Barcode Studio
Barcode Designer

Version 9.4

User Manual

15 January 2010

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2   Disclaimer

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3   Introduction

3.1   About

TEC-IT **Barcode Studio** is a tool for generating and printing bar codes. All common linear, 2D and composite bar code symbologies are supported.

You can adapt all bar code parameters to your needs, export the bar code to an image file (e.g. for using it in your artwork), copy the bar code to the clipboard or print it.

If you have any questions, please contact our support: support@tec-it.com.

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3.2   Supported Operating Systems

- Mac OS (10.4 or higher) for Intel
- Mac OS (10.4 or higher) for PowerPC
- Windows 7 (tested with Beta)
- Windows Vista
- Windows XP
- Windows 2000
- Windows NT 4.x or higher
- Windows Server 2003
- Windows 98 (image dimensions are restricted to 1200 pixels width / height)
- Windows ME (image dimensions are restricted to 1200 pixels width / height)
- Linux/UNIX (please refer to www.tec-it.com or request a build)

3.3   Restrictions of the Demo Version

► A demo marker across the bar code indicates that the demo version is active. The correctness of the bar code is not affected.

► To obtain a license key for the full version (without the demo marker) please order **Barcode Studio** online at http://www.tec-it.com/order/default.aspx.

4 Installation

4.1 Install Barcode Studio on Microsoft® Windows

On Microsoft® Windows operating systems (XP, Vista, …), **Barcode Studio** is installed with the Windows Installer. If the Windows Installer is not available on the system, please download it from following link:

http://www.microsoft.com/downloads/details.aspx?FamilyID=889482fc-5f56-4a38-b838-de776fd4138c&displaylang=en

The following steps need to be performed (you need to have administrator privileges).

1. Open the installer by double-clicking it.
2. Follow the instructions of the installation wizard.

By default, **Barcode Studio** is installed in the following directory:

```
C:\Program Files\TEC-IT\BCStudio9
```

4.2 Install Barcode Studio on Mac OS X® (10.4 or higher)

For Mac operating systems (Mac OS X 10.4 or higher), **Barcode Studio** is provided as a zip-file.

The following steps need to be performed (you need to have administrator privileges).

1. Extract the zip-file to an arbitrary directory.

5   Quick-Start

5.1   Introduction

This chapter will guide you through the most important functions of **Barcode Studio** by showing you how to create an EAN13 bar code. For more detailed explanation of the user interface and the available functions and settings, please refer to the chapters 6 and 7.

5.2   How to Create an EAN13 Bar Code
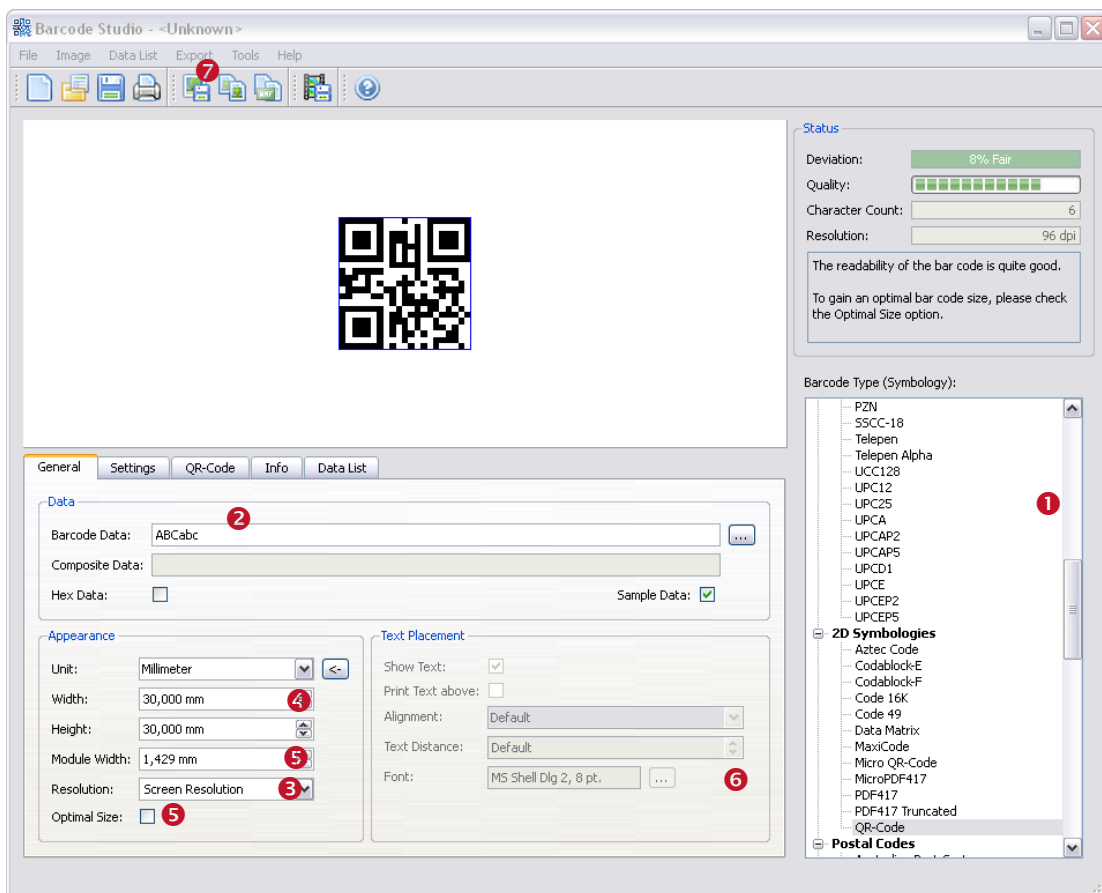
Figure 1: Quick-Start – Barcode Studio Main Window

In order to create an EAN13 bar code, please perform the following steps:

❶   Select the bar code type (symbology) – see section 5.2.1.
❷   Enter the bar code data - see section 5.2.2.
❸   Select the output resolution - see section 5.2.3.
❹   Specify the bar code dimensions - see section 5.2.4.
❺   Fine-tune the module width - see section 5.2.5.
❻   Set font style and size - see section 5.2.6.
❼   Export or print the bar code.

5.2.1 Select Bar Code Type (Symbology)
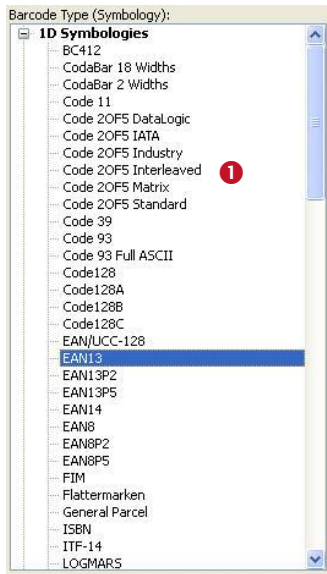
Select the bar code type (symbology) in ❶. Choose "EAN13" from the list of symbologies.

Hint: If you press the *E* key, the first entry starting with an "E" will be selected in the list.

5.2.2 Enter Bar Code Data

A valid EAN13 bar code needs exactly 12 digits (or 13 digits including the check digit). By default you will see valid data ("123456789012") if the checkbox "Sample Data" is checked.
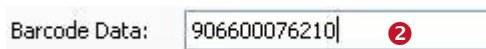
Enter the data to be encoded in ❷. You can also edit the bar code content in the *Bar Code Data* dialog or import it from a file (see 7.7.1.1).

The bar code view is updated after every change. If you enter exactly twelve (or thirteen) characters, the bar code will be drawn in the bar code view in the top left corner.

If "Sample Data" is not checked, it is possible that the input data is invalid (e.g. wrong characters or a wrong number of characters). In this case you will see an error message like following instead of the bar code:

Error: Wrong number of input characters (12 chars needed)!

For a list of the most common error messages, please refer to Appendix B.

> ► The 13th digit in the resulting EAN13 bar code (in this case the digit "3") is the check digit. It will be calculated automatically.
>
> ► If you enter 13 (instead of 12) characters you need to provide the correct check digit by yourself. This is not recommended (unless you supply the correct value). A wrong check digit may make the bar code unreadable!

5.2.3   Select Output Resolution

> ► **Barcode Studio** uses the selected resolution for computing the barcode images. Thus it is essential to adjust a resolution which leads to readable bar codes (see also section 5.2.5).
>
> ► Usually higher resolutions lead to better bar code quality. Please notice that it is very important that the selected resolution accords to the resolution of the output device (printer, image or of image processing / layout software).
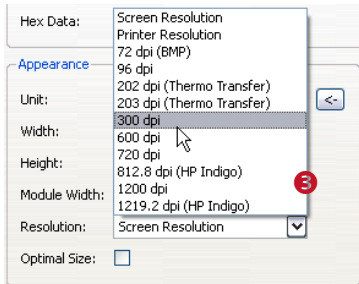
The output resolution can be adjusted in ❸.

In this example the output resolution is changed to "300 dpi". If you are planning to print the bar code on a laser printer you would most probably select a higher resolution (600 or 1200 dpi).

If you want to *export* the bar code *as image* for your web page you could also choose "Screen Resolution" or "72 dpi (BMP)".

> ► If you use bar code images in pre-press applications, take care to avoid any scaling or resizing of the generated bar code image. This may lead to inaccuracies and distortions rendering the bar code unusable. Generate the bar code image in exactly the resolution and size as required!

5.2.4   Specify Bar Code Dimensions

The bar code dimensions can be modified by changing **width**, **height**, and **module width**.

Most label or bar code specifications require specific bar code dimensions. Following values are usual for EAN13:

Magnification factor	Module width [mm]	Width [mm]	Height [mm]
0.80	0.264 (SC0)	29.83	20.73
1.00	**0.330 (SC2)**	**37.29**	**25.91**
1.50	0.495 (SC6)	55.94	38.87
2.00	0.660 (SC9)	74.58	51.82

Table 1: EAN13 Dimensions (not complete)
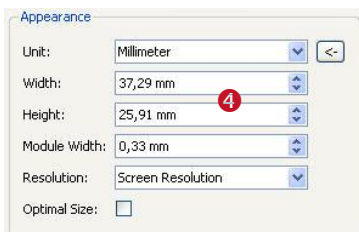
Here we use the magnification factor *1.00*.

Enter the width and the height in ❹. The appropriate module width will be calculated automatically.

The bar code should now look like this.

5.2.5 Fine-tune the Module Width

Yet the quality of the bar code is not perfect (see the Quality Watch at the top right corner of the **Barcode Studio**'s application window):
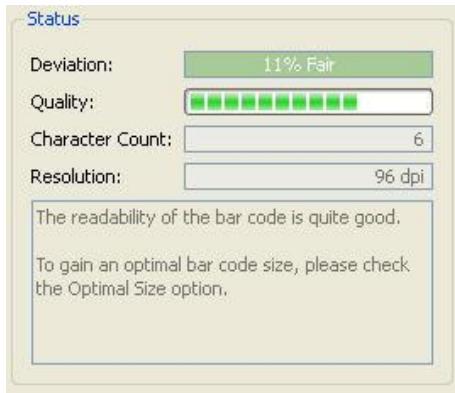
To optimize the bar code quality we recommend you to fine-tune the module width. You have the following options:

- Select the option *"Optimal Size"* (see Figure 1, ❺)
- Choose *"Pixel"* in field *"Unit"* and enter a whole-numbered value in the field *"Module Width"*.
- Increase the output resolution

The first two options both lead to a "*perfect*" bar code quality.

5.2.6 Set Font Style and Size

The font properties can be set via the "Select Font" dialog. You can open this dialog by clicking the ⊡ button in the "Text Placement" section (see Figure 1 ❻).

This example uses a 10 pt Courier New font:

6 Using Bar Codes in Applications (Exporting Bar Codes)

This chapter is a general instruction for using bar codes generated with **Barcode Studio** in other applications. A detailed explanation of the user interface and available bar code settings can be found in the next chapter.

6.1 General

You can export the bar codes created in **Barcode Studio** in the following ways:

- Copy the bar code to the clipboard (as image) and paste it into your application.
- Copy the bar code to the clipboard (as metafile) and paste it into your application. (available under Microsoft Windows only)
- Export the bar code to an image file.
- Export a series of bar code images (batch job).

Before the export of a bar code you have to adjust the required bar code settings. The size of the resulting bar code image can be controlled by changing the dimensions (width, height, and module width) and the output resolution (DPI) – see also section 7.7.2 . These settings apply to all kinds of export operations.

6.2 Resolution and Readability

> ► Do not resize exported bar code images with image manipulation software (like Photoshop$^{®}$)! The quality and the readability might suffer!
>
> ► Whenever possible, let **Barcode Studio** create the bar code in the required size and resolution to avoid resizing later on.

6.2.1.1 Bar Code Quality

When exporting the bar code to a bitmap image (BMP, GIF, JPG, PNG, and TIF), it must be converted from its internal resolution (high) to a graphical pixel resolution (low). During this process (rasterizing) the module width can vary due to rounding errors.

When exporting a bar code to a vector based image format (EPS, E4C, and E1C) or as metafile to the clipboard, the internal representation of the bar code symbol allows a very high resolution (which is independent of the adjusted dpi). Thus it is recommended to use vector based image formats (EPS, E4C and E1C) whenever possible. However, in the context of certain applications (e.g. web applications) it is inevitable to use bitmap images.

The readability of a bar code can be estimated by looking at the quality watch (see section 7.1, ❺). The quality of a bar code depends on the selected output resolution, the bar code's size and its content. To ensure an optimal readability, check the option "*Optimal Size*".

6.2.1.2 Module Width

Larger module widths usually lead to a better readability of a bar code. In practice, for most linear bar codes, the module width should never be less than approximately 0.2 mm.

6.3 Export to File

If you want to export a bar code as an image file, select *Export ► Export Barcode…* from the menu or press the keyboard shortcut *Ctrl+E.* In the *Save As* dialog choose a filename, select the image file type (e.g. "Bitmap (*.bmp)"), and confirm by pressing the *Save* button.

The saved image can be imported in your target application (e.g. Microsoft® Word). To import the image in Word you would select *Insert ► Image ► From File…* from the menu.

> ► The exported bar code symbol will match the preview in **Barcode Studio** exactly.
>
> ► To see a list of available image formats, please refer to Appendix C.
>
> ► If the format of the resulting image is a bitmap based file format (see Appendix C), resizing of the imported image is not recommended!

6.4 Copy to Clipboard (As Image)

To copy the current bar code as an image to the clipboard, you have to select *Copy to Clipboard (As Image)* from the menu (located in the *Image* submenu) or from the toolbar. You can also press the keyboard shortcut *Ctrl+B.*

Then switch to your target application and paste the bar code (e.g. in Microsoft® Word) by pressing *Ctrl-V* (or by selecting *Edit ► Insert* from the menu).

> ► Resizing bar code images may result in a loss of quality. In the worst case resizing a bar code image may lead to unreadable bar codes.

