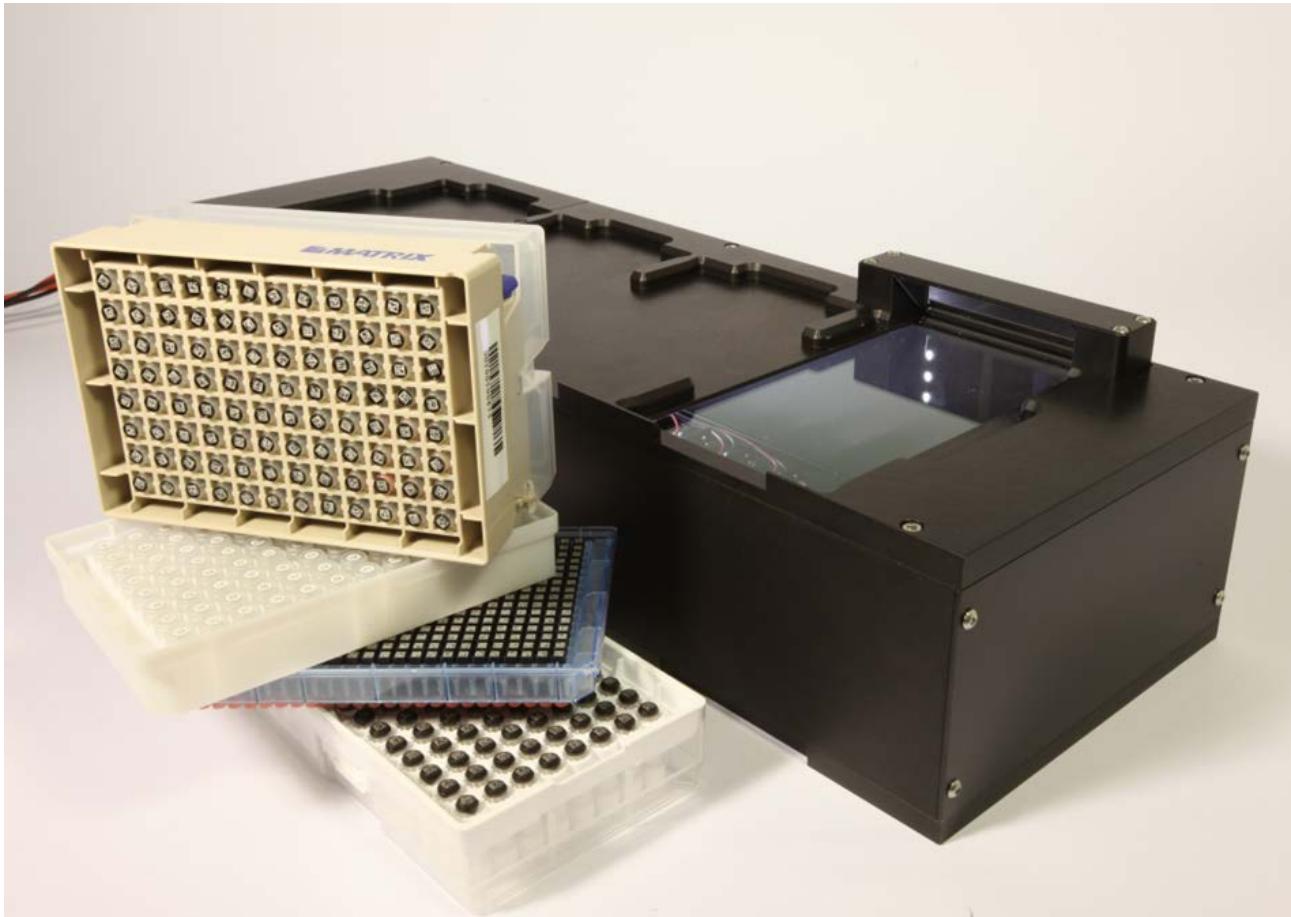


easyCodeII Software and Carrier

Operator's Manual for Microlab® STAR



HAMILTON



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1 General Information

easyCodeII is a Sofware add-on to the HAMILTON Microlab® STAR VENUS Software and is designed to read Bar Codes with a Camera. In conjunction with the easyCode Carrier, it is used to read Bar Codes from Racks and Tubes.

The easyCode is equipped with a built-in Camera which is capable of reading Data Codes on Labware. It has to be installed on the Deck of a HAMILTON Microlab® STAR Line Instrument.

This Operator's Manual is designed to help you to get the most out of these products.

1.1 About This Manual

The purpose of this manual is to help the operator to get familiar with the easyCodeII Software and to get the best performance out of this product.

The manual describes the installation, the functionality and how to find the best settings. It refers to the easyCodeII release V3.x for the Microlab® STAR.

ATTENTION or **NOTE** emphasizes important and critical instructions. They are printed in italics and appear as follows:



ATTENTION: *Any special issues, warning or important information will be accompanied by this symbol. Read these items carefully.*



NOTE: *Information is given to the operator that is useful but not essential to the task at hand.*

— References to Manuals, Figures, Sections, etc. are **Underlined**.

1.2 Additional Manuals

Additional information can be found in the manuals for the Microlab® STAR; the ML STAR Operator's Manual and also in the ML STAR Programmer's Manual. A detailed software reference for the Microlab® STAR can also be found in the On-Line Help of the Microlab® STAR VENUS Software.

1.3 Intended Use

The easyCodeII Software and the easyCode Carrier are components for the Microlab® STAR Line Instruments.

1.4 Operation

Operators of the Microlab® STAR must have attended an appropriate training course. The procedures described in this manual are tested by the manufacturer and are deemed to be fully functional. Any deviation from the procedures given here could lead to erroneous results or malfunction.

Training courses will be held by your HAMILTON Representative. Please feel free to contact your local dealer to arrange Operator Training.

1.5 Safety Precautions and Hazards



ATTENTION: *All items in this section are of importance for a safe and reliable operation of your equipment.*

The following section describes the main safety considerations to follow and the hazards involved when operating this product.

When using the Microlab® STAR, Good Laboratory Practices (GLP) should be observed. Suitable protective clothing, safety glasses and protective gloves should be worn.

1.5.1 General Precautions

Refer to the [Microlab® STAR Operator's Manual](#).

1.5.2 Computer Precautions

Refer to the [Microlab® STAR Operator's](#).

1.5.3 easyCode Specific Precautions



ATTENTION: *Direct exposure of the Instrument's front towards light sources (artificial or natural) must be avoided.*

The optical path must not be obstructed by the operator, specifically the Glass Plate and Mirror of the easyCode Carrier must be free of dust and dirt.

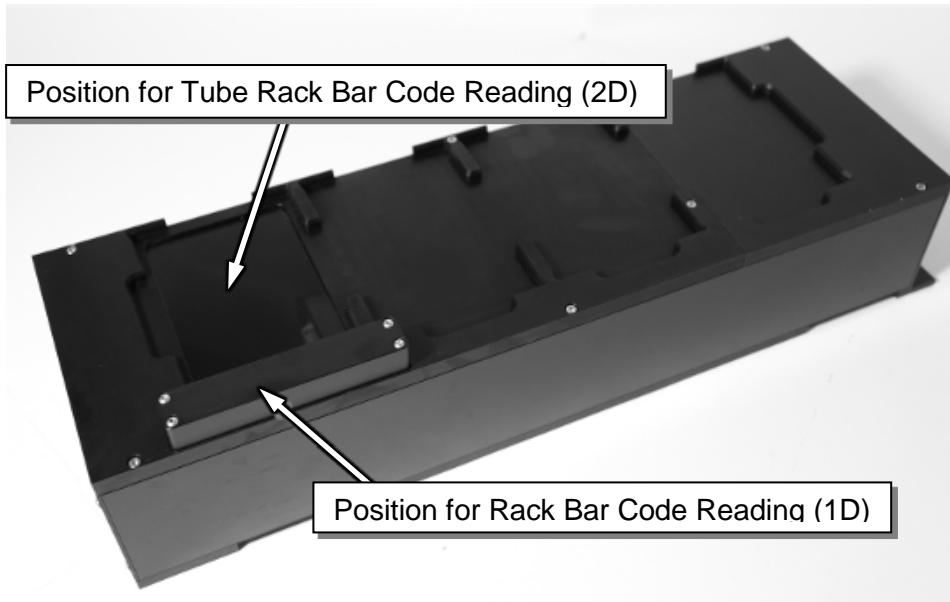


Figure 1: Optical Paths of the easyCode Carrier^{PLUS} Glass Plate for the Tube Rack 2D Bar Code and Mirror for the Rack 1D Bar Code



To prevent loss of data, do not open an easyCode Specific Output File during a run.

1.5.4 Hazards



ATTENTION: *easyCode Carrier is breakable!*
Handle with care!



Figure 2: easyCode Carrier is Breakable



ATTENTION: Do not open the easyCode Carrier; LEDs inside of the easyCode Carrier might be hot and the Camera could become mis-adjusted.

2 easyCode Carrier

2.1 Overview

This section describes the hardware part which consists of the Reader Carrier, a USB Cable and Power Cable. The easyCodeII Carrier is designated to mount on the Microlab® STAR Deck and contains a Camera and LED's for illumination. The standard easyCode Carrier will take up 6 tracks on the Deck of the Microlab® STAR Line Instrument. The easyCode Carrier^{PLUS} with Rack Bar Code Reading will take up 7 tracks on the Deck of the Microlab® STAR Line Instrument. The easyCode Carrier can hold up to 4 Tube Racks, Microtiter Plates or Deep Well Plates.

The installation must be executed by a HAMILTON Trained Field Service Engineer. Operation and Maintenance are intended to be performed by the Operator.

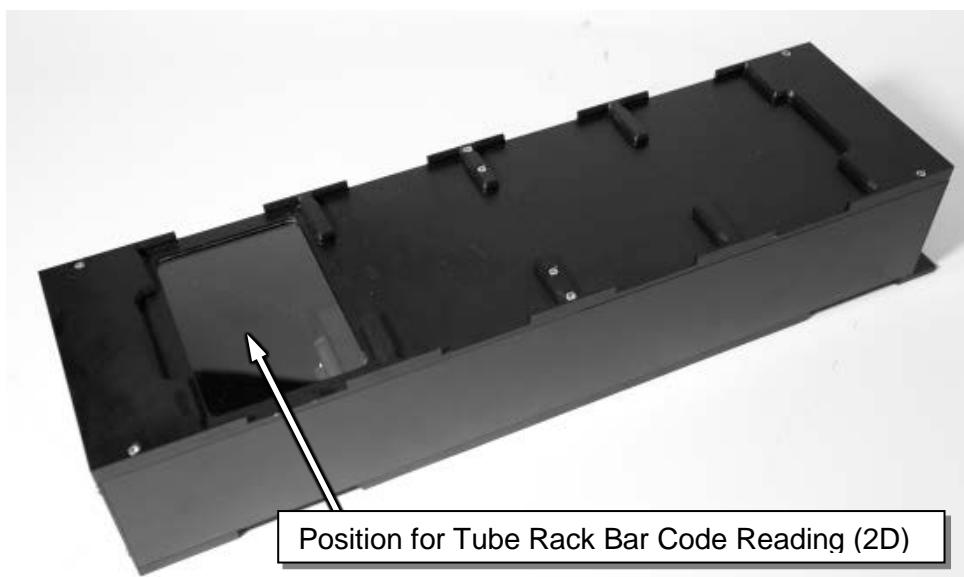


Figure 3: easyCode Carrier

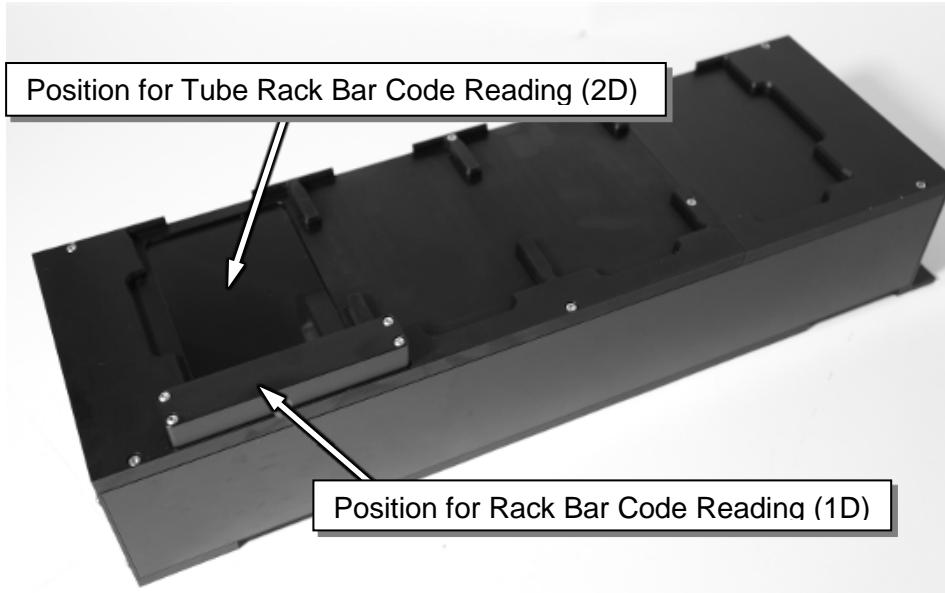


Figure 4: easyCode Carrier^{PLUS}

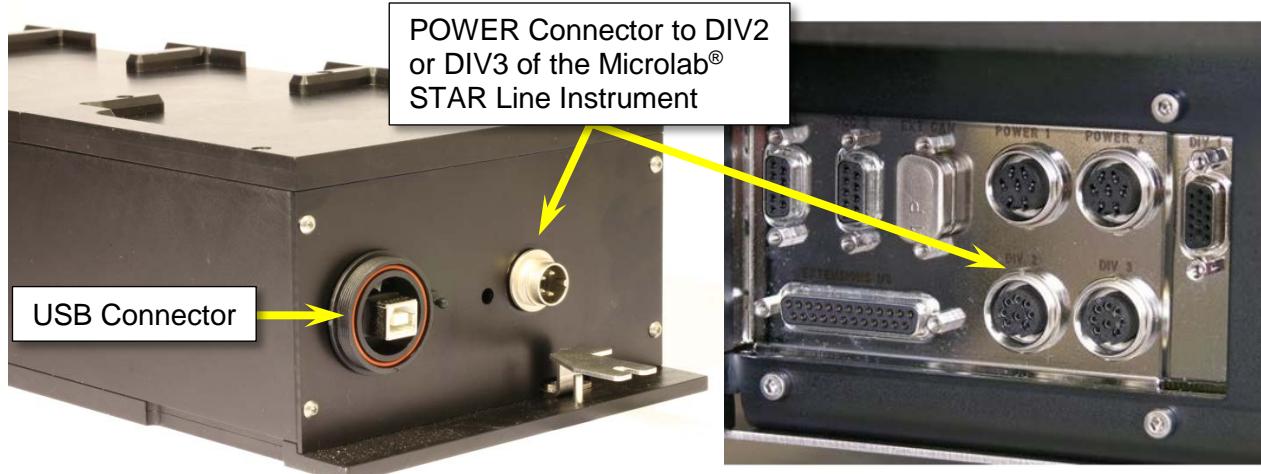


Figure 5: Backside of the easyCode Carrier / easyCode Carrier^{PLUS} with USB and Power Cable Connectors

Figure 6: Periphery Connector of the Microlab® STAR Line Instrument with DIV2 and DIV3 Connectors

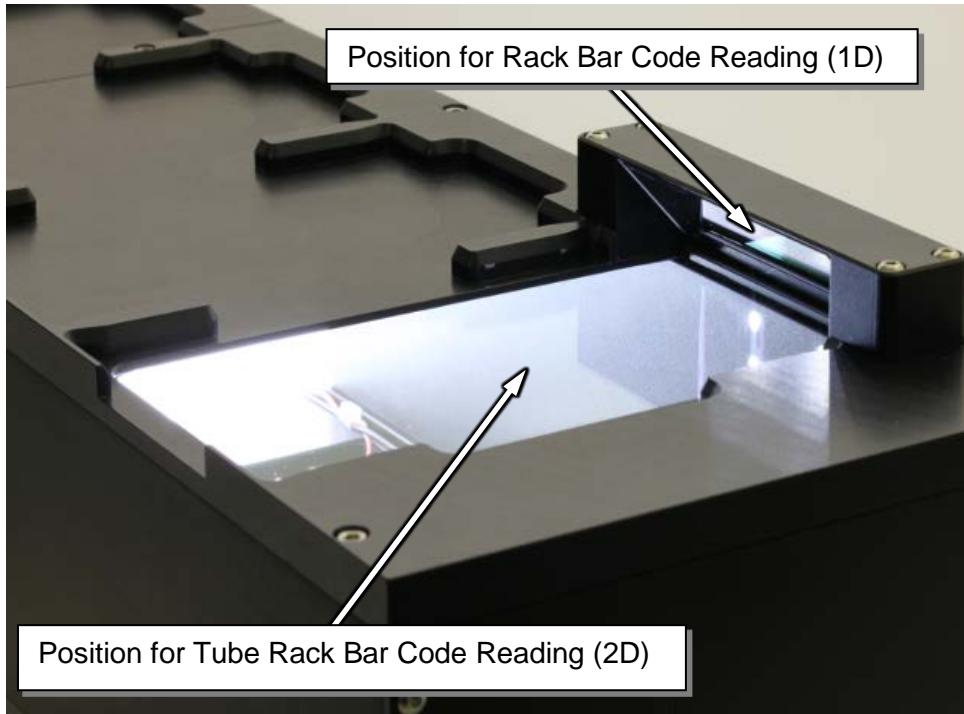


Figure 7: Detail of easyCode Carrier^{PLUS} Reading Window for the Tube Rack 2D Bar Code and the Rack 1D Bar Code Reader

2.2 Installation of the easyCode Carrier

The easy Code Carrier has to be installed or relocated by a HAMILTON Trained Field Service Engineer. Installations of instrument options and accessories are also done by a HAMILTON Trained Field Service Engineer.

Connect the Power Cable to the connector of the easyCode Carrier (see [Figure 5 Backside of the easyCode Carrier / easyCode CarrierPlus with USB and Power Cable Connections](#)) and to the DIV2 or DIV3 Connector of the STAR Periphery Connector (see [Figure 6 Periphery Connector of the Microlab® STAR Line Instrument with DIV2 and DIV3 Connectors](#)). The connector can be set in the method (see Light Command in the easyCodeII Library). In the Demo Method, connector DIV2 is preset.

Connect the USB Cable to the connector of the easyCode Carrier.



ATTENTION: To assign the USB Driver correctly, connect the USB Cable after the successful installation of easyCodeII Software to the Computer.

2.3 Installation of the easyCodeII Software

For information regarding installation of the easyCodeII Software, please see [Section 3.3 Installation of easyCodeII Software](#).

2.4 Maintenance

Generally, refer to the [Microlab® STAR Operator's Manual](#) for the Microlab® STAR Line Maintenance Concept and Procedures and also for Ordering Information e.g. cleaning agent.

Carry out the following tasks for Daily Maintenance while the Instrument is switched OFF:

- Check the easyCode Carrier for dust, dried liquids or pieces of Bar Code Labels. If necessary, remove dried liquids and labels from the carrier.
- Use the Special Cloth provided with the easyCode Carrier to clean any dust that may have accumulated on the glass and/or mirror of the easyCode Carrier.



ATTENTION: If the dust cannot be removed, use cleaning agent as described below.



ATTENTION: Make sure not to scratch the surface of the easyCode Carrier.

Mirror Cleaning:

Check the easyCode Carrier for dust, liquids, dried liquids and scratches. Dust may be removed with the cloth delivered with the easyCode Carrier. Liquids and dried liquids may be removed using Deconex Solarsept.

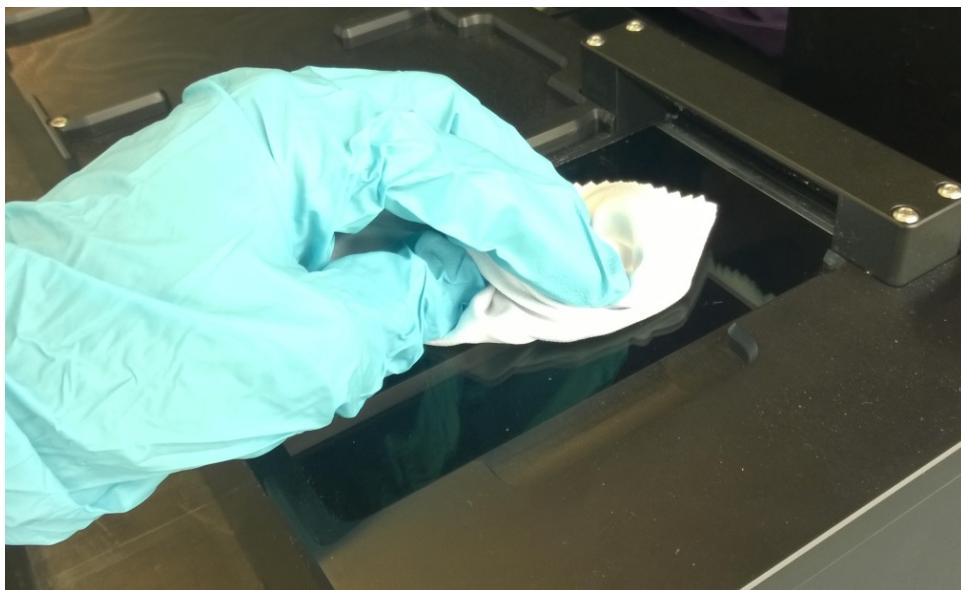


Figure 8: Cleaning the easyCode Carrier Surface



ATTENTION: Use Deconex Solarsept and a soft lint free cloth to clean the glass/ mirror. For further information on cleaning tools, consult the [Microlab® STAR Operator's Manual](#).



NOTE: If the glass and/or mirror is broken or damaged, the easyCode Carrier is considered damaged. Please contact your HAMILTON Representative to get a replacement.

2.5 Disposal

Please refer to the [Microlab® STAR Operator's Manual](#) for further information.

3 easyCodeII Software

3.1 Introduction

For Bar Code reading, an Image Processing Camera takes an image of an area of interest. The Image Processing Software then searches for Bar Codes within this area.

easyCodeII can be controlled from HAMILTON's Microlab® STAR VENUS Software by means of the easyCodeII Libraries (easyCodeII_Helper.smt, easyCodeII_Library.hsl, easyCodeII_SmartStep.smt).

However, the settings can only be changed in the easyCodeII Program. Hence, this is also true for the optimizing process of the Bar Code evaluation. It is possible to perform the optimizing offline (without any connection to the hardware).

During installation, a database file is installed on the Controlling PC Hard Disk. The results of the evaluation, the link to the image file and the settings are saved to this database.

3.2 Computer Specifications

Refer to the [ML STAR Operator's Manual](#).



ATTENTION: *It is necessary to use USB 2.0 or higher! Lower USB versions will not work! Using USB Hubs or USB cable lengths over 5 meters may cause loss of signal and this will limit functionality.*



NOTE: *The file path <>Program Files<> that are mentioned in this manual varies depending on the Windows™ Operating System and the local language of Windows™.*

3.3 Installation of easyCodeII Software

3.3.1 Components

The complete installation comprises the following components:

- easyCodeII Software
- easyCodeII Libraries for Microlab® STAR VENUS Software
- Demo Methods for Microlab® STAR VENUS Software
- Labware Files of the easyCode Carrier for the Microlab® STAR VENUS Software
- uEye Camera Driver
- easyCodeII Software and Carrier Operator's Manual
- Bar Code Settings: see [Appendix 11.4 easyCodeII Settings Suggestions](#) for the available settings and their matching Camera Settings.
- Camera Settings: (the number refers to the exposure time in milliseconds)

For easyCode Carrier, the following default settings are available:

- easyCodeCarrier_Default_150.camerasettings.xml
- easyCodeCarrier_Default_200.camerasettings.xml
- easyCodeCarrier_Default_300.camerasettings.xml

For easyCodeCarrierPlus, the following default settings are available:

- easyCodeCarrierPlus_Default_150.camerasettings.xml
- easyCodeCarrierPlus_Default_200.camerasettings.xml
- easyCodeCarrierPlus_Default_300.camerasettings.xml

3.3.2 Installation Procedure



ATTENTION: The Microlab® STAR VENUS Software has to be installed prior to the easyCodeII Software.



ATTENTION: The easyCodeII Software has to be installed prior to the USB Cable connection between the easyCode Carrier and the Controlling PC.

1. Insert the easyCodeII USB stick in the USB port..
2. Install the uEye-Camera Driver: Start the program
uEye64_XXXXX_WHQL.exe

For a 64bit Windows installation from the easyCodeII USB stick. The files will extract themselves. Afterwards, choose “Install driver” and later choose “Complete setup”.

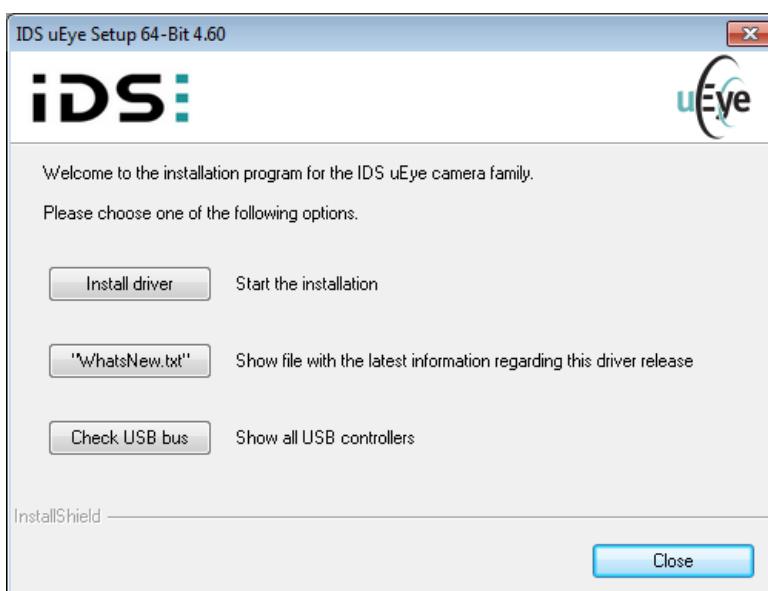


Figure 9: Installation Wizard

- Start the following program:

Installer_easyCodeII_VX.X.X.exe

Follow the instructions always using the default selections.

- Now connect the easyCode Carrier and the Controlling PC with the USB Cable.
- During installation, the easyCodeII Shortcut Icon will be created on the Desktop.



Start easyCodeII by double-clicking on the easyCodeII Desktop Icon. If the User Interface of the easyCodeII Software opens, the installation was successful.

3.4 User Interface Overview



Start the easyCodeII Software by double-clicking on the easyCodeII Desktop Icon.

