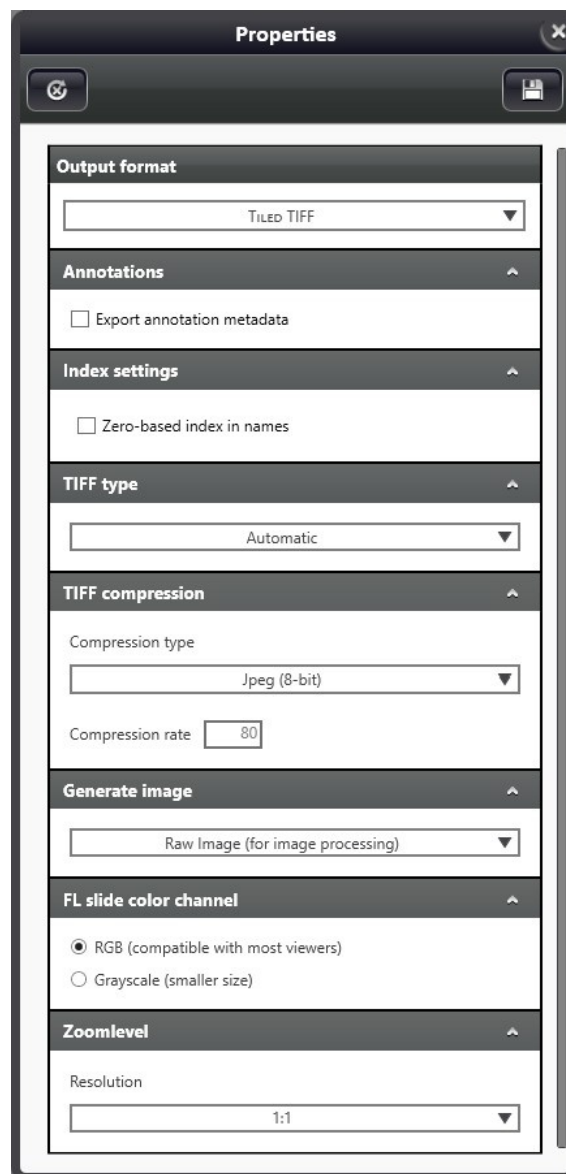
- **Annotations**
  - **Export annotation metadata:** name, type, pixel coordinate data of the annotations are written into an XML file to supplement the created slide
- **Change compression** (disabled by default)

If output compression is not defined and the source slide consists of JPEG or BMP tiles, then the output tile format will be JPEG or BMP as well (inheriting compression factor of the source slide).

**NOTE:** If the format of the source slide is not JPEG or BMP, the output slide compression type will be JPEG with a compression rate of 80 percent by default.

- Select a compression method from the **Compression type** drop-down list:
  - **uncompressed (BMP)**
  - **jpeg** – Compression rate can be set (1-100, default: 80)

## 4.8 MRXS to TILED TIFF



Convert MRXS slides to TIFF files, separate files will be created for each FL channels and Z-stack layers. Folders of the output TIFF files will be named after the MRXS slide name, the created TIFF file names consist of the following components: *slidename\_fchannelname\_zstack*

**Parameters:**

- **Annotations**
  - **Export annotation metadata:** name, type, pixel coordinate data of the annotations are written into an XML file to supplement the created slide
- **Index settings**
  - **Zero based index in names:** z-stack layers of the generated TIFF files will be indexed starting with 0, and not the focus distance of the actual layer will be included (inactive by default)
- **Tiff type**
  - **Automatic:** the converter automatically selects the most appropriate method based on the size of the source slide
  - **Force simple tiff:** TIFF files use 32-bit offset addressing, therefore file size is limited to a maximum of 4Gb.
  - **Force big tiff:** Big TIFF files use 64-bit offset addressing allowing the creation of bigger TIFF files.
- **TIFF compression**