6.5 Copy to Clipboard (As Metafile)

To copy the current bar code as vector based metafile (EMF) to the clipboard select *Copy to Clipboard (As Metafile)* from the menu (located in the *Image* submenu) or from the toolbar. You can also press the keyboard shortcut *Ctrl+M.*

Then switch to your target application and paste the bar code (e.g. in Microsoft® Word) by pressing *Ctrl-V* (or by selecting *Edit ► Insert* from the menu).

> ► Metafiles can only be used on Microsoft Windows.
>
> ► Due to the vector based format you may resize the imported image within your target application without heavy losses in readability.
>
> ► The resulting bar codes may differ from the preview in **Barcode Studio.** The bars in the symbol may be enlarged and therefore the font of the human readable text may not fit exactly.

6.6 Export Data List

Lists of bar codes can be imported, generated, edited, and at last exported to image files. See chapter *8 Data List*.

7 Barcode Studio User Interface

7.1 Main Window and Menu
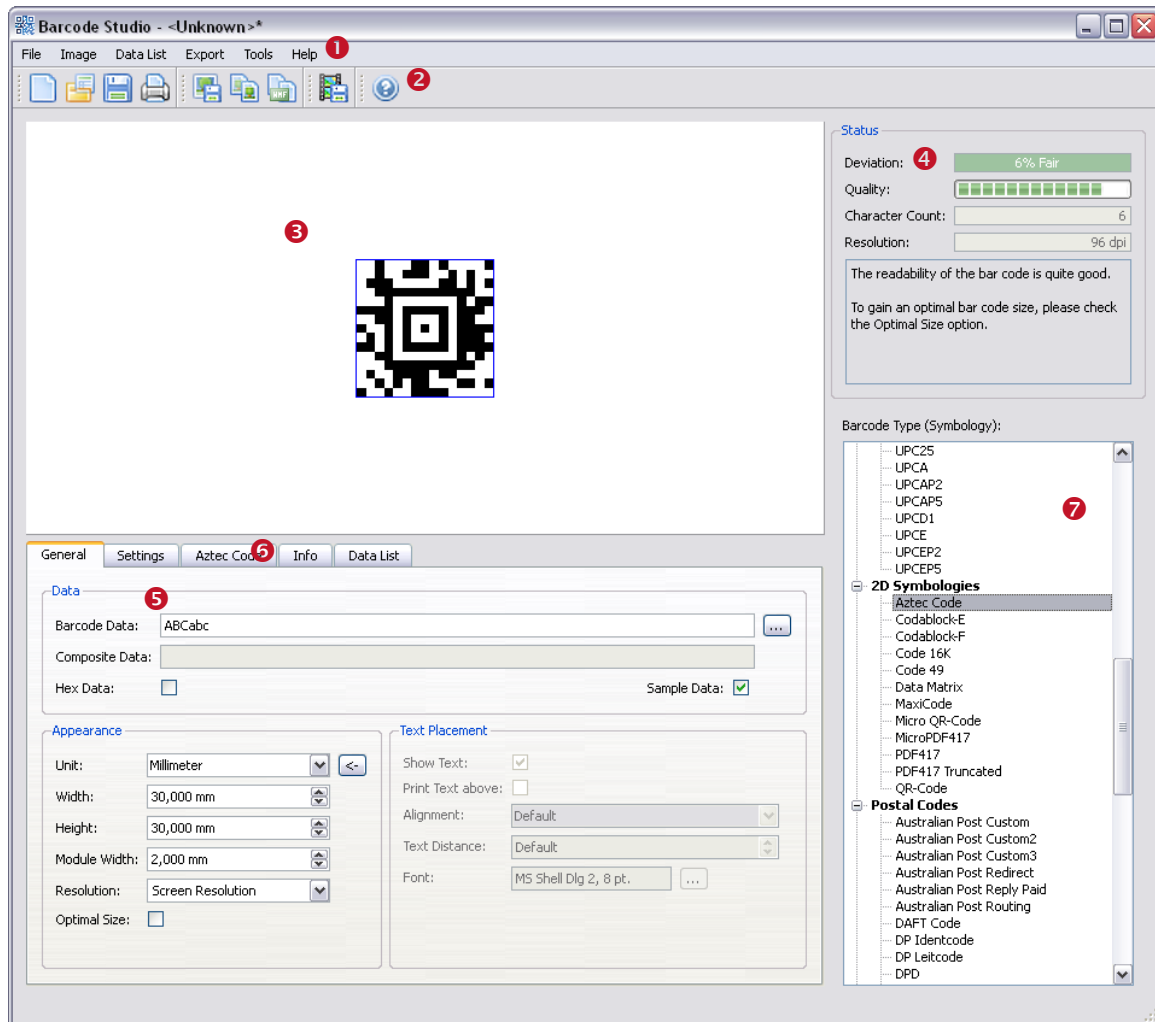
Figure 2: User Interface

The main window is split into the following areas:

❶ Menu (see section 7.2)
❷ Toolbar (see section 7.3)
❸ Barcode View (see section 7.6)
❹ Quality Watch (see section 7.4)
❺ Bar Code Settings (see chapter 7)
❻ Settings for 2D symbologies (according to selected symbology; see section 0)
❼ Symbology (see section 7.4)

7.2 Menu

The menu gives you access to the following functions:

7.2.1 File

New	Create a new document (with initial bar code settings). Shortcut: *Ctrl+N*
Open…	Open an existing bar code settings document file (*.bc). Shortcut: *Ctrl+O*
Save as… **Save**	Save the current bar code settings document file (symbology, dimensions, module width, …). Bar code settings files have the extension **.bc**. Shortcut: *Ctrl+S (for Save)*
Print…	Print the document with current bar code settings. The output resolution, and so the values for quality and deviation, depend on the printer settings. Note: Inkjet printers sometimes produce better results if bar width reduction is set (see also section 7.8.1.4). Shortcut: *Ctrl+P*
Page Setup…	Choose the paper size, the paper source, the orientation, and the page margins.
Exit	Exit **Barcode Studio**. If you have unsaved changes, **Barcode Studio** will prompt you to save before exiting. Shortcut: *Ctrl+Q*

7.2.2 Image

Export Barcode…	Export the bar code to a picture file. Shortcut: *Ctrl+E*
Copy to Clipboard (As Image)	Copy the bar code as image to the clipboard. Shortcut: *Ctrl+B*
Copy to Clipboard (As Metafile)	Copy the bar code as metafile to the clipboard (Windows only). Shortcut: *Ctrl+M*

7.2.3 Data List

File Import…	Import data from a text file and add it to the data list. Shortcut: *Ctrl+I*
Create Sequence…	Create a data sequence and add it to the data list.

7.2.4 Export

Export Data List…	Export the data list as a series of bar code images. Shortcut: *Ctrl+L*

7.2.5 Tools

Options…	Specify the Application's *Options (see Chapter 9).*

7.2.6 Help

Help	Open the documentation. Shortcut: *F1*
Barcode Reference	Open the default browser and navigate to the bar code reference document.
TEC-IT Website	Open the default browser and navigate to www.tec-it.com.
License...	Enter your license data.
About Barcode Studio	Displays the application information, version number and copyright.

7.3   Toolbar

Figure 3: Toolbar

The toolbars offer following functions:

	New	Create a new document (with initial bar code settings). Shortcut: *Ctrl+N*
	Open	Open an existing bar code settings file (*.BCS). Shortcut: *Ctrl+O*
	Save	Save the current bar code settings to your hard disk. Shortcut: *Ctrl+S*
	Print	Print the current bar code. Shortcut: *Ctrl+P*
	Export Barcode	Export the bar code to a picture file. Shortcut: *Ctrl+E*
	Copy to Clipboard (As Image)	Copy the bar code as image to the clipboard. Shortcut: *Ctrl+B*
	Copy to Clipboard (As Metafile)	Copy the bar code as metafile to the clipboard. Shortcut: *Ctrl+M*
	Export Data List	Export the data list as a series of bar code images. Shortcut: *Ctrl+L*
	Help	Open the documentation. Shortcut: *F1*

7.4   Quality Watch – Status Section
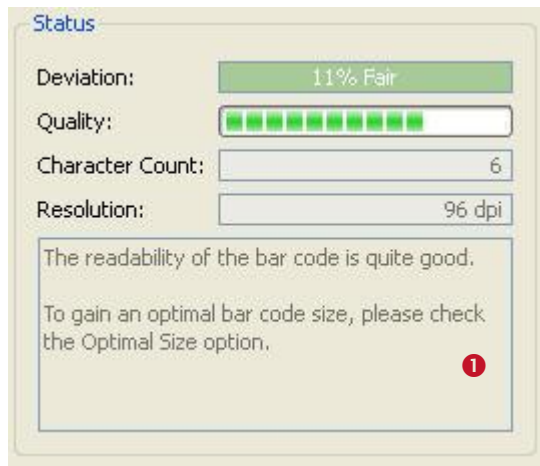
Figure 4: Quality Watch

7.4.1   Deviation

The less the deviation the better is the quality and the readability of the bar code. The deviation depends on the output resolution and the print ratio of the bar code. You can also improve the quality by changing the module width to an appropriate value ➔ As measurement unit select "Pixel" and set the module width to an *integer value* (1, 2, 3, …, 25, …).

The Deviation field will report one of the following values:

Tolerance	Aberration	Description
Perfect	0%	Optimal output quality.
Fair	1-15%	Should be readable with most bar code scanners.
Poor	16-25%	May be readable.
Bad!	26-50%	Not readable in most cases.
Data Loss!	51-100%	Total or partly loss of information. Unreadable bar code.

Table 2: Bar code Qualities

7.4.2 Quality

The quality of the bar code – the higher the deviation, the lower is the quality.

7.4.3 Character Count

Displays the number of characters encoded in the bar code.

7.4.4 Resolution

The current output resolution in dpi (dots per inch).

7.4.5 Hint Box

The hint box (❶) displays information about the current bar code quality and recommended methods to improve the readability.

7.5 Symbology

Select the bar code type (symbology) from the list (see Figure 2, ❽).

> ► For 2D codes like Aztec Code, Codablock-F, PDF417, Micro QR-Code, MicroPDF, MaxiCode, Data Matrix, QR-Code, GS1-DataBar Stacked variants and for all Composite Symbologies you need a 2D license. For the other symbologies a 1D license is sufficient.

If you want to learn more about the selected symbology, please examine the *Barcode Reference* from the Help menu.

7.6 The Bar Code View
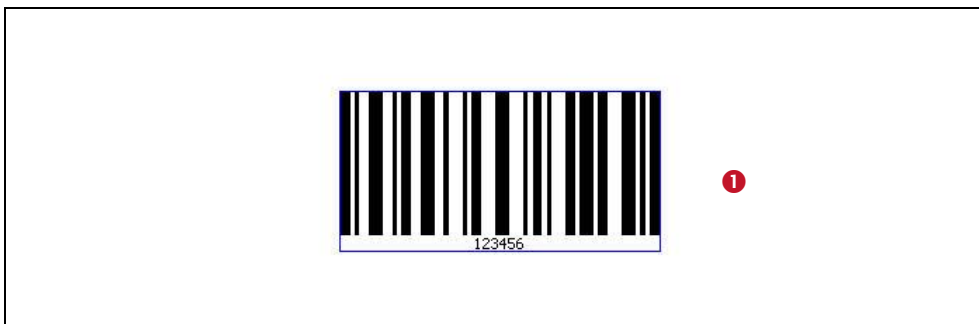
Figure 5: Bar Code View

The Bar Code View shows the bar code in its actual appearance (as it is should be printed).

To change the size of the bar code, enter the required dimensions in the "Appearance" section (see section 7.7.2). The quality of the bar code depends on the output resolution and the module width. It can be observed in the Status section (see section 7.4).

7.7   Page General

7.7.1   Data
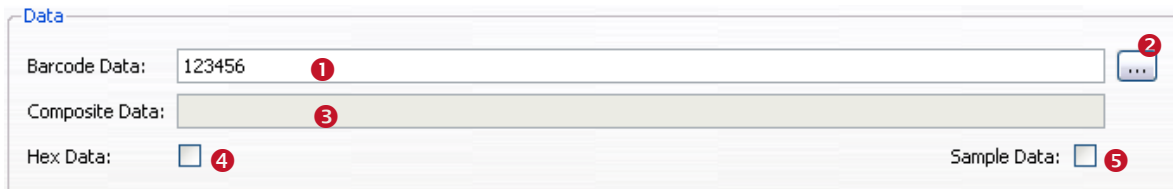
Figure 6: Data Section

7.7.1.1   Bar Code Data

Enter the bar code content in the field "*Barcode Data*" (see ❶) or in the "*Input Data*" dialog (▭ ❷).

Figure 7: Input Data (Dialog)

The *Input Data* dialog allows you to enter the bar code data in a multi-line edit control and to import the data from a text file via the *Load File…*. Use the *Reset* button to clear the *Data* field.

> ►   Not all bar code types are able to represent all data-characters. Some bar code symbologies can hold digits, others can contain alphanumeric characters (digits + letters + punctuation characters), or the full ASCII character set.

7.7.1.2   Add Control Characters

You can enter control characters directly in the edit field or use the context menu. Open the context menu by right-clicking in the edit field and choose *Add Control Characters*. Then select the control character, you want to insert, from the submenu.

Because control characters are represented by special character combinations (like \F for FNC1), **Barcode Studio** enables escape sequences automatically (see section 7.8.2.3).
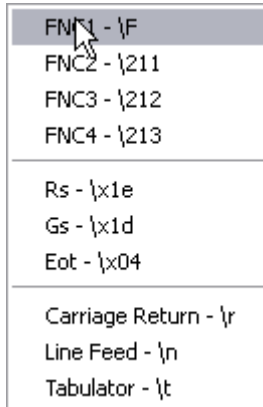
Figure 8: Add Control Character

For more information on all available control characters, please refer to the "Barcode Reference" available from www.tec-it.com or via the menu *Help ► Barcode Reference*.

7.7.1.3 Check Digit Override

Some bar codes with a predefined number of utilizable data characters (like all EAN, UPC, Postnet and RSS-14 codes) contain a check digit on a fixed position in the bar code data.

Example:

The EAN13 code consists of 12 utilizable digits and 1 check digit at the last position (❻).

If you enter 12 digits as bar code data the check digit will be calculated and inserted automatically. However, you can also enter all 13 digits and override the calculated check digit.

► Note: If the bar code data already contains a check digit, the bar code is only valid if the check digit **equals** to the automatically calculated check digit. ► Only if the check digit method is set to *None* (see section 7.8.2.2), the correctness of a check digit remains unchecked. Under normal circumstances you should not use this setting – we recommend relying on the automatic calculation of the check digit(s) by **Barcode Studio.**

7.7.1.4 Composite Data

The Composite Data field (❸) is only enabled if the selected bar code type supports composite data (check if the **Composite** page is visible) and if a *2D Composite Component* has been selected ("Auto", "CC-A", "CC-B" or "CC-C") on this page.