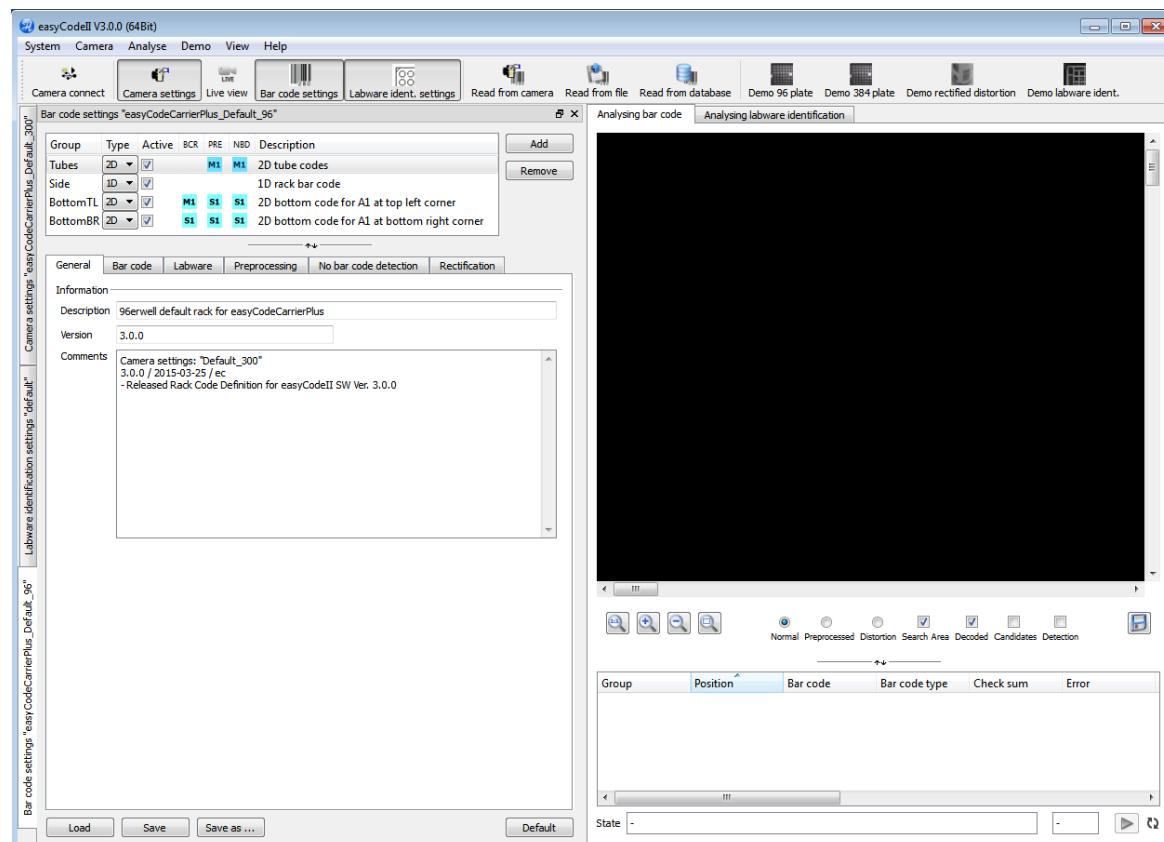
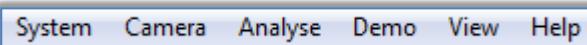


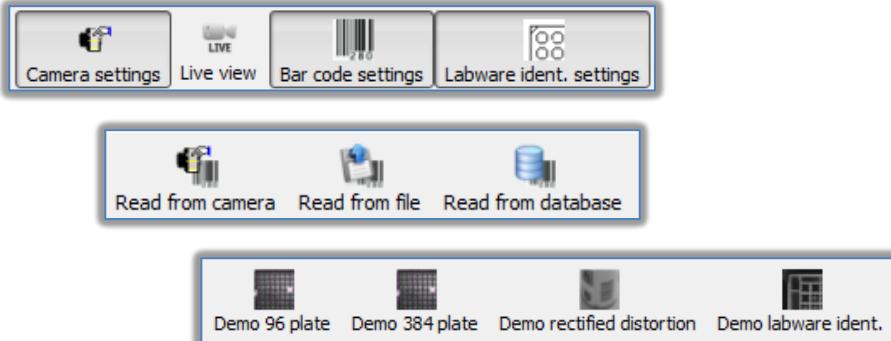
Figure 10: easyCodeII Main Window

The User Interface consists of the following sections:

1. Menubar



2. Toolbar with Setting-, Reading- and Demo functions



3. Settings Window.

The displayed content depends on the settings selected:

Camera settings "default"

Basic Enhancement White balance Trigger/Flash/IO Device

Color mode: Gray Color

Exposure time [ms]:

Picture: Mirror left/right Mirror up/down

Rotate:

Multiple pictures (noise reduction):

Edge Enhancement: Disable Weak Strong

Labware identification settings "default"

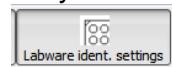
Model template picture: Use current Load from file Switch to define model

General Labware Reference position Labware type Labware orientation Bar code

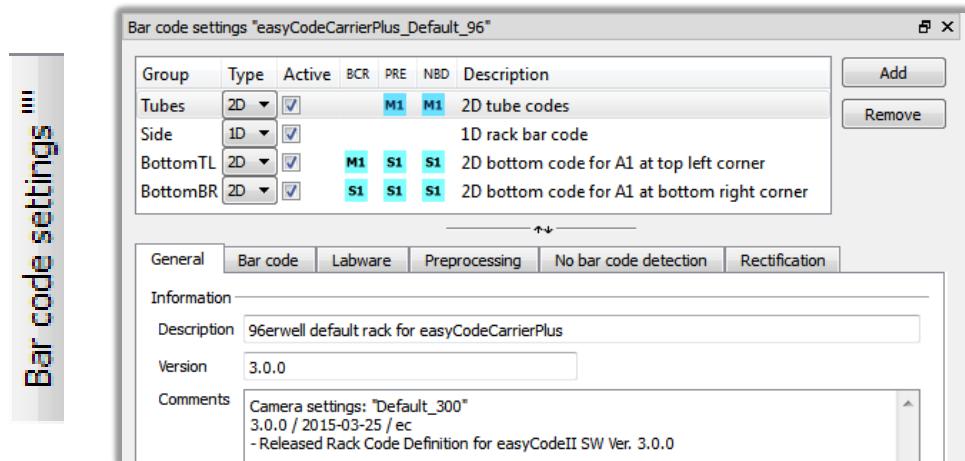
Information: Description Version

Comments:

The option “Labware identification settings” is not used in the easyCodeII Application and can be deactivated by pressing the



Button.

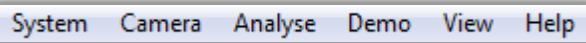


4. Image Window with Evaluation View Settings.

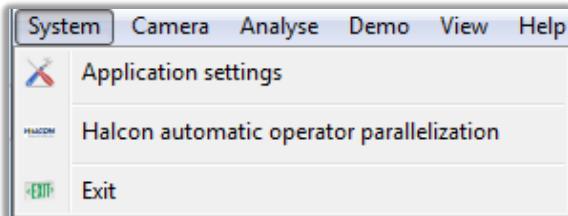
<p>Image Window</p>																																																																
<p>Evaluation View with Analysis Data</p>	<p>Analysing bar code Analysing labware identification</p> <p>Normal Preprocessed Search Area Decoded Candidates Detection</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Group</th> <th>Position</th> <th>Bar code</th> <th>Bar code type</th> <th>Check sum</th> <th>Error</th> <th>Ro</th> </tr> </thead> <tbody> <tr><td>▲ 1/Tubes</td><td>Tubes 0001 / A1</td><td>1024557816</td><td>Data Matrix ECC 200</td><td><input checked="" type="checkbox"/></td><td>(0) No error</td><td><input type="checkbox"/></td></tr> <tr><td></td><td>Tubes 0002 / A2</td><td>1024556229</td><td>Data Matrix ECC 200</td><td><input checked="" type="checkbox"/></td><td>(0) No error</td><td><input type="checkbox"/></td></tr> <tr><td></td><td>Tubes 0003 / A3</td><td>1024536006</td><td>Data Matrix ECC 200</td><td><input checked="" type="checkbox"/></td><td>(0) No error</td><td><input type="checkbox"/></td></tr> <tr><td></td><td>Tubes 0004 / A4</td><td>1024536007</td><td>Data Matrix ECC 200</td><td><input checked="" type="checkbox"/></td><td>(0) No error</td><td><input type="checkbox"/></td></tr> <tr><td></td><td>Tubes 0005 / A5</td><td>1024536008</td><td>Data Matrix ECC 200</td><td><input checked="" type="checkbox"/></td><td>(0) No error</td><td><input type="checkbox"/></td></tr> <tr><td></td><td>Tubes 0006 / A6</td><td>1024536009</td><td>Data Matrix ECC 200</td><td><input checked="" type="checkbox"/></td><td>(0) No error</td><td><input type="checkbox"/></td></tr> <tr><td></td><td>Tubes 0007 / A7</td><td>1024536010</td><td>Data Matrix ECC 200</td><td><input checked="" type="checkbox"/></td><td>(0) No error</td><td><input type="checkbox"/></td></tr> <tr><td></td><td>Tubes 0008 / A8</td><td>1024536011</td><td>Data Matrix ECC 200</td><td><input checked="" type="checkbox"/></td><td>(0) No error</td><td><input type="checkbox"/></td></tr> </tbody> </table> <p>State: Analysing sucessfully finished. 4.3 s </p>	Group	Position	Bar code	Bar code type	Check sum	Error	Ro	▲ 1/Tubes	Tubes 0001 / A1	1024557816	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0002 / A2	1024556229	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0003 / A3	1024536006	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0004 / A4	1024536007	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0005 / A5	1024536008	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0006 / A6	1024536009	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0007 / A7	1024536010	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0008 / A8	1024536011	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>
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	Tubes 0008 / A8	1024536011	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>																																																										

3.5 Menu Structure of the easyCodeII Software

The menu structure is held as simple as possible. It consists of:

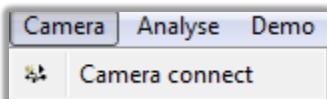


3.5.1 System Menu

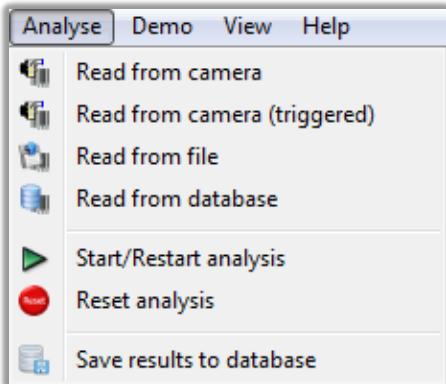


- For "Application settings", see [Appendix 11.2 Application Settings](#).

3.5.2 Camera Menu



3.5.3 Analyse Menu



- For "Start/Restart analysis" see [Section 4.4 How to Evaluate Pictures](#).
- For "Save results to database" see [Appendix 11.1 Database Settings](#).

- Read from Camera:

Read codes from pictures captured by the camera:

Use the "easyCodeII_TurnOnTheLight.med" Method to turn ON the Light. Now start the easyCodeII Software and press the "Camera connect" Button.

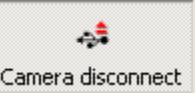
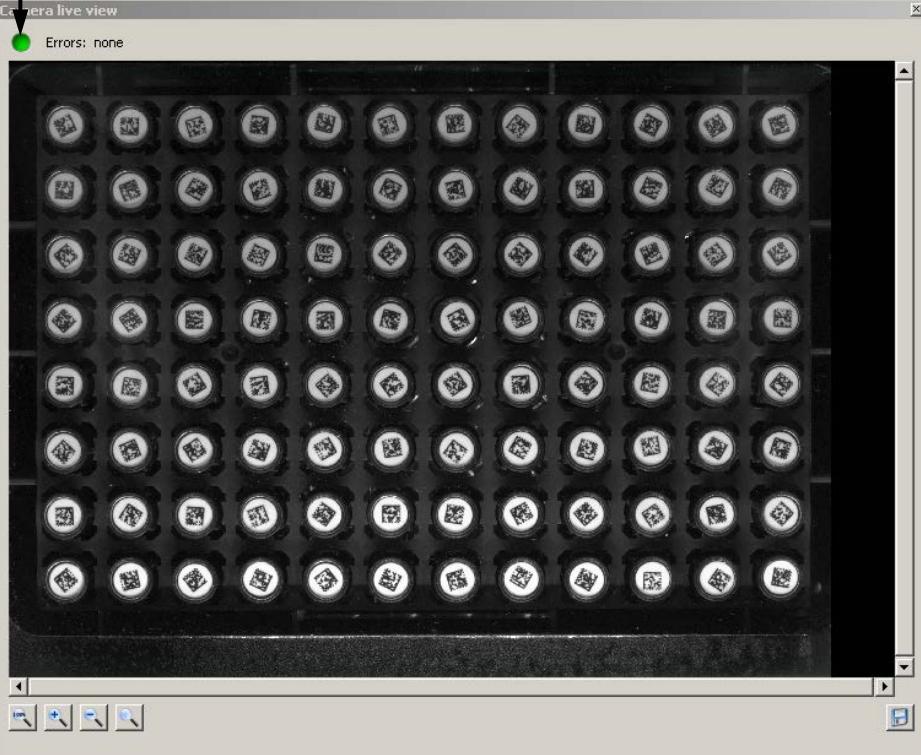
	With this command, the easyCodeII Software connects with the Camera. When the Camera has successfully been connected, this button turns into the "Camera disconnect" Button.
	<p>Camera Connection Status</p>  <p>The screenshot shows a software interface titled "Camera live view". At the top left, there is a green circular indicator labeled "Errors: none". The main area displays a 10x10 grid of small QR code images. Below the grid, there are several small icons for navigating through the images.</p>

Figure 11: Live image window

In case the camera status shows no or erroneous communication see chapter 10, Troubleshooting.

Press the "Read from camera" Button.

	Now the picture is taken, shown in the picture window and evaluated with the currently activated settings. If the "Camera connect" Button is not selected, it will automatically get activated and deactivated after the picture has been taken.
---	--

- "Read from camera (triggered)

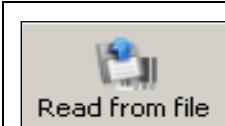
NOTE: Read from Camera (triggered) is not used with the easyCode Carrier.



- Read from File:

Read Bar Codes from an Image File loaded from your Controlling PC Hard Disk:

Press the “Read from file” Button.

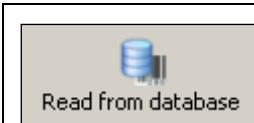


With this function, you can Load Images from your Hard Disk and evaluate them with the currently activated settings.

- Read from Database:

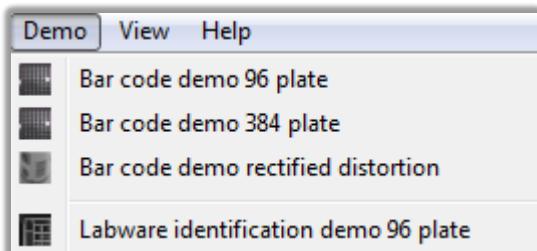
Read Bar Codes from Files loaded from the Database.

Press the “Read from Database” Button.



With this command, you can load evaluated images with their settings from the database. Find more information about reading from the database in [Appendix 11.3 Reading From Database](#).

3.5.4 Demo Menu

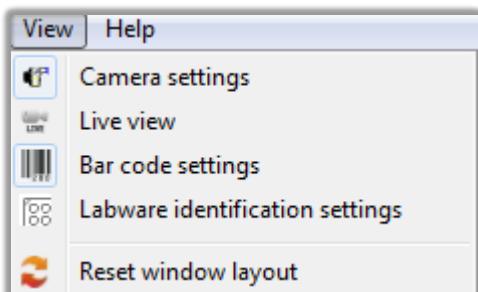


A Demo Picture allows you to see the effects when you change parameters which affect Bar Code reading. You can either use images from files, images from the database (if already stored) or live images.



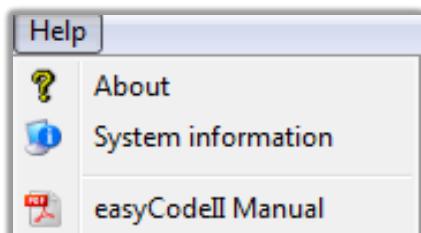
Labware identification settings are not available for the easyCode Carrier, therefore the options “Labware identification” and “Bar code rectified distortion” are not relevant for the easyCode Carrier.

3.5.5 View Menu



- For “Bar Code Settings” see [Section 5 Bar Code Settings](#).
- For “Camera Settings” see [Section 6 Camera Settings](#).
- The “Labware identification settings” feature is not available for the easyCode Carrier. For easier display, de-activate this feature.
- To use the Live View, the Camera has to be connected (see [Section 4.1 Read Bar Codes from a Known Tube Rack](#)).
- The “Reset window layout”: arranges the window to its startup appearance as shown in [Figure 15 Load New Settings](#).

3.5.6 Help Menu



- “About” displays the easyCodeII Software Version
- To get detailed Installation Information for better analysis by HAMILTON Technical Support
- This manual will be displayed as a PDF File

4 Quick Guides

4.1 Read Bar Codes from a Known Tube Rack

1. Install the easyCode Carrier and the Software according to [Section 2.2 Installation of easyCode Carrier](#) and [Section 2.3 Installation of easyCodeII Software](#).
2. Switch ON the STAR Line Instrument.
3. Place the Tube Rack onto the easyCode Carrier. A1 of the Tube Rack is usually placed on the upper left edge of the reading position.

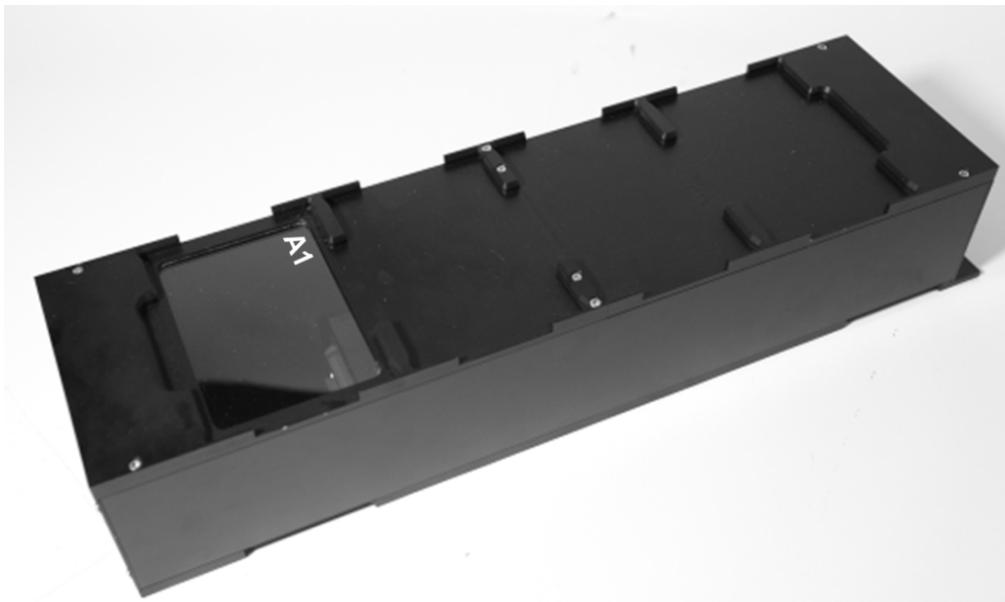


Figure 13: Position A1 on the easyCode Carrier

4. Switch ON the Light of the easyCode Carrier by using the method easyCodeII_TurnOnTheLight.med. The method can be found in the folder Hamilton\Methods\EasyCodeMethods, see also [Section 7 Demo Methods for easyCodeII Software](#).



ATTENTION: Wrong positioning of Labware may cause wrong results.



5. Start the easyCodeII Software by double-clicking on the easyCodeII Desktop Icon and the Startup Screen will appear.

1. Load the Camera Settings related to your Tube Rack

Default settings for the common Tube Racks are already prepared for your use.

For easyCode Carrier, the following Default Settings are available:

- easyCodeCarrier_Default_150.camerasettings.xml
- easyCodeCarrier_Default_200.camerasettings.xml
- easyCodeCarrier_Default_300.camerasettings.xml

For easyCode Carrier^{Plus}, the following default settings available:

- easyCodeCarrierPlus_Default_150.camerasettings.xml
- easyCodeCarrierPlus_Default_200.camerasettings.xml
- easyCodeCarrierPlus_Default_300.camerasettings.xml

Just load them in the window “Camera settings” with the “Load” Button”.

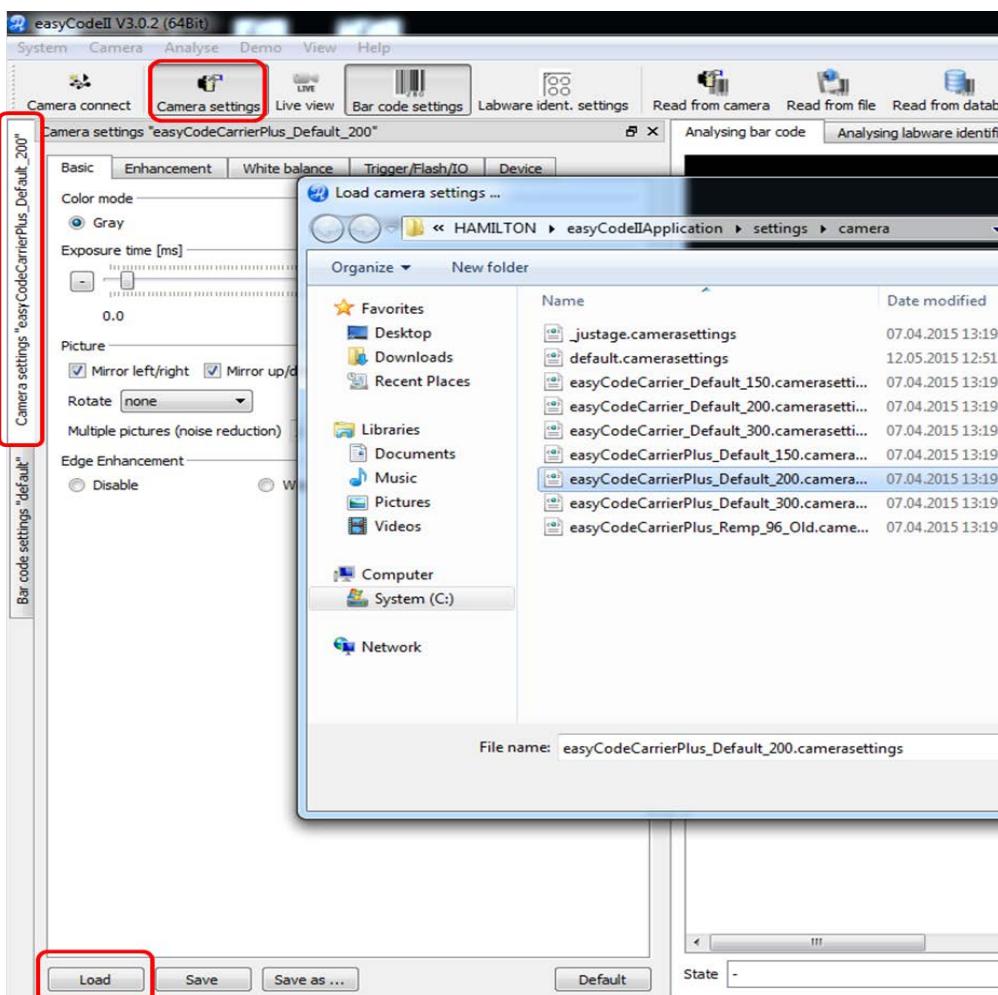


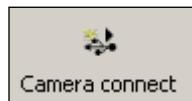
Figure 14: Load New Settings

- The naming of the setting files tells you about the type of reader you want to use: easyCode Carrier (for Standard) or easyCode Carrier^{Plus} (extended with Rack Bar Code Reader) and the Exposure Time.

Example: easyCodeCarrierPlus_default_200.camerasettings.xml will decode with an Exposure Time of 200 milliseconds.

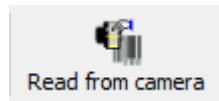
Please see [Appendix 11.4 easyCodeII Settings Suggestions](#) to find the Camera Settings matching your Rack.

2. Connect the Camera.



With this command, the easyCodeII Software connects with the Camera. When the Camera has successfully been connected this button turns into the "Camera disconnect" Button.

3. Capture Picture from the Camera.



4. Load the Bar Code or Bar Code Settings related to your Tube Rack.

A large number of settings for common Tube Racks are already prepared for your use. Load them in the "Bar Code Settings" Window with the "Load" Button.

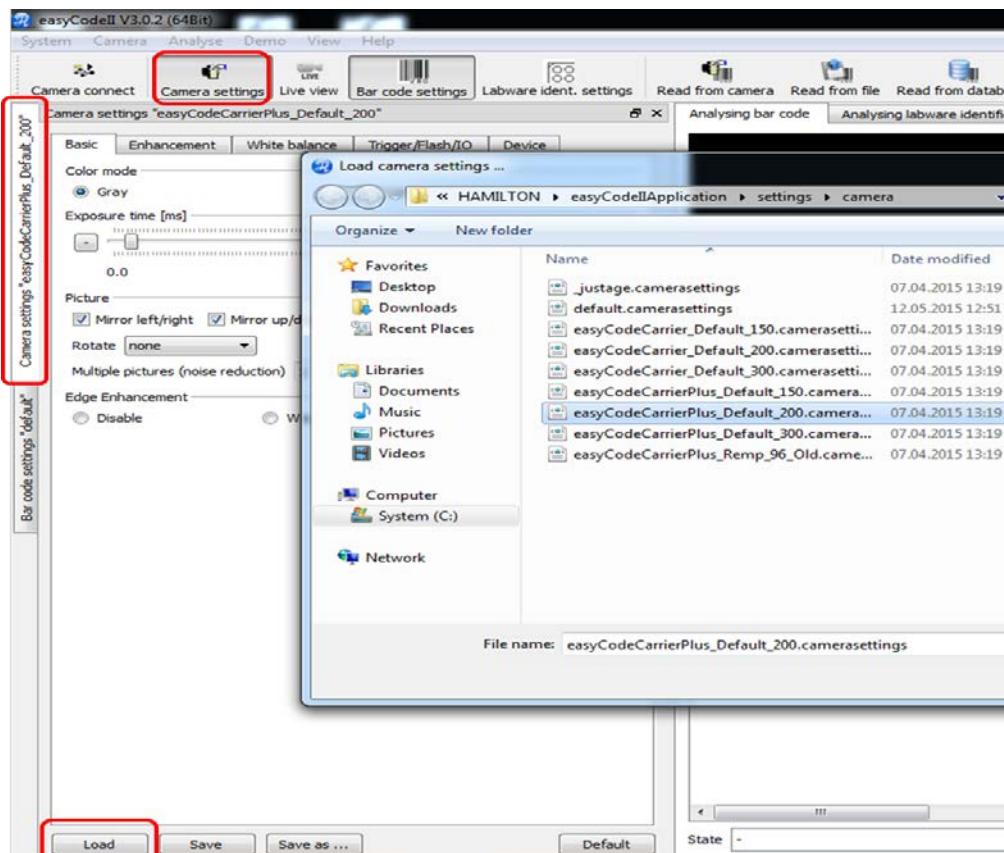


Figure 15: Load New Settings

The naming of the setting files tells you about:

- The type of reader you want to use: easyCode Carrier (for Standard) or easyCode Carrier^{PLUS} (extended with Rack Bar Code Reader)
- The brand of the manufacturer
- The number of Tubes
- Additional Specifications e.g. Honey Comb, Cryo Racks,...

Example: easyCodeCarrierPlus_Greiner_48_CryoRack.barcodesettings.xml will decode a Greiner CryoRack with 48 Tubes on the easyCode Carrier^{PLUS}.

If in doubt, choose the default settings for the respective easyCode Carrier and Rack Size (e.g. easyCodeCarrierPlus_Default_48.barcodesettings.xml).

See [Appendix 11.4 easyCodeII Settings Suggestions](#) for the available settings and their matching Camera Settings.

5. Test your settings.

Check picture quality regarding light, if not optimal, load other camera settings from the list or optimize picture quality by changing e.g. Exposure Time (see also [Section 6 Camera Settings](#)) and repeat [Step 3. Capture Picture from the Camera](#).

Click on the “Read from Camera” Button and verify if all the Bar Codes are successfully identified.

If identification was not successful, load other Bar Code Settings from the pre-defined settings. During the loading process, the picture will be automatically evaluated with the new settings and results are visible in the image window of the User Interface (see also [Step 4. Image Window with Evaluation View Settings in Section 3.5 User Interface Overview](#)).