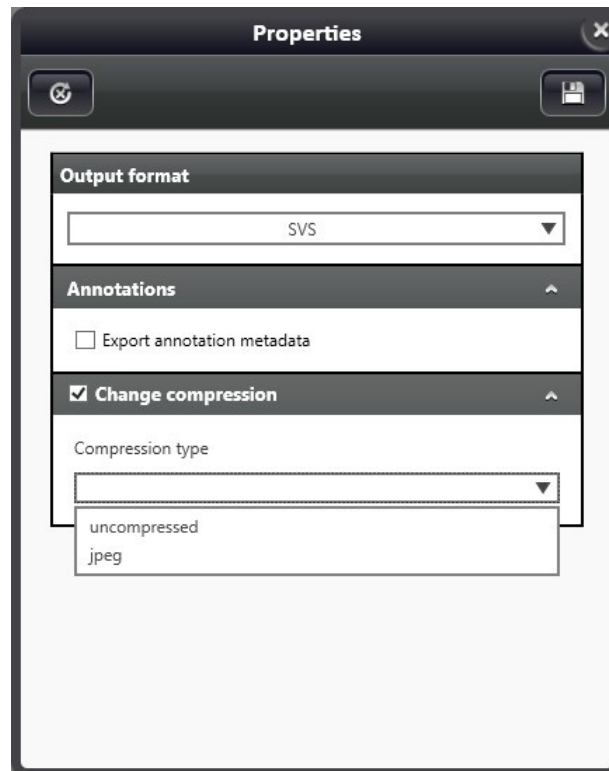
Select a compression method from the **Compression type** drop-down list:

  - **Jpeg (8-bit):** compression rate can be set (1-100, default: 80)
  - **Lossless compression 8-bit**
  - **Lossless compression native:** color depth of the source slide is inherited (16-bit is supported)
  - **Uncompressed 8-bit**
  - **Uncompressed native:** color depth of the source slide is inherited (16-bit is supported)
- **Generate image**
  - **Raw Image (for image processing):** effective only if an FL slide is converted – separate TIFF gray-scale images are created for each FL channel
  - **Enhanced Color Image (for viewing):** effective only if an FL slide is converted – Pseudocolored TIFF image is created based on the original FL slide. If selected, the **FL slide color channel** option is inactive.
- **FL slide color channel**
  - **RGB** – a 24-/48-bit color TIFF image is created. File size is bigger, but most of the image viewers are capable to open it.
  - **Grayscale** – an 8-/16-bit grayscale TIFF image is created. File size is smaller, but some of the viewers cannot handle it.
- **Zoomlevel**
  - Set the level of zoom at which the TIFF image is created in order to get the smallest file size possible.

## 4.9 MRXS to SVS

- Convert MRXS slides to Aperio (SVS) slides
- Output slide name will be identical with the MRXS slide name, with an SVS extension

### Parameters:



- **Annotations**
  - **Export annotation metadata:** name, type, pixel coordinate data of the annotations are written into an XML file to supplement the created slide
- **Change compression** (disabled by default)
  - If output compression is not defined and the source slide consists of JPEG or BMP tiles, then the output tile format will be JPEG or BMP as well (inheriting compression factor of the source slide).

**NOTE:** If the format of the source slide is not JPEG or BMP, the output slide compression type will be JPEG with a compression rate of 80 percent by default.




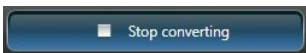
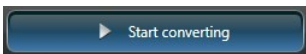
  - Select a compression method from the **Compression type** drop-down list:
    - **uncompressed** – in BMP format
    - **jpeg** – compression rate can be set (1-100, default: 80)




## 5 Conversion queue

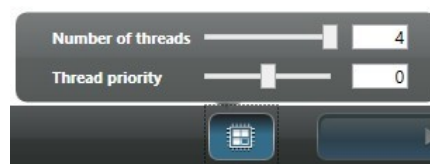
- The number of queued conversion processes is not limited
- Queued processes can be removed by the following:

**NOTE:** Not running processes can be removed only, those with the status of “In progress” cannot.

-  – Remove selected items
-  – Remove all
-  – Remove converted items
- Finished / Total conversion progress bar
-  – Stop converting
-  – Start converting

If you move the cursor over the input/output format of a queued slide conversion process, the path of the source file is displayed in tooltips. Other slide- and conversion-related data are displayed on the queue panel:

- input format (slide path in tooltip)
- output format (slide path in tooltip)
- slide name
- trash bin icon, if the source file is being deleted
- conversion status / progress
- editing of parameters:
  - Parameters of conversions that are not already finished, stopped or erroneous can be edited only (output format, folder and every other parameters), otherwise the defined parameters can be viewed only.
  - Open output slide or folder
-  – Multi-threading support
  - The number of threads used by converter processes can be set real-time during conversion.
  - Set thread priority – thread scheduler assigns processor to a thread based on priority of thread



**Conversion statuses:**

- Queued: Conversion process has been added to the list, but not yet processed
- In progress: Conversion in progress (percentage is shown in a progress bar)
- Error: Conversion failed due to an error (cause is displayed in a tooltip)
- Stopping: Conversion is being stopped
- Stopped: Conversion has been stopped
- Finished: Conversion has successfully been finished

**Start conversion:**

- Conversions are processed based on the list (from top to bottom)
- Only those listed processes will be run which statuses are not "Finished"
- Additional conversion process can be added to the end of the list during running conversion
- Processes that are not yet started can be removed from the list only.
- Editing of parameters is not possible during conversion
- After finishing a conversion process, the converter starts with the following item in the queue
- If logging is on, the log file is updated after each conversion

**Stop conversion:**

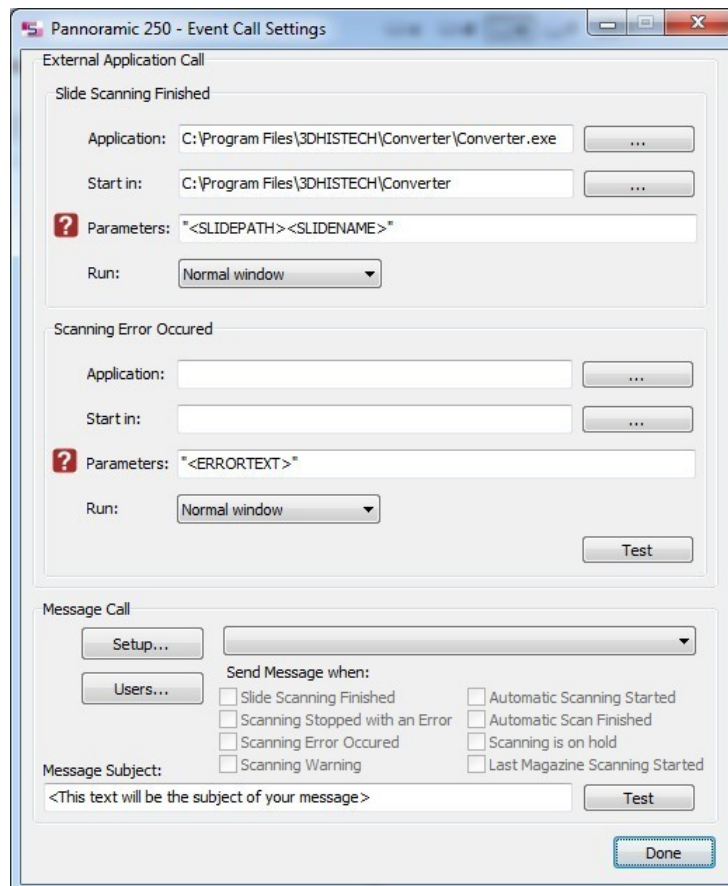
- The actual conversion process will be terminated
- The status of the terminated process will be „Stopping“ first, then „Stopped“ if termination was successful. The upcoming conversion will not be started.

**Erroneous of stopped conversion:**

- Faulty or incomplete files created during erroneous of stopped conversion will be deleted after the actual conversion is stopped

## 6 Integration with Scanner control software

The Panoramic Scanner control software can be linked with the Slide Converter, therefore, it is available for you to scan directly to different slide formats. Set a local folder as the destination of the created digital slide, and set Slide Converter as an external application that the scanner software calls once slide scanning has finished.



Set conversion parameters under the Settings menu in Slide Converter (see **Section 3.1**). It is advised to activate the **Delete input slide** option to save disk space by deleting input slides and store converted slides only. After conversion, another application can be called with which the converted slide can be opened, if required.