► You can also enter the composite data in the Barcode Data field by separating the composite data from the linear bar code data with the vertical bar character "|".

7.7.1.5 Hex Data

If this option (❹) is selected the bar code data is treated as hexadecimal data. This property applies to the bar code data as well as to the composite data.

Whenever Hex Data is enabled, Barcode Studio treats manual entered data as well as imported data as a hexadecimal character sequence. This sequence is converted to a normal character sequence before a bar code is generated.

7.7.1.6 Sample Data

If the option *"Sample Data"* (❺) is selected, *Barcode Studio* provides you with a valid sample data string depending on the currently selected barcode type. The data is adapted automatically, if you switch between different symbologies.

7.7.2 Appearance

Figure 9: Appearance Section

7.7.2.1 Unit

This value (❶) specifies the measurement units for displaying and/or entering the dimensions of the bar code. Possible values are:

- Millimeter
- Inch
- Mils (=1/1000 inch)
- Pixel.

7.7.2.2 Dimensions (Width, Height)

Use these settings to change the width (❷) and the height (❸) of the bar code.

Unit	Description
Millimeter	The width and the height of the bar code in millimeters. The physical width (in pixels) can be calculated as follows: width (pixels) = width (mm) / 25.4 * resolution (dpi)
Inch	The width and the height of the bar code in inches. The physical width (in pixels) can be calculated as follows: width (pixels) = width (inch) * resolution (dpi)
Mils	The width and the height of the bar code in mils. The physical width (in pixels) can be calculated as follows: width (pixels) = width (mils) / 1000 * resolution (dpi)
Pixel	The width and the height of the bar code in pixels. The width and the height are shown as physical (pixel) values. Basis for the displayed dimension is the size on the screen (in mm respectively in inch) and the adjusted resolution (dpi).

Table 3: Units

7.7.2.3 Module Width (❹)

The bar code is divided into several "modules". A module is the smallest bar (or space) segment. The module width is the fundamental measuring unit for bar codes, i.e. all bar and space widths base on it.

Depending upon the screen, printer, or image resolution, the lower limit for the module width may be exceeded. This leads to unreadable bar codes (e.g.: if the module width is smaller than 1 pixel).

MaxiCode: this bar code type has a predefined constant module width to achieve the standard-ized symbol dimensions. However, you can change the module width on demand.

7.7.2.4 Resolution (DPI) (❺)

► The screen preview has a resolution of 72, 96 or 120 dpi (depending on your monitor and the display settings for your operating system). If you need to adjust a bar code for screen resolution, choose the setting with the same name in the *Resolution* select box.

► To increase the details of the bar code symbol you can increase its resolution.

► However, only some professional layout applications consider the resolution correctly.

► Most applications show (and print) the bar code image in screen resolution. This leads to an increased output size if the resolution is higher than screen resolution.
Example: If your screen resolution is 96 dpi and the exported image has a resolution of 300 dpi it will be displayed about 3 times as large as in **Barcode Studio.**

► The dpi value can be stored for certain image formats only! For detailed information, please refer to Appendix C.

Resolution (DPI)	Description
Screen Resolution	Use the actual screen resolution (72, 96 or 120 dpi). The image will be exported in exactly the same size as you see it in Barcode Studio. Note: Under Windows XP the screen resolution is adjusted in the *Control Panel ► Display ► Settings ► Advanced ► General: Display / DPI Setting.*
Printer Resolution	Use the DPI setting of the currently selected printer.
72 dpi (BMP)	Create the image with 72 dpi.
Other	Create the image with the given dpi. Higher dpi values result in larger (and more detailed) image files.

Table 4: Resolution Settings

► You can enter custom resolutions, which are automatically added to the list.

When exporting an image to a BMP or to PNG file, the adjusted resolution (dpi) will not be stored there. Only the formats JPG, TIF, and PCX are capable of storing the resolution.

7.7.2.5 Optimal Size

Barcode Studio provides the possibility to enhance the bar code quality and therefore the readability. This setting can be very helpful especially for lower resolutions. If the "Optimal Size" option (❻) is checked, the module width of the bar code will be set to a whole-numbered pixel size (to the nearest lower value). Hereby the pixel deviation is reduced to a minimum or eliminated completely.
In other words: The bar code is printed using whole-numbered pixel sizes only. This avoids aliasing effects and guarantees an optimal scanning quality.

► If the "Optimal Size" option is enabled, the module width will be adjusted for optimum output quality.

► The symbol in the bar code view can only displayed with an optimum size, if the property is set to "Screen Resolution". The screen preview is not detailed enough to display higher resolutions correctly. You will see the optimal result only on according output devices (printer, image,…).

7.7.2.6 Reset Button

Use the <-- button to reset all *Appearance* settings to their initial values.

7.7.3 Text Placement

In this section you can change the settings regarding the human readable text of the bar code.
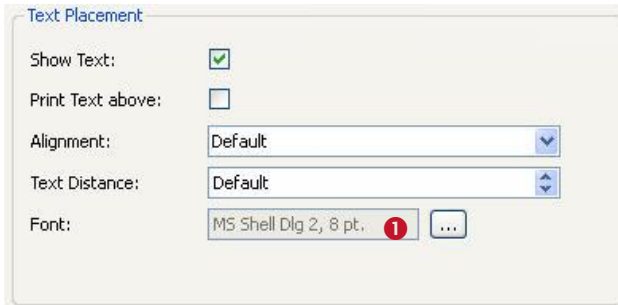
Figure 10: Text Placement Section

7.7.3.1 Show Text

If enabled, the "human readable text" is displayed. (Default: enabled.)

7.7.3.2 Print Text Above

If enabled, the "human readable text" is printed above the bar code symbol and not below it. (Default: disabled).

This setting cannot be enabled in conjunction with bar code types like UPC and EAN.

7.7.3.3 Alignment

This property adjusts the alignment of the human readable text (Default, Left, Right, and Center).

7.7.3.4 Text Distance

This property adjusts the distance between the "human readable text" and the bar code (in mm).

7.7.3.5 Font

Click the ⌷ button to select the font used for the human readable text. The selected font is displayed in the text box (❶).

7.8 Page Settings

7.8.1 Drawing
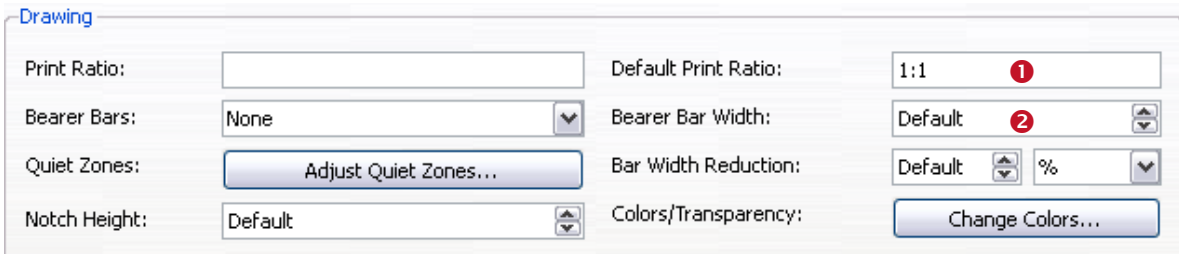
Figure 11: Drawing Section

7.8.1.1 Print Ratio

The print ratio describes the relationship between the widths of the single bars and spaces of a bar code related to the module width (do not mix up this item with the width/height ratio of a symbol!).

The print ratio consists of a colon-separated-list of bar and space widths. The list starts with **n** bar widths, followed by **m** space widths. The numbers **n** and **m** depend on the bar code type. The width values are not given absolutely but relatively to the module width.

- 1 → "Equal to the module width",
- 2 → "twice the module width",
- …

You can use the Default Print Ratio ❶ as a template for a customized **Print Ratio** value. It shows how many different bar and space widths are used for the selected bar code type. The absolute width of a bar (or space) is calculated using the values of the print ratio multiplied with the module width.

Example: If a bar code element has 4 different bar widths and 4 different space widths, the print ratio could look like this (e.g. for Code 128): 1:2:3:4:1:2:3:4.
The first 4 numbers ("1:2:3:4") stand for the bar widths, in last 4 numbers for the space widths (in this case, they are the same). The smallest bar is "1" module wide, the next larger is "2" (thus twice as wide as the smaller bar) and so on.

> ► Modifications within this area make sense for special applications only! For the Code 2OF5 interleaved, e.g., the print ratio can range from 1:2 to 1:3.
>
> ► Use this option with care! Bar codes may become unreadable when setting wrong print ratios.

For additional information on print ratios, please refer to the "Barcode Reference".

7.8.1.2 Bearer Bars

Select the kind of bearer bars you want to use. Bearer bars help a decoder to detect the full width of a bar code and reduce the possibility of partial scans (decoding only a part of the symbol). You can change the width of the Bearer Bars in ❷.

7.8.1.3 Quiet Zone

Click the *Adjust Quiet Zones…* button to open the Quiet Zones dialog.

This property adjusts the sizes of the quiet zones around the bar code. The sizes can be given in several units like *number of modules*, *Millimeters*, *Inches*, *Mils*, and *Pixels*.
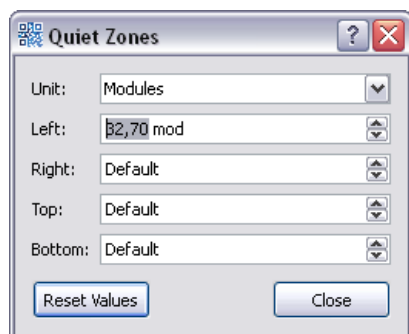
Figure 12: Quiet Zone

You can configure the quiet zone on each side of the barcode independently from each other. By clicking *Reset Values* you can reset the sizes to zero.

7.8.1.4 Bar Width Reduction

When printing on inkjet printers, the ink that is absorbed by the paper tends to diffuse. Setting the bar width reduction allows you to work against this spreading of ink. But also for laser printers with high toner saturation this property is useful.

The bar width reduction can be specified in several measure units like *percent of the module width*, *mm*, *Inch*, *Mils*. Thus when the unit is set to percent and the value is set to 20 all bars will be narrowed by 20 percent of the module width.

> ► Be careful: Setting the bar width reduction to more than 50 percent might leave the bar code unreadable! When using this feature we recommend you to do several test-scans to make sure that the bar code can be scanned correctly. A common value to start with is 15%.

7.8.1.5 Notch Height

This property adjusts the height at which the synchronization bars (e.g. the double lines in EAN on the left, center and on the right side) extend the regular bar code height.

7.8.1.6 Colors / Transparency

Click the *Change Colors…* button to open the Colors/Transparency dialog.
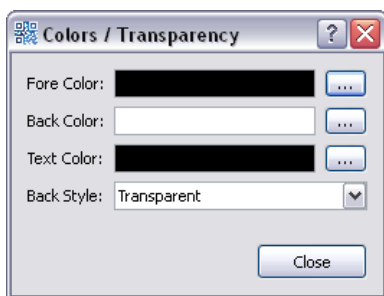
Figure 13: Colors Dialog

Click the ⌊…⌋ button beside the color you want to change and select the desired color in the following dialog.

Fore Color: The foreground color of the bar code (color of the bars)

Back Color: The background color of the bar code (color of the spaces)

Text Color: The color of the "human readable text".

Back style: Mode for drawing the background of the bar code. The background can be set to transparent (= default, background shines through) or opaque (background is overwritten with the background color). This setting is also relevant if you use copy and paste (clipboard).

7.8.2 Advanced Data Manipulation
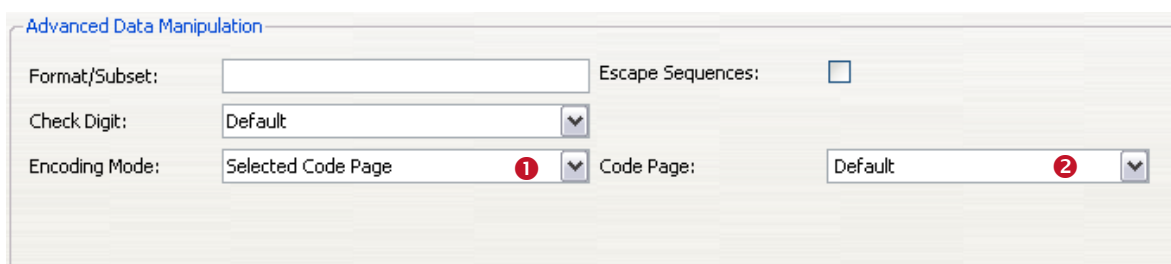
Figure 14: Advanced Data Manipulation Section

7.8.2.1 Format/Subset

The format string is used for formatting the utilizable data of the bar code according to defined rules. It operates with substitute symbols to indicate how the data shall be structured.
With the format string it is possible to insert constant characters to the bar code data. Control characters make it possible to change the Subsets for Code 128, EAN 128 and UCC 128 or to define the desired start/stop character of CODABAR.

For more information on format strings, please refer to the "Barcode Reference" available from www.tec-it.com or via the menu *Help ► Barcode Reference*.

7.8.2.2 Check Digit

This property specifies the check digit calculation method. In order to guarantee that the bar code data is going to be read properly a check digit can be added to the end of the utilizable data. A comparison of the bar code content with the check digit informs the scanning device (scanner) about incorrect scans and forces the device to repeat or reject the scan. The check digit calculation method is standardized for certain common bar codes types. Using check digits is mostly optional – but often recommended for particular symbologies and standards.

When set to **default** the check digit is calculated according to the specification of the selected bar code. Modifications are admissible for bar codes with selectable check digit methods or for special applications only.

For additional information on check digit calculation, please refer to the "Barcode Reference" available from www.tec-it.com or via the menu *Help ► Barcode Reference*.

7.8.2.3 Encoding / Code Pages

With the fields *Encoding Mode* (❶) and *Code Page* (❷) the user can affect the interpretation of the input data.

For a general overview about encoding and code pages, please refer to the "Barcode Reference" available from www.tec-it.com or via the menu *Help ► Barcode Reference*.

> ► Data is always passed as UNICODE stream to **Barcode Studio**. As UNICODE characters always consist of more than one byte and most of the barcode types are only able to encode one byte per character, it is not always clear how the input data should be interpreted. So we give you the possibility to decide yourself.
> ► Per default the input data is converted to the selected *Code Page* (see below). If other kinds of interpretations are needed, you have to change this property.

You have following possibilities:

Value	Description
Selected Code Page	Converts the input data to the code page, which is selected in the property *Code Page.* (default)
Lo-Bytes only	Considers only the lower bytes of the input characters, the higher bytes are ignored.
Lo- before Hi-Byte	The data is passed as it is. No conversion is done. All bytes are considered. The lower byte is passed before the higher byte.
Hi- before Lo-Byte	Consider both bytes but change the order of lower and higher byte. That means the higher byte is encoded before the lower byte.