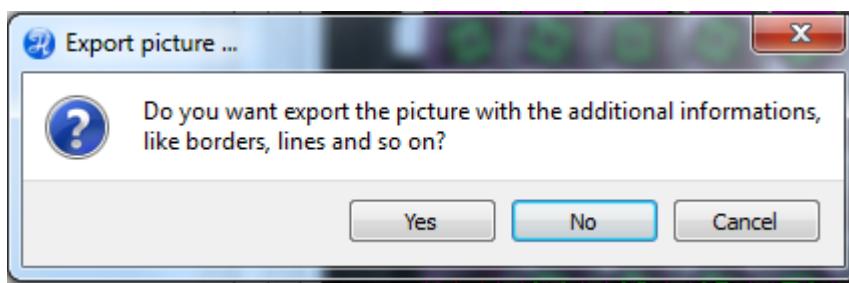
If the Bar Codes are still not successfully identified with the predefined settings, create your own settings according to [Section 4.2 Create New Bar Code Settings](#).

6. Save the Picture.

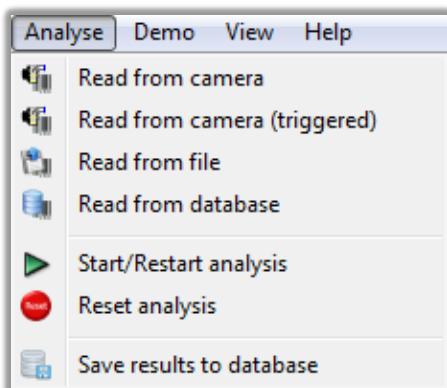
Click on the “Save” Button to save the image.



7. Select "No" in the Export Picture Dialog Box as usually the picture shall be saved without the additional information.



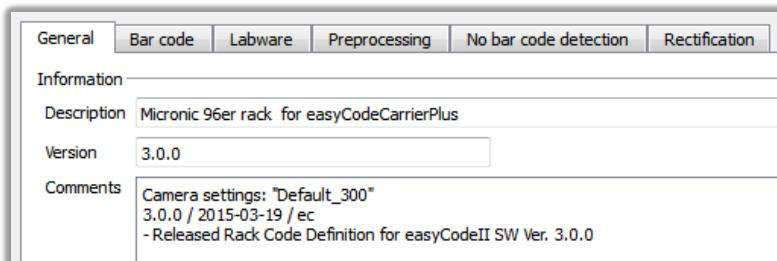
8. Select a folder and filename. The picture will be saved as a ".png file". If "yes" is selected and the picture is saved with the additional information, it cannot be used for further evaluations e.g. with other settings.
9. Alternatively, the picture with its assigned settings and analysis results can be stored in the database. Go to the "Analyse" Menu Tab and select "Save results to database".



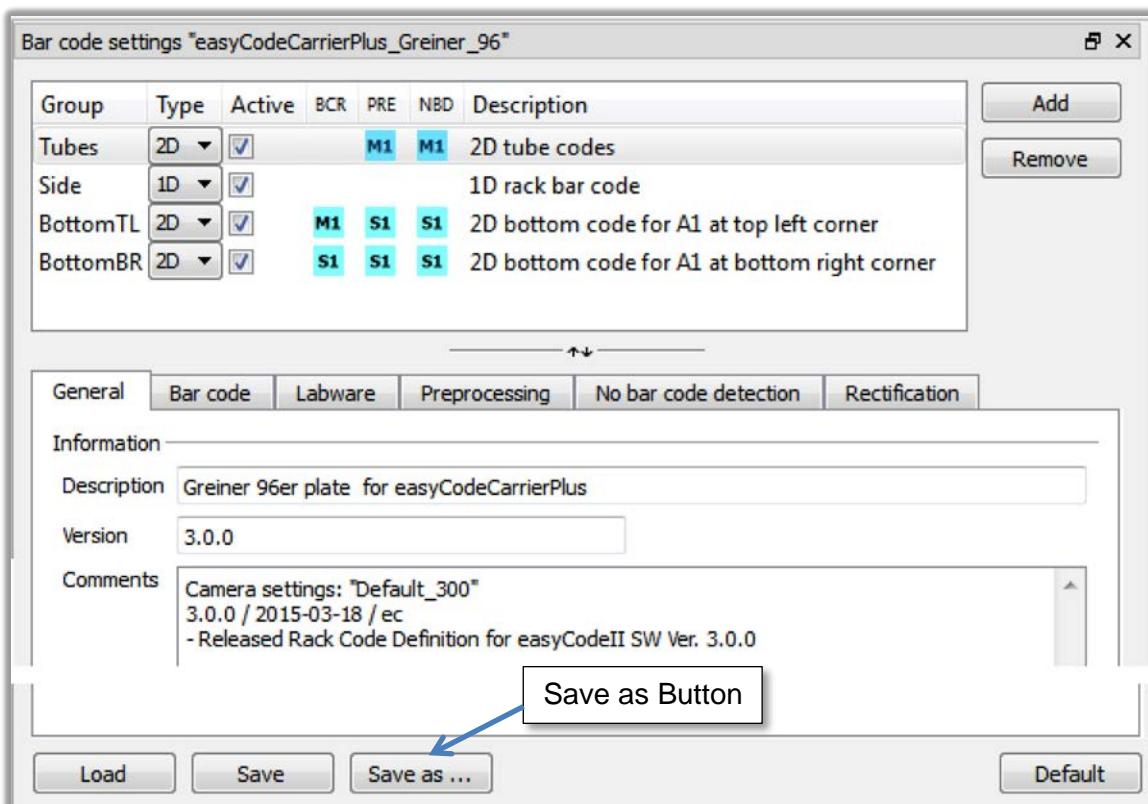
10. A database entry is created containing all information. This is especially helpful if there is a general problem with evaluation and the data has to be send to HAMILTON's Technical Support, see also [Section 9.5 General Problems with the Evaluation](#).

4.2 Create New Bar Code Settings

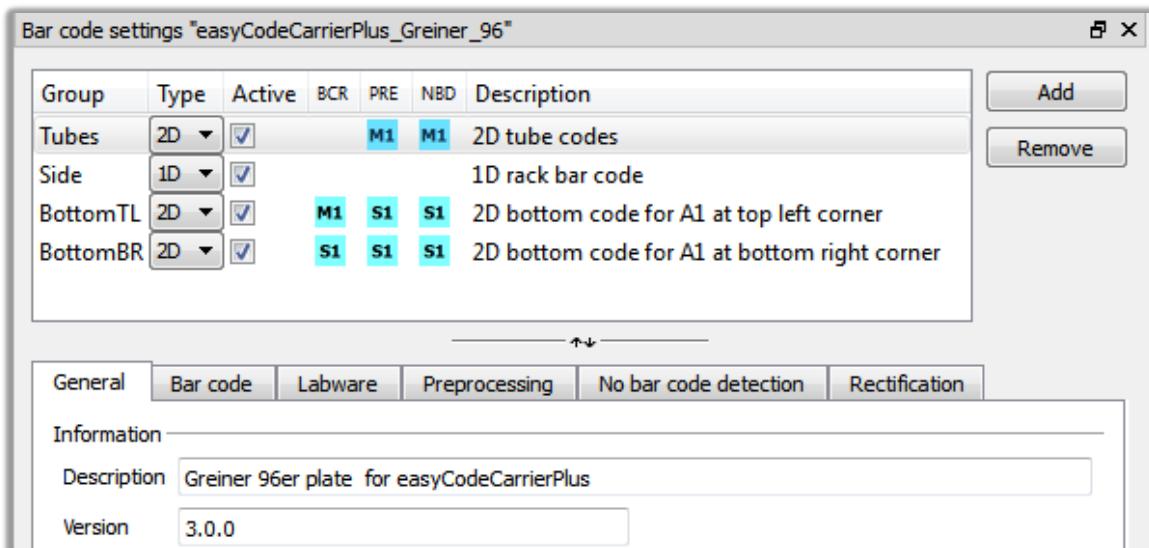
1. Load a picture either from file, from database or take a picture by following the procedure in [Section 4.1 Read Bar Codes from a Known Tube Rack](#).
2. Load the Bar Code Settings by selecting settings similar to your Rack (see [Step 4. Load the Bar Code or Bar Code Settings related to your Tube Rack in Section 4.1](#)).
3. In the “General” Tab, store some information about the settings. The comments field can be used to create a version history.



4. Save the settings with your preferred name by selecting the “Save as” Button

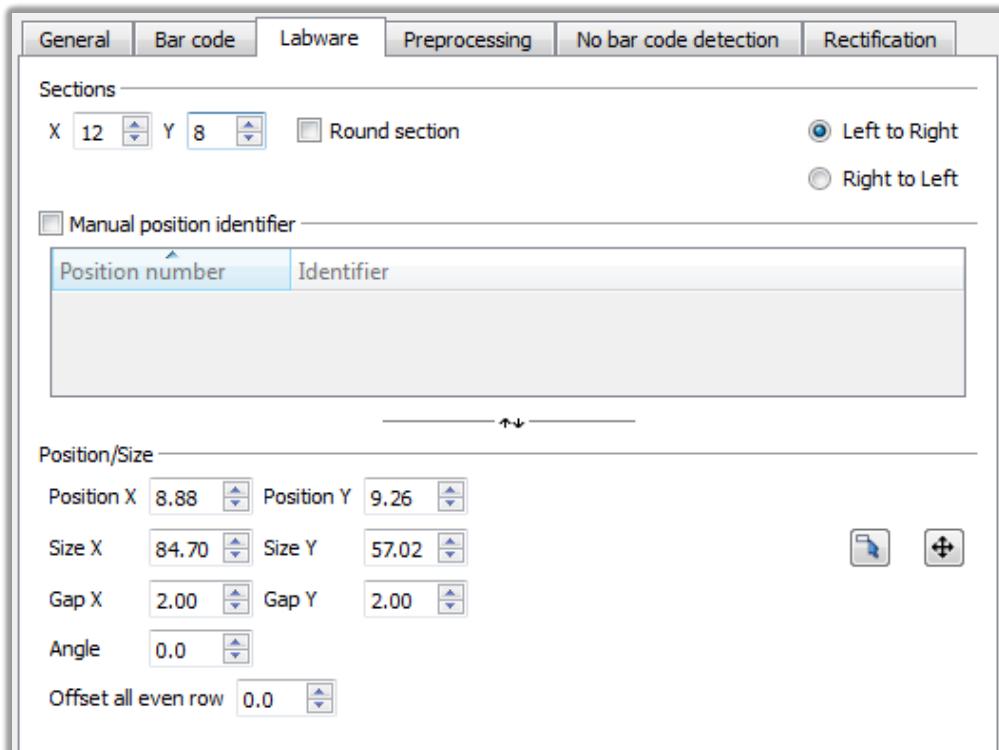


5. Define the “Group” for your Tube Rack.



With “Groups”, you can not only define different types of search areas, you can also assign different settings for decoding or pre-processing to these areas. The pre-processing that you use for the 2D Bar Codes of the Tubes may not fit to the 1D of the Rack Bar Code, so it is better to assign them to different groups. For details see [Section 5.1 Groups](#).

6. Select the “Labware/Position” Tab



Define your search field in the Tab

Under “Sections”, choose for instance a 12 x 8 array for a 96 Tube Rack.



This button lets you draw a new search field with the mouse.



This button lets you shift the corners of the search field and shift the complete search field by clicking on the red squares in the search field.

Use the red squares at the edges to change the size of the grid. Use the red square in the middle to change the position.

For detailed information see detailed information in [Section 5.4 Labware Tab](#).

7. Select the “Bar code” Tab.

Bar code settings "easyCodeCarrierPlus_Greiner_96"

Group	Type	Active	BCR	PRE	NBD	Description
Tubes	2D	<input checked="" type="checkbox"/>	M1	M1		2D tube codes
Side	1D	<input checked="" type="checkbox"/>				1D rack bar code
BottomTL	2D	<input checked="" type="checkbox"/>	M1	S1	S1	2D bottom code for A1 at top left corner
BottomBR	2D	<input checked="" type="checkbox"/>	S1	S1	S1	2D bottom code for A1 at bottom right c...

Add Remove

General **Bar code** **Labware** Preprocessing No bar code detection Rectification

Maximum decoding duration
Maximum decoding duration for single bar code [s] 5.0

Bar code type (2D)
 Data Matrix ECC 200 QR Code Aztec Code
 PDF417 Micro QR Code

General setting
 Only readable characters allowed Multiple bar code allowed

Bar code mask(s) *

Advance settings
 Recognition mode enhanced Contrast minimum default
 Polarity light on dark No quiet zone check
 Mirrored yes
 Determinate bar code quality information (ISO IEC 15415)

Data Matrix ECC 200
 Symbol shape square min/max
 Module symbol size minimum 12x12 Module symbol size maximum 14x14
 Module grid fixed Maximum slant angle default

8. Select the correct options for your Rack according to the detailed information in [Section 5.3 Bar Code Settings Tab](#). All changes can be seen in the Image Window with evaluation view settings.

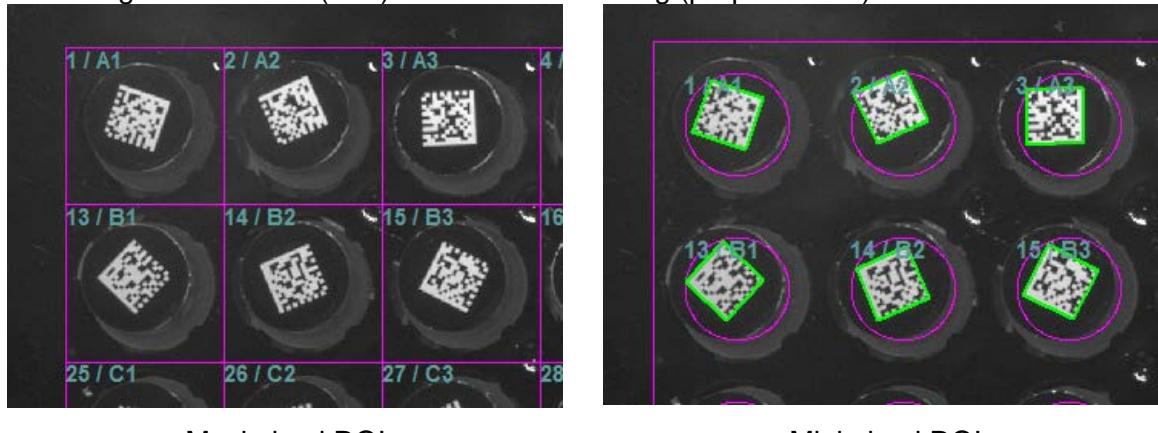
Image Window																																																																
Evaluation View with Analysis Data	<p>Analysing bar code Analysing labware identification</p> <p><input type="radio"/> <input checked="" type="radio"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Normal Preprocessed Search Area Decoded Candidates Detection</p> <table border="1"> <thead> <tr> <th>Group</th> <th>Position</th> <th>Bar code</th> <th>Bar code type</th> <th>Check sum</th> <th>Error</th> <th>Ro</th> </tr> </thead> <tbody> <tr> <td>1/Tubes</td> <td>Tubes 0001 / A1</td> <td>1024557816</td> <td>Data Matrix ECC 200</td> <td><input checked="" type="checkbox"/></td> <td>(0) No error</td> <td><input type="checkbox"/></td> </tr> <tr> <td></td> <td>Tubes 0002 / A2</td> <td>1024556229</td> <td>Data Matrix ECC 200</td> <td><input checked="" type="checkbox"/></td> <td>(0) No error</td> <td><input type="checkbox"/></td> </tr> <tr> <td></td> <td>Tubes 0003 / A3</td> <td>1024536006</td> <td>Data Matrix ECC 200</td> <td><input checked="" type="checkbox"/></td> <td>(0) No error</td> <td><input type="checkbox"/></td> </tr> <tr> <td></td> <td>Tubes 0004 / A4</td> <td>1024536007</td> <td>Data Matrix ECC 200</td> <td><input checked="" type="checkbox"/></td> <td>(0) No error</td> <td><input type="checkbox"/></td> </tr> <tr> <td></td> <td>Tubes 0005 / A5</td> <td>1024536008</td> <td>Data Matrix ECC 200</td> <td><input checked="" type="checkbox"/></td> <td>(0) No error</td> <td><input type="checkbox"/></td> </tr> <tr> <td></td> <td>Tubes 0006 / A6</td> <td>1024536009</td> <td>Data Matrix ECC 200</td> <td><input checked="" type="checkbox"/></td> <td>(0) No error</td> <td><input type="checkbox"/></td> </tr> <tr> <td></td> <td>Tubes 0007 / A7</td> <td>1024536010</td> <td>Data Matrix ECC 200</td> <td><input checked="" type="checkbox"/></td> <td>(0) No error</td> <td><input type="checkbox"/></td> </tr> <tr> <td></td> <td>Tubes 0008 / A8</td> <td>1024536011</td> <td>Data Matrix ECC 200</td> <td><input checked="" type="checkbox"/></td> <td>(0) No error</td> <td><input type="checkbox"/></td> </tr> </tbody> </table> <p>State: Analysing successfully finished. 4.3 s </p>	Group	Position	Bar code	Bar code type	Check sum	Error	Ro	1/Tubes	Tubes 0001 / A1	1024557816	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0002 / A2	1024556229	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0003 / A3	1024536006	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0004 / A4	1024536007	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0005 / A5	1024536008	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0006 / A6	1024536009	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0007 / A7	1024536010	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>		Tubes 0008 / A8	1024536011	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>
Group	Position	Bar code	Bar code type	Check sum	Error	Ro																																																										
1/Tubes	Tubes 0001 / A1	1024557816	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>																																																										
	Tubes 0002 / A2	1024556229	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>																																																										
	Tubes 0003 / A3	1024536006	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>																																																										
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	Tubes 0007 / A7	1024536010	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>																																																										
	Tubes 0008 / A8	1024536011	Data Matrix ECC 200	<input checked="" type="checkbox"/>	(0) No error	<input type="checkbox"/>																																																										

9. You may further optimize your settings by changing values on the “Pre-processing” and “No barcode detection” Tabs see [Section 5.5 Preprocessing Tab](#) and [Section 5.6 No Bar Code Detection Tab](#).
10. Save your settings.
11. Load the picture and the newly created settings. Verify if all the Bar Codes are successfully identified.

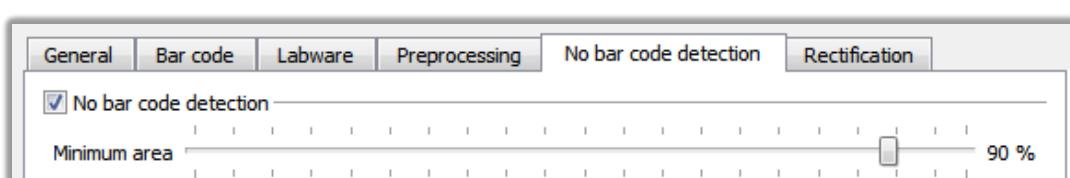
4.3 How to Optimize Decoding Speed

This section shows the most important adjustments to reach a high evaluation speed without having to go through the complete section.

- Minimize region of interest (ROI) for Bar Code reading (purple circles).

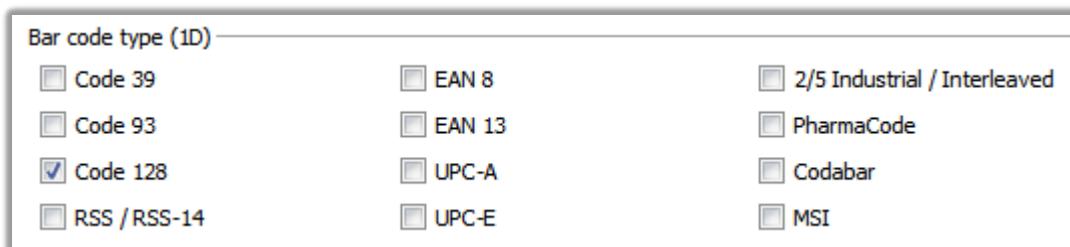


Define the “Minimum area” in the “No bar code detection” Tab towards a higher value.



Drawback: Less borderline codes will not be detected.

- If all of your Tube Racks are completely filled with Tubes having Bar Codes, turn OFF the “No bar code detection” function. For detailed information see [Section 5.6 No Bar Code Detection Tab](#).
- In the “Advanced settings” Tab, make sure enhanced recognition is turned ON. Choose whether the Bar Code is mirrored or not (do not choose auto). Also choose the polarity (do not choose auto) and the module symbol size.
- Make sure that only requested “Barcode type (1D)” is or are checked in the “Barcode type” Tab.



- General tip: turn OFF the Live View (Live view) Button.

4.4 How to Evaluate Pictures

After the evaluation, you will get the following screen:

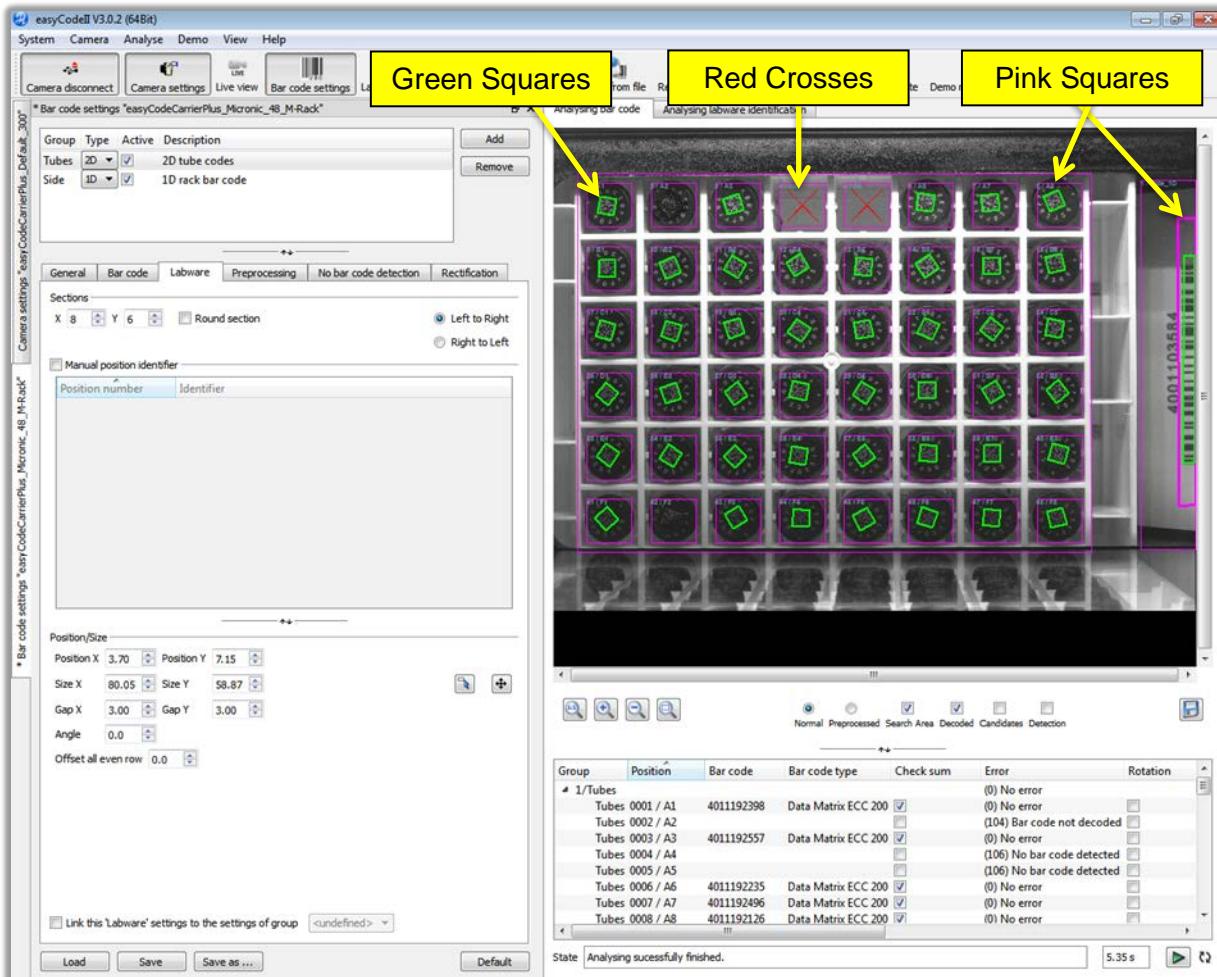


Figure 16: Evaluated Bar Codes

- The **Green Squares** show the positions of successfully decoded 2D Bar Codes.
- The **Red Crosses** show areas where no tubes were recognized.
- The **Pink Squares** are the search fields where the easyCodeII Software is looking for 2D BarCodes.

Underneath the image are the evaluation view settings and the zoom tools.

- Zoom tools: the evaluated image can be zoomed in, zoomed out, zoomed into a section and reset to the original size.
- Choose between normal view and pre-processed view. The pre-processed view shows you the evaluation process. This only makes sense for BarCodes with bad readability.
- Search area: if this box is checked, the pink search areas are shown.
- Decoded: if this box is checked, the green squares surrounding decoded 2D Bar Codes are shown.

- Candidates: if this box is checked, recognized 2D Bar Codes are surrounded with a red square. This is helpful to check whether a Bar Code was recognized at all. If the “Decoded” Check Box is selected, the green squares of the evaluated Bar Codes cover the red squares.
- Detection: this function can be helpful when the “No bar code detection” Function is active. This function is explained in detail in [Section 5.6 No Bar Code Detection Tab](#).



The “Analyse start/restart” Button: Starts the evaluation with the currently active Bar Code and Camera Settings.

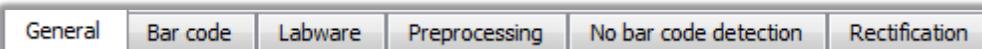
5 Bar Code Settings

Before you can read and evaluate your Bar Codes, you have to optimize the Bar Code settings. Make sure that the “Bar code settings” Button is activated.

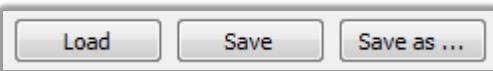


The “Bar code settings” Window is activated per default and displayed on the upper left hand side of the main window. It can be activated and deactivated by pressing the “Bar code settings” Button.

There are 6 Tabs in this window:



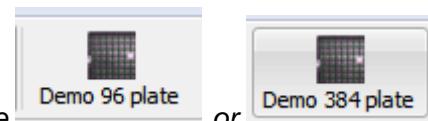
With the buttons on the lower left, the settings can be saved or existing settings can be loaded.



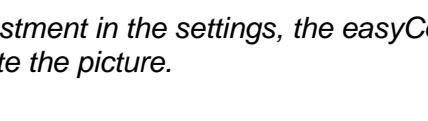
To get the best performance with the highest reading speed, load a Picture and proceed as described in this section.

Select a similar setting for the new Tube Rack as already defined in the Bar Code Settings Folder for the easyCodeCarrier, respectively the easyCodeCarrier^{Plus}. There are default settings for 24, 48, 96 and 384 Size Racks, but also brand-specific settings are pre-defined.

After selecting and open the settings with the “Load” Button, save the setting with a new setting name with the “Save as...” Button.



NOTE: The demo settings (press the or Button) can be used as a template to start with, but using already defined settings for the corresponding plate format and carrier type is recommended.



NOTE: Everytime you make an adjustment in the settings, the easyCodeII Software will automatically re-evaluate the picture.

