Matrix Abacus Calculator

User guide

Version 0.5.2

C) Josef Pirkl 2012

Web pages

Sorry for my English :-)

Author cannot take any responsibility for the application`s results.

PROGRAM 5

1.1 License 5
1.1.1 License – details 6
1.1.2 Project sponsoring 6

1.2 Installation / uninstallation 6
1.2.1 Advice - saved settings from old version 7
1.2.2 Version changes 7

1.3 Contact 7

2. TUTORIAL 8
2.1.1 Example 1 - Two matrices multiplication [Real numbers] 8
2.1.2 Example 2 – Two matrices addition [Fractions] 10

3. PREPARED EXAMPLES 12

4. APPLICATION ORGANIZATION 13

5. DETAILED PROGRAM GUIDE 13

5.1 Main menu commands 13
5.1.1 Program submenu 13
5.1.2 Edit submenu 14
5.1.3 Data-matrix 14
5.1.4 Math-operation 15
5.1.5 Desktop menu 16
5.1.6 Help submenu 17

5.2 Matrix popup (context menu) 17

6. TOOLBARS 19

6.1 Main toolbar 19

7. THE APPLICATION DIALOGS 21

7.1 "About program" dialog 21

7.2 "Advanced file export" dialog 21

7.3 “Matrix properties” dialog 23

7.4 “Matrix wizard” dialog 23

7.5 "Print preview" dialog 23

7.6 "Printer setting" dialog 24

7.7 "Settings" dialog 24

7.7.1 Settings dialog – Page “Common” 25

7.7.2 Settings dialog – Page “Matrix” 26

7.7.3 Settings dialog – Page “Print” 26

7.8 “Printing settings” dialog 27

8. PRINTING 28

9. APPENDIX 29

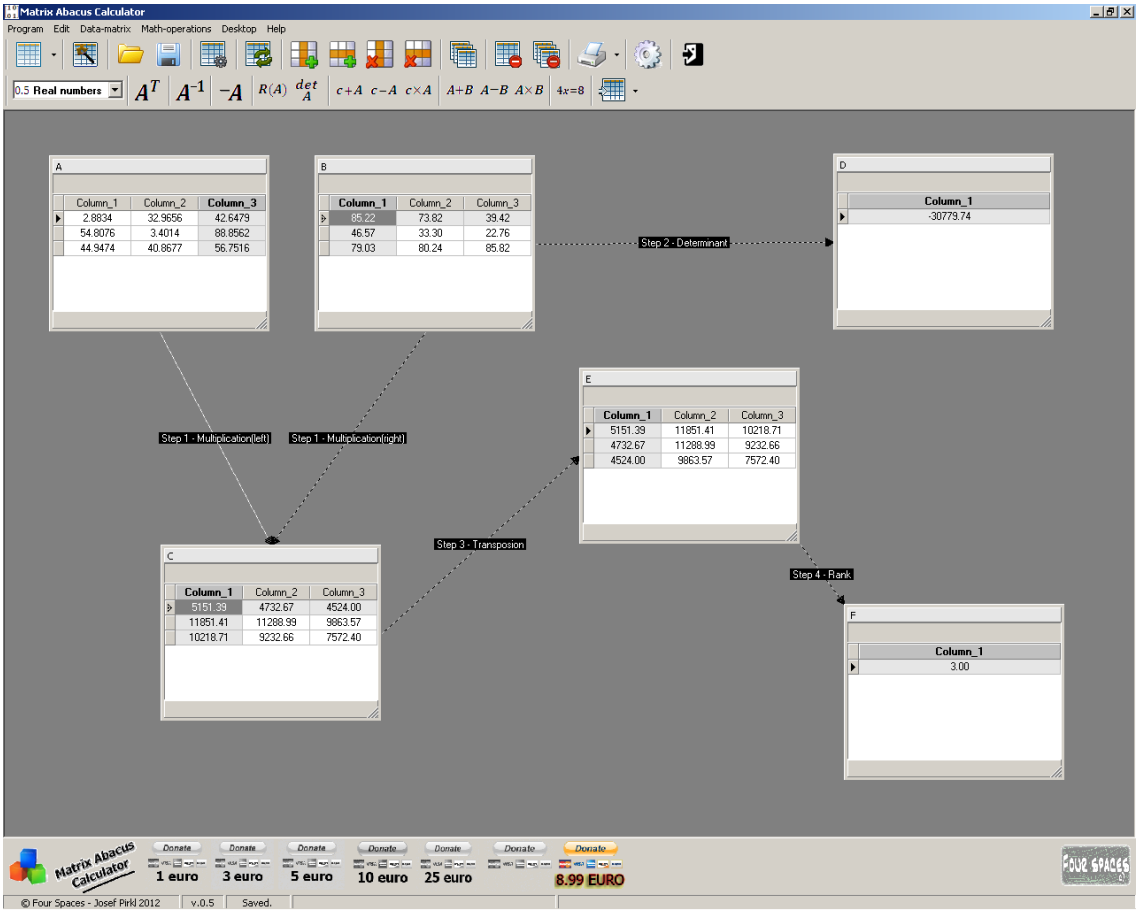
9.1 Version changes 29

9.2 Images list 30

9.3 Tables list 31

Program

Matrix Abacus Calculator is visual tool for computing with the math matrices.