Table 5: Compression

The *code page* is related to the property *Encoding Mode*. It is only considered if the encoding mode is set to *Selected Code Page*. You can choose between several pre-defined code pages (e.g. ANSI, ISO 8559-1 Latin I, UTF-8, Shift-JIS…) or add the IDs of custom code pages, which are automatically added to the list.

7.8.2.4   Escape Sequences
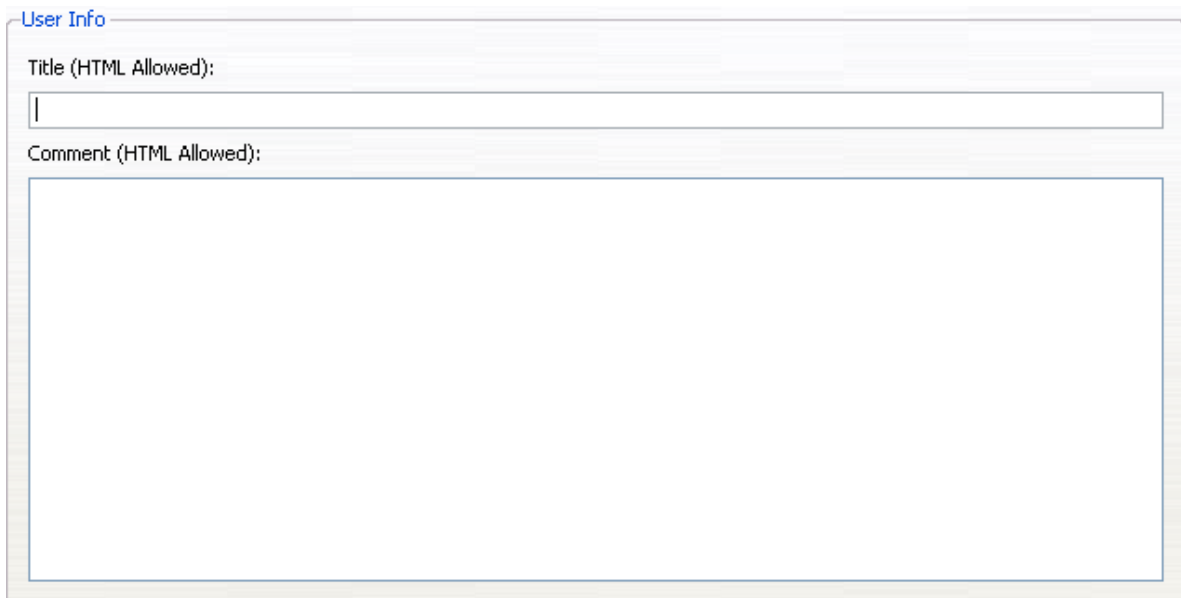
The use of escape sequences is appropriate if you need to encode control characters like carriage return or FNC1 into the bar code.

This option specifies, whether escape sequences (like "\n") shall be translated or not (default: no). Each escape sequence starts with a backslash ("\"). For a list of recognized escape sequences, please refer to the additional document "Barcode Reference" available via the menu *Help* ► *Barcode Reference* or from www.tec-it.com.

> ►   If escape sequences are activated, the backslash character can't be used directly in the bar code data. It must be replaced by a double back-slash "\\" in order to be encoded correctly.

7.9   Page Info

7.9.1   User Info

Figure 15: User Info Section

7.9.1.1   Title and Comment

Users can enter a title and a comment in HTML-Format. If not left empty title and comment are displayed as info text below the barcode. The info text can be used to provide other users with necessary information.

Possible fields of application:

- Provide a short description of specific bar code settings.
- Inform other users about the input data format.
- Advice other users to perform the necessary steps to generate correct bar codes.
- …
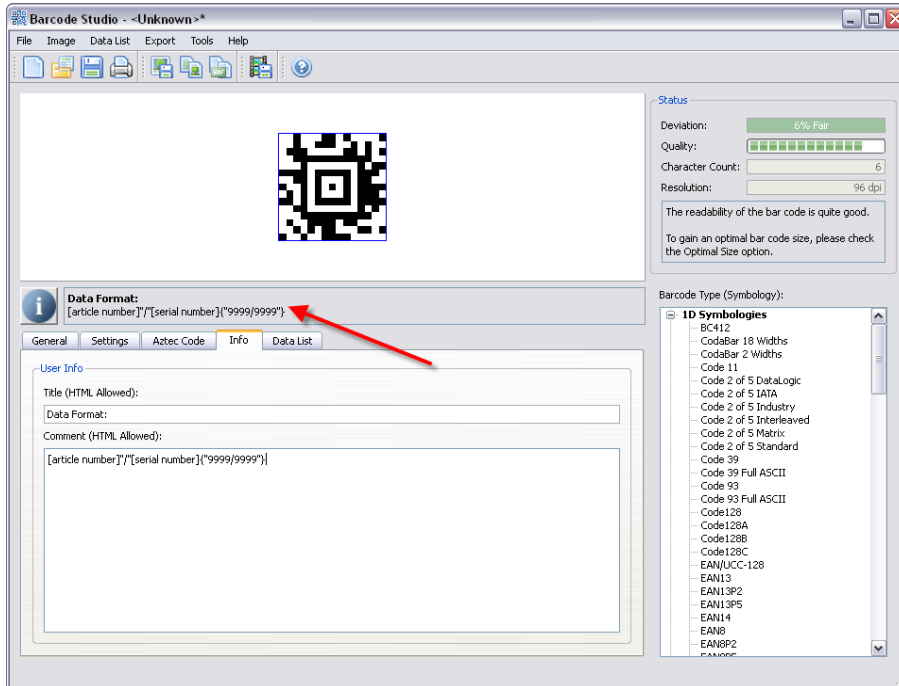
Figure 16: Info Text

To distribute settings with an info text, please perform following steps:
► Change all settings according to your needs.
► Enter the info text to the title/comment field.
► Save the settings to a file.
► Provide this file to all users who need it.

7.10 2D Settings

7.10.1 PDF417 / Micro PDF417
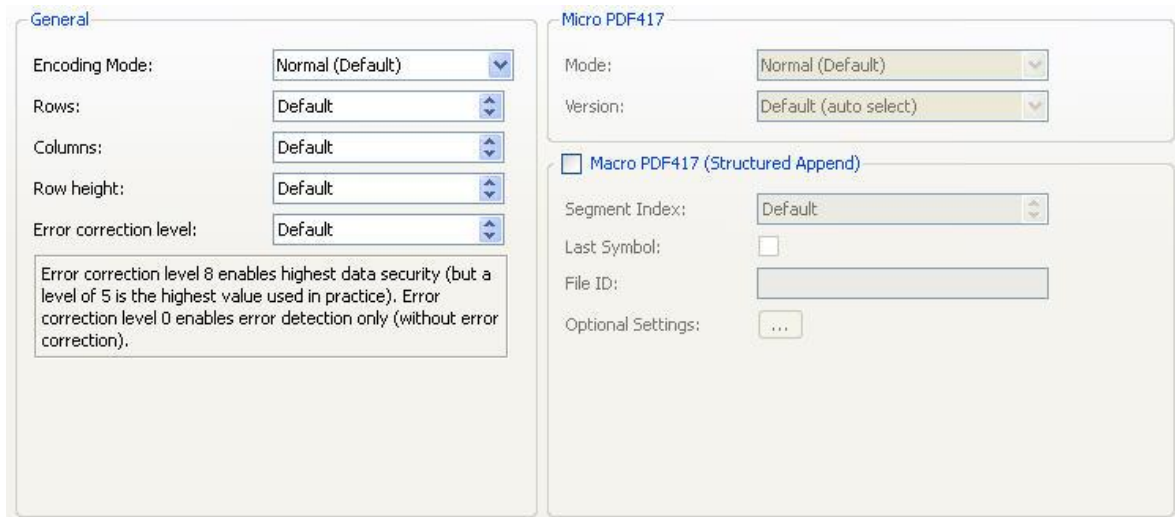
Figure 17: PDF417 / Micro PDF417 Properties

The PDF417 / Micro PDF417 page is used to modify the standard behavior of the two-dimensional PDF417 bar codes. PDF417 divides data contents into rows and columns – it is a stacked symbology with error correction capabilities. This page is not relevant to other symbologies.

► Be careful when modifying these adjustments. Always make a test scan in case of doubt!

7.10.1.1 Encoding Mode

Determine whether to enforce binary encoding. In **Binary Encoding** mode the encoding algorithm does not try to calculate the smallest possible symbol, but it uses binary encoding for all characters. This is recommended for binary input data and for bar code generation with optimal speed.

7.10.1.2 Rows [3..90]

The number of rows. The value must be between 3 and 90.

Default: the number of lines is calculated automatically depending on the number of input characters.

► This property is not available for the Micro PDF417 symbology!

7.10.1.3 Columns [1..30]

The number of columns. The value must be between 1 and 30. Start-, stop- and line-indicator columns are not taken into account.

Default: the number of columns is calculated automatically depending on the number of input characters.

7.10.1.4 Row Height [mm]

The height of an individual row in millimeter. If specified, the bar code height will remain locked at the specified value. (Modifying the bar code dimensions will only affect the bar code width.).

Default: the row height is calculated automatically depending on the number of input characters.

7.10.1.5 Error Correction Level

The error correction level. The value can be between 0 (only error detection) and 8 (highest correction).

Default: the level is calculated automatically between 2 and 5 - according to the number of input characters.

► This property is not available for the Micro PDF417 symbology!

7.10.1.6 Mode

Specifies how data is encoded as Micro PDF417. In most cases the "Default" mode is the best choice.

► Note: Often the scanner hardware does not support all modes listed here – check with your scanner first.

Mode (Enumeration)	Description
Normal (Default)	Input data is analyzed. Text, numeric or binary compaction mode will be used accordingly (to produce the smallest symbol).
UCC/EAN-128 Emulation	UCC/EAN-128 Emulation mode. Transmit]C1 or]L3. Use compaction for Application Identifier (AI) "01" + 14 digits.
Code128 Emulation	Code-128 Emulation mode. Transmit]C2 or]L4.
Code128 FNC2 Emulation	Code-128 with FNC2 on first position will be emulated.

Linked UCC/EAN-128	Linked UCC/EAN-128 emulation. Transmit]C1 or]L3.
	Indicates that the Micro PDF symbol is linked with a linear symbol (which may be required for a successful scan).
	Using this mode, the following AIs can be encoded with better compaction in the given order:
	▪ Date (AI 11, 13, 15 or 17) + lot number (AI 10) + other AI's (optional).
	▪ Date (AI 11, 13, 15 or 17) + serial number (AI 21) + other AI's (optional).
	▪ Date (AI 11, 13, 15 or 17) + other AI's (optional).
	Note: This mode is not used with UCC EAN Composite Symbology, which uses linked symbols, too.
05 Macro	The preamble [(> RS 0 5 GS precedes the encoded data.
06 Macro	The preamble [(> RS 0 6 GS precedes the encoded data.
CC-A Data Mode	For special applications only: use Base-928 compaction and process input data as byte array.
CC-B Data Mode	For special applications only: use binary compaction (Base-900), prefix symbol data with reserved symbology code word.

Table 6: Micro PDF417 - Modes

► This property is not available for the PDF417 symbology!

7.10.1.7 Version

Specifies the "size" of the symbol in terms of codeword-columns and Micro PDF417 rows.

► This property is not available for the PDF417 symbology!

7.10.1.8 Macro PDF417 (Structured Append)

Inserts a Macro PDF control block into the bar code.

PDF417 allows the user to spread the data across several symbols. This might be done if the data is too large to fit into a single symbol or for reasons of appearance and geometry.

The so called "Macro PDF Control Block" carries information that relates its contents to the overall data. The below described properties are mandatory for the Macro PDF functionality.

7.10.1.9 Segment Index

Index of the actual data segment in the symbol chain. Start with 1 and increase for each additional symbol in the data chain. Value range = 1…99999.
Note: when reading the encoded data with a scanner, the index will be zero-based.

7.10.1.10 Last Symbol

Identifies the last symbol in the data chain. If set to true, the "Last Segment Indicator" is put at the end of the Macro PDF control block.

7.10.1.11 File ID

The file id identifies all symbols, which belong to the same data chain. For reassembling, all data blocks having the same File ID are concatenated in the order of increasing segment index.

7.10.1.12 Advanced (optional fields)

These fields are *optional* and may be encoded into the Macro PDF417 control block on demand.
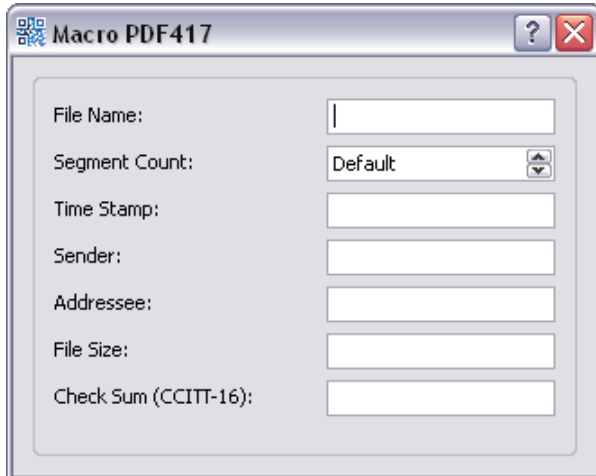
Figure 18: Macro PDF417 Optional Settings

File name (alphanumeric)	File name (variable length field).
Segment count (numeric)	Total number of data segments (range 1…99999).
Time stamp (numeric)	Time stamp (elapsed time in seconds since January 1, 1970 00:00 GMT).
Sender (alphanumeric)	Sender (variable length field).
Addressee (alphanumeric)	Addressee (variable length field).
File size (numeric)	Total number of bytes encoded (variable length field).
Checksum (numeric)	16-Bit CRC checksum (using CCITT-16 polynomial x16 + x12 + x5 + 1 over the entire data).

7.10.2 MaxiCode

MaxiCode represents data, by drawing hexagonal items, which are arranged around a circular center (a so called "Bull's Eye"). The internal data structure is regulated by different "modes". The mode "Structured Carrier Message" was defined by the parcel transport service UPS®. Data can be encoded in two different error correction levels (SEC = Standard Error Correction and EEC = Enhanced E.C.).