5.1 Groups

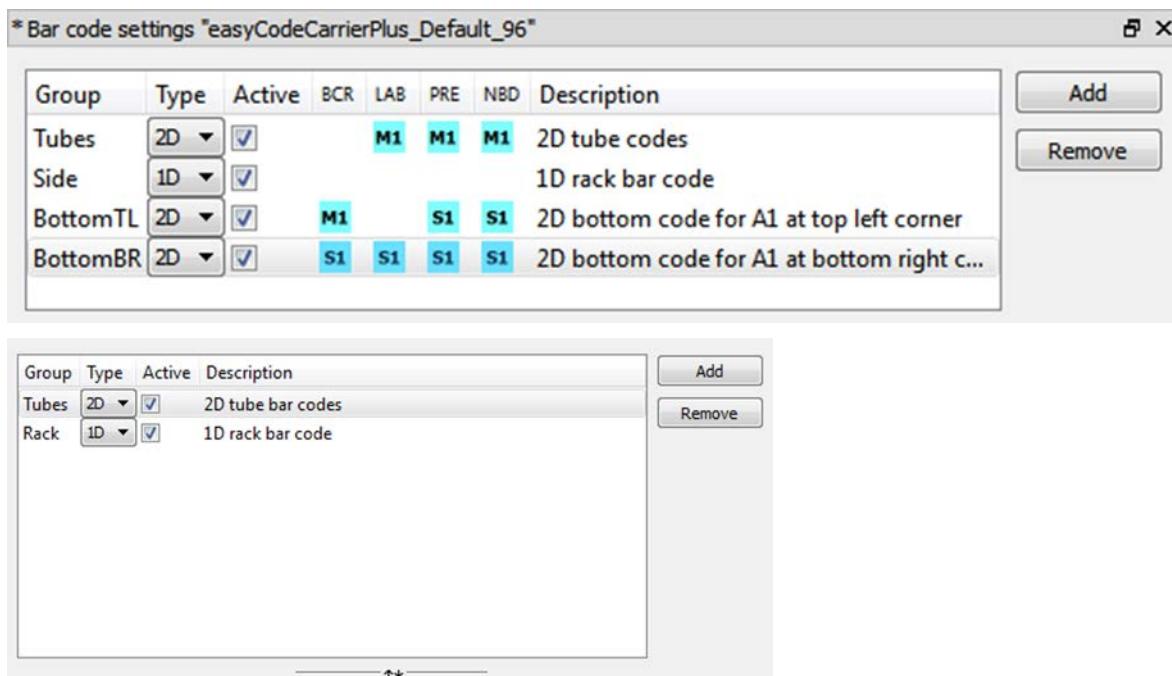


Figure 17: Groups

With “Groups”, you can not only define different types of search areas, you can also assign different settings for decoding or pre-processing these areas. The pre-processing that you use for the 2D Bar Codes of the Tubes may not fit to the 1D Rack Bar Code, so it is better to assign them to different groups.

Group: here you can define the name of the group. Double-click on the field to edit the name.

- “Tubes” Typically 2D Bar Codes, located at the bottom of the Tubes
- “Side” Typically a 1D Bar Code, located at the smaller side of the Rack
- “BottomTL” Typically a 2D Bar Code, located at the bottom of a standard oriented Rack (i.e. Tube Position “A1” is in the top left corner)
- “BottomBR” Typically a 2D Bar Code, located at the bottom of a opposite oriented Rack (i.e. Tube Position “A1” is in the bottom right corner)

Type: Define the type of Bar Code you want to read. Choose between 1D and 2D Bar Codes. Depending on your choice, only the corresponding settings of the highlighted group are shown in the “Bar code” Tab.

Active: Remove the “Active” checkmark if you want to de-activate this group in this setting without deleting it.

BCR (Bar Code), LAB (Labware), PRE (pre-processing) and NBD (no bar code detection): These columns show the links between the Master (M1) and the Slave (S1) definition of the corresponding feature. Links are set at the bottom of the corresponding tab, e.g. for Bar Code of group “BottomBR”.

Link this 'Bar code' settings to the settings of group **BottomTL**.



NOTE: Labware linked between groups as shown in [Figure 17 Groups](#) such as between "Tubes" and "BottomBR" makes no sense for the easyCode Carrier application.

Description: Double-Click on the field to edit the description of the group.

Add: Create a new group.

Remove: Delete the selected group.

5.2 General

The screenshot shows a software interface for setting up a rack. At the top, there are tabs: General (which is selected), Bar code, Labware, Preprocessing, No bar code detection, and Rectification. Below the tabs, under the 'Information' section, there are three fields: 'Description' containing '96erwell default rack for easyCodeCarrierPlus', 'Version' containing '3.0.0', and 'Comments' which contains a multi-line text area with the following content:
Camera settings: "Default_300"
3.0.0 / 2015-03-25 / ec
- Released Rack Code Definition for easyCodeII SW Ver. 3.0.0

Figure 18: General

The "General" Tab is intended to store some information about the settings. The comments field can be used to create a Version History and related Camera Setting.

5.3 Bar Code Settings Tab

5.3.1 Bar Code Type (1D)

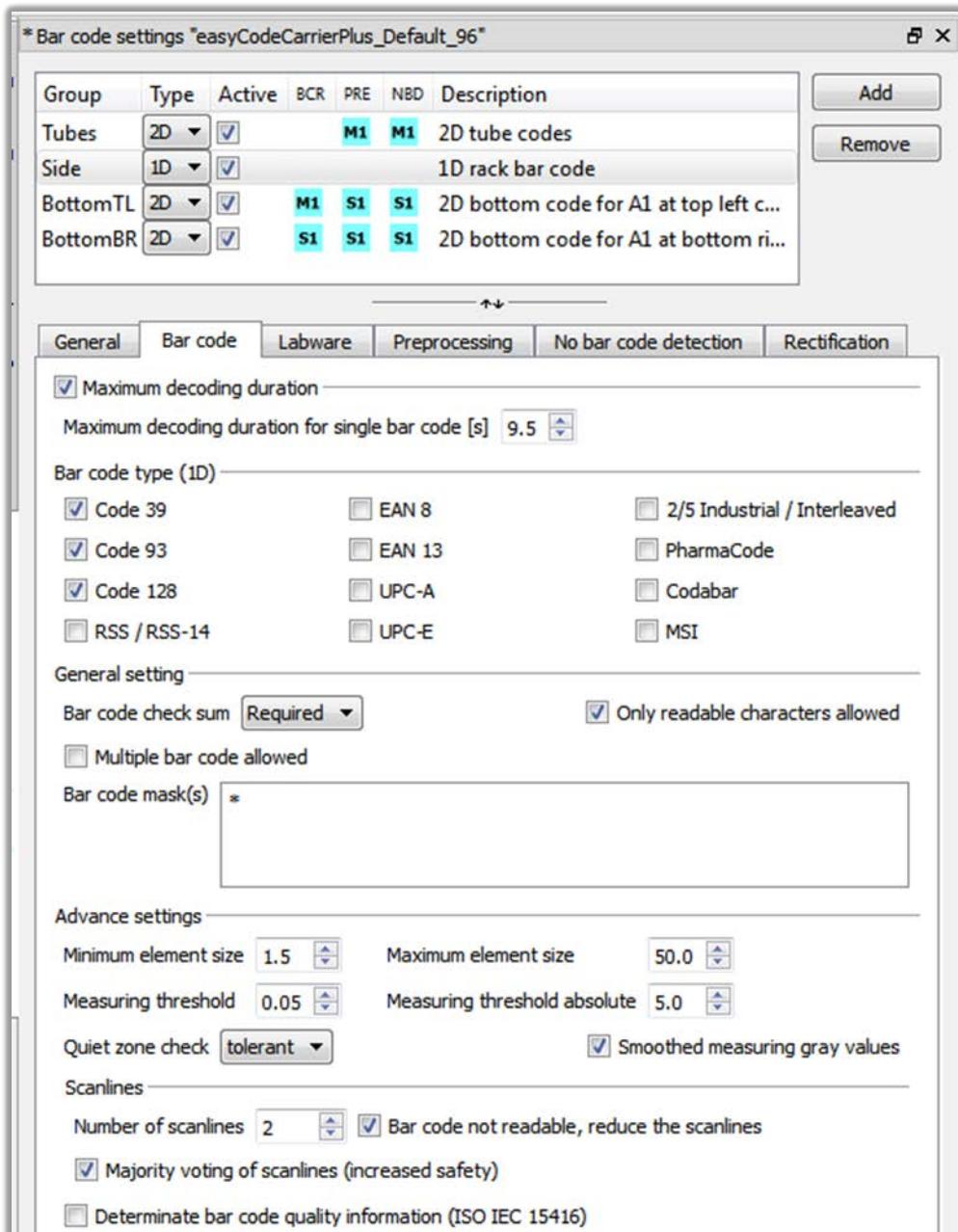
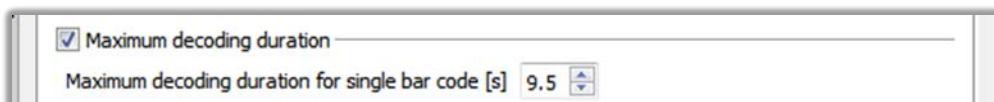


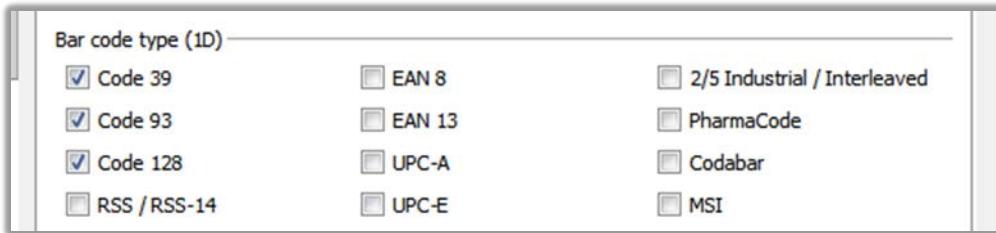
Figure 19: 1D Barcode Settings

Bar Code Settings:

- **Maximum decoding duration:** Sets the time limit for the decoding of a single Bar Code.



- **Bar code type (1D):** Choose the type of 1D Bar Code you want to read.

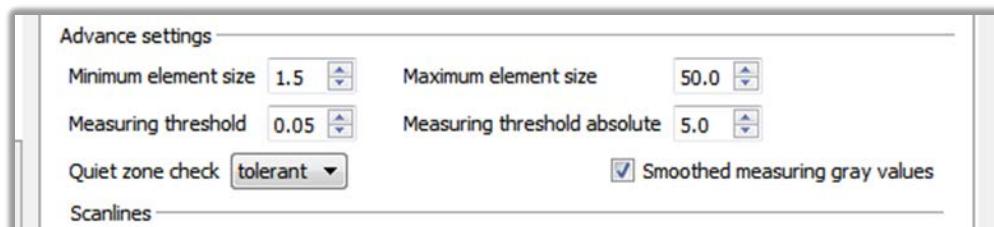


General Setting:



- **Bar code check sum:**
 - *Required:* Choose this if the Bar Code contains a checksum for higher safety. The Bar Code will be unreadable if the checksum is not decoded!
 - *None:* Choose this if the Bar Code does not contain a checksum.
 - *Optional:* In this case, a checksum will be decoded, but the Bar Code is still readable when the checksum decoding did not work.
- **Only readable characters allowed:** Mis-readings are rare and mostly happen when the algorithm wrongly detects a smaller Bar Code in the actual larger Bar Code. Mis-readings may contain several special characters like #)%), which do not occur in normal Bar Codes. Set the checkmark to reject Bar Code results with these characters.
- **Multiple Bar Code allowed:** If checked, several Bar Codes in one search area can be evaluated.
- The usage of Bar Code masks are an even better way to avoid mis-readings (see [Section 5.3.2 Bar Code Type \(2D\)](#)).

Advance Settings:

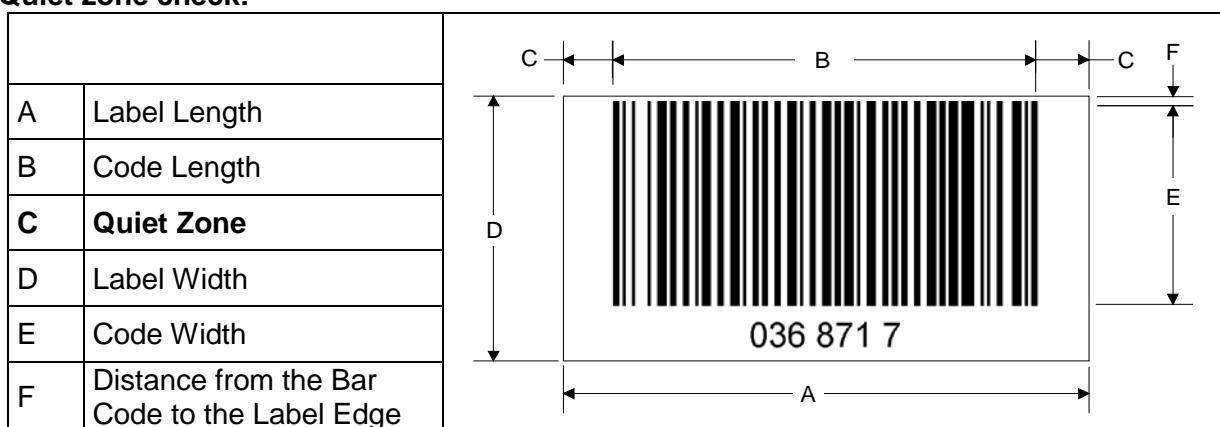


The easyCodeII Software creates 10 *scanlines* which are placed in the area of the Bar Code. Sudden changes of the brightness are detected as "edges". A series of edges can be interpreted as a Bar Code. In theory, it is possible to read a non-sense Bar Code which is not a Bar Code but some noise in the picture. The following settings deal with some of the mechanisms that prevent such mis-readings.

- **Minimum element size** defines the width in number of pixels of the thinnest line or bar in the Bar Code. For Rack Bar Codes, this is usually about 4 pixels. Only for very small Bar Codes, a smaller pixel size should be set.
- **Maximum element size** defines the width in number of pixels of the thickest line or bar in the Bar Code. For Rack Bar Codes, this is usually about 20 pixels.

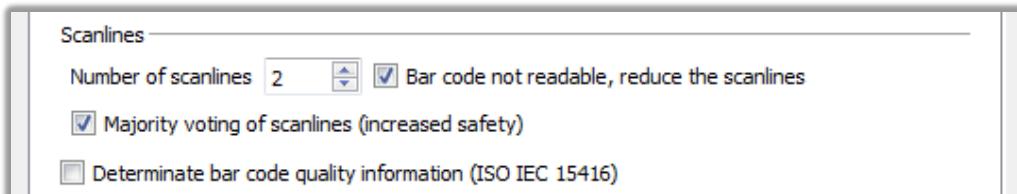
Proper settings will result in lower execution time and fewer candidates. It will avoid that a smaller part of the Bar Code is interpreted as a shorter string of numbers with completely different content. This can happen in rare cases and only if printing or light conditions are insufficient. Adaption of the element sizes and the Bar Code Mask are a simple way to avoid these problems.

- **Measuring threshold:** This threshold defines how large the change in brightness must be to be interpreted as an edge. This is a relative threshold that adapts to the dynamic changes in the background and can therefore be very small. If the picture is very noisy and contains disturbances, then it is better to choose a higher value. **Default: 0.05**
- **Measuring threshold absolute:** In some cases, it might make sense to change the absolute threshold as well. If the picture has a lot of noise, a higher value might help to read the Bar Codes properly. If the picture does not have much noise but has only low contrast, it is better to choose lower values or to disable this function by choosing 0.0. **Default: 5.0**
- **Quiet zone check:**



off:	The Bar Code is decoded even if the Quiet Zone is violated (contains edges)
on:	The quiet zone has to have the size according to the specifications of the respective Bar Code
Tolerant:	A few edges are allowed in the Quiet Zone
2x:	
3x:	The size of the Quiet Zone is increased by a factor of 2 or 3

- **Smoothed measuring gray values:** Usually the gray values are smoothed to lower the effects of noise. In pictures with very small Bar Codes, it is better to disable this feature otherwise one or several bars of the Bar Code may disappear.

Scan Lines:

- **Number of scanlines:** Defines the minimum number of scan lines that must have the same result. A higher number of scan lines will increase safety but will lower the probability of successful reading.
- **Bar code not readable, reduce the scanlines:** If you set this checkmark, you can automatically reduce the number of scan lines (which deliver the same result) if the Bar Code was not readable.
- **Majority voting of scanlines:** Chooses the Bar Code result that is delivered by the majority of the scan lines. This provides much reading safety but is more flexible than the minimum number of scan lines.
- **Determinate bar code quality information:** When set, all the Bar Codes are evaluated according to ISO 15415. The results of the evaluation are added to the results table. Only use for evaluation purposes.

5.3.2 Bar Code Type (2D)

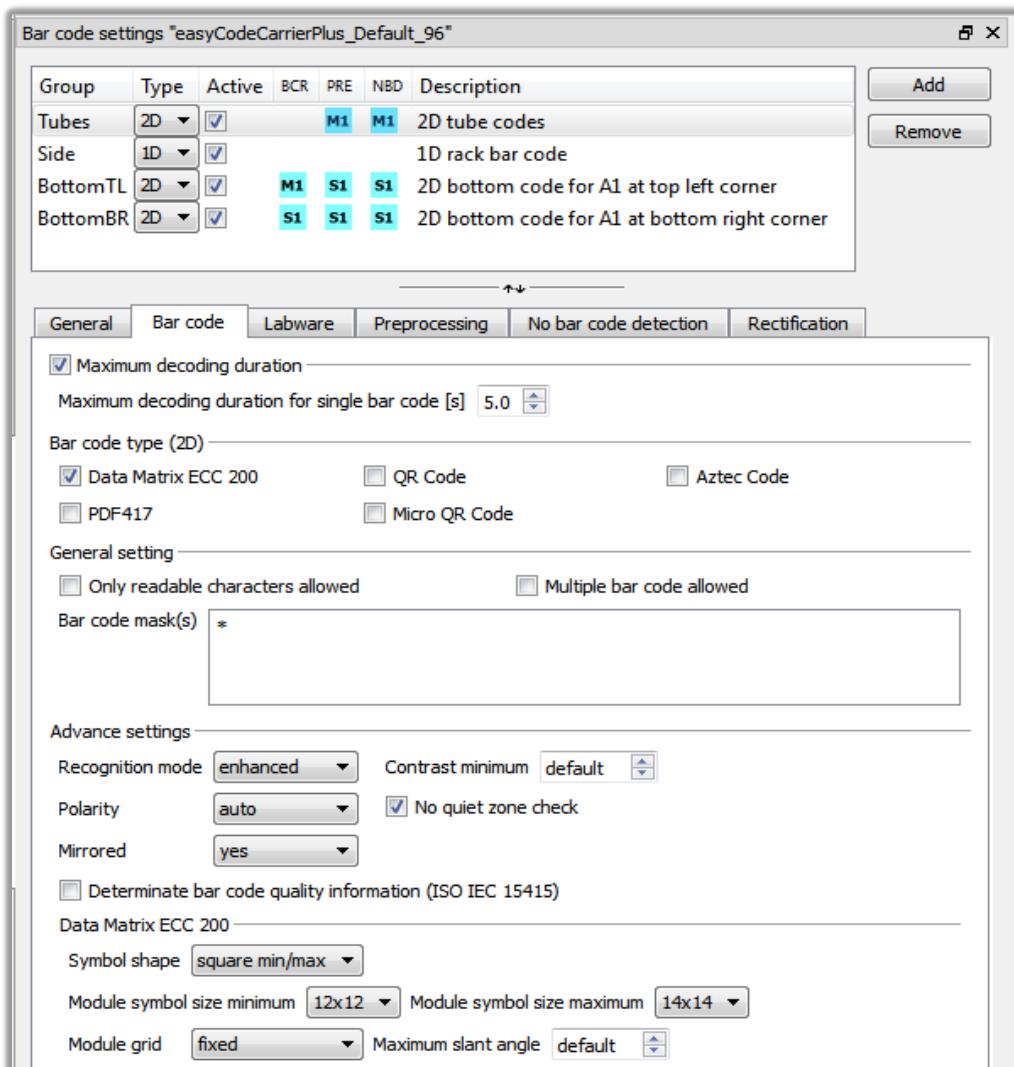
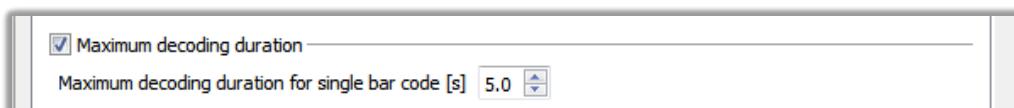


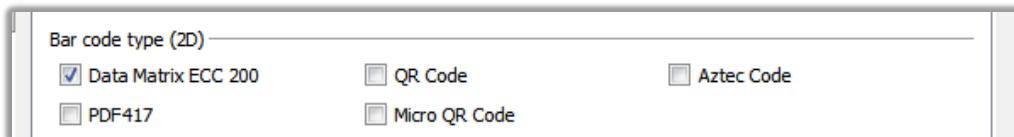
Figure 20: 2D Bar Code Settings

Bar Code Settings:

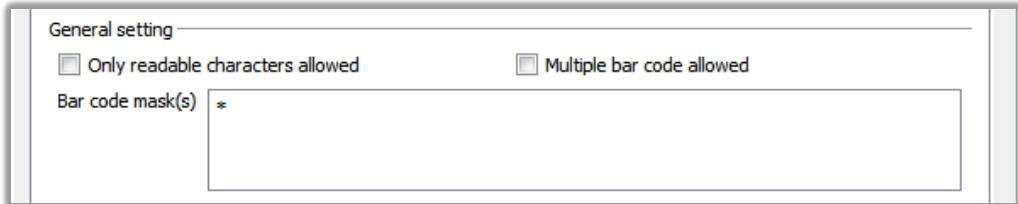
- **Maximum decoding duration:** Set the a time limit for the decoding of a single Bar Code.



- **Bar code type (2D):** Choose the type of 2D Bar Code you want to read. The Bar Code type on storage tubes is in nearly all cases Data Matrix ECC 200.



General Setting:



- Only readable characters allowed:** Mis-readings of 2D Bar Codes are rare and mostly happen when the algorithm wrongly detects a smaller Bar Code in the larger actual Bar Code. Often these mis-readings contain several special characters like #)%), which do not occur in normal Bar Codes. Set the checkmark to reject Bar Code results with those characters. The usage of Bar Code masks and proper matrix size settings are an even better way to avoid mis-readings.
- Multiple bar codes allowed:** If checked, several Bar Codes in one search area can be evaluated.
- Bar Code Mask (1D and 2D Bar Code Types):**

If you work with the Bar Code Mask, all read Bar Codes that do not contain the defined mask content will have an error e.g. this might be helpful to make sure that no Bar Codes from a wrong batch will be read by mistake.

If you do not use the Bar Code Mask, just leave the “**” in the input field.

Example:

Position	Bar code	Bar code type	Error
001 / A1	1024557816	Data Matrix ECC 200	(0) No error
002 / A2	1024556229	Data Matrix ECC 200	(0) No error
003 / A3	1024536006	Data Matrix ECC 200	(105) Wrong bar code mask
004 / A4	1024536007	Data Matrix ECC 200	(105) Wrong bar code mask

Figure 21: Bar Code Mask

A detailed explanation of the place holders is listed in the table below:

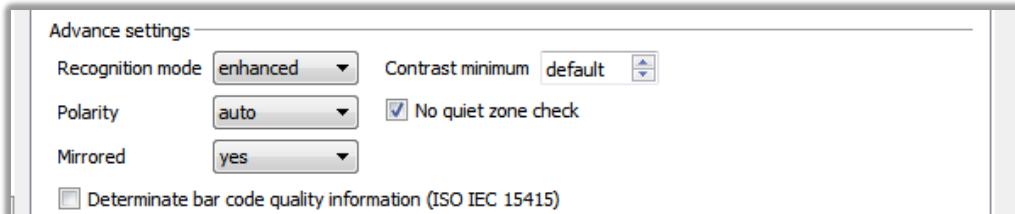
Place holder	Explanation	Example	Successful matches	Unsuccessful matches
*	Place holder for none or any amount of characters	*45*	456789 123456 345678	654321 123467
?	Place holder for one character	12345?	123456 123457 123458	1234567 23456
[]	Place holder for one character which has to match with one	12[abc]345	12a3456 12b3456 12c3456	12abc345 12d3456 123456

Place holder	Explanation	Example	Successful matches	Unsuccessful matches
	from the set in brackets			
[^]	Place holder for one character which must not match with one from the set in brackets	12[^abc]345	12d345 122345 12_345	12a3456 12b3456 12c3456

Use of place holders as mask characters in the Bar Code:

Place holder	Explanation	Example	Successful matches	Unsuccessful matches
[*]	Write place holder in square brackets to use them as a character in the mask.	*567[*]	abc 567 * 123 4567 *	345678
[?]		123[?]?	123? 4 123? a 123??	12345 123ab
[[]]		12[[]]a*	12[a 45 12[ab c	12a45
[[]]		12[[]]a*	12]a 45 12]ab c	12a45

Advance settings:



- Recognition mode:** Can be set to *standard*, *enhanced* or *maximum* and activates stronger decoding strategies. These functions, especially increase the readability of small 2D Bar Codes, but will lead to a longer decoding time.
- Polarity:** Depending on your Labware, the 2D Bar Code is light background on dark color bars or the other way around. For the recognition, you can choose between "auto", "dark on light" or "light on dark". Only choose auto if you don't know the polarity since this will slow down evaluation speed.
- Mirrored:** Depending on your Labware or the reading hardware, the 2D Bar Code might be mirrored. For recognition, you can choose between auto, no and yes. Only choose "auto" if you don't know whether the Bar Code is mirrored since this will slow down evaluation speed.



ATTENTION: Use these settings with care! Inappropriate settings will make decoding impossible. If you do not choose "auto", it will only read Bar Codes that apply to the settings e.g. if you set polarity to light on dark, a tube with a dark on light Bar Code cannot be decoded.

- **Contrast minimum:** This threshold value differs between dark and light zones. The lower the value is, the faster a contrast will be detected, i.e. also contour and noise can lead to false Bar Code candidates. Higher values reduce false zone detections but also reduce the chance of Bar Code detection. The default value is an empirical evaluated threshold value for typically lighted Bar Codes.
- **No quiet zone check:** All Data Bar Codes require an empty area around the Bar Code, which is called "quiet zone". When the checkmark is set even Bar Codes with a poor quiet zone are accepted.
- **Determinate bar code quality information:** When set, all the Bar Codes are evaluated according to ISO 15415. The results of the evaluation are added to the result table. Only use for evaluation purposes.

Data Matrix ECC 200

The screenshot shows a software interface for configuring a Data Matrix ECC 200 barcode. It includes fields for 'Symbol shape' (set to 'square min/max'), 'Module symbol size minimum' (set to '12x12'), 'Module symbol size maximum' (set to '14x14'), 'Module grid' (set to 'fixed'), and 'Maximum slant angle' (set to 'default').

- **Symbol shape:** Here you can set the shape (square or rectangle) and the size of the matrix of the Bar Code.

Auto	Accepts all shapes and sizes.
Rectangle auto	Accepts rectangle Bar Codes of all sizes.
Square auto	Accepts square Bar Codes of all sizes.
Square fixed	Only accepts square Bar Codes of the Module symbol size that you can set below.
Square min/max	Only accepts square Bar Codes of the Module symbol size within a certain range that you can set below.

Only choose "Auto" if you don't know the module size since this will slow down evaluation speed. Choose "min/max" also if you expect Racks with mixed symbol sizes, such as Tubes with 14 x 14 and 12 x 12.



ATTENTION: Use these settings with care! Inappropriate settings will make decoding impossible. If you do not choose auto, it will only read Bar Codes that apply to the settings e.g. if you set the symbol size to a fixed value, tubes with other Bar Code sizes cannot be decoded.

- **Module grid:** Can be set to variable if the sizes of the modules in the Bar Code will vary within the Bar Code. On the easyCode Carrier, it is recommended to choose "fixed" since the modules within a 2D Bar Code will all be the same.
- **Maximum slant angle:** Choose maximum allowed slant of a 2D Bar Code. It is best to leave it at default (3°).

5.4 Labware Tab

Here you can define your Bar Code search field area and Position Identifier. It is recommended to define the Labware Settings prior to other settings.