Picture 1 - "Matrix Abacus Calculator" program

Easy example especially for a new user you can find here. Detailed program guide is here.

1.1 License

Program is distributed as shareware. You have 14 days for trying software, after this time please pay charge of 8.99 Euro into my PayPal account.

The author won't take any responsibility for any damages this software will occur.

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1.1.2 Project sponsoring

Program is free for personal use and for students. BUT, you can help in next program development by sponsoring across *PayPal* by using link from application.

1.2 Installation / uninstallation

There are no special requirements for the installation - you can only copy directory structure into any directory and then you can run application (Picture 2).

Picture 2 - program icon

For uninstallation you can delete directory only. All settings are written only to local files, no registers writing.

1.2.1 Advice - saved settings from old version

If you have some older version and if you install new, let in the destination application directory your old setup file: **setup.xml**. If new version finds this old setup file, it will use it to try read your saved settings.

1.2.2 Version changes

Version changes are completely descripted in Appendix here.

1.3 Contact

Contact addresses. All suggestions for better program improvement will be welcomed.

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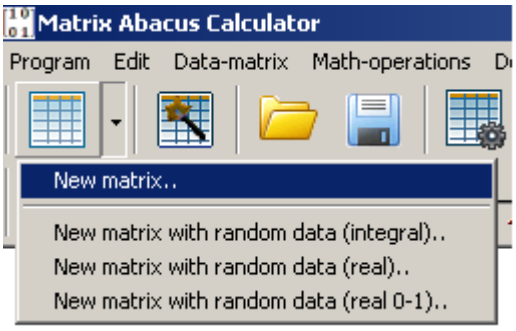
2. Tutorial

This chapters shows some basic example for newcomers.

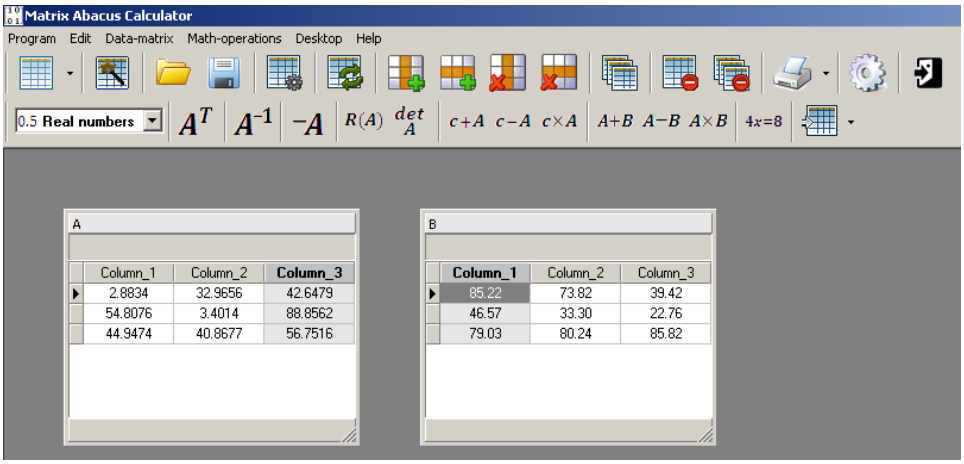
2.1.1 Example 1 - Two matrices multiplication [Real numbers]

1. Run the application.

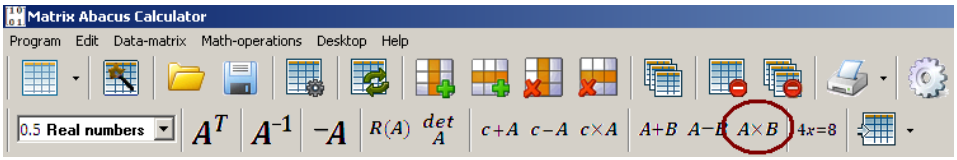
2. Make new matrix (or you can generate random data).



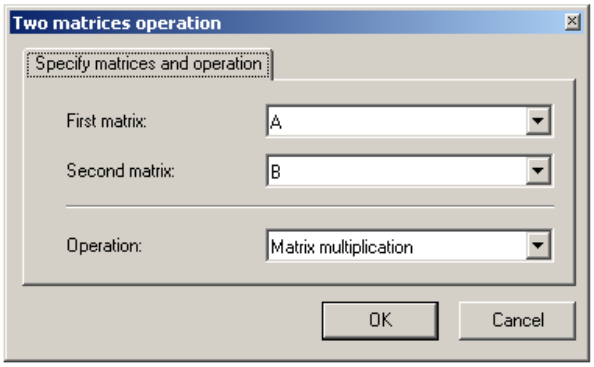
3. Make another matrix (or you can generate random data). For matrices multiplication is condition, that first matrix row`s count must be equal to second matrix column`s count.