With "Structured Append" you can divide larger quantities of data into several MaxiCode symbols – they are joined by the scanner. The maximum data capacity of one symbol is 93 characters. The actual quantity of the utilizable data depends on the selected mode, how often special characters are used, whether numeric sequences, which can be compressed, are used and which level of error correction is adjusted.
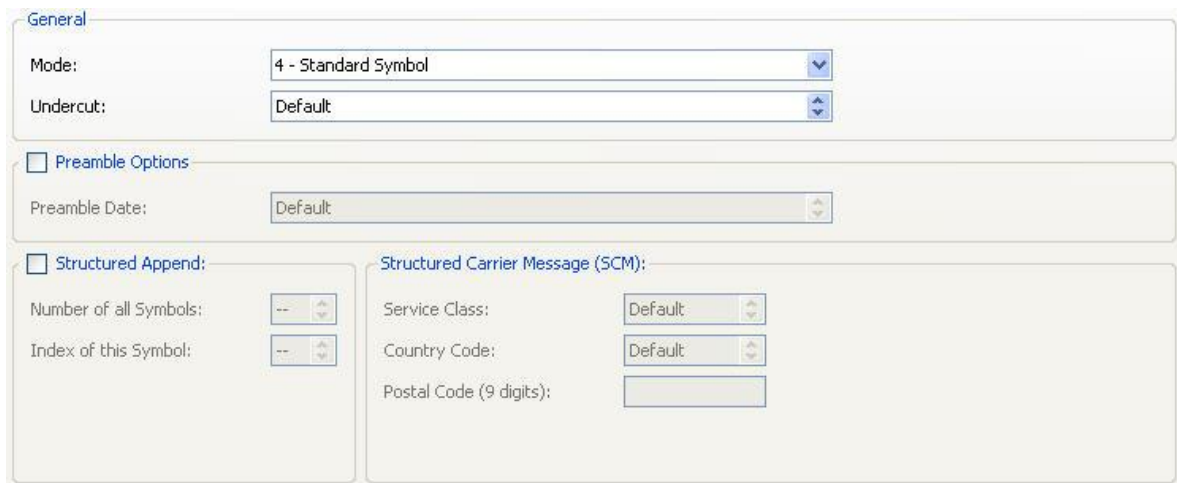
Figure 19: MaxiCode Properties

7.10.2.1 Mode

Mode (Enumeration)	Description
4 – Standard Symbol	For numeric and alphanumeric character sequences (incl. standard error correction).
2 – SCM (Numeric)	Structured Carrier Message, up to 9 digits (postal code consist of digits only).
3 – SCM (Alphanumeric)	Structured Carrier Message, up to 6 characters (postal code consist of alphanumeric characters).
5 – Full EEC	Like mode 4 but with enhanced error correction (safer, but fewer utilizable data possible).

Table 7: MaxiCode - Modes

7.10.2.2 Undercut [0..100]

The undercut influences the diameter of the hexagonal bar code elements. In new applications it is recommended (according to the AIM standard) to use an undercut setting of 75% (default).

7.10.2.3 Preamble Options

Used particularly in "Open System Standards". Under "Preamble Date" the last two digits of a year can be entered. They are inserted automatically into the data stream in a predefined place.

7.10.2.4 Structured Append

If you want to "connect" several MaxiCode symbols in order to encode larger quantities of data, then you can use "Structured Append". A symbol identification number which is entered in the "Index of this Symbol" field can be assigned to each MaxiCode symbol. Its value can range between 1 and 8. This index indicates the order, in which the data is joined after the reading/scanning process. The total number of arranged MaxiCode symbols must be entered in "Number of all symbols".

7.10.2.5 Structured Carrier Message (SCM)

MaxiCode was originally developed by UPS® (United Parcel Service). In the operating mode "Structured Carrier Message" (mode 2 and 3) there are defined data fields for UPS®-purposes. These can be entered in the fields "Service Class", "Country Code", and "Postal Code". In "Mode 3" you can use digits as well as alphanumeric characters for the "Postal Code".

By using escape sequences it is possible to insert the values for date, preamble, service class, country and postal code directly into the bar code data (text property). To learn more about this possibility, please refer to the additional document "Barcode Reference" available from www.tec-it.com or via the menu *Help ► Barcode Reference*.

7.10.3 Data Matrix

> ► Please note, that **Barcode Studio** always uses ECC 200 error correction.

Figure 20: Data Matrix (ECC200) Properties

7.10.3.1 Code Format

Code Format (Enumeration)	Description
Default	Standard format.
GS1/UCC/EAN	Special format defined by GS1/UCC/EAN. Used for encoding Application Identifiers. (FNC1 at 1st position).
Industry	Supports peculiar industry formats (FNC1 at 2nd position).
Macro 05	[)>Rs05Gs is encoded at the beginning of the code.
Macro 06	[)>Rs06Gs is encoded at the beginning of the code.

Table 8: Data Matrix - Modes

7.10.3.2 Symbol Size

The size of the symbols in number of rows and columns. Possible sizes are "10 x 10" to "144 x 144" modules for square symbols and "8 x 18" to "16 x 48" for rectangular symbols. If set to default, the minimal possible square size is used (depending on the input data).

7.10.3.3 Enforce Binary Encoding

Determine whether to enforce binary encoding. In **Binary Encoding** mode the encoding algorithm does not try to calculate the smallest possible symbol, but it uses binary encoding for all characters. This is recommended for binary input data and for bar code generation with optimal speed.

7.10.3.4 Show as Rectangle

Determines if the Data Matrix symbol should be displayed as a rectangle (option is **checked**) or a square (**unchecked** - default).

7.10.3.5 Structured Append

If you want to "connect" several Data Matrix symbols in order to encode larger quantities of data, then you can use "Structured Append". A symbol identification number - which is entered in the "Index of this Symbol" field - can be assigned to each Data Matrix symbol. Its value can range from 1 to 16. This index indicates the order, in which the data is joined after the reading/scanning

process. The total number of arranged Data Matrix symbols must be entered in "Number of all symbols". The "File ID" has to be the same for all symbols within such a chain.

7.10.4   QR-Code / Micro QR-Code

The QR-Code symbology is a 2-dimensional matrix symbology (similar to Data Matrix). Remarkable is the large data capacity (up to 3000 ASCII characters or 7000 digits). QR Code means Quick Readable code – it was originally designed to read and decode symbols with high amounts of data within a minimum of time.

The Micro QR-Code symbology is based upon QR-Code, but is adapted to encode only small quantities of data. It produces less overhead and smaller symbols.

Figure 21: QR-Code Properties

7.10.4.1 Format / Application Indicator

Format (Enumeration)	Description
Default	Standard format.
GS1/UCC/EAN	Special format defined by GS1/UCC/EAN. Used for encoding Application Identifiers. (FNC1 at 1st position).
Industry	For special industry formats (FNC1 is inserted at second position). If you choose this value, you also have to fill in the field Application Indicator (2 digits or 1 letter). It determines to which industry format the input data (should) correspond(s).

Table 9: QR Code – Modes

> ►   This property is not available for the Micro QR-Code symbology!

7.10.4.2 Symbol Version (Size)

Specifies the version (= size) of the symbol, defined by a version number, the number of rows and the number of columns. The range for QR-Code symbols is from „(1) 21 x 21" up to „(40) 177 x 177" modules for square symbols. The range for Micro QR-Code symbols is from "(M1) 11x11" to "(M4) 17x17".

If the property is set to default, the size is computed automatically based on the data to be encoded.

7.10.4.3 Error Correction Level

Defines the error correction level. You can choose from following possible values:

Error Correction Level (Enumeration)	Description
(L)ow	Lowest level. Data recovery capacity is up to approximately 7%.
(M)edium (default)	Up to 15%.
(Q)uartil	Up to 25%.
(H)igh	Highest level. Up to 30%.

Table 10: QR Code – Error Correction Levels

> ► Depending on the selected version, Micro QR-Code does not support all levels of error correction. If a level is selected, which is too high for given symbol version, **Barcode Studio** automatically uses the highest possible level.

7.10.4.4 Mask Pattern

Specifies the mask pattern that is applied to the symbol to improve the readability of the code.

Mask Pattern (Enumeration)	Description
Default	The mask pattern is calculated automatically.
0..7 (QR-Code only)	With the values 0 to 7 you choose the appropriate mask pattern. It would make sense to specify this setting directly, especially, if you have to optimize computation time. The algorithm to calculate the optimal mask is rather complex (and therefore very resource consuming).
0..3 (Micro QR-Code only)	With the values 0 to 3 you choose the appropriate mask pattern. It would make sense to specify this setting directly. Compared to QR-Code the mask algorithm for Micro QR-Code is rather fast and simple.

Table 11: QR Code – Mask Patterns

7.10.4.5 Compaction

The multi-byte compaction mode. QR Code provides code compaction for various Multi Byte character encodings (Kanji, Chinese). This compaction can help to produce smaller bar codes.

Compaction (Enumeration)	Description
Default multi byte compaction (Default)	Automatically chooses the appropriate compaction method.
No multi byte compaction	Disables the multi byte compaction.
Kanji character compaction	Enables the compaction for Kanji characters.
Chinese character compaction	Enables the compaction for Chinese characters.

Table 12: QR Code – Compaction

QR-Code supports compaction of Kanji characters (if present in the Multi Byte character set Shift JIS X 0208). The Kanji characters are compacted into a 12-Bit codeword (instead of a 2 Byte / 16 Bit codeword) – so you need less space in the symbol. It is recommended to enable this compaction only if you have Kanji characters in your input data. Enabling is not recommended for binary data.

7.10.4.6 Structured Append

If you want to "connect" several QR Code symbols in order to encode larger quantities of data, then you can use "Structured Append". A symbol identification number which is entered in the "Index of this Symbol" field can be assigned to each QR Code symbol. Its value can range from 1 to 16. This index indicates the order, in which the data is joined after the reading/scanning process. The total number of arranged symbols must be entered in "Number of all Symbols".

Chained QR Code symbols are identified by the parity byte. The parity byte must be identical in all symbols. The value can be calculated using the method „QR_StructAppParity", which is part of **TBarCode**.

> ► This property is not available for the Micro QR-Code symbology!

7.10.5 Aztec Code

Figure 22: Aztec Code Properties

7.10.5.1 Format / Format Specifier

Code Format (Enumeration)	Description
Default	Standard format.
GS1/UCC/EAN	Special format defined by GS1/UCC/EAN. Used for encoding Application Identifiers. (FNC1 at 1st position).
Industry	For special industry formats (FNC1 is inserted at second position). If you choose this value, you also have to fill in the field Application Indicator (2 digits or 1 letter). It determines to which industry format the input data (should) correspond(s).

Table 13: Aztec Code – Modes

7.10.5.2 Symbol Size

Defines the size of an Aztec Code symbol by the number of rows and columns. Possible values range from „15 x 15" up to „151 x 151" modules. If the property is set to default, the size is computed automatically based on the data to be encoded.

7.10.5.3 Enforce Binary Encoding

Determine whether to enforce binary encoding. In **Binary Encoding** mode the encoding algorithm does not try to calculate the smallest possible symbol, but it uses binary encoding for all characters. This is recommended for binary input data and for bar code generation with optimal speed.

7.10.5.4 Aztec Runes Mode

Enables the Aztec Runes mode. Aztec Runes are a special kind of Aztec Code Symbols and are used to generate small and very fast readable markers. Aztec Runes can only encode integer values from 0 to 255.

7.10.5.5 Error Correction

Defines the error correction level. The value can be between 1 and 89 percent.

Default: the level is set to 23 percent.

7.10.5.6 Structured Append

If you want to "connect" several Aztec Code symbols in order to encode larger quantities of data, then you can use "Structured Append". A symbol identification number which is entered in the "Index of this Symbol [A..Z]" field can be assigned to each Aztec Code symbol. Its value can range from "A" to "Z". This index indicates the order, in which the data is joined after the reading/scanning process. The index of the last Symbol must be entered in "Number of all Symbols [A..Z]".

Chained Aztec Code symbols are identified by the "Message ID". The "Message ID" must be identical in all symbols.

7.10.6 Codablock-F

The Codablock-F property page is used to adjust symbology specific parameters. Similar to PDF-417 the data content is divided into rows and columns. Codablock-F is a stacked symbology with additional internal checksums for error recognition.

Codablock-F is based upon the Code 128 symbology - one data row consists of a single Code 128 bar code extended with row identifiers and column check sum.

> ► Caution when modifying these adjustments. Always make a test scan in case of doubt!
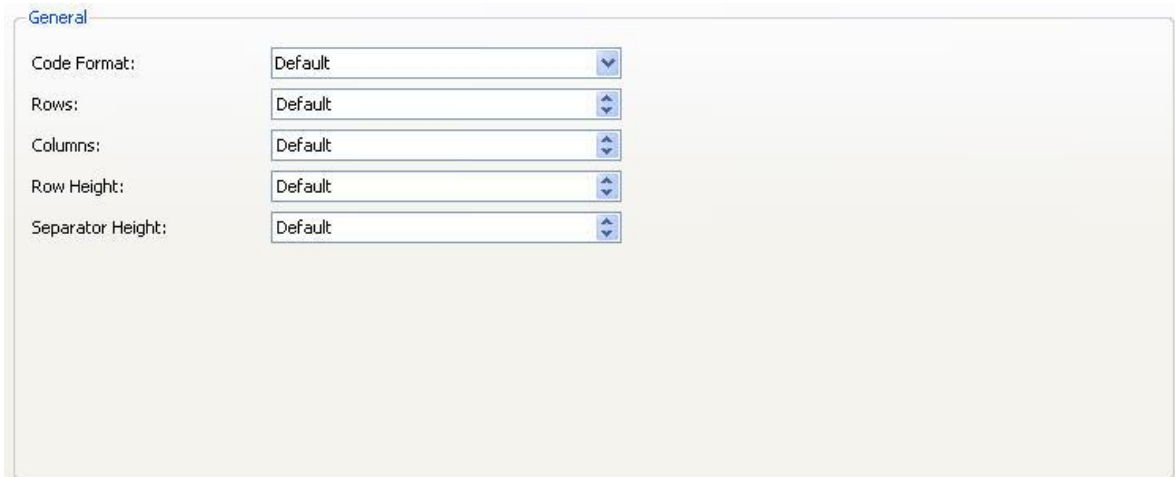
Figure 23: Codablock-F Properties

7.10.6.1 Code Format

Code Format (Enumeration)	Description
Standard	Standard format
GS1/UCC/EAN	Special format defined by GS1/UCC/EAN to be used in GS1/UCC/EAN applications.

Table 14: Codablock-F – Modes

7.10.6.2 Rows [2..44]

The number of rows used for encoding. The value must be between 2 and 44. Default: the number of lines is calculated automatically depending on the number of input characters.

7.10.6.3 Columns [4..62]

The number of columns (in data words), which are to be printed. The value must be between 4 and 62. Start-, stop- and line-indicator columns are not taken into account. Default: the number of columns is calculated automatically depending on the number of input characters.

7.10.6.4 Row Height [mm]

The height of an individual row in millimeter. If specified, the bar code height will remain locked at the specified value. (Modifying the bar code dimensions will only affect the bar code width.) Default: the row height is calculated automatically depending on the number of input characters.

7.10.6.5 Separator Height [mm]

The width of the row separator line in millimeter. Default: the line width is equal to the module width (calculated automatically depending on the symbol size).

7.10.7 Composite Symbology

Figure 24: Composite Symbology Settings

Composite components are available for the following bar codes:

- EAN8
- EAN13
- GS1-DataBar / RSS14
- GS1 DataBar Stacked / RSS14 Stacked
- GS1 DataBar Stacked Omnidirectional / RSS14 Stacked Omnidirectional
- GS1 DataBar Truncated / RSS14 Truncated
- GS1 DataBar Expanded / RSS Expanded
- GS1 DataBar Expanded Stacked / RSS Expanded Stacked
- GS1 DataBar / RSS Limited
- GS1-128 / UCC/EAN128
- UPC-A
- UPC-E

> ► By default Composite Component Symbologies are set to *disabled*.