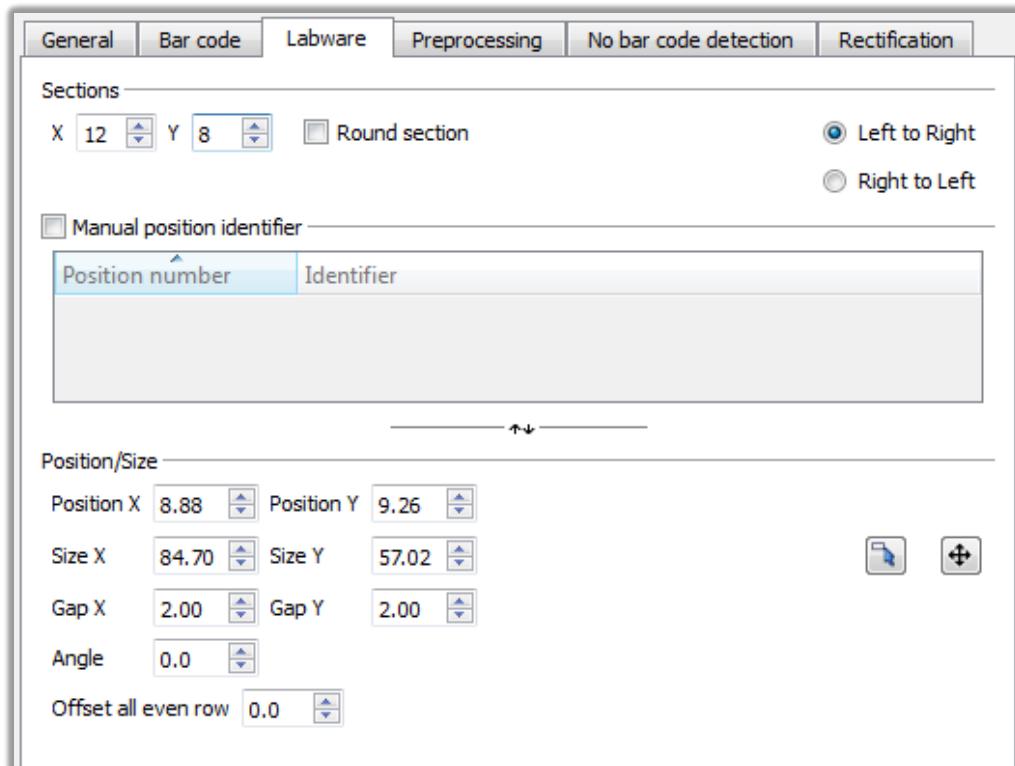
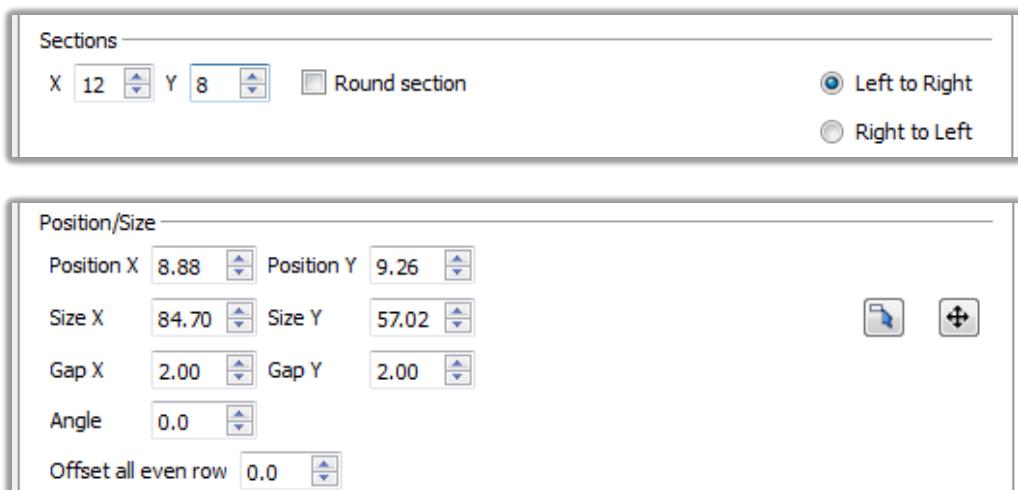


Figure 22: Labware/Position Tab

5.4.1 Bar Code Search Field Area



Under "Sections", you can choose the amount of search fields (pink squares) where easyCode should look for Bar Codes. If "Round section" is checked, the search fields become circles.



Under "Position/Size", this button lets you draw a new search field with the mouse.

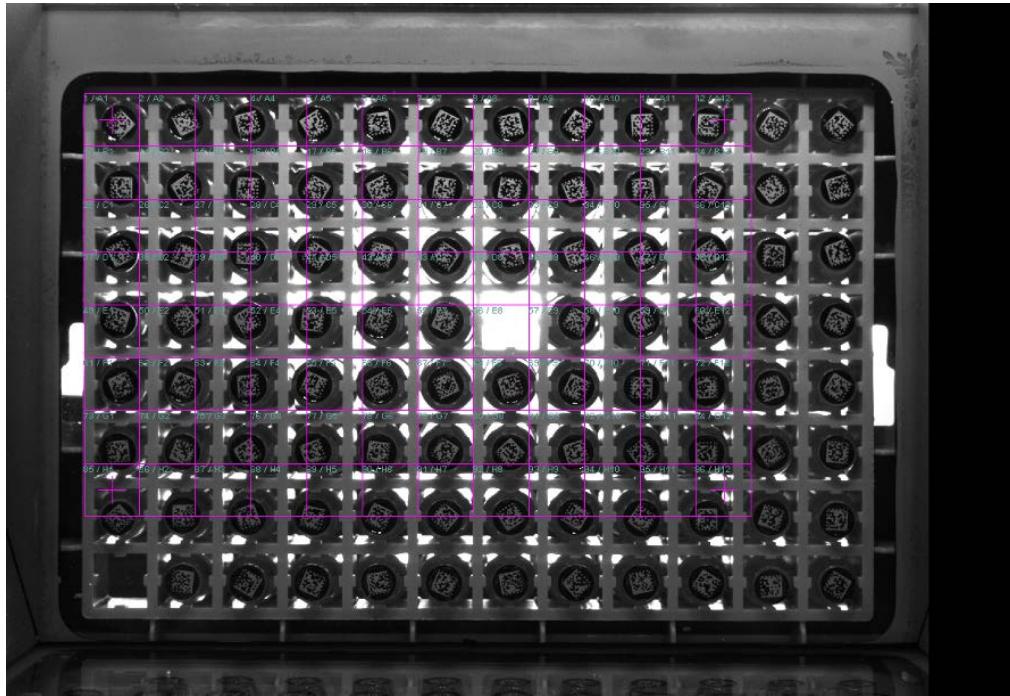


Figure 23: Draw a New Search Field



Under "Position/Size", this button lets you shift the corners of the search field and shift the complete search field by clicking on the red squares in the search field.

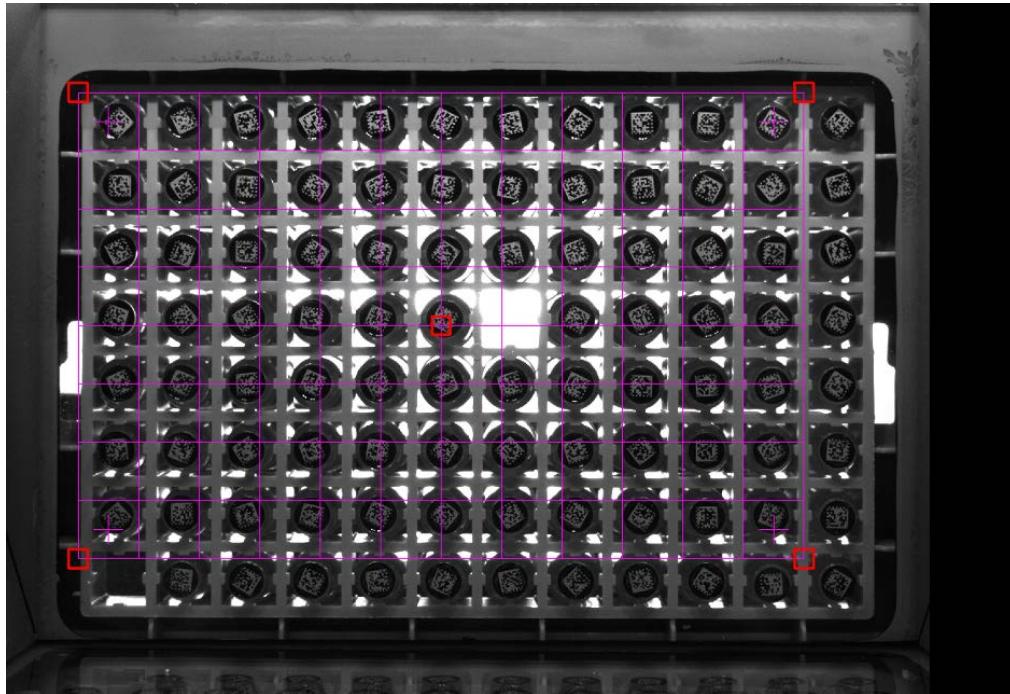


Figure 24: Shift Corners of the Search Field

These let you shift the complete search field, change its size, rotate it and also create gaps between the single search fields. It is recommended to make the gaps as big as possible and to the squares just as big as necessary. This will speed up the evaluation process. As a good example see [Section 4.3 How to Optimize Decoding Speed](#).

With the input field "Offset all even row" every other row can be shifted to the left or to the right. This is needed for Tube Racks with a honeycomb structure.

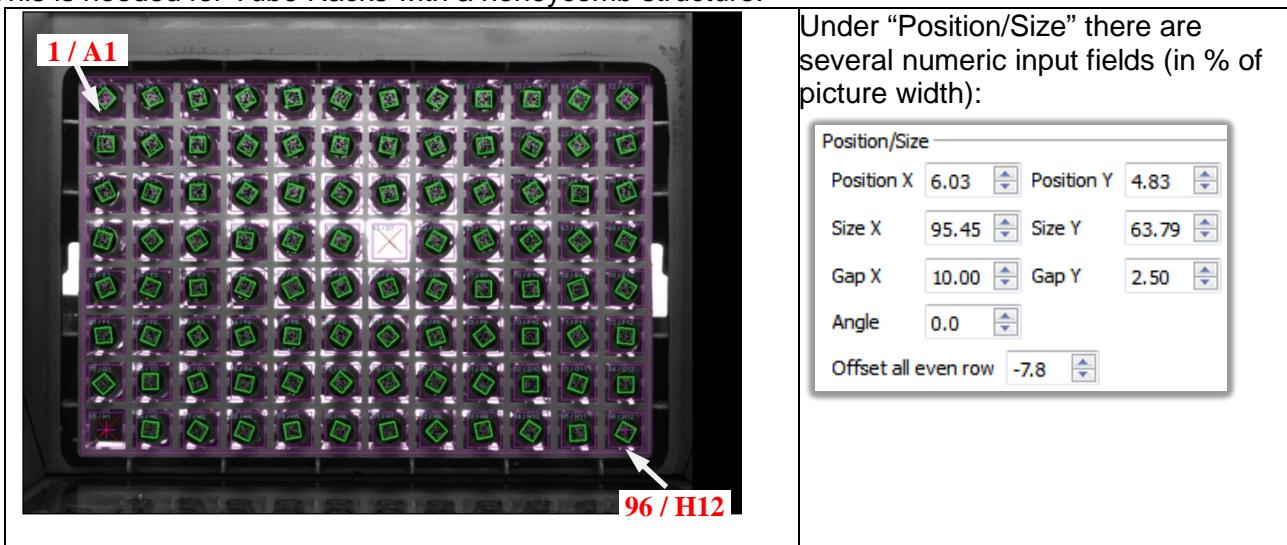
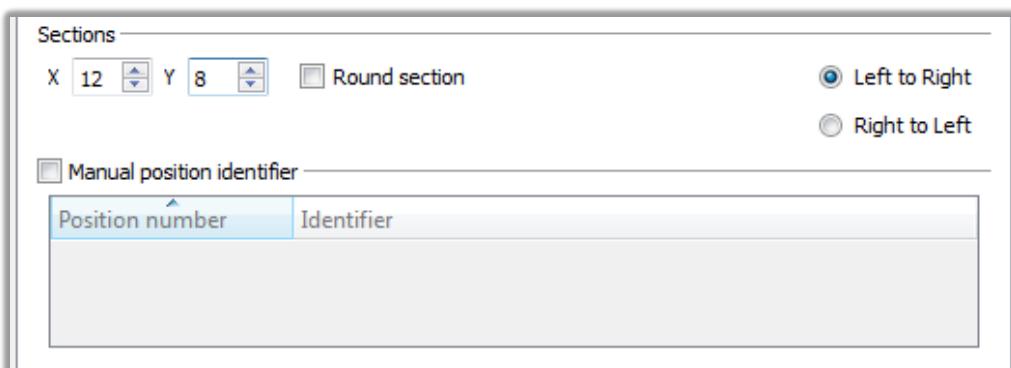


Figure 25: Image of Tube Rack with Honeycomb Structure

5.4.2 Manual Position Identifier



If the "Left to Right" Button is selected, the search field on the upper left hand side is for position 1 named A1 and the numbering goes from left to right and from top to bottom. For a Tube Rack with a 12x8 format, the position on the lower right hand side is for position 96 then named H12. If the "Right to Left" Button is selected, the naming of the positions is done vice versa, i.e. lower right hand side will be called A1.



ATTENTION: Correct tube orientation assignment is very important to avoid false tube identification!

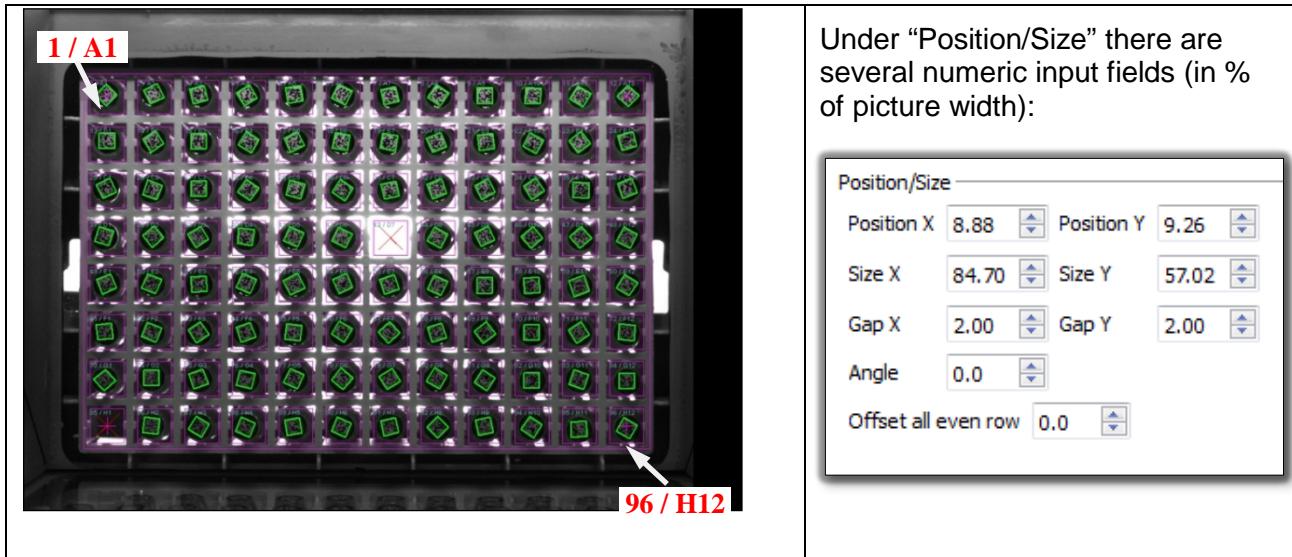


Figure 26: Standard Alpha-Numeric Position Definitions of Tubes, when the “Left to Right” Button is Selected

If the tube position naming does not follow the standard definitions (honeycomb plates, random tube allocations, positions for Rack Bar Codes as side Bar Code and bottom Bar Code), each position can be assigned manually.

General		Bar code		Labware		Preprocessing
Sections						
X	6	Y	8	<input checked="" type="checkbox"/>	Round section	
Manual position identifier: Activate this function when using “honey comb” Racks with a diagonal pattern and numbering that does not follow the standard. Each position number can be linked with an Identifying Code.						
<input checked="" type="checkbox"/>	Manual position identifier					
Position number	Identifier					
0001	A2					
0002	A4					
0003	A6					
0004	A8					
0005	A10					
0006	A12					
0007	B1					

5.5 Preprocessing Tab

When Bar Codes are difficult to read, these settings can be modified to optimize readability.

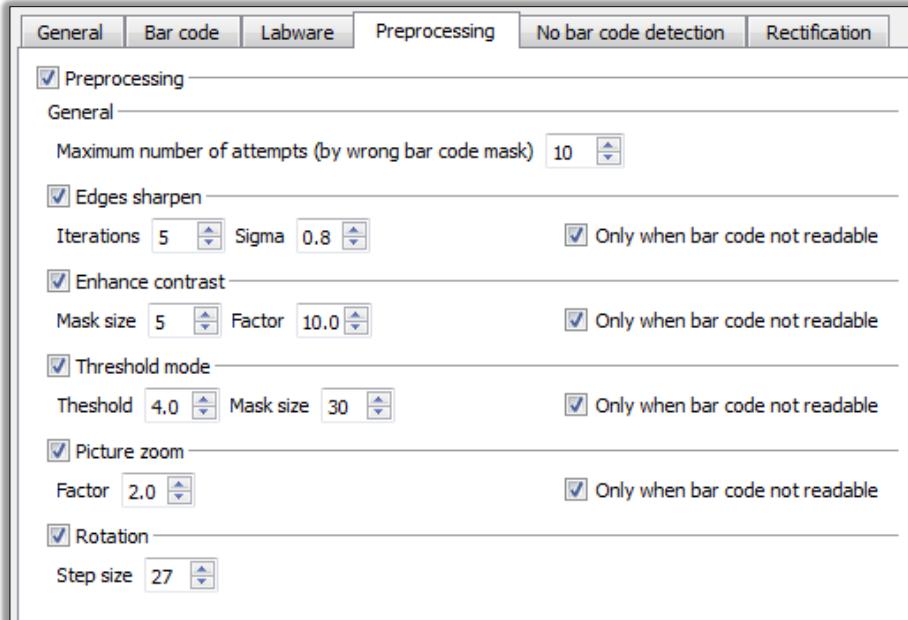


Figure 27: Preprocessing Tab

Checkbox "Only when bar code not readable": When selected, the function only applies when the Bar Code is not readable. When un-checked the function always applies.

Edges sharpen: Check this when the picture is blurred.



Enhance contrast: Used when the contrast is bad.



Threshold mode: Produces a binarized picture with only black and white regions. Helpful when the contrast is low.



Picture zoom: Can be used when using small Bar Codes. While a Bar Code is being evaluated, the search field is shown enlarged.

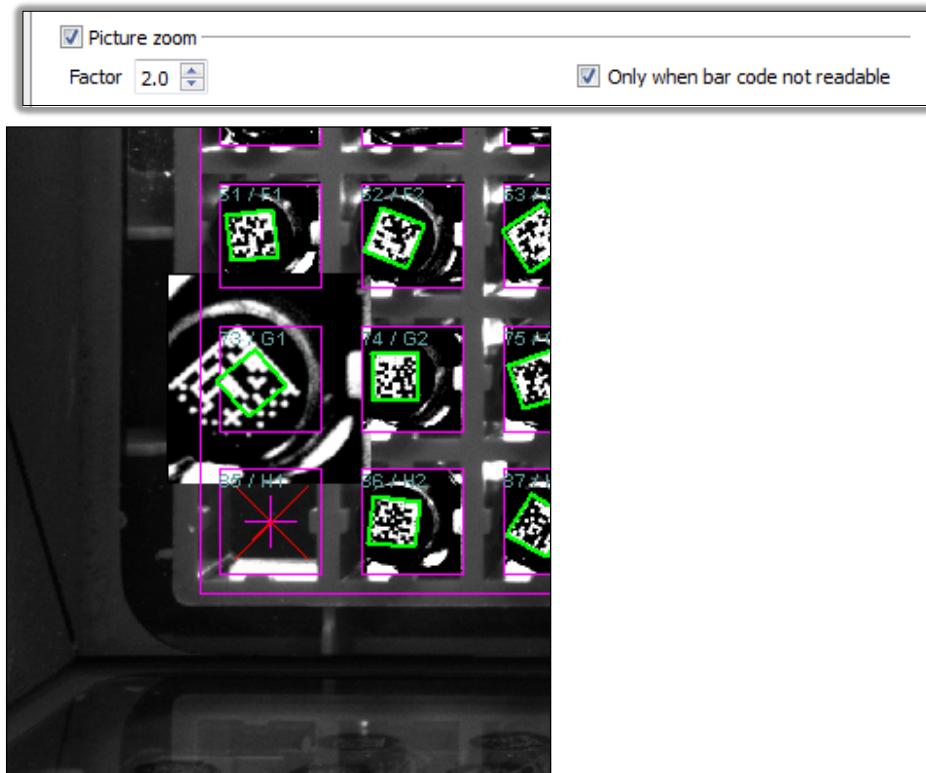


Figure 28: Zoomed Picture of a Tube Bar Code

Rotation: The search region is being rotated if the Bar Code could not be read. The step sizes can be varied to optimize the performance. The default of 27 degrees is a compromise between good readability and evaluation time.



5.6 No Bar Code Detection Tab

The “No bar code detection” function is useful when using Racks that are not completely filled with Tubes. In this case, the evaluation speed can be accelerated. If the Racks are always completely filled, this function should be un-checked.

The function looks for edges where Bar Codes are expected. Since a Bar Code will show a lot of edges, the software can use this criteria to distinguish whether a Tube (with a Bar Code) is present or not.

The appearance of the window below changes depending on the Bar Code Type (1D or 2D).

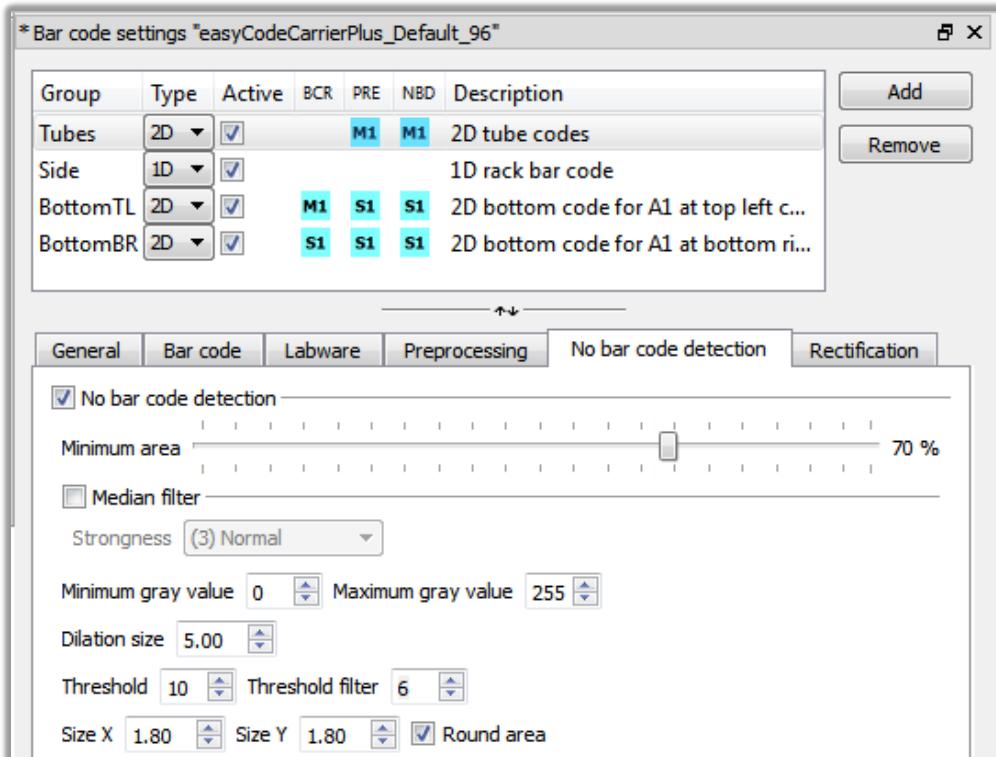


Figure 29: “No bar code detection” (2D) Tab

To set the parameters in this No Bar Code Detection Tab, proceed as follows:

1. Activate the "Detection" checkbox to show the detection function (blue lines). The blue circles show the area where the function looks for edges. These found edges are displayed in blue and are surrounded by a bright blue band. The percentage of blue color in the ellipse is then calculated and used for the “No bar code function”.

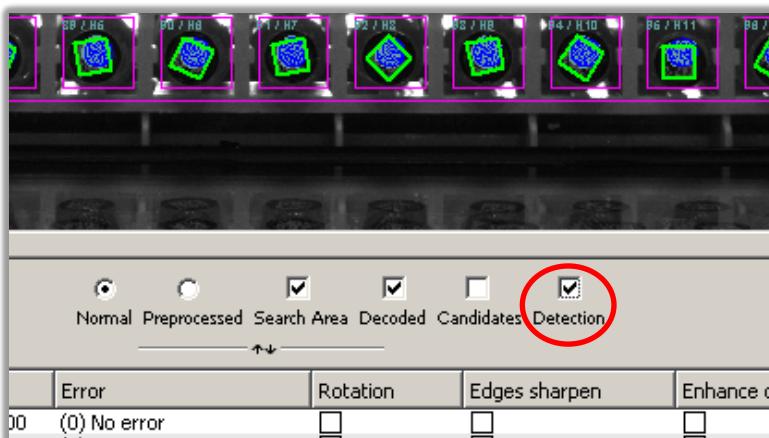


Figure 30: Detection Check Box

2. “Round area” should be checked. Set the size of the blue circles in such a way that it covers as much of the Bar Code as possible. The size in X and Y should have the same values so that the areas are circles. These are automatically positioned in the center of the search fields.
3. Set the “Threshold” as high as possible, however, the edges of the Bar Codes must still be detected (blue lines). Leave the "Threshold filter" value at "6".

4. With the "Dilation size", you can adjust the width of the bright blue band around the found edges. Set this value as low as possible, however, make sure the blue circles are well filled with the bright blue color where a Bar Code is present. See [Figure 31: Example with Well Defined Parameters when a Tube is Present](#).
5. Set the "Minimum gray value" to "0" and the "Maximum gray value" to 255 for 2D Bar Codes only.
6. Now adjust the slider "Minimum area". This value is the relation between the sizes of the bright blue area and the area within the blue circle. For most Rack types 80% is a good value. If you have wrong detections proceed as follows:
 - a. Function detects a tube where no tube is present: increase the "Minimum area" value
 - b. Function detects no tube where a tube is present: decrease the "Minimum area" value

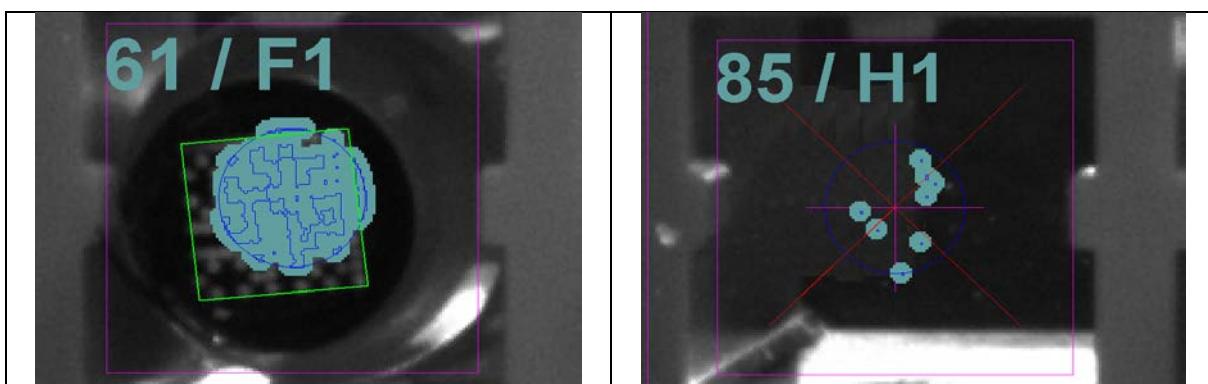


Figure 31: Example with Well Defined Parameters when a Tube is Present

Figure 32: Example with Well Defined Parameters when No Tube is Present

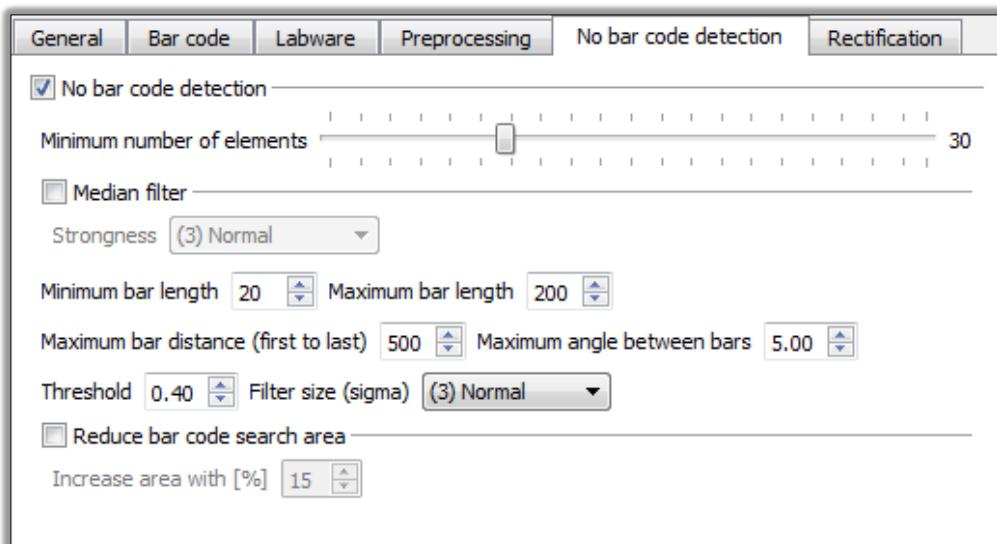


Figure 33: "No bar code detection" Tab (1D)

If you have chosen a group with 1D Bar Codes, some additional settings for the detection of the Bar Codes are available.