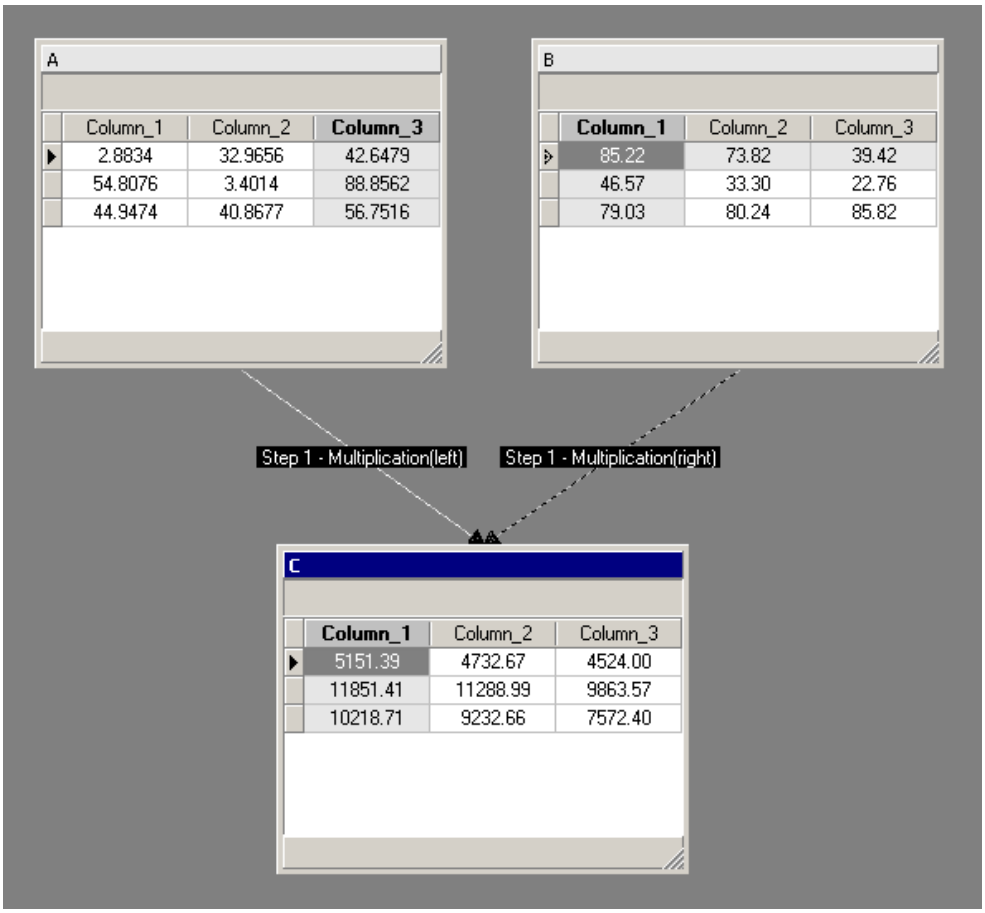
4. Click on the multiplication images in lower toolbar.



5. This shown dialog for selection two matrices operation. Confirm, that selected operation is „Matrix multiplication“ and click on the „OK“ button.



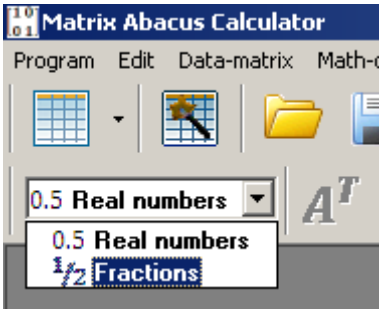
6. Multiplication is performed, new result matrix is created.



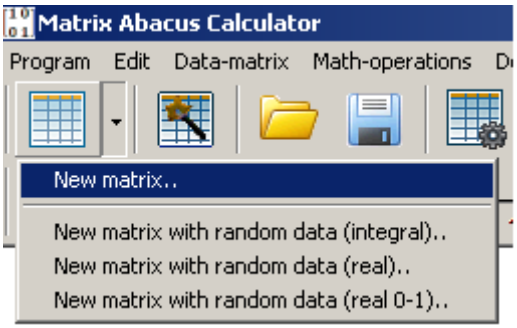
2.1.2 Example 2 – Two matrices addition [Fractions]

1. Run the application.

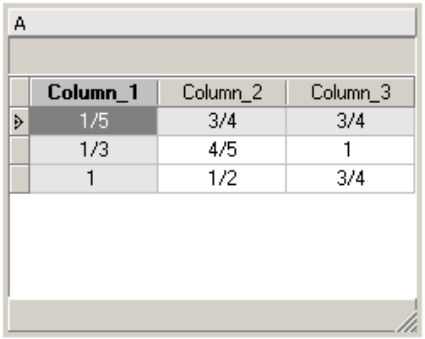
2. The application can compute in fraction mode too. For changing into fraction mode please select "**Fraction**".