7.10.7.1 2D Composite Component

None	Composite Symbologies are disabled.
Auto	Automatically choose CC-A, CC-B or CC-C Symbology depending on the length of the input data.
CC-A	CC-A is a variant of the MicroPDF417 Symbol with a unique combination of row address patterns (RAP). It is the smallest variant of the 2-dimensional composite component. Up to 56 digits of alphanumeric data can be coded with 3 to 12 rows and 4 columns.
CC-B	CC-B is a subset of the MicroPDF417 Symbol, which is identified by the code word 920. Encoding systems choose CC-B automatically when CC-A has not enough capacity (Auto-mode). CC-B encodes up to 338 digits of alphanumeric data in 3 to 12 rows and 2 to 4 columns.
CC-C	The CC-C structure is a PDF417 Symbol, which is identified by the internal code word 920 (920 is the first code word after the symbol length indicator). The CC-C structure can be used as a 2 dimensional composite component of a UCC/EAN-128 Composite Symbols. It has the largest data capacity of EAN.UCC Composite Symbols because of its possibility to code of up to 2361 numbers. It can code numbers with up to 2361 digits of alphanumeric data, which have 3 to 30 rows and up to 30 Data-Error-checking-Code-Columns.

7.10.7.2 Segments per Row

This property adjusts the number of (graphical data) segments per row in the **GS1 DataBar Expanded Stacked (RSS)** Symbol. This parameter influences the width of the bar code. "Default" means that each row contains at least 4 segments.

> ►   This property is only used by the bar code type **GS1 DataBar Expanded Stacked (RSS)**.

8   Data List

8.1   General

The data list feature can be used to produce series of bar code images. The data can be imported from files, generated by a sequence generator, or edited manually by the user.

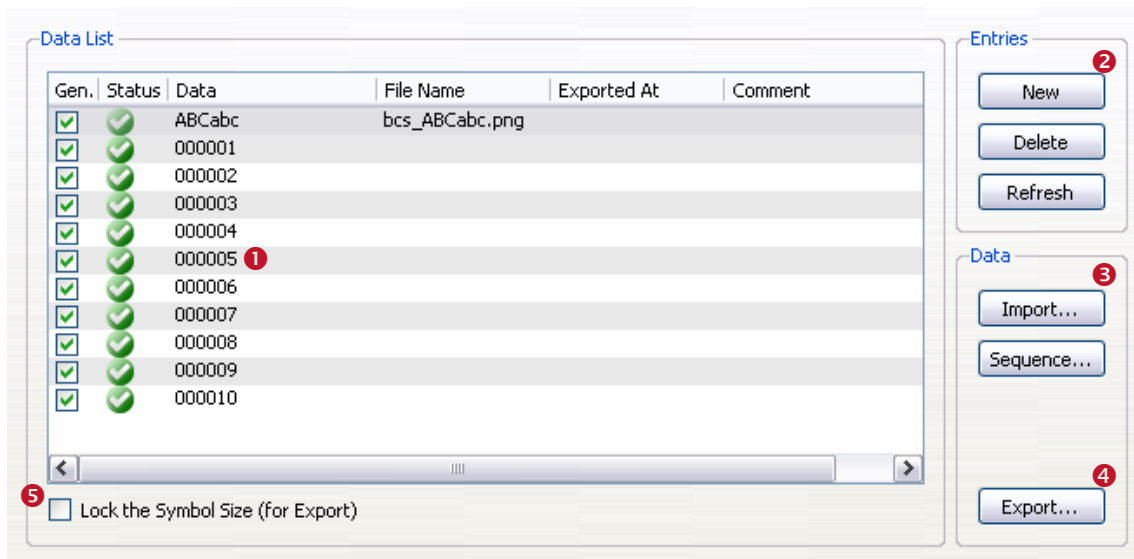Go to the *Data List* tab to see following view.

8.2   Data List View

Figure 25: Data List View

The data list (❶) contains a list of bar code data, which can be used to export series of bar code images. The data can be inserted, updated, or deleted manually (❷), imported from a text file or generated automatically by a sequence generator (❸). Finally the data list is exported as a series of image files (❹).

8.2.1   List Content

8.2.1.1   Generate

Generate determines whether the data row shall be exported. This value is checked by default.

8.2.1.2   Status

The status column informs the user whether a bar code can be created successfully (✔) - that means the data is valid for the given settings - or not (✖).

To get a detailed error message select the data row with the error icon. The error message is shown in the **Barcode View** above.

8.2.1.3   Data

This column contains the bar code content. This value is mandatory for bar code generation and may not be empty. Values can be edited manually, imported from a file or generated with the sequence generator.

8.2.1.4   Composite Data

Composite Data contains the content of the composite part of a bar code. It is only used in connection with composite bar code types. So this column is only visible if a composite bar code type is selected. It can be edited manually or imported from a file.

8.2.1.5   File Name

This column contains the name of the exported file. The file names can be edited manually, imported from a file, or generated automatically during export.

8.2.1.6   Exported At

Exported At contains the time when the bar code was exported the last time successfully. It is generated automatically during export and cannot be changed by the user.

8.2.1.7   Comment

The user may enter comments for the data list here.

8.2.2   Symbol Size / Module Width

By default all bar codes in the data list have the same module width. That means bar codes with different contents may vary in size but the minimum bar width and the quality will be the same for each bar code.

The user has also the possibility to generate bar codes with (nearly) the same symbol size (but different module width). He can do this by checking the field *Lock Symbol Size* (❺).

8.2.3   Editing

8.2.3.1   Add New Entries

The user can append a new bar code entry by clicking the *New*-button. All columns are empty and have to be filled by the user.

8.2.3.2   Edit the Data List

The user can edit the data directly in the list by **double-clicking** the list entries (or pressing **F2**). He may change the *Data*, the *Composite Data*, the export *File Name*, and the *Comment*. The *Data* column is mandatory, all others are optional.

8.2.3.3   Delete Entries

By clicking the *Delete*-button the user has the possibility delete one or more selected data list entries.

8.2.3.4   Refresh

The *Refresh*-Button updates the error status of the data list entries.

8.2.4   Error Status

The status icons inform the user whether the data content of each row is valid for the actual bar code settings(❶).
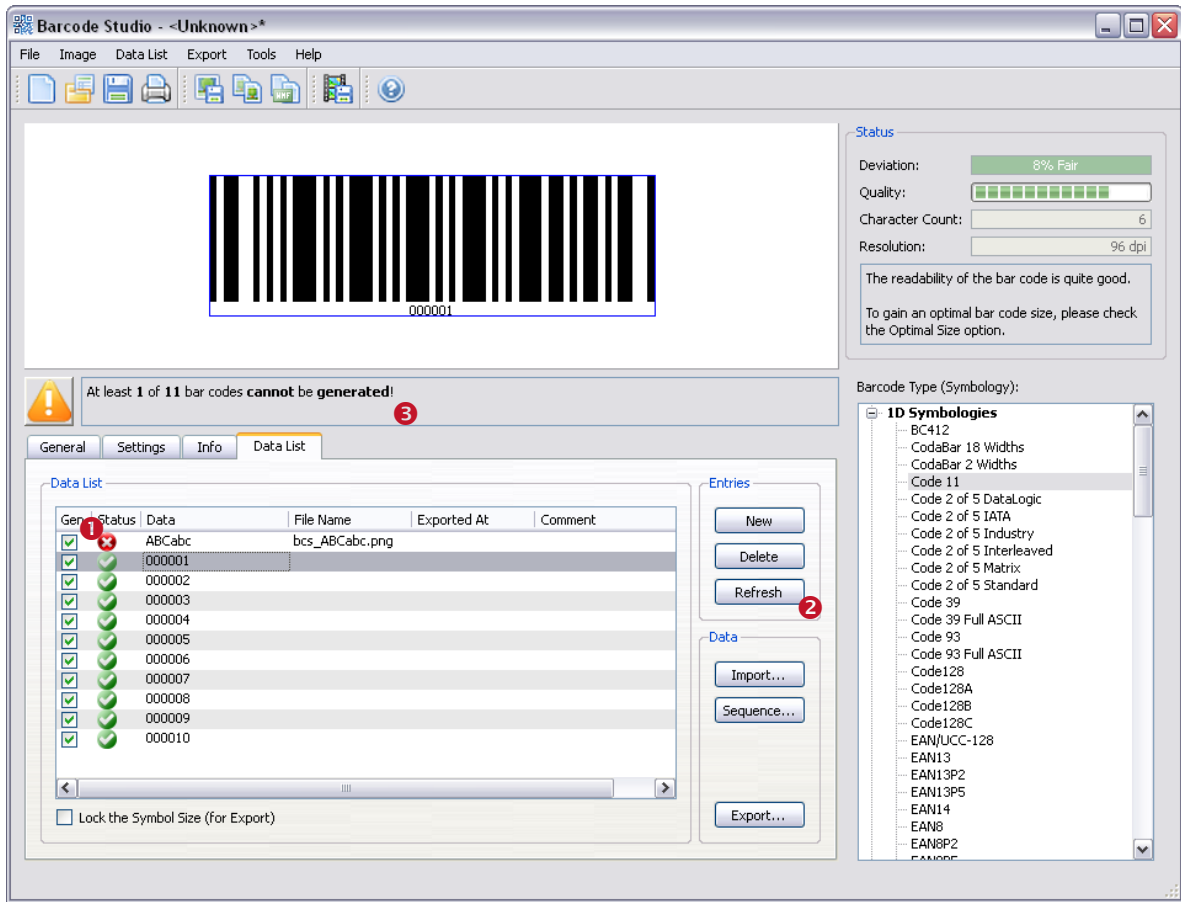
Figure 26: Error Status

In order to avoid long update times, the error status is not kept up-to-date. So the user has to click *Refresh* to see the **real** error status (**❷**).

If at least one data row produces an error, the user is informed by a **warning box** about how many data rows are invalid (**❸**).

8.3   File Import

8.3.1   Import Dialog

8.3.1.1   File

Enter or choose the file name of the import file. The file must be a character-separated-text file (*.csv, *.tsv, …). The data rows are separated by line breaks and the columns by a specified separator character (**❶**).
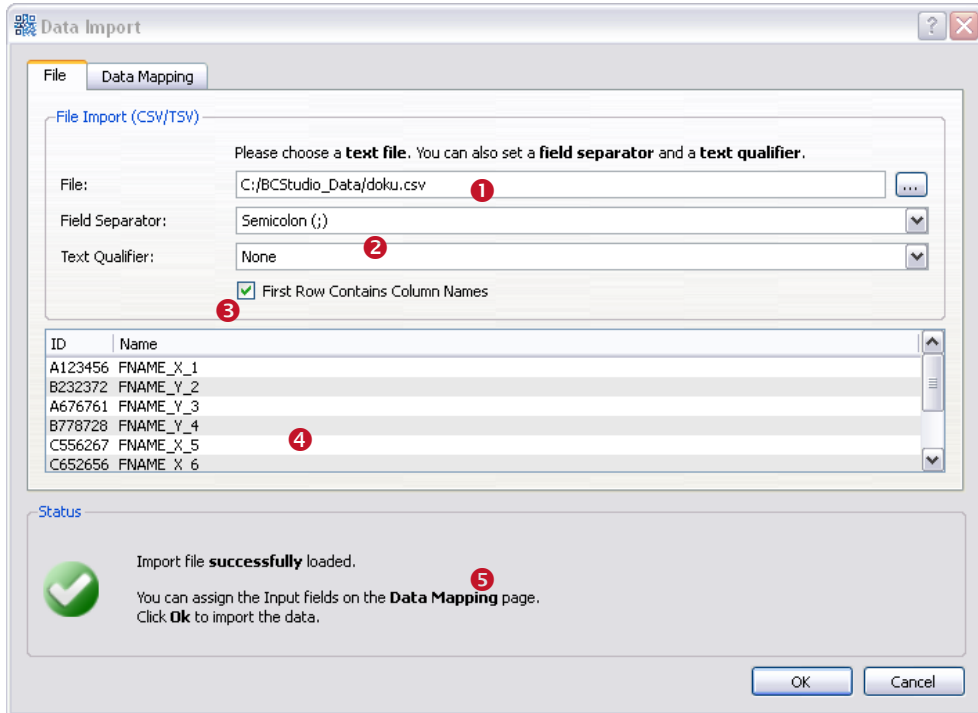
Figure 27: File Import

8.3.1.2   Field Separator and Text Qualifier

The *field separator* divides data rows into several columns. Frequently used separator characters are **commas** (**,**), **semicolons** (**;**), and **tabulators**, but the user can specify any character he likes (❷).

If the import data contains separator characters within a single column, the user has the option to specify a *text qualifier* character. All characters between 2 related text qualifiers are handled as unit. Often used text qualifiers are **quotes** (**'**) and **double quotes** (**"**) (❷).

8.3.1.3   First Row Contains Column Names

If this setting is checked the first row is assumed to contain the column names (❸).

8.3.1.4   Preview and Status

As soon a valid file name has been specified the preview shows the first lines of the imported file (❹). The status field below (❺) informs the user about the import status and how to proceed.
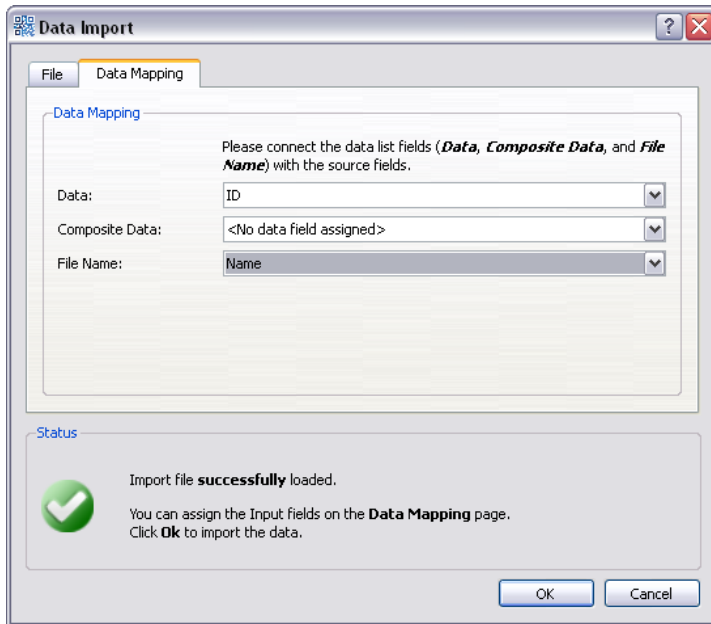
8.3.2 Data Mapping

Figure 28: Data Mapping

Each column of the imported file can be mapped to *Data* column, the *Composite Data* column, and the *File Name* column of the data list. The Data column is mandatory, all others are optional.