- **Minimum and maximum bar length:** Defines the expected length of the Bar Code elements in pixels.
- **Maximum bar distance:** The horizontal maximum length of the Bar Code from the first to the last bar.
- **Maximum angle:** In case of distortions, the bars of the Bar Code might not be completely parallel. With this setting you can specify a certain angle that is allowed between the bars.

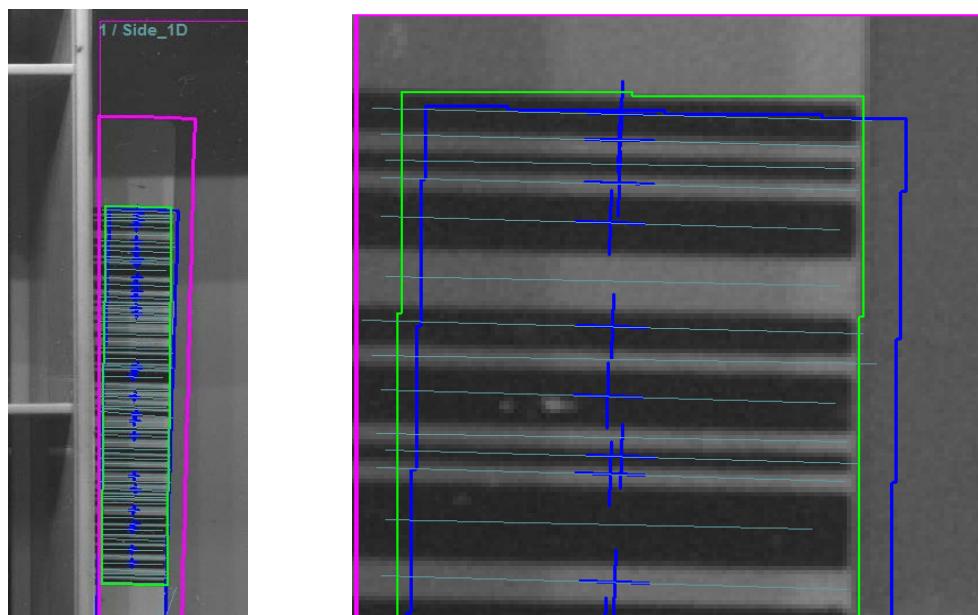


Figure 34: Example when Rack Side Code is Present

5.7 Rectification Tab



NOTE: This Function is **not used** for easyCode, therefore the following description is for information only.

“Rectification” is meant to decode distorted Bar Codes from Tubes imaged from a very steep angle and / or if the Bar Code Labels are on curved surfaces.

6 Camera Settings

For most applications, loading the default settings should be suitable. For the easyCode Carrier, the following Camera default settings are also available:

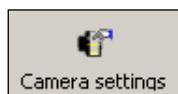
For easyCodeCarrier, the following default settings are available:

- easyCodeCarrier_Default_150.camerasettings.xml
- easyCodeCarrier_Default_200.camerasettings.xml
- easyCodeCarrier_Default_300.camerasettings.xml

For easyCodeCarrier^{Plus}, the following default settings are available:

- easyCodeCarrierPlus_Default_150.camerasettings.xml
- easyCodeCarrierPlus_Default_200.camerasettings.xml
- easyCodeCarrierPlus_Default_300.camerasettings.xml

However, in some cases it might be necessary to adapt the camera settings.



The "Camera settings" Window is activated per default and displayed on the upper left hand side of the main window.

There are 5 Tabs in this Window: "Basic", "Enhancement", "White balance", "TriggerFlash/IO" and "Device".

With the buttons on the lower left hand side of this Window, the Settings can be saved or existing settings can be loaded.

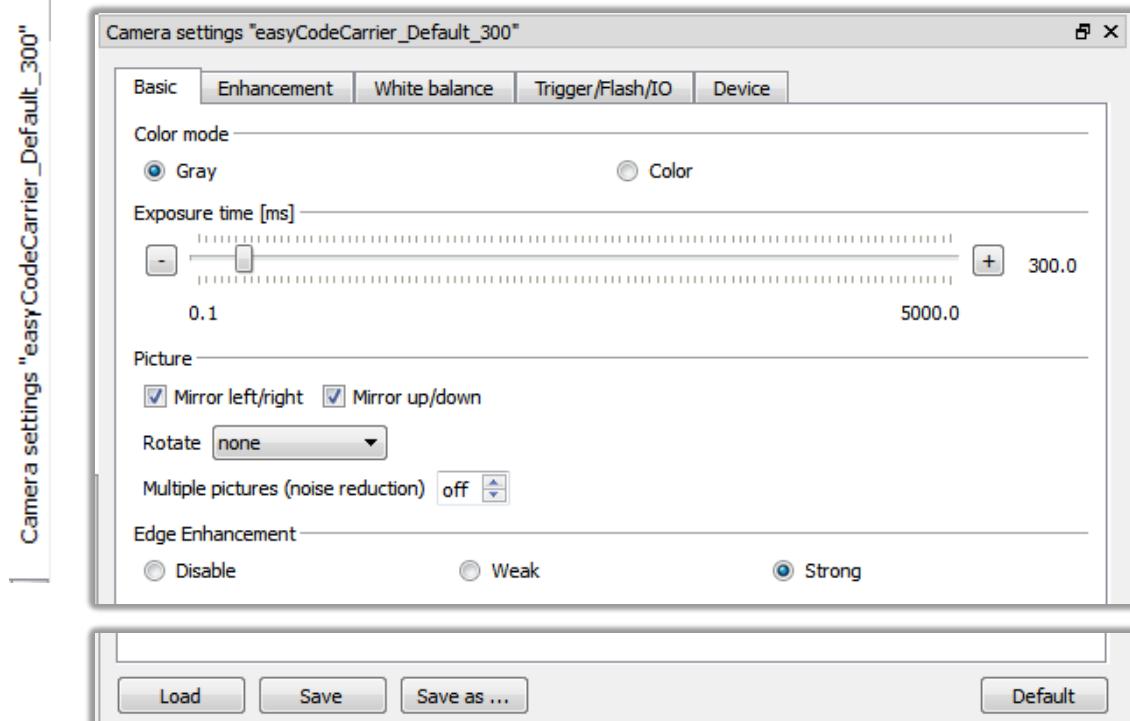
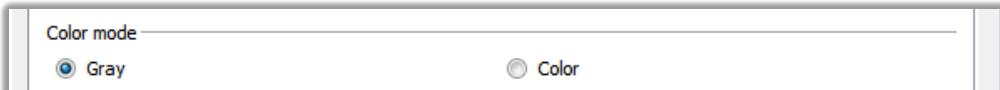


Figure 35: Window Camera Settings, Basic Tab

Relevant parameters are mentioned at the beginning of the following descriptions.

6.1 Basic Tab

Color mode:

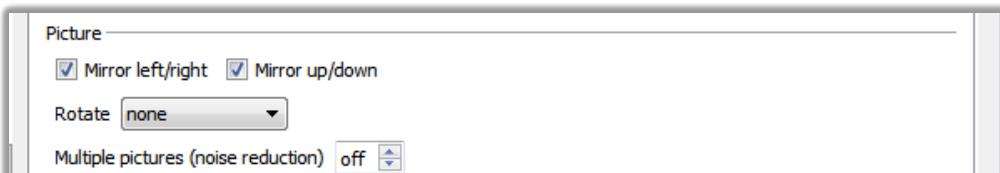


- With the radio buttons under color mode you can switch between "Gray" and "Color". Choose "Gray" since "Color" doesn't give you any advantages.

Exposure time:



- The main parameter is the **Exposure Time**, depending on the Rack material. The rest should not be changed for the easyCode Carriers.
- Underneath the **Exposure Time** can be adjusted. e.g. this can be increased for dark Racks.



- In the **Picture** Section, the picture can be mirrored or even rotated.
- Choose **Multiple pictures** to reduce the noise of the picture. Then a number of pictures will be added into one. The time for picture acquisition is then accordingly longer.

Edge Enhancement:



- "Edge Enhancement" activates the image sharpness enhancement in the camera.

6.2 Enhancement Tab

Use default values except when specifically recommended by experts.

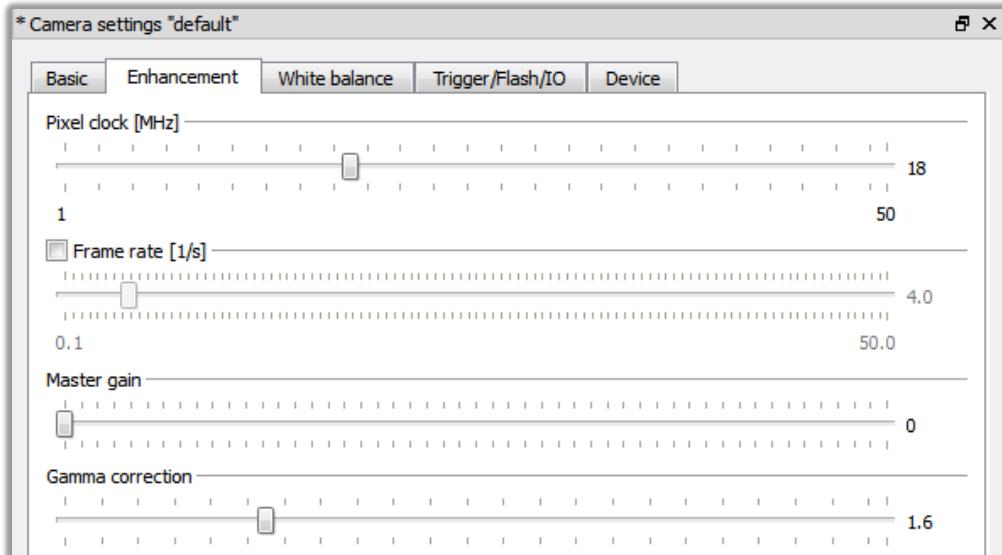


Figure 36: Camera Settings: Enhancement

The **Pixel Clock** is set on 18 MHz by default and should only be changed in case of USB connection problems. For detailed information see [Section 9.7 Problems with Camera Connection](#).

Frame Rate increases the rate of picture transfer. Do not change!

Master Gain activates the internal amplifier of the camera. It is useful for very poor lighting conditions, but will also enhance noise. Do not change!

Gamma Correction: Can be used to adapt color properties of the camera picture (do not change).

6.3 White Balance Tab

Mode disabled because it is either a black & white (gray) Camera or the color mode is defined as "gray" (see [Section 6.1 Basic Tab](#)).

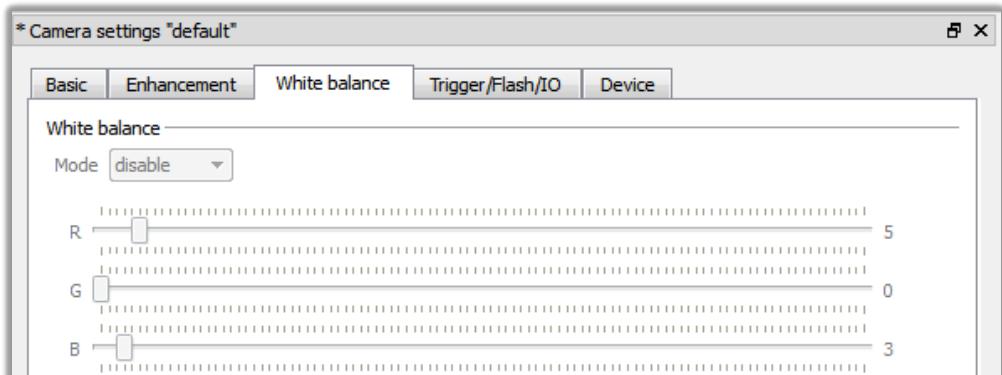


Figure 37: Camera Settings: White Balance

6.4 Trigger/Flash/IO Tab

"External trigger" and "External flash" should be switched OFF, because it is not relevant for the easyCode Carrier and the easyCode Carrier^{Plus} Installation.

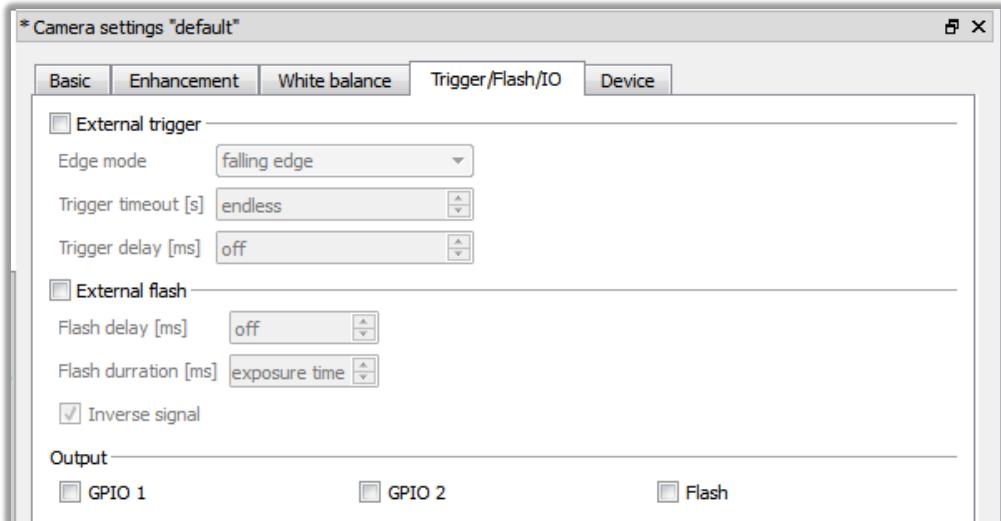


Figure 38: Camera Settings: Trigger/Flash/IO

The input and output ports of the Camera can be used to trigger picture acquisition with an external element or to control an external light.

6.5 Device Tab

In case only one Camera is connected to the USB, the **Default Camera** is automatically selected.

In a multiple Camera system, select the corresponding Camera, using preferable the connection mode "Camera serial number" (unique identification). Connection can be checked with the "Liferview" Option, see also [Section 9.7 Problems with Camera Connection](#).

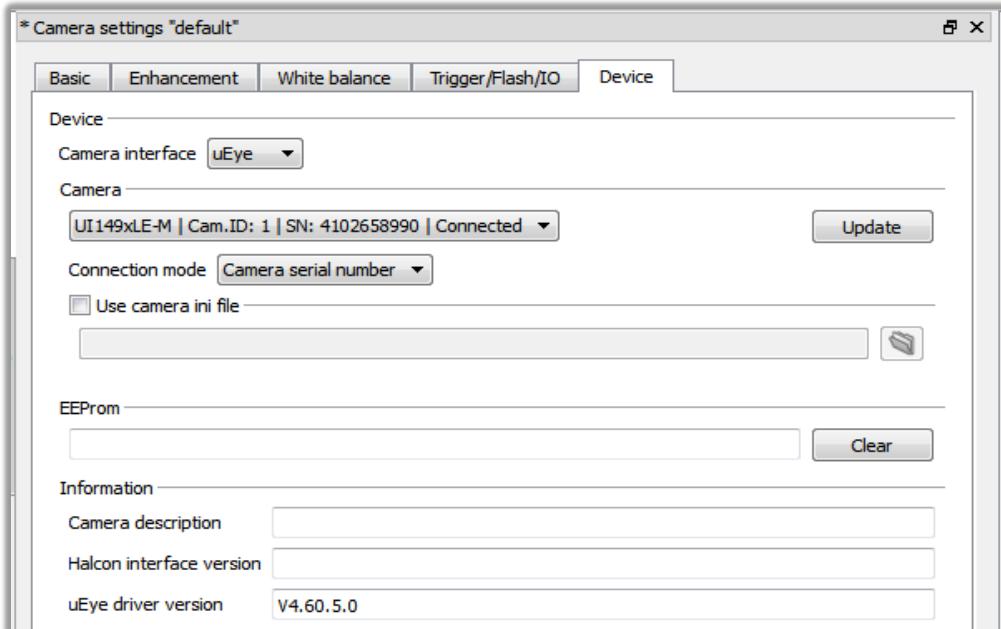
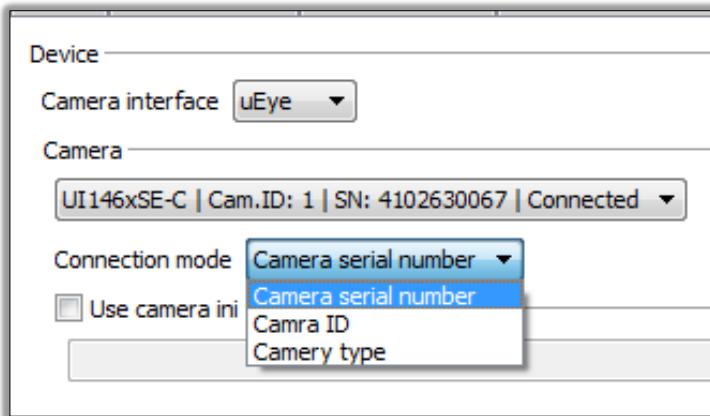


Figure 39: Camera Settings: Device

The **Device Tab** gives you the possibility to choose the correct device in case of more than one Camera is connected. The Camera can be identified by its Serial Number, its Camera ID or the type of Camera.

**Figure 40: Camera Settings: Connection Mode**

7 Demo Methods for easyCodeII Software

For Microlab® STAR Instruments and VENUS Software

7.1 Overview Demo Methods

During installation, three demo methods were installed on the Controlling PC Hard Disk.

They are all saved to the following path:

<Program Files>\Hamilton\Methods\easyCodeII\Methods

- easyCodeII_ReadBarcodeDemo.med

This method shows an example of a method where easyStep Commands are used.

- easyCodeII_SmartStep_ReadBarcodeDemo.med

This method shows the same example but realized with smartStep Commands.

- easyCodeII_TurnOnTheLight.med

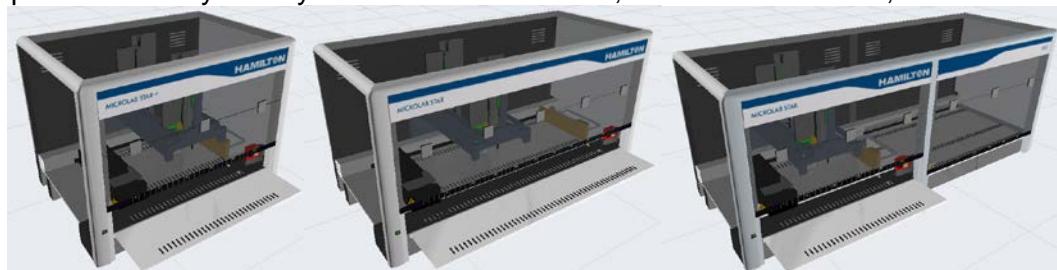
This method just turns ON the Light of the easyCode Carrier or the easyCode Carrier^{Plus}. It is provided to be used to initially find the settings in the easyCodeII Software Application without having already created a method.

7.2 Adapt Demo Methods to Microlab® STAR Hardware

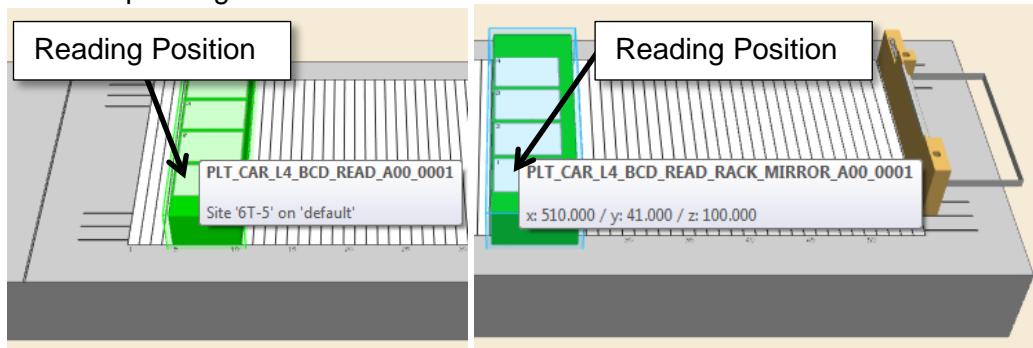
Select a useful Demo Method and copy it under a new name (and folder).

7.2.1 Adapt Deck Layout

Adapt the Deck Layout to your Microlab® STARLet, STAR or STARPlus,



with a corresponding carrier:

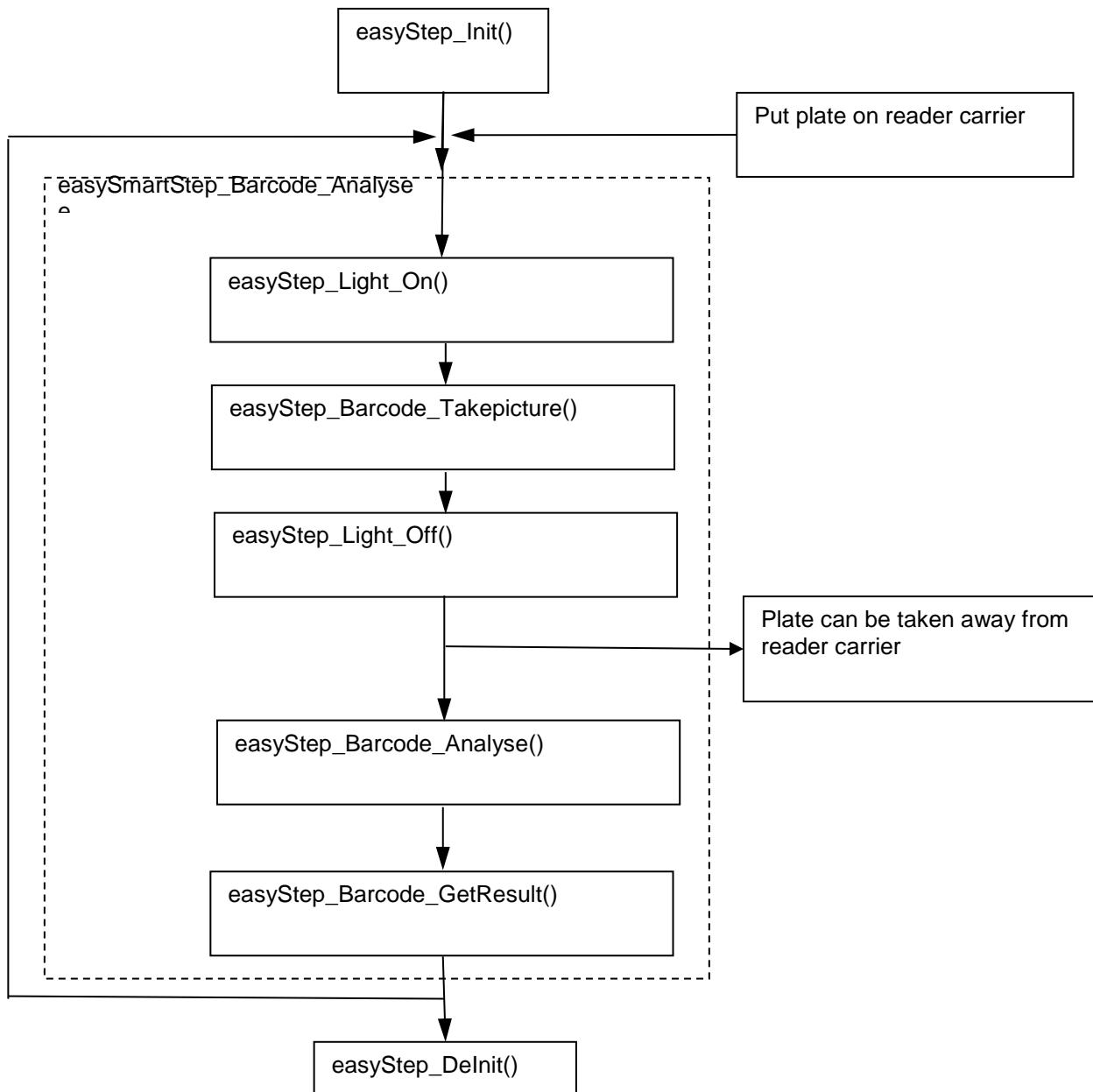


7.2.2 Adapt Connector for Light

In the method select the DIV Connector (DIV2 or DIV3) of the STAR where the easyCode Carrier or easyCode Carrier^{Plus} is connected (see [Figure 5 and 6 Cable Connections](#)).

7.3 Basic Example of a Method to Read Bar Codes

The following easySteps (or easySmartStep) should be programmed in the order shown as in the flow diagram below.



8 easyCode Library for the Microlab® STAR VENUS Software

8.1 Structure

In the folder "C:\...\Hamilton\Library\easyCodeII Library" are three available libraries:

- EasySteps Library (Helper Library): easyCodeII_Helper.smt
- SmartSteps Library: easyCodeII_SmartStep.smt
- General Library: easyCodeII_Library.hsl

In the folder "C:\...\Hamilton\Methods\easyCodeIIMethods", three demo methods are available:

- Read Bar Codes with Helper Library steps easyCodeII_ReadBarcodeDemo.med
- Read Bar Codes with Smart Steps easyCodeII_SmartStep_ReadBarcodeDemo.med
- Switch ON the Light easyCodeII_TurnOnTheLight.med

8.2 EasySteps Library (Helper Library)

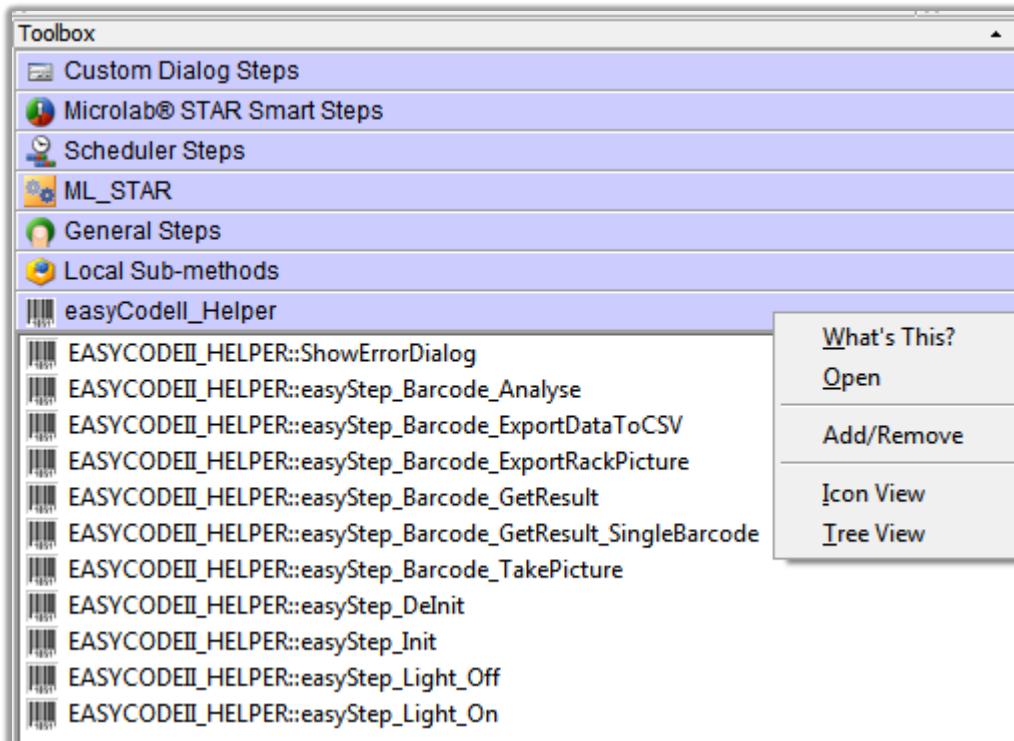


Figure 41: Toolbox with EasySteps Library

Help information to each step can be displayed with "What's This?" (Click the Right Mouse Button on the corresponding step).