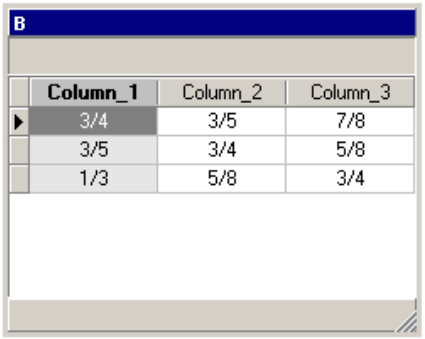


3. Make new matrix (or you can generate random data). When is activated fraction mode, data must be entered in fraction mask. For example, you can enter: 2 or ½ or 1 ½. When you will generate random data, it will be in fraction form.

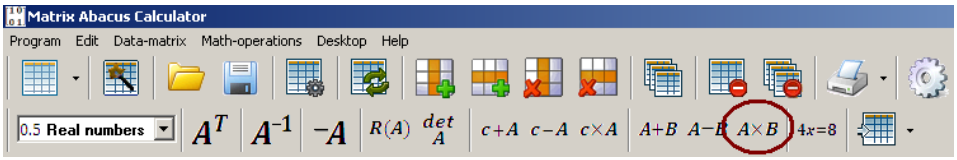


4. Create another one matrix. Now you have two matrices. Again, for multiplication is valid condition about matrices rows and columns.

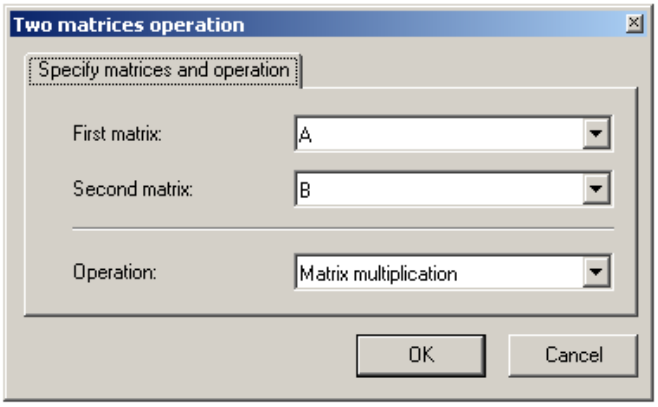




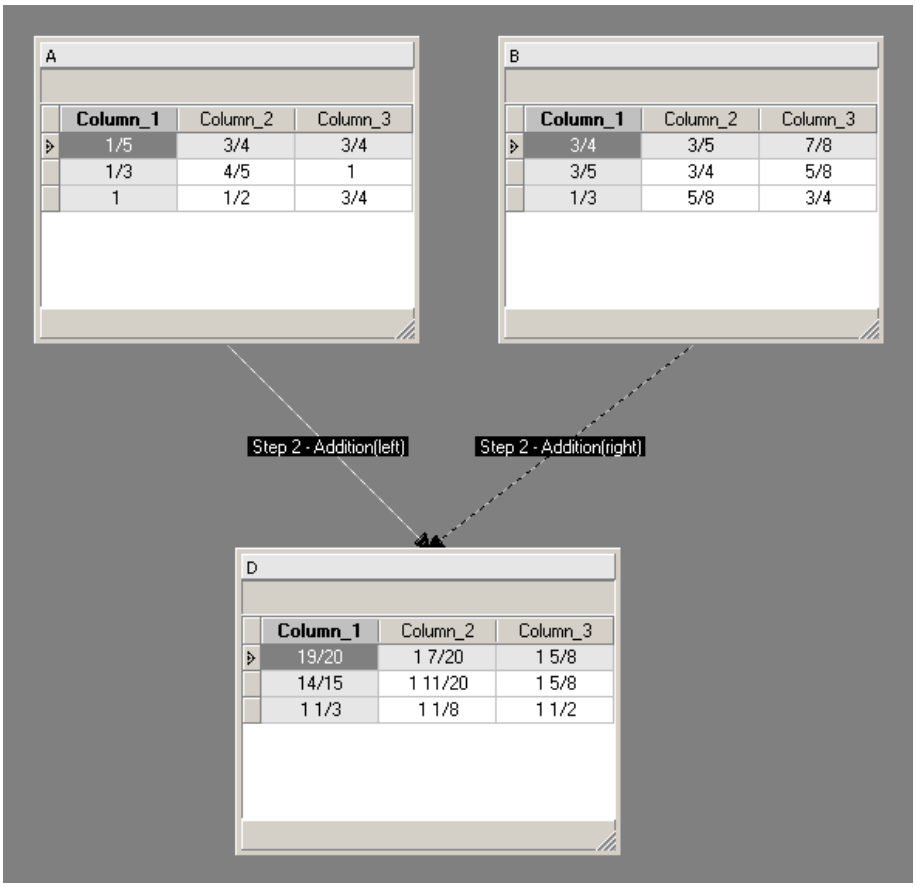
5. Click on the multiplication images in lower toolbar.



6. This shown dialog for selection two matrices operation. Confirm, that selected operation is „Matrix addition“ and click on the „OK“ button.



7. Addition (in fraction mode) is performed, new result matrix is created.



3. Prepared examples

This chapter describe prepared examples save in **\examples** subdirectory (Table 1).

Table 1 – List of examples (\examples subdirectory)

Filename	Mode	Description
ex_1.xml	real	Computing of determinant.
ex_2.xml	real	Transposition and inversion of one matrix.
ex_3.xml	real	Rank of matrix.
ex_4.xml	real	Multiplication of two matrices.
ex_5.xml	real	Multiplication of two matrices.
ex_6.xml	real	Determinant of matrix.
ex_7.xml	real	Solving of linear equations.
ex_8.xml	real	Rank of two matrices.
ex_9.xml	real	Rank of two matrices.
ex_fraction_addition.xml	fraction	Two matrices addition.
ex_multiplication.xml	real	Multiplication of two matrices.
ex_project.xml	real	Complex project.

4. Application organization

At one time you can have opened only one project. When you want to create new project, please save current and then perform „Save as..“ option for establishing new project. Now you can call menu option „Close all matrices“.

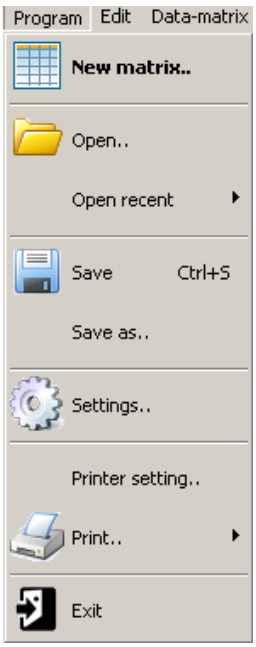
5. Detailed program guide

5.1 Main menu commands

The main menu is menu on top window. It is consisted from several submenus.

5.1.1 Program submenu

This is submenu for operation with project; you can create here new project (Picture 3). Descriptions for particular items contain Table 2.



Picture 3 - Program submenu

Table 2 - Program submenu description

Action	Description
New matrix..	Create new matrix in size by “Settings” dialog.
Open..	Open saved project from file. Saved project has **.xml** extension.

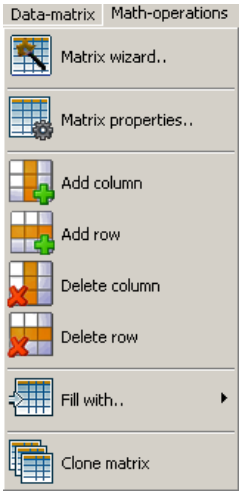
Open recent	List of earlier opened projects. You can open it quickly again.
Save	Save current model into external file.
Save project as..	Saving current model under new name.
	Dialog with project information.
Settings..	Settings dialog.
Printer setting..	Standard printer setting dialog.
Print..	Printing. Is possible print all model or active matrix data. More here.
Exit	Closing of application.

5.1.2 Edit submenu

This submenu is prepared for working with edit box (or memo item). At this time is possible to use F10 key for main menu activation (**Chyba! Nenalezen zdroj odkazů.**).

5.1.3 Data-matrix

This submenu is prepared for working with active matrix (Picture 4). Item descriptions shows Table 3.



Picture 4 – Data-matrix submenu

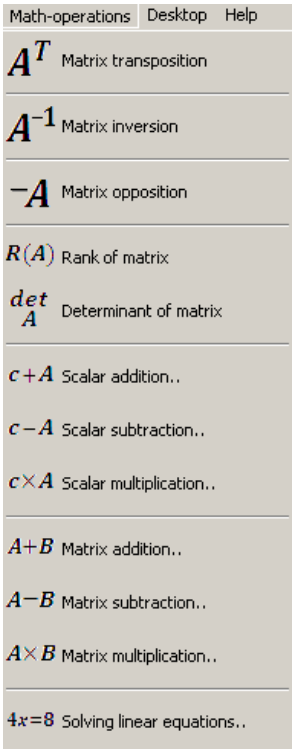
Table 3 – Data-matrix submenu description

Action	Description
Matrix wizard..	Opens "Matrix wizard" dialog.
Matrix properties..	Opens "Matrix properties" dialog.
Add column	Add new column into active matrix.

Add row	Add new row into active matrix.
Delete column	Delete active column from active matrix.
Delete row	Delete active row from active matrix.
Fill with..	Enables to fill active matrix with some random data. Possible values are: 1) Random integral 2) Random real (0-100) 3) Random real (0-1) 4) Identity matrix
Clone matrix	Create copy of current matrix as new matrix.

5.1.4 Math-operation

This submenu contains math operation that are accessible for current matrix (Picture 5). Item descriptions shows Table 4.



Picture 5 – Math-operation submenu

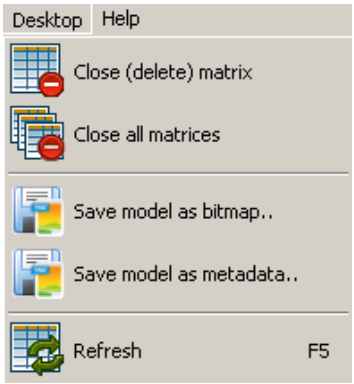
Table 4 – Math-operation submenu description

Action	Description
Matrix transposition	Perform transposition of active matrix.
Matrix inversion	Perform inversion of active matrix.

Matrix opposition	Perform opposition of active matrix.
Rank of matrix	Compute rank of active matrix.
Determinant of matrix	Compute determinant of active matrix.
Scalar addition..	Additive constant value into all matrix`s item.
Scalar subtraction..	Subtract constant value from all matrix`s item.
Scalar multiplication..	Multiply constant value with all matrix`s item.
Matrix addition..	Perform addition between two matrices.
Matrix subtraction..	Perform subtraction between two matrices.
Matrix multiplication..	Perform multiplication between two matrices.
Solving linear equations..	Solve linear equations. For that you must prepare two matrices, first with coefficients and second with roots. More see in Prepared examples chapter.

5.1.5 Desktop menu

This submenu is prepared for desktop working with matrices (Picture 6). Description for particular items contains Table 5.



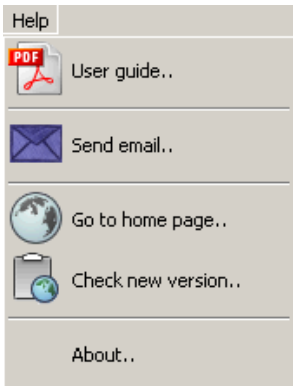
Picture 6 - Project submenu

Table 5 - Desktop submenu description

Action	Description
Close (delete) matrix	Delete active matrix. When matrix has some relationship, that are removed too.
Close all matrices	Erase all objects from desktop.
Save model as bitmap..	Save all matrices & relation from desktop into bitmap file.
Save model as metadata..	Save all matrices & relation from desktop into metadata file.
Refresh..	Refresh desktop.

5.1.6 Help submenu

This submenu contains help support items (Picture 7). A description for particular items contains Table 6.



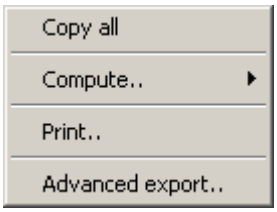
Picture 7 - Help submenu

Table 6 - Help submenu description

Action	Description
User guide	This user guide in pdf format.
Send email..	Email (address, subject) with any message to author.
Go to home page..	Opening project website.
Check new version	If you have access to Internet, you can check new version. For proper update must be in "tools" subdirectory "**Update manager**" (umanager.exe). If some files are replaced, then original replaced files are placed into "_backup" subdirectory. **Tip**: It is recommended set full access right in "Matrix Abacus Calculator" directory and below subdirectories.
About	Common information about program.

5.2 Matrix popup (context menu)

For every list is possible to show this context menu (Picture 8) by using right mouse button (above the list). Descriptions for menu items contains Table 7.



Picture 8 – List popup menu

Table 7 - List popup menu descriptions

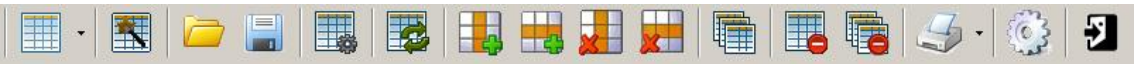
Action	Description
Copy all..	Copy all data into clipboard.
Compute.. -> ..count	For numeric column computes count of selected rows.
Compute.. -> ..sum	For numeric column computes sum of selected rows.
Compute.. -> ..average	For numeric column computes average of selected rows.
Compute.. -> ..variance	For numeric column computes variance of selected rows.
Compute.. -> ..standard deviation	For numeric column computes standard deviation of selected rows.
Print..	Print active matrix data.
Advanced export..	File export dialog with more export settings.

6. Toolbars

The application contains two toolbar: main toolbar and toolbar with math-operation. Toolbar with math-operation is more or less described in section with math-operation submenu.

6.1 Main toolbar

The main toolbar is located under the main menu All its actions are accessible from main menu too (Picture 9). Items descriptions shows Table 8.



Picture 9 – Main toolbar

Table 8 - Main toolbar items decryptions

Icon	Description
	Adding of new matrix. You can use arrow for selection creating with data filling.
	Shows “Matrix wizard” dialog for matrix creation.
	Open saved project from external file.
	Save project into external file.
	Shows “Matrix properties” dialog.
	Refresh all objects.
	Add new column into active matrix.
	Add new row into active matrix.
	Delete active column from active matrix.
	Delete active row from active matrix.
	Clone matrix => make copy of active matrix.

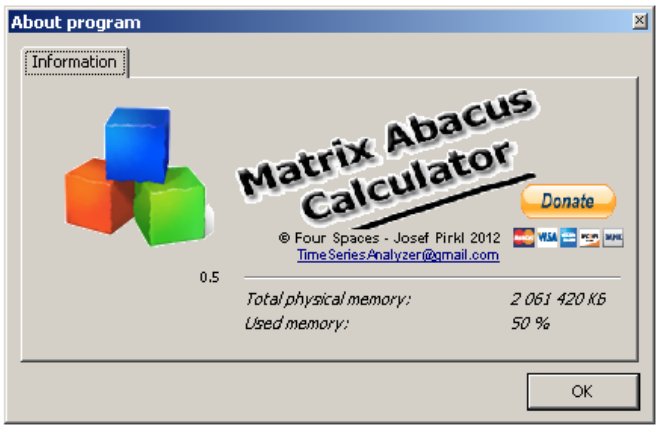
	Delete active matrix.
	Delete all objects on the desktop.
	Printing.
	Shows “Settings” dialog.
	Closing of application.

7. The application dialogs

The dialogs are sorted alphabetically by its name.

7.1 "About program" dialog

This window shows base information about program, especially program version. At the bottom you can see *Total physical memory* of your computer and *Used memory,* too.



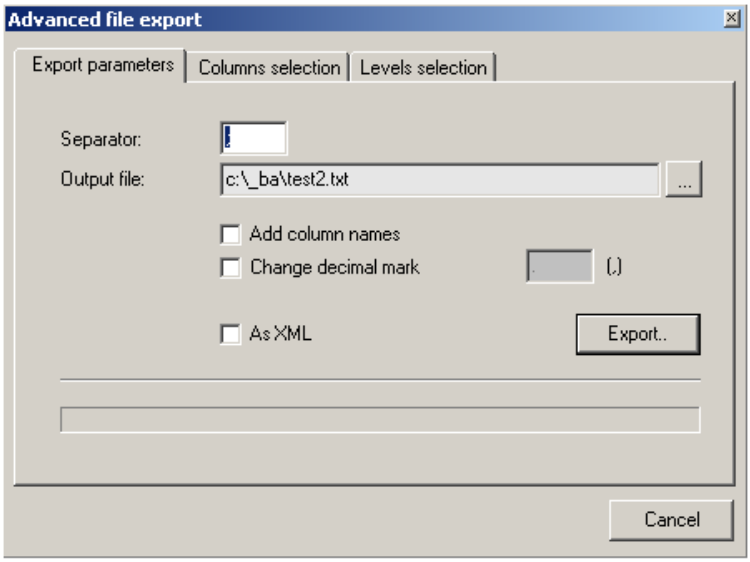
Picture 10 – "About program" window

7.2 "Advanced file export" dialog

File export dialog with more export settings. This dialog is accessible for all list object by right mouse button clicking (Picture 11).

The dialog is composed from three pages:

- **Export parameters** - for base export setting.
- **Column selection** - for columns selection.
- **Levels selection** - for levels section.



Picture 11 – Advanced export dialog - the first page

It is possible to change that options (Picture 11).

Table 9 - Options descriptions in "Advanced file export" dialog

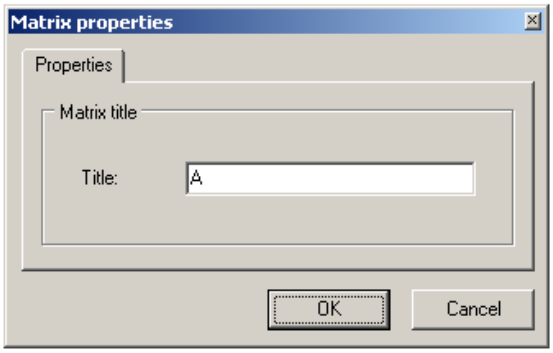
Option	Description
Separator	Separator for columns values.
Output file	Output file name.
Add column names	If is checked, columns names will be added at the first row into export.
Change decimal mark	If is checked, is possible change current decimal point into other character. In parenthesis behind edit box is shown current decimal point character.
As XML	If is checked export will be in XML format.

For export performing click to "**Export**.." button. After successful export is shown the confirmation (Picture 12).

Picture 12 – Confirmation after successfully advanced export

7.3 "Matrix properties" dialog

This dialog is used for changing matrix properties, at this time you can change caption of matrix (Picture 13). That matrix title must be unique.



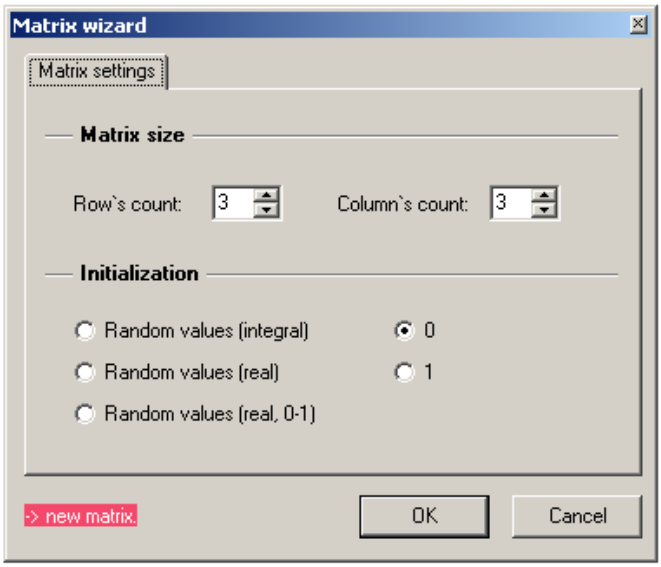
Picture 13 – "Matrix properties" dialog

7.4 "Matrix wizard" dialog

This dialog (Picture 14) is used for:

1. Creation new matrix (if no matrix is active, when dialog is called).
2. Update active matrix (if some matrix is active, when dialog is called).

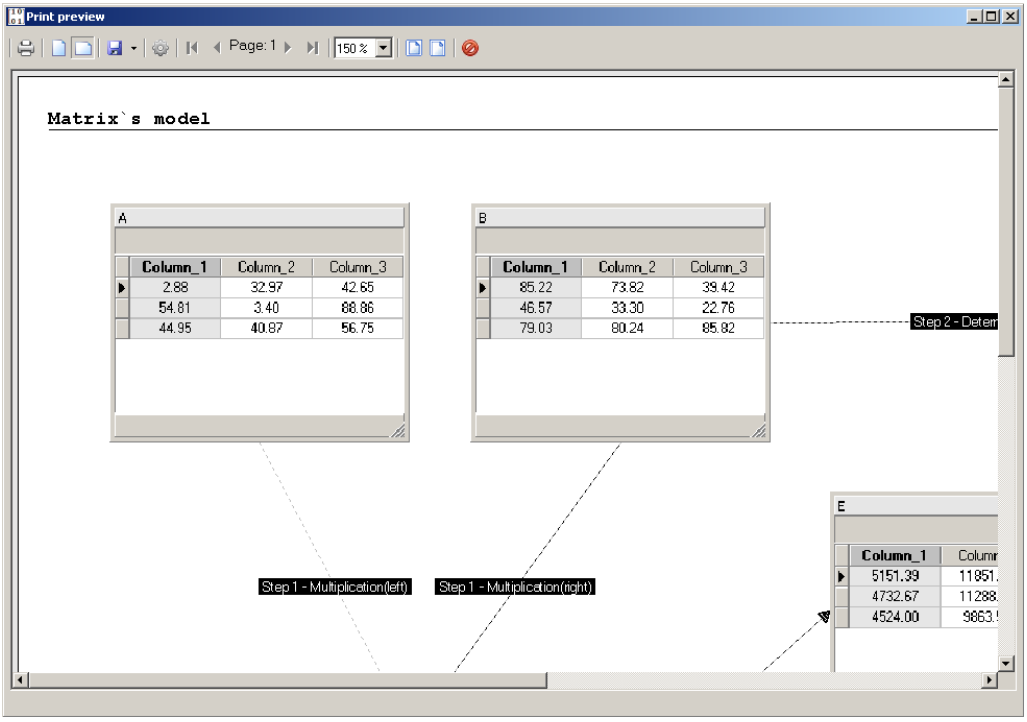
That different modes are distinguished by red text in lower left corner.



Picture 14 – "Matrix wizard" dialog

7.5 "Print preview" dialog

If is enabled "**Print preview**" in Settings (default) is every print directed before printing into this dialog (Picture 15). From here is possible continue/cancel printing or change some print settings.

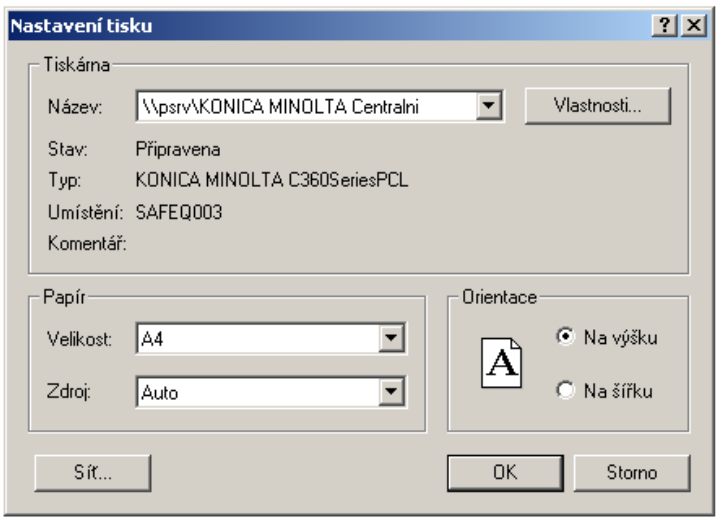


Picture 15 – "Print preview" dialog

Some more information's about printing are in Printing chapter.

7.6 "Printer setting" dialog