At last press *Ok* to import the file into the data list.
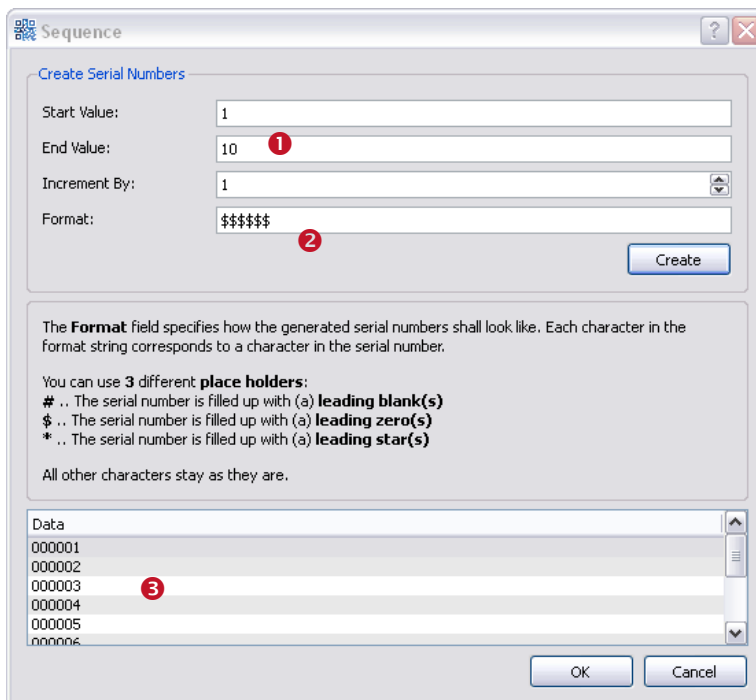
8.4 Sequence Generator

Figure 29: Sequence Generator

By clicking *Sequence…* the user opens the **Sequence** Dialog with the sequence generator. The sequence generator allows the user to fill the data column of the data list with a formatted serial number.

8.4.1 Start Value / End Value / Increment

The range of a sequence is specified by the *Start Value*, the *End Value*, and the *Increment*. The start value defines the lower bound of the range, the end value the upper bound, and increment the step size between consecutive list items. (❶)

►   The last value of the sequence will never exceed the number specified in *End Value*.

8.4.2 Format

The *Format* defines the pattern, which will be applied to the items of the sequence (❷). The format string may contain 3 kinds of placeholders, which are replaced by the digits of a serial number during generation. All other characters are left as they are.

Character	Description
#	Barcode Studio inserts leading blanks instead of the placeholders if the number of characters given in Format string exceeds the number of characters in the item of the sequence.
$	Like "#" but insert leading zeros instead of blanks.
*	Like "#" but insert leading stars instead of blanks.
	All other characters are used literally.

Table 15: Format - Characters

Examples:

Format String	Sample Output	Description
$$	01, 02, 03, …, 10, 11	Leading zeros
##	1, 2, 3, …, 10, 11	Leading spaces
**	*1, *2, *3, …, 10, 11	Leading asterisks
00$$	0001, 0002, 0003, …, 0099	Like "$$" but with "00" as **constant** prefix
A$$	A01, A02, A03,…	Like "$$" but with "A" as **constant** prefix

Table 16: Format - Examples

►   If you enter "$$$" and create a sequence containing numeric values higher than 999, the bar code data will be truncated. In this case change the format string.

8.4.3 Create

Create the sequence based on the settings specified above. Click *Create* to see a preview of the generated sequence.

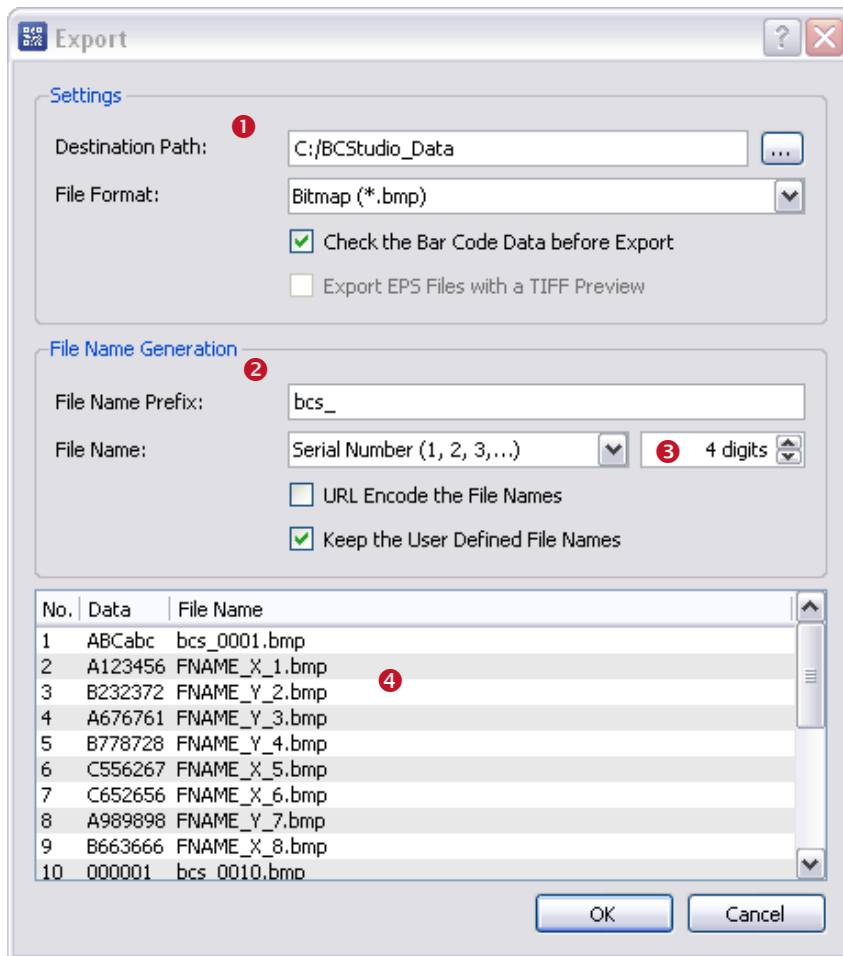At last press *Ok* to insert the sequence into the data list.

8.5 Export

Figure 30: Export Dialog

By clicking *Export…* the **Export** dialog opens. Here the user can specify the destination directory (❶), the file names (❷), and several other settings.

8.5.1 Export Settings

8.5.1.1 Destination Path

The destination path specifies to which directory the export images shall be saved.

8.5.1.2 File Format

Specify the file format of the export file. Please also refer to Appendix C.

8.5.1.3 Check the Bar Code Data before Export

If this field is checked, the bar code data is checked before the export and the user is informed whether the data list contains invalid data.

8.5.1.4 Export EPS Files with a TIFF Preview

If this field is checked, a TIFF preview is added to the generated EPS files. The check box is only active if one of the *EPS* file formats is selected.

8.5.2   File Name Generation

8.5.2.1   File Name Prefix

The file name prefix is prepended to the generated file name.

8.5.2.2   File Name

The user has the possibility to choose between following file name generation methods:

Generation Method	Description
Same as Data	The file name is based on the bar code data (sequence data). For instance if you encode "12345" in the bar code, the file name will be *prefix + 12345.bmp.* Ideal for numeric values and for easy bar code to image file assignment.
	Note: if the sequence data contains characters that are not allowed for file names, use URL-encoding.
Serial Number	The image file names are based on serial numbers starting with 1. The user can specify the number of digits of the generated numbers (❸).

Table 17: Sequence – File Name

8.5.2.3   URL-Encoding

If checked, the file names are URL-encoded. That means that characters that are not allowed in file names are escaped by a percent sign followed by the hexadecimal ASCII code.

Character	HEX-Code	Character	HEX-Code	Character	HEX-Code
\	%5C	/	%2F	:	%3A
*	%2A	?	%3F	"	%22
<	%3C	>	%3E			%7C
%	%25				

8.5.2.4   Keep User Defined File Names

If checked, the file names, which are already defined in the data list, are kept. If unchecked all file names are overwritten by the file generation.

8.5.3   Preview

The preview demonstrates how the generated file names will look like. (❹)

8.5.4   Export

By clicking *Ok* the bar code images are exported.

If at least one image file cannot be generated, an error message will be shown. This may have one of the following reasons:

- A value of the sequence item list cannot be encoded by the actual selected bar code type (e.g.: symbology **2of5 IL** may only contain digits).
- An invalid file name has been generated (e.g. if you have a backslash in the data and "Data URL-Escaped" is not used).

Keep in mind that exporting many sequence items can take *a lot* of time and hard drive space!

9   Options

In the Options dialog you can change general settings.

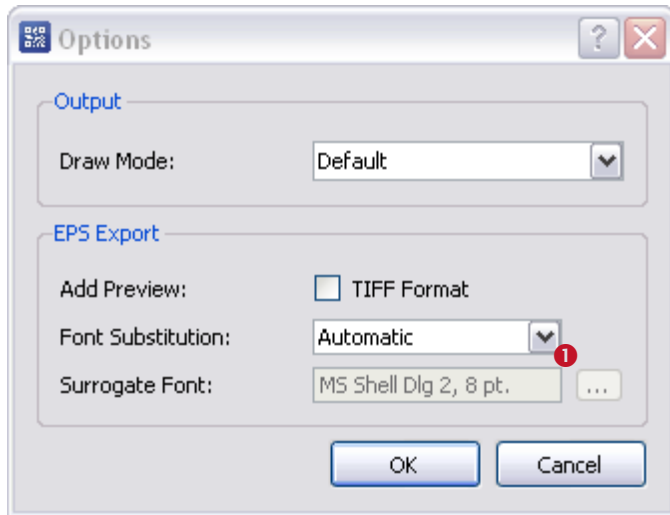You can open the Options dialog via the menu *Tools ► Options…*

Figure 31: Options Dialog

9.1   Output

9.1.1   Draw Mode

To handle different printer driver implementations, you are able to choose from several draw modes.

Draw Mode	Description
Default Advanced	The bar codes are drawn in the advanced mode. This provides the best quality.
Compatible	The bar codes are drawn in the compatible mode. This decreases the quality slightly, but is supported by the most printers.
Dual	The bar codes are drawn in the dual mode. This is a combination of the Advanced and Compatible mode.

Table 18: Draw Modes

9.2   EPS Export

9.2.1   Add Preview (TIFF)

Many applications are not able to process Postscript, and so they often display embedded EPS documents only as placeholder (such as empty rectangles, etc.). To give the user a chance to see the content of such an embedded document also in previews and design views, the EPS generator offers the possibility to include a preview image into the file.

The preview in TIFF format is supported by many applications (unfortunately not by all).

> ► If the preview mode is enabled, the size of the generated EPS files increases by the **multiple of the original file size**. So the preview mode should be disabled if many documents have to be printed.

9.2.2 Font Substitution

Font Substitution is only used when exporting the barcode to an EPS file. This is an advanced option and should only be changed for special applications.

Font Substitution	Description
None	The font won't be substituted, unless it is a invalid one
Automatic (Default)	The font will always be substituted with an appropriate one.
Fixed Font	The font will always be substituted with the font specified in "Surrogate Font"

Table 19: Font Substitution

9.2.3 Surrogate Font

The font used for EPS exports. This property overrides the "Font" property on the "General" tab, but only if "Font Substitution" (❶) is set to "Fixed Font".

10 FAQ

> ► Please check out the **TEC-IT Barcode Reference** for bar code (and parameter) related questions. You can download it from:
> http://www.tec-it.com/download/PDF/Barcode_Reference_EN.pdf
>
> ► More Information can be found on our website
> http://www.tec-it.com/support/faq/Default.aspx or by contacting our support team: support@tec-it.com.

10.1 How can I encode the FNC1 character in EAN128?

Check (activate) "Escape Sequences" (Page Settings) and insert the following escape code into the data:

Control character	Escape sequence	Bar code type(s)
FNC1	\F	Code 128, EAN128, UCC128, GS1-128, GS1-DataBar EAN.UCC Composite Symbology

Read more about Application Identifiers (EAN/UCC/GS1) in our Barcode Reference.

10.2 How can I encode the FNC1 character in GS1/UCC/EAN Data Matrix?

Set the Data Matrix Code Format to **GS1/UCC/EAN** (Data Matrix Tab), check *Escape Sequences* (Settings Tab) and insert the following escape code into the data:

Control character	Escape sequence	Bar code type(s)
FNC1	\F	EAN Data Matrix

Read more about Application Identifiers (EAN/UCC/GS1) in our Barcode Reference.

10.3 Escape-Sequences are not encoded (and the scanner signals an error)

Escape sequences are starting with "\" and enable encoding of special characters. They are translated before the bar code is created.

Some scanners have problems with the backslash. Escape sequences are only translated if the checkbox "Escape Sequences" is checked in the *Settings Tab* (see section 7.8.2.3). Otherwise you will find the original character sequence (e.g. „\t") in your data and not the special character.

10.4 After saving the bar code to an image file, my bar code scanner cannot read the bar code!

The bars and spaces in the symbol must have precise widths. By creating a bitmap image from the bar code, the widths are adapted to the matrix of the bitmap. Depending on its resolution more or less deviations can occur. The lower the resolution, the more differences in the width of bars/spaces will appear.

There are different strategies to overcome these problems - please check out the section "Resolution and Readability" in the Barcode Reference for more information.

11 Licensing

11.1 License Types

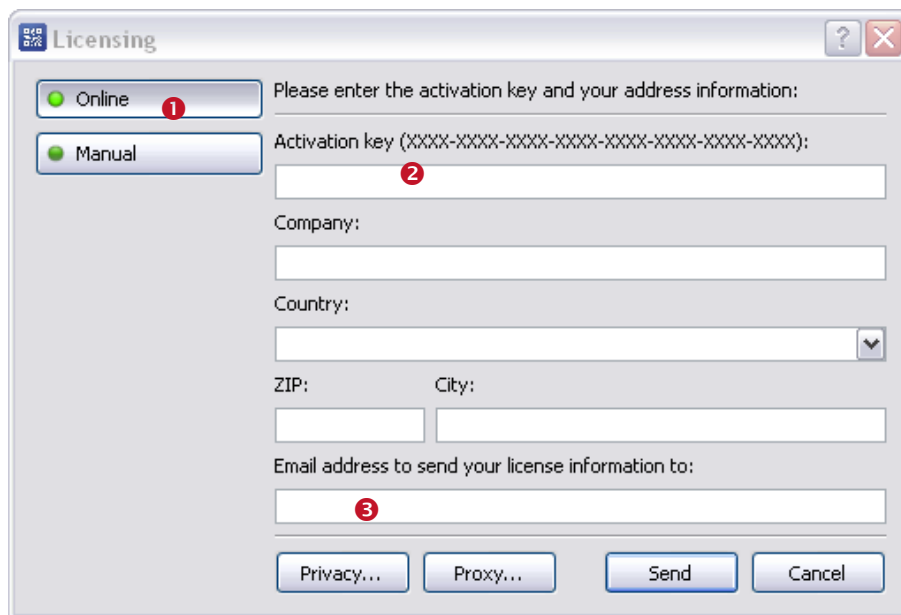Please check out http://www.tec-it.com/order/Default.aspx for available license types and pricing.