8.3 SmartSteps Library

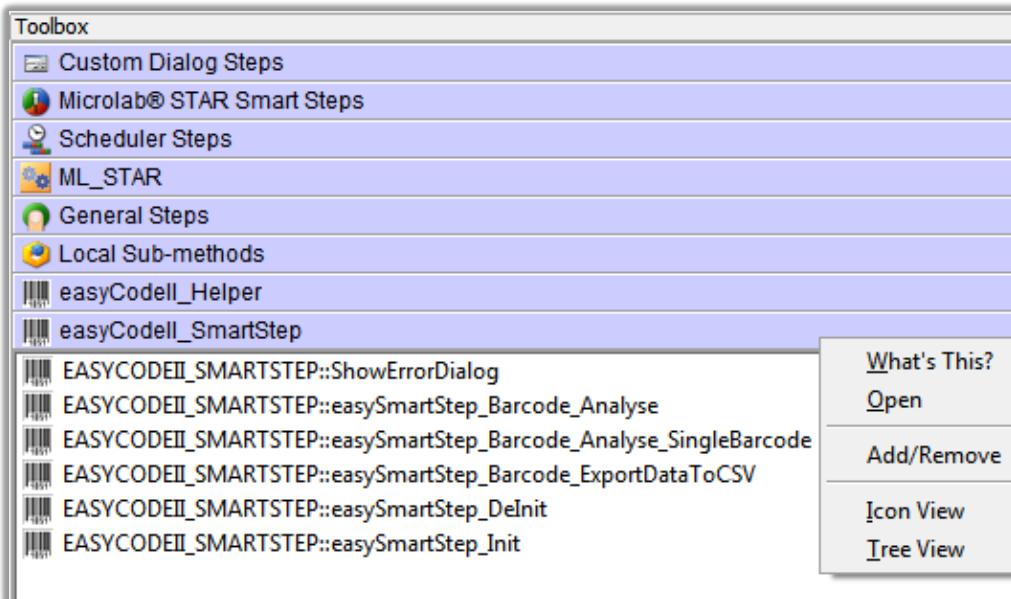


Figure 42: Toolbox with SmartSteps Library

Help information to each step can be displayed with “What’s This?” (Click the Right Mouse Button on the corresponding step).

8.4 General easyCodeII Library

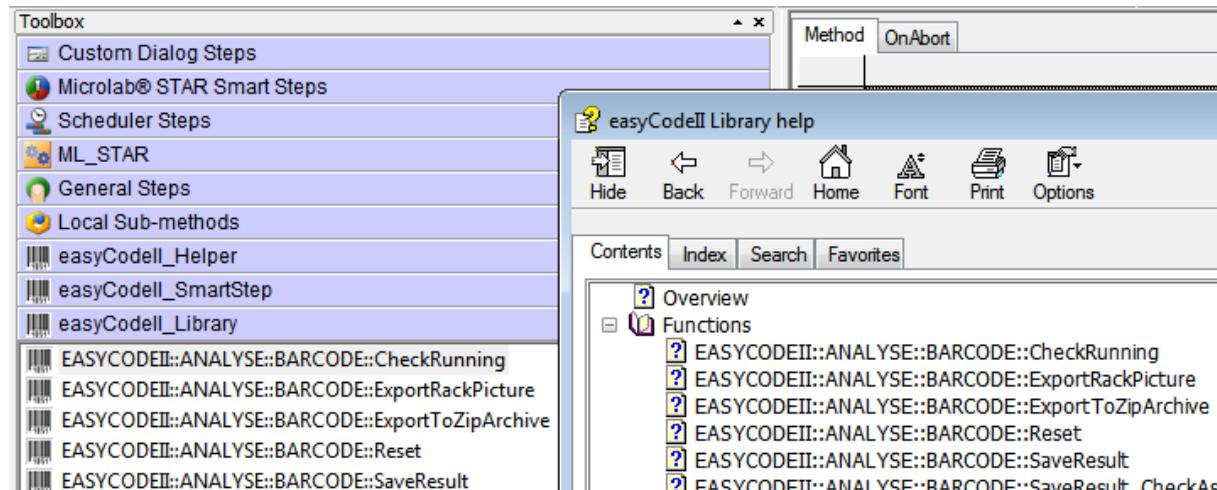


Figure 43: Toolbox with the General easyCodeII Library

Help information to each step can be displayed with “What’s This?” (Click the Right Mouse Button on a Library and then select the corresponding steps respective function).

Using these steps is only recommended for an Advanced Programmer, with knowledge in HSL (Hamilton Standard Language). Some useful steps are explained with examples in [Section 8.6.4 HSL Code Used in the Demo Method](#).

8.5 Error Codes

The Error Codes are coded in namespace ERROR followed by a sub-namespace which groups the Error Codes, e.g. ERROR::GENERAL::_APPLICATION_ERROR. The only exception is the first group (example ERROR::_NONE):

8.6 Write a Bar Code Reading Method Based on the Demo Method

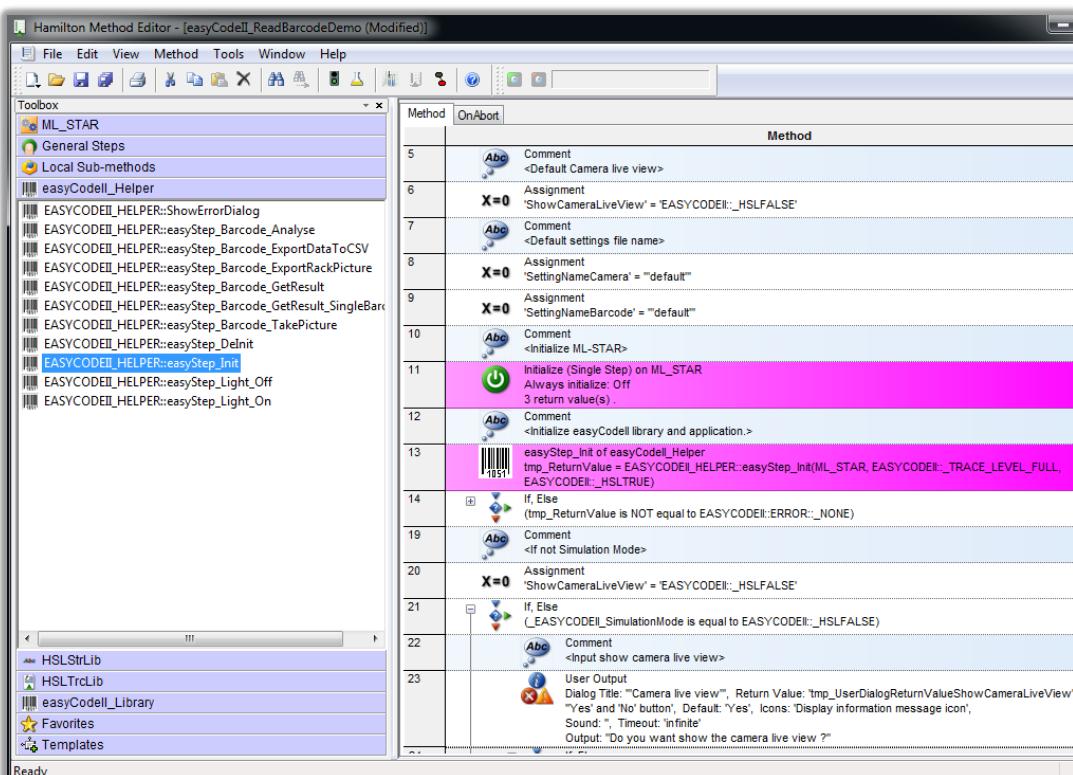
8.6.1 General

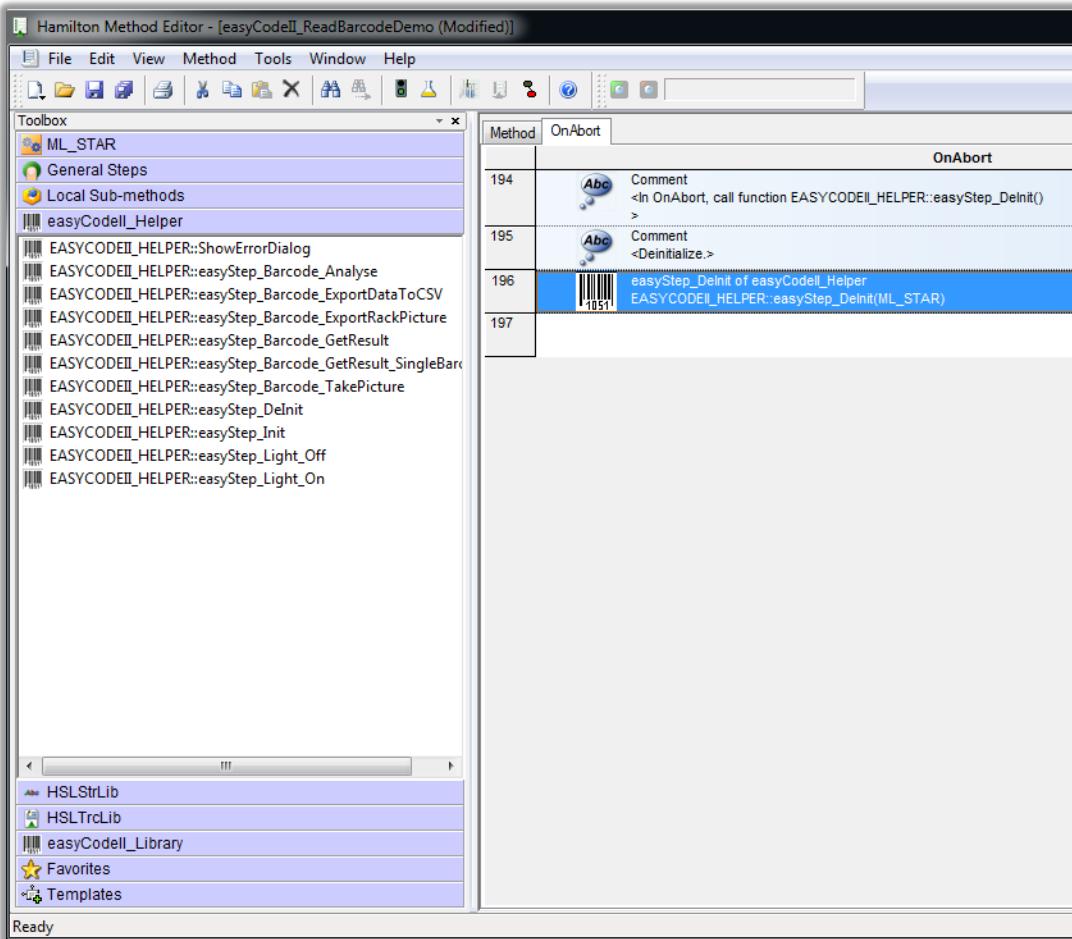
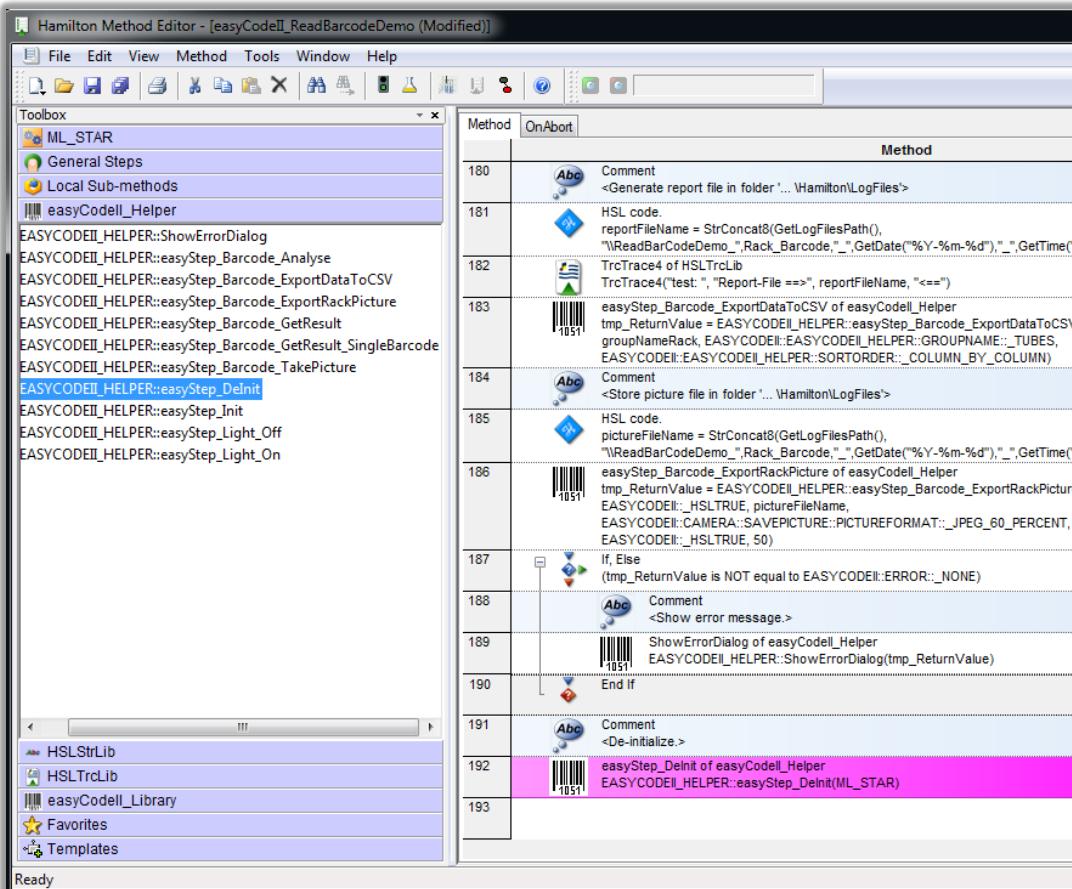
Start from the easyCodeII_ReadBarcodeDemo Method as a reference. You may copy the whole method or parts of it into your method/workflow. If doing so make, sure to delete or disable the Microlab® STAR Init Step.

8.6.2 Init – Delnit – OnAbort



ATTENTION: Be sure to include the “Helper Init” and “Delnit” Functions into your method and also the “Delnit” Function in the “OnAbort”-Method to prevent crashes of the Microlab®-STAR Pipetting Channels and the Camera Channel!

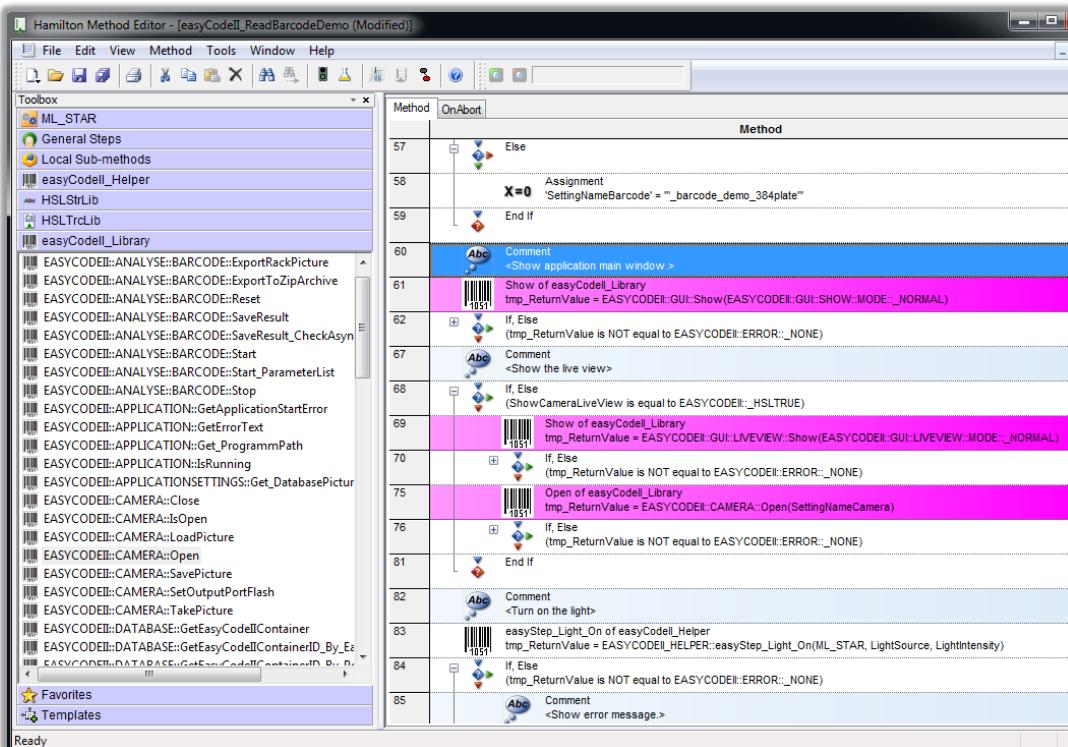




8.6.3 General easyCodeII Library Steps in the Demo Method

In the the easyCodeII_ReadBarcodeDemo Method, not only is the easySteps Library used but also steps from the General easyCode Library.

These steps show the Application Main Window as well as the Live View Window.



8.6.4 HSL Code Used in the Demo Method

To generate an output file and to save pictures in a dedicated Folder, HSL Code is used in the Demo Method.

```

Hamilton Method Editor - [easyCodeII_ReadBarcodeDemo (Modified)].hsl
File Edit View Method Tools Window Help
Toolbox Method OnAbort
Method
179 User Output
Dialog Title: "easyCodeII", Return Value: "", Buttons: "Only 'OK' button", Default: 'OK', Icons: 'Display information message icon', Sound: "", Timeout: 'Infinite'
Output: tmp_Result_BarcodesOutputText
180 Comment
<Generate report file in folder ... \\HamiltonLogFiles>
181 HSL code.
reportFileName = StrConcat2(GetLogFilePath(),
"\\\ReadBarcodeDemo\_Rack_Barcode\\"", GetDate("%Y-%m-%d"), "\\", GetTime("%H%M"), ".csv");
182 TrcTrace4 of HSLTrcLib
TrcTrace4("test: ", Report_File == "", reportFileName, "<=>")
183 easyStep_Barcodes_ExportDataToCSV of easyCodeII_Helper
tmp_ReturnValue = EASYCODEII_HELPER::easyStep_Barcodes_ExportDataToCSV(easyCodeII::RackID, reportFileName,
groupNameRack, EASYCODEII::EASYCODEII_HELPER::GROUPNAME::TUBES,
EASYCODEII::EASYCODEII_HELPER::SORTORDER::COLUMN_BY_COLUMN)
184 Comment
<Store picture file in folder ... \\HamiltonLogFiles>
185 HSL code.
pictureFileName = StrConcat2(GetLogFilePath(),
"\\\ReadBarcodeDemo\_Rack_Barcode\\"", GetDate("%Y-%m-%d"), "\\", GetTime("%H%M"), ".jpg");
186 easyStep_Barcodes_ExporRackPicture of easyCodeII_Helper
tmp_ReturnValue = EASYCODEII_HELPER::easyStep_Barcodes_ExporRackPicture(easyCodeII::RackID, EASYCODEII::HSLTRUE,
pictureFileName, EASYCODEII::CAMERA::SAVEPICTURE::PICTUREFORMAT::JPEG_60_PERCENT, EASYCODEII::HSLFALSE,
EASYCODEII::HSLTRUE, 50)
187 If Else
(tmp_ReturnValue is NOT equal to EASYCODEII::ERROR::NONE)
188 Comment
<Show error message.>
189 ShowErrorDialog of easyCodeII_Helper
EASYCODEII_HELPER::ShowErrorDialog(tmp_ReturnValue)
190 End If
191 Comment
<De-initialize >
192 easyStep_DeInit of easyCodeII_Helper
EASYCODEII_HELPER::easyStep_DeInit(ML_STAR)
...

```

9 Troubleshooting

This section should be helpful when encountering problems with the EasyCodeII Software or the easyCode Carrier.

9.1 General

When contacting HAMILTON's Technical Support refer to your version of your easyCode software and make trace- and Data export files available for investigation. The respective information can be found in the Help menu under "About". Also see [Section 9.5 General Problems with the Evaluation.](#)

9.2 Software Installation Check



With the uEye Camera Manager, you can check whether the camera is properly connected. Click on the uEye Camera Manager Shortcut that was automatically been created on your Desktop during installation.

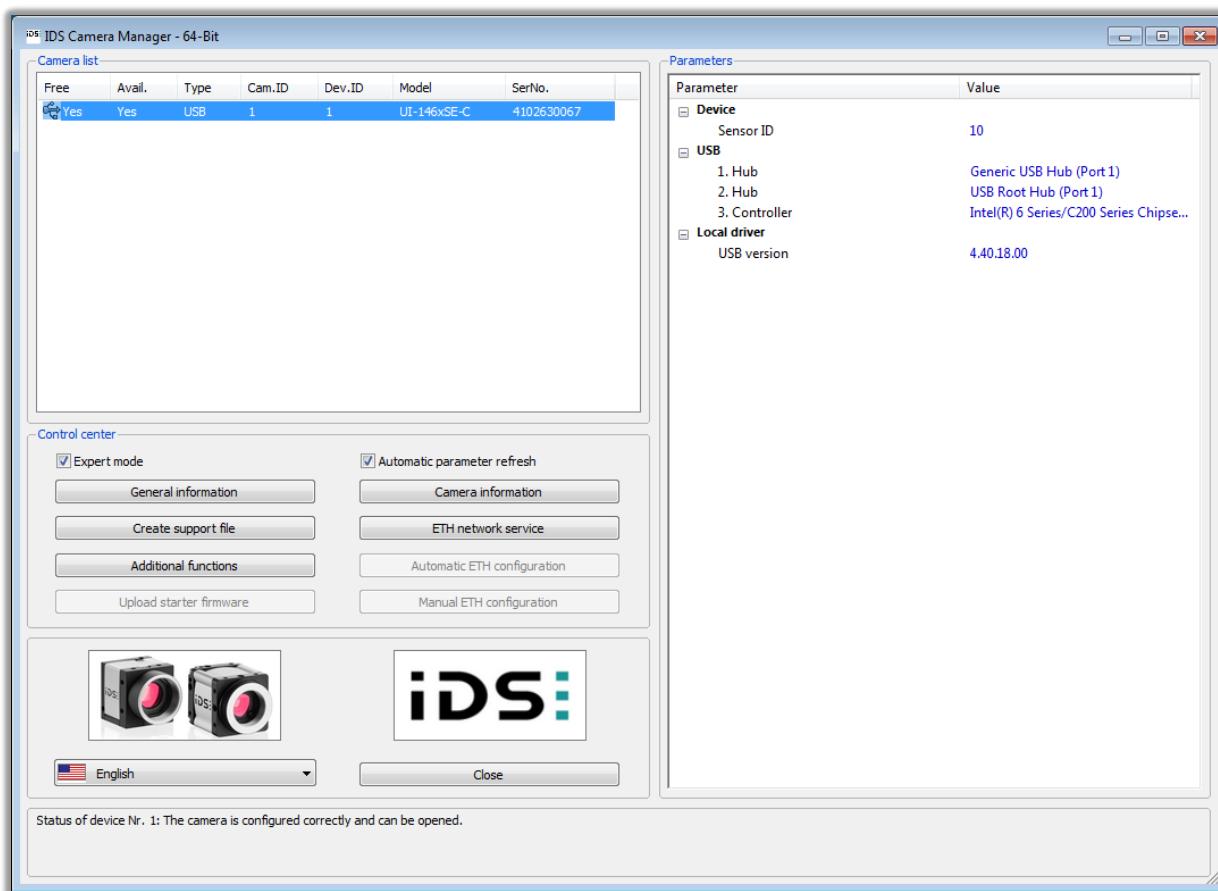
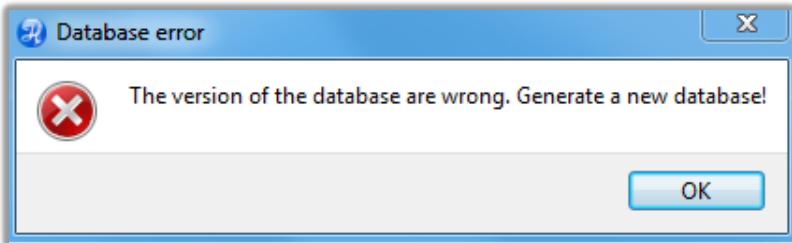


Figure 44: uEye Camera Manager

The camera of the easyCode Carrier should be listed in the "Camera list".

9.3 Problem with Database Installation



There is an error in the Database Installation. Go to the Application Settings (see [Appendix 11.2 Application Settings](#)), delete the database and create a new one (SQLite 3). After, restarting the application should work.

9.4 Check the Optical Camera Adjustment

During installation two check methods were also installed on the Controlling PC Hard Disk.

They are all saved under the following path:

<Program Files>\Hamilton\Methods\easyCodeII\Methods\Check

- easyCodeII_easyCodeCarrier_CheckCamera.med
- easyCodeII_easyCodeCarrier^{Plus}_CheckCamera.med

In the method, the corresponding Deck Layout and the DIV Connector (DIV2 or DIV3) of the Microlab® STAR where the easyCode Carrier is connected has to be defined, similar to the Demo Method in [Section 7.2 Adapt Demo Methods to Microlab® STAR Hardware](#).

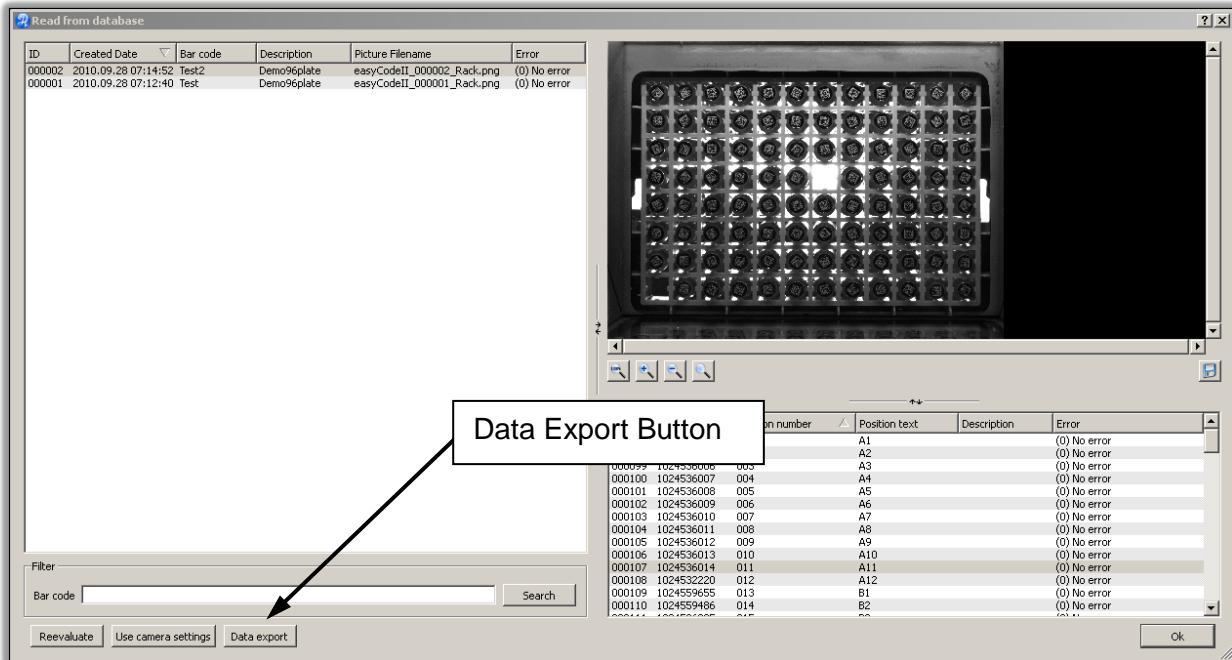
These methods check the optical camera adjustment as focus, aperture and picture frame (positioning). When the criteria are not matched, contact the HAMILTON's Technical Support. It will help to determine the problem, if you send also the following files:

- The Picture "easyCodeCarrier_CheckPlatePosition_*.png"
- and
- The Trace File "easyCodeII_easyCodeCarrier_CheckCamera_*_Trace.trc"

9.5 General Problems with the Evaluation

If you encounter problems during evaluation that cannot be solved by changing the settings proceed as follows:

Save the Image File including its settings to the Database. Press the “Read from database” Button, select the respective Evaluated Picture and press the “Data export” Button.



The Data Export Button creates a Zip File with the image and all configuration settings of the selected image. The Zip File can then be provided to HAMILTON Technical Support.

9.6 Camera Not Found



The Camera is not connected or not initialized. Try another USB Port on your PC – the USB Port must match USB 2.0 features. Some PC's have both USB 1.x and USB 2.0 Type Ports.

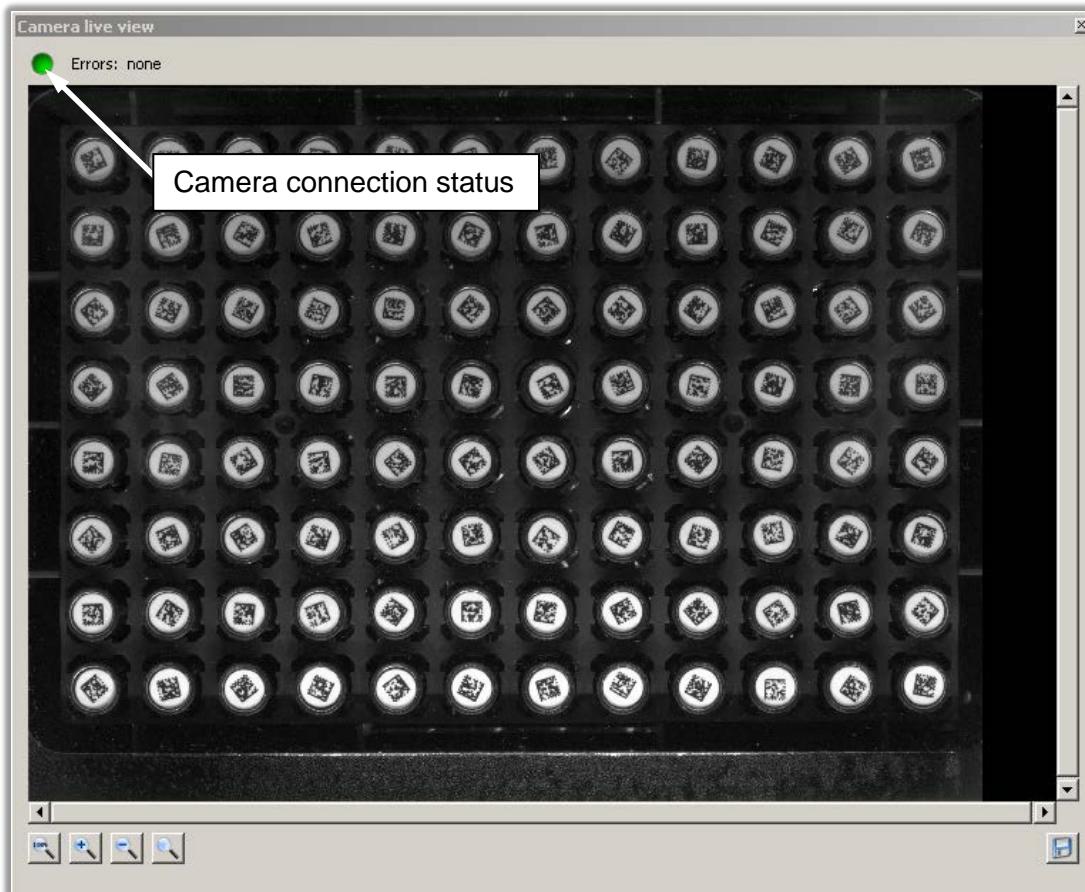
Check within the Camera Manager for the presence of the Camera. Make sure that the Camera is not occupied by a different task, possibly an unsuccessful closed “easy” Application. In this case, kill these tasks in the Task Manager.

9.7 Problems with Camera Connection



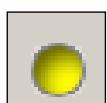
Press the “Live view” Button.

The window with the live Camera Image pops up.



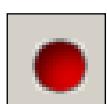
When the Status Light is green, the Camera is connected and capturing works properly. The flashing frequency indicates the capturing frequency which can be defined in “Camera Settings”. Next to the Status Light, it should say “Errors: none”.

If the Camera connection Status Light is not green, you can have the following problems:



When the Status Light is yellow;

The Camera is not connected to the software. Press button "Camera connect".



When the Status Light is red;

Physical connection has been interrupted or has transmission errors. Check the USB connection and wiring. The cable length must not be longer than 5 meters. Furthermore, the USB Cable has to be connected directly to the PC and not via an additional hub. See also [Section 9.8 Error Status Camera Cannot Grab Picture](#).

Next to the error status there is an error counter. It counts the numbers of connection interrupts. If the connection is working properly, no number is visible.

9.8 Error Status Camera Cannot Grab Picture



The bandwidth of the USB Connection does not fit to the frame rate of the Camera. So from time to time the Camera is not able to send the requested frame.

- Check the USB Cable for proper connection, length and quality. The cable length must not be longer than 5 meters. Furthermore, the USB Cable has to be connected directly to the PC and not via an additional hub. See also [Section 9.7 Problems with Camera Connection](#).
- Check the USB Ports of the Computer and the bandwidth of the USB Bus on the Computer.
- Open the easyCodeII Software, connect to the Camera and open "Camera live view". With a pixel clock of 18 MHz (default) you should get no errors (Status Light instead of green one). Good USB Connections easily manage 30 MHz. Adjust the pixel clock until you do not get anymore errors. Methods should still work with 7 MHz. Take care that the Exposure Time is still the same.
- Try to handle the error in your method by requesting a new picture if this error occurs.

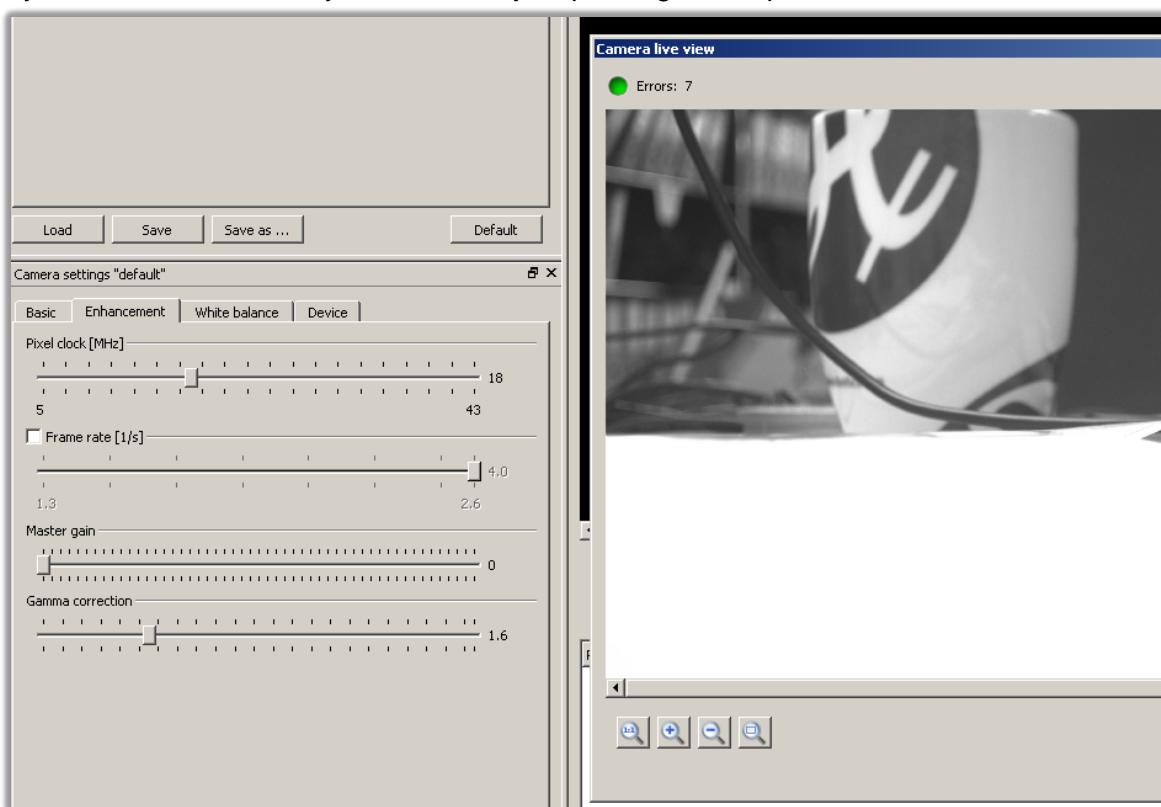


Figure 45: Changing the Pixel Clock

10 Technical Specifications easyCode Carrier

Criteria	Description														
Microlab® STAR Line Deck Space Required	<p>easyCode Carrier</p> <ul style="list-style-type: none"> Carrier for 2D-Bar Code reading of Tube Rack, 6 Tracks wide <p>easyCode Carrier^{Plus}</p> <ul style="list-style-type: none"> Carrier for 2D-Bar Code and 1D Rack Bar Code reading, 7 Tracks wide 6 tracks / 7 tracks 														
easyCode Carrier per Instrument	1														
Weight	<p>easyCode Carrier 4.6 kg</p> <p>easyCode Carrier^{Plus} 5.2 kg</p>														
Rack Format	<p>SBS Format Footprint</p> <p>Overall Height ≤ 43 mm</p>														
Rack Layout	<p>Tube Racks with 1 to 384 Tubes, regular (Matrix) arrangement or honeycomb layout</p> <p>Overall Height ≤ 43 mm</p>														
Operating Data	<u>Generally, refer to the Microlab® STAR Operator's Manual</u>														
Lifetime	<u>Please refer to the Microlab® STAR Operator's Manual</u>														
Code Symbologies	1D Bar Codes	<p>Bar code type (1D)</p> <table> <tr><td><input type="checkbox"/> Code 39</td><td><input type="checkbox"/> EAN 8</td><td><input type="checkbox"/> 2/5 Industrial / Interleaved</td></tr> <tr><td><input type="checkbox"/> Code 93</td><td><input type="checkbox"/> EAN 13</td><td><input type="checkbox"/> PharmaCode</td></tr> <tr><td><input type="checkbox"/> Code 128</td><td><input type="checkbox"/> UPC-A</td><td><input type="checkbox"/> Codabar</td></tr> <tr><td><input type="checkbox"/> RSS / RSS-14</td><td><input type="checkbox"/> UPC-E</td><td><input type="checkbox"/> MSI</td></tr> </table>		<input type="checkbox"/> Code 39	<input type="checkbox"/> EAN 8	<input type="checkbox"/> 2/5 Industrial / Interleaved	<input type="checkbox"/> Code 93	<input type="checkbox"/> EAN 13	<input type="checkbox"/> PharmaCode	<input type="checkbox"/> Code 128	<input type="checkbox"/> UPC-A	<input type="checkbox"/> Codabar	<input type="checkbox"/> RSS / RSS-14	<input type="checkbox"/> UPC-E	<input type="checkbox"/> MSI
<input type="checkbox"/> Code 39	<input type="checkbox"/> EAN 8	<input type="checkbox"/> 2/5 Industrial / Interleaved													
<input type="checkbox"/> Code 93	<input type="checkbox"/> EAN 13	<input type="checkbox"/> PharmaCode													
<input type="checkbox"/> Code 128	<input type="checkbox"/> UPC-A	<input type="checkbox"/> Codabar													
<input type="checkbox"/> RSS / RSS-14	<input type="checkbox"/> UPC-E	<input type="checkbox"/> MSI													
2D Bar Codes	<p>Bar code type (2D)</p> <table> <tr><td><input type="checkbox"/> Data Matrix ECC 200</td><td><input type="checkbox"/> QR Code</td><td><input type="checkbox"/> Aztec Code</td></tr> <tr><td><input type="checkbox"/> PDF417</td><td><input type="checkbox"/> Micro QR Code</td><td></td></tr> </table>		<input type="checkbox"/> Data Matrix ECC 200	<input type="checkbox"/> QR Code	<input type="checkbox"/> Aztec Code	<input type="checkbox"/> PDF417	<input type="checkbox"/> Micro QR Code								
<input type="checkbox"/> Data Matrix ECC 200	<input type="checkbox"/> QR Code	<input type="checkbox"/> Aztec Code													
<input type="checkbox"/> PDF417	<input type="checkbox"/> Micro QR Code														
Code Specifications	1D Bar Codes	<u>Please refer to the Microlab® STAR Operator's Manual</u>													
	2D Bar Codes	<p>Have to be according to ISO/IEC 15415</p> <p>Information Technology Automatic Identification and Data Capture Techniques</p> <p>Minimum Density: 10 mil</p>													
Bar Code Positioning on Tube Racks	1D Bar Codes	<u>Please refer to the Microlab® STAR Operator's Manual</u>													

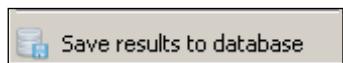
10.1 Declaration of Conformity

Each individual instrument includes a Declaration of Conformity.

11 Appendices

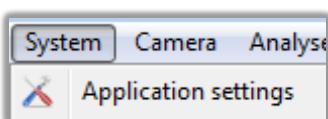
11.1 Database Settings

During installation, a database file is installed on your Controlling PC Hard Disk. Here you can store evaluated pictures (including their settings) that were captured by the Camera, loaded from a file from the Hard Disk or loaded from the Database. To store a picture, click the "Save results to database" Button in the Analyse Menu.



A Dialog Box pops up and asks for an Optional Description, e.g. "batch 1".

11.2 Application Settings



In the "System" Menu, click on the "Application Settings" Sub-Menu. This opens up a Dialog Box where the database settings can be changed.

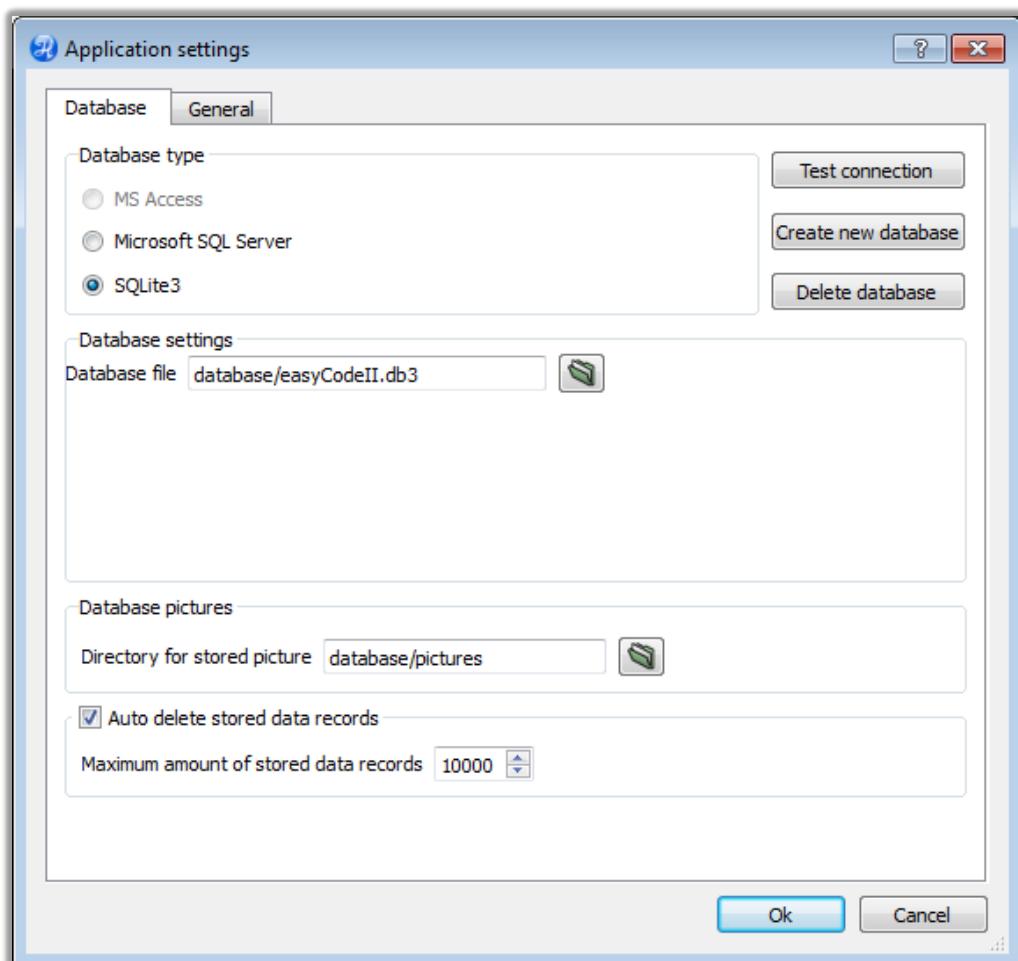
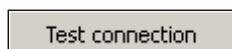


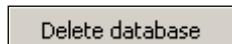
Figure 46: Database Tab of the Application Settings Dialog Box



The “Test connection” Button tests the connection to the database to check whether the settings are correct.



The “Create new database” Button generates a new database according to your settings.



The “Delete database” Button.

Database Type:

When using Microsoft Access, you have to define the following setting:

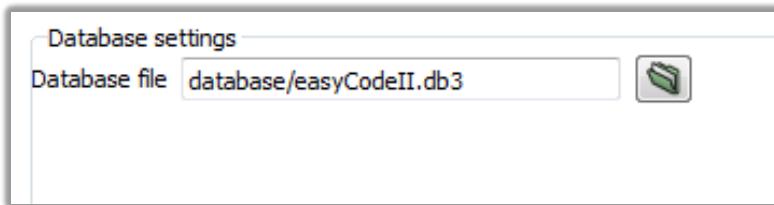


Figure 47: Database Settings for Microsoft Access

When using Microsoft SQL Server, you have to define the following settings:

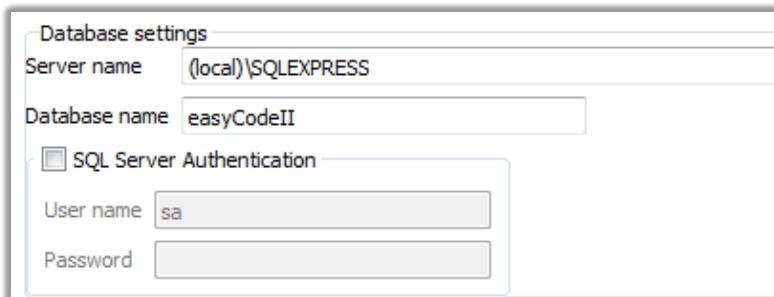


Figure 48: Database Settings for Microsoft SQL Server

Database Pictures:

The directory for the stored pictures can be defined here. When “Auto delete stored data records” is checked, the maximum amount of stored data records can be defined here. When reaching this count the oldest database entry including its picture will be deleted.

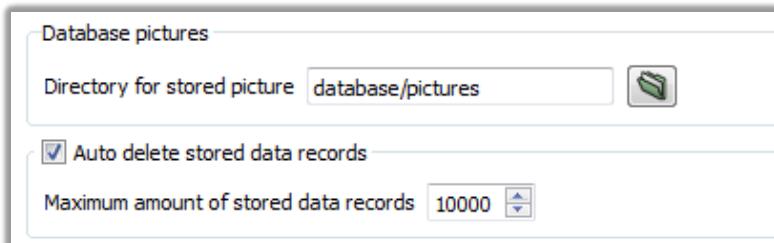


Figure 49: Database Pictures

11.3 Read From Database



With the “Read from database” Button in the Analyse Menu, you can load evaluated images with their settings from the database.

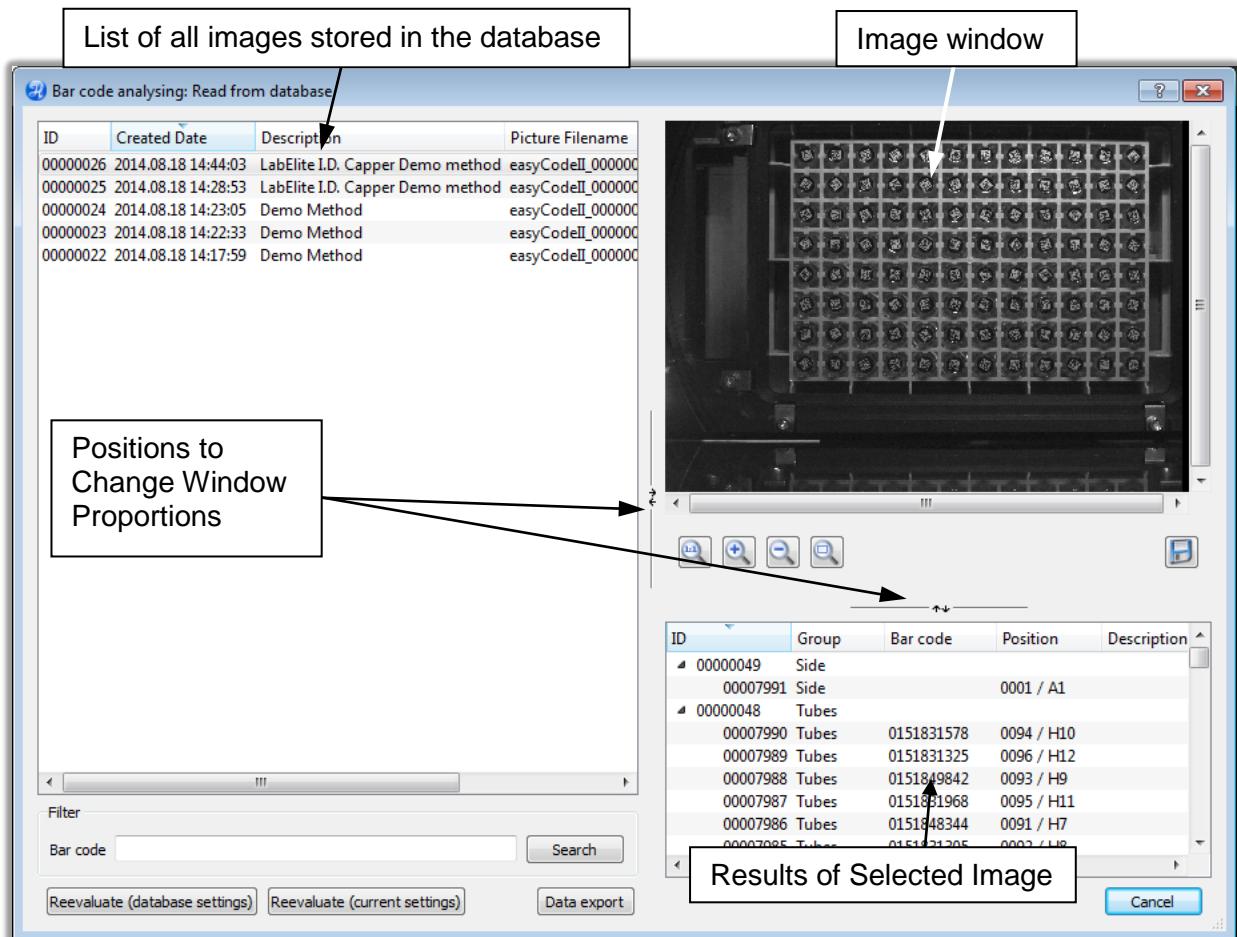


Figure 50: Read Bar Code from Database

In the window on the left, a list of all evaluated images is shown. In the “Filter” Window underneath, you can search for Tube Rack Bar Codes with a specific content.

On the right side, a preview shows the database image which can be zoomed in, zoomed out, zoomed into a section and reset to the original size. With the “Disk” Button on the right, the image (without settings) can be saved separately.

On the lower right hand side the respective results are displayed.

The “Bar codes” Column shows the Bar Code content of the Tube Rack.

In the window on the left select an evaluated image and choose one of the following functions to proceed:

Reevaluate

Reevaluate: When the image of interest is found press this button. The picture will be loaded and evaluated with the configuration settings (barcode settings and camera settings) stored in the database.

Data export

Data export: This button creates a Zip file with the image and all configuration settings of the selected image. When experiencing problems with evaluations, this information can be provided to HAMILTON's Technical Support. See also [Section 9 Troubleshooting](#).

Ok

Ok: selected image is being loaded with appropriate evaluation.

11.4 easyCodeII Settings Suggestions

Barcode Setting File Name Extension: .barcodesettings.xml	Camera Setting File Name Extension: .camerasettings.xml	Remarks
Corning_384	Default_300	
Default_24	Default_300	
Default_384	Default_300	
Default_48	Default_300	
Default_96	Default_300	
FluidX_Corning_96	Default_300	
Greiner_48_CryoRack	Default_300	
Greiner_96	Default_300	
Hamilton_24_Autolys	Default_150	
Hamilton_48_HoneyComb	Default_200	
Matrix_24	Default_300	
Matrix_96	Default_300	
Micronic_48_M-Rack	Default_300	
Micronic_96	Default_300	
Micronic_96_M-Rack	Default_300	
Nunc_48_HoneyComb	Default_200	
Nunc_96	Default_300	for Cryo Tubes
	Default_200	for Samples Tubes
Remp_96_New	Default_200	NO additional illumination needed

Barcode Setting File Name	Camera Setting File Name	Remarks
Extension: .barcodesettings.xml	Extension: .camerasettings.xml	
Remp_96_Old	Default_200 (PN808300)	NO additional illumination needed
	Default_300	
Thermo_384	Default_300	
Thermo_48_HoneyComb	Default_300	



NOTE: File prefix for easyCode Carrier (P/N 808300) is "easyCodeCarrier_" and for easyCode Carrier^{Plus} (P/N 808200) is "easyCodeCarrierPlus_".

Example: easyCodeCarrierPlus_Corning_384.barcodesettings.xml. For Camera Settings, see [Section 3.3.1 Components](#).

11.5 Ordering Information

Microlab® STAR easyCode Carrier		
easyCode Carrier	Carrier for 2D-Code Reading of Tube Rack, 6 Tracks Wide	808300

Microlab® STAR easyCode Carrier^{Plus}		
easyCode Carrier ^{Plus}	Carrier for 2D Bar Code and 1D Rack Bar Code Reading, 7 Tracks Wide	808200

Microlab® STAR easyCodeII Check Plate		
easyCodeII Check Plate	Check Plate	808229

Microlab® STAR easyCodeII Special Cloth		
HAMILTON Cleaning Cloth	To clean the glass and mirror of the easyCode Carrier	692429



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