11.2 Entering your License Data

The license information is entered in the following dialog. To enter the license data select *Help ►License…* from the menu. Usually the software is activated online (see 11.2.1):

> ► Online activation is not possible or do you prefer manual activation?
> Please get in touch us with us if your system has no internet access or if you prefer to use the manual activation for any reason. We will be glad to send you the license data which is suitable for manual licensing (see 11.2.2) without internet access.

11.2.1 Online Activation using an Activation Key

The *online* product activation (❶) is the preferred licensing method if you received an *activation key* from TEC-IT.

Figure 32: License Dialog - Online Activation

In the topmost field (❷) you have to enter your activation key. All fields are required. A license certificate is sent to the given *Email address* (❸) automatically.

Confirm by clicking "*Send*". A message informs you about the successful activation. In case of problems or errors please get in touch with TEC-IT.

11.2.2 Manual Licensing

Manual licensing is the alternative method for licensing if your system has no Internet connection. Select *Manual* licensing (❹) and enter the license data as provided by TEC-IT.

| |
|---|
| ► Please enter the license data exactly as you received it from TEC-IT!
Spacing and upper/lower case letters are to be considered. To avoid typographical errors, please insert the data using "copy and paste" from the email containing your license data whenever possible. |
| ► Single licenses
If you purchased a Single License, you need to provide the so-called *"System ID"* (or *hostname* on LINUX and MAC) of the target computer. You can find the *System ID* (or *hostname*) in the licensing dialog of Barcode Studio (see below). |
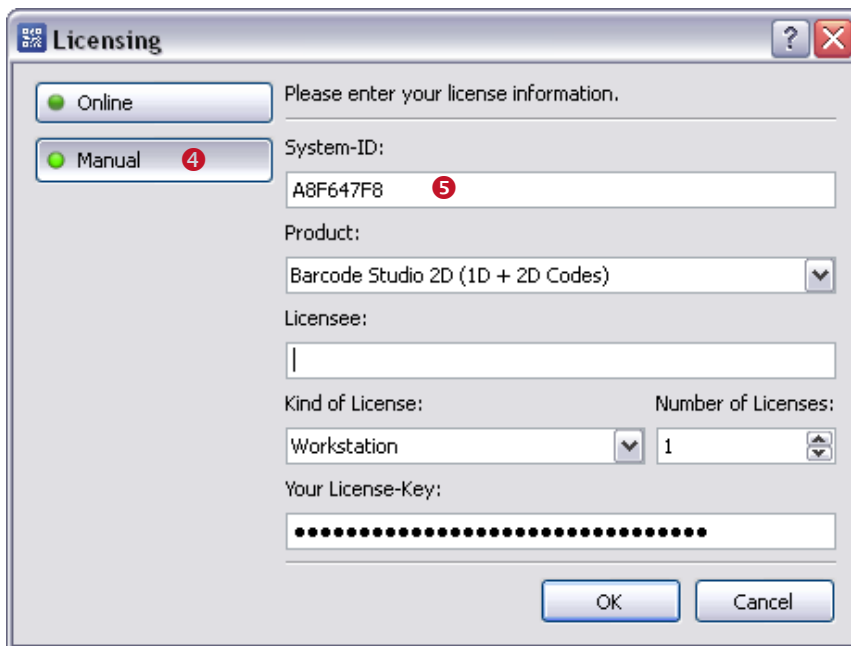
Figure 33: License Dialog – Manual Licensing

Perform the following steps to enter the license data:
1. On the top of the dialog you find the *System ID*[1] (❺) of your computer.
2. For field *"Product"* please choose between "Barcode Studio 1D (Linear Codes)" and "Barcode Studio 2D (1D + 2D Codes)".
3. In the field *"Licensee"* enter the name of the license holder.
4. In field *"Kind of License",* please select the kind of license that you have purchased. You can choose among:
    - Single
    - Site
    - Enterprise
5. The field *"Number of Licenses"* should be filled with the number of licenses that you purchased.
6. In the field *"Your License-Key"* enter the license key exactly as received from TEC-IT.
7. Confirm the dialog with *OK*.

---

[1] On UNIX, Linux or Mac OS X the hostname of the system is used as System ID (relevant only for Single licenses)

12 Contact and Support Information

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Appendix A: Bar Codes

A.1 Supported Bar Codes

Please refer to the additional document "Barcode Reference" available from www.tec-it.com.

This document contains an overview of the supported bar codes, enumeration values (for developers using **TBarCode OCX),** the standard print ratio and the standard check digit methods.

A.1.1 MaxiCode

12.1.1.1 Setting SCM parameters

Please refer to the additional "Barcode Reference" available from www.tec-it.com.

A.2 Check Digits

The method for the check digit(s) calculation depends on the respective bar code type. A standard method for each bar code type is supplied.

See section 7.8.2.2 for adjusting the check digit in **Barcode Studio.**

For more information please refer to the "Barcode Reference" available at www.tec-it.com.

A.3 Print Ratio

The Print Ratio is the relationship between the widths of the bars and the widths of the gaps of a bar code. Each bar code symbology should be generated with certain print ratios only.

See section 7.8.1.1 for adjusting the print ratio in **Barcode Studio.**

For more information please refer to the "Barcode Reference" available at www.tec-it.com.

A.4 Format

Format is like a "mask", which is used for formatting the bar code data before encoding (please do not mix up the Format with the Ratio Format). Placeholders in the specified format string can be mixed with constant data characters to build a final bar code data string. Also control characters are supported.

See section 7.8.2.1 for adjusting the format string in **Barcode Studio.**

For more information please refer to the "Barcode Reference" available at www.tec-it.com.

A.5 Escape Sequences

If you want to encode non-printable or special characters in a bar code, "Escape Sequences" must be used. They always start with a backslash ("\") followed by the sequence. They can be use for encoding binary data (Bytes) too (if the symbology you are using offers this feature – e.g. PDF417 or Data Matrix).

See section 7.8.2.3 for enabling or disabling the translation of escape sequences in **Barcode Studio.**

For more information please refer to the "Barcode Reference" available at www.tec-it.com.

Appendix B: Error Messages

Error	Recommended Action
Wrong character ‚xx' at position yy!	You entered a character which cannot be encoded with the selected bar code symbology. Use another symbology or change your input data.
Wrong check digit ‚xx' at position yy!	You entered a check digit which is incorrect for the selected bar code symbology. Correct the check digit or remove it, so the application will calculate it automatically.
Wrong number of input characters (needs xx chars)!	You entered too much or too less characters for the selected bar code symbology. Use another symbology or correct the length of your input data.
Input string too long	The length of the input string is too long for **Barcode Studio.** Please reduce the length of your input data.
No input characters	No barcode data was specified. Please enter some data in the *Barcode Data* field to be encoded as bar code.
Not implemented (reserved for future use)	This bar code symbology is not supported yet. Please contact TEC-IT.
Error in linear Component: No input characters.	You want to generate a composite symbology. The data for the linear symbol is missing. Please enter the data into the *Barcode Data* field.
Error in linear Component: Wrong character 'x' at position n!	You want to generate a composite symbology. The data in the linear symbol is incorrect. Please correct the data in the *Barcode Data* field.
Error in linear Component: Invalid number of input characters in combination with composite!	When using UCC/EAN-128 as part of a composite symbology it must have a minimum amount of *symbol* characters (which is not equal to the amount of *input* characters). Please increase the number of input characters in the *Barcode Data* field.
Error in linear Component: Wrong number of input characters (needs xx characters).	You want to generate a composite symbology. The number of characters for the linear component is wrong. Please correct the data in the *Barcode Data* field.
Error in 2D Composite Component: No input characters.	You want to generate a composite symbology. The data for the 2D symbol is missing. Please enter data into the *Composite Data* field.
Error in 2D Composite Component: Wrong character 'x' at position n!	You want to generate a composite symbology. The data in the 2D symbol is incorrect. Please correct the data in the *Composite Data* field.
Error in 2D Composite Component: Input string too long!	You want to generate a composite symbology. The data in the 2D symbol is too long (e.g. more than 56 characters in CC-A). Please reduce the length of the composite data or choose another 2D composite type.
Increase bar code size. Resolution too low!	The output resolution is too small to produce a readable bar code with given symbol size. You either have to increase the width/height of the bar code, the module width, or the output resolution.

Table 20: Error Descriptions

Appendix C: Image Types

Choosing *Export ► Export Barcode…* the bar code can be converted to a bitmap or image format. The following image types are available. Please keep in mind that the bar code will become unreadable when producing a bitmap with very low resolution (does not apply for vector based image formats).

Image Format	Description	Internal Format	Color	Printing Resolution included?
BMP	Microsoft Windows Bitmap.	Bitmap	b/w	No
EMF	Enhanced Meta File	Vector based	color (RGB)	Yes
EPS	Encapsulated PostScript. Newer releases of Barcode Studio are exporting a vector EPS format. V4.x used a bitmap based format.	Vector based	color (RGB)	No
EPS	EPS file which uses the CMYK color space (4 color channels) instead of RGB. Drawing is in vector based format.	Vector based	color (CMYK)	No
EPS	Grayscale EPS file which uses one channel (luminance) only. Drawing is vector based.	Vector based	b/w	No
GIF	Graphics Interchange Format. Supported since Barcode Studio V7. Not supported in previous versions because of license terms.	Bitmap	color (RGB)	No
JPG	Joint Photographic Expert Group image file format.	Bitmap	b/w	Yes
PDF	Portable Data Format.	Vector based	color (RGB)	No
PNG	Portable Network Graphics.	Bitmap	b/w	No
TIF	Tagged Image File. No compression is used (compressed formats available on request).	Bitmap	b/w	Yes

Table 21: Image Data Formats

Appendix D: Command Line Parameters

The program can also be started at the command line. It supports various parameters which allow the user to automate the bar code-generation process.

D.1   Syntax

```
1) BCStudio -d=<data> -out=<outputfile> [[-s=]<settingsfile>] [-h=<height>] [-w=<width> |
            -m=<modulewidth>] [it=<imagetype>] [-r=<dpi>] [-o][-fs=<fileseparator>]
            [-log=<logfile>] [-q]
2) BCStudio -datafile=<datafile> -out=<outputfile> [[-s=]<settingsfile>] [-h=<height>]
            [-w=<width> |-m=<modulewidth>] [it=<imagetype>] [-r=<dpi>] [-o]
            [-fs=<fileseparator>] [-log=<logfile>] [-q]
3) BCStudio -datalist=<datalistfile>  [-skipheader=<numlines>] -outlist=<outputlistfile>
            [[-s=]<settingsfile>] [-h=<height>] [-w=<width> |-m=<modulewidth>]
            [it=<imagetype>] [-r=<dpi>] [-fs=<fileseparator>] [-o] [-log=<logfile>] [-q]
4) BCStudio <settingsfile>
5) BCStudio -g [[-s=]<settingsfile>]
6) BCStudio [-? | -help]
```

-d=<data>	Specifies the bar code data. Can be used alternatively to -datafile=<datafile> and -datalist=<datalistfile>.
-datafile=<datafile>	Specifies the bar code data through a data file. Can be used alternatively to -d=<data> and -datalist=<datalistfile>.
-datalist=<datalistfile>	Specifies the file that contains a list of data strings (separated line breaks). Can be used alternatively to -d=<data> and -datafile=<datafile>.If this argument is used you must also specify -outlist=<outputlistfile>. The number of entries in both lists should be equal.
-skipheader=<numlines>	Specifies the number of lines of the data list that should be handled as header lines and so skipped. This argument can only be used in conjunction with -datalist=<datalistfile>.
-out=<outputfile>	The name of the output file (image file). The filename extension may be one of the following: JPG, GIF, TIF, BMP, PNG, EPS, and PDF. The filename extension must be specified! Can be used alternatively to –outlist=<outputlistfile>.
-outlist=<outputlistfile>	The name of the file that contains a list of output file names (separated line breaks). Can be used alternatively to –out=<outputfile>. If this argument is used you must also specify -datalist=<datalistfile>. The number of entries in both lists should be equal.
[-s=]<settingsfile>	Settings-Files are *.bc files which have been created with Barcode Studio. By passing command line arguments you can override values of the settings file. If you pass only the settings file without an argument name and no other argument, the application is opened in graphics mode.
-h=<height>	Height of symbol, measured in 1/1000mm.
-w=<width> -m=<modulewidth>	Specify either the total width of the symbol or the module width (dimension X or narrow bar width); values are measured in 1/1000mm. E.g.: -w=50250 … bar code is 50.25 mm wide
-it=<imagetype>	The type of the output file. It may have the same values as the file name extensions but is supplemented by E1C (EPS grayscale) and E4C (EPS CMYK).
-o	Optimal resolution (adapt module width to pixel width) – recommended for low resolution devices.
-r=<dpi>	The resolution of the output file in dpi (default = 96 dpi).
-fs=<fileseparator>	A custom file separator that can be used for separating file names of command line arguments and for the list of file names in the output file names list.
-log=<logfile>	The name of the log file. If this argument is not set, no log file is generated.
-q	Activates the "Quiet Mode". The program does not interact with the user. This setting is useful, for instance, to run Barcode Studio on servers. If an error occurs, a message is logged to file error.log.
-g	Starts the application in "Graphics Mode". This setting is needed to pass a settings file to Barcode Studio and start it in graphics mode.
-? -help	Display the help screen.

D.2   Examples

Generate Code128 (default), content=98765, size 50x30mm:

```
bcstudio -d="98765" -out=barcode.bmp -w=50000 -h=30000 -o
```

Generate a bar code image (JPG) with 300 dpi and 0.330 mm module width:

```
bcstudio -d="12345" -out=barcode.jpg -h=30000 -m=330 -r=300
```

Generate a bar code (symbology defined in bc file) 70x30mm:

```
bcstudio -d="123" -out="c:\pictures\bc.jpg" -s=bcsettings.bc -w=70000 -h=30000 -o
```

Generate a bar code with data from txt file:

```
bcstudio -datafile=data.txt -out=barcode.tif -s=bcsettings.bc -w=70000 -h=30000 -o
```

Generate a list of bar codes using the arguments datalist and outlist:

```
bcstudio -datalist=datalist.txt -outlist=outputfilenames.txt -s=bcsettings.bc -o
```

Generate a bar code with optimized readability and fixed module width:

```
bcstudio -d="ABCDE" -out=barcode.bmp -s=bcsettings.bc -h=30000 -m=265 -o
```

Open a settings file in graphics mode:

```
bcstudio bcsettings.bc
   or
bcstudio –g -s=bcsettings.bc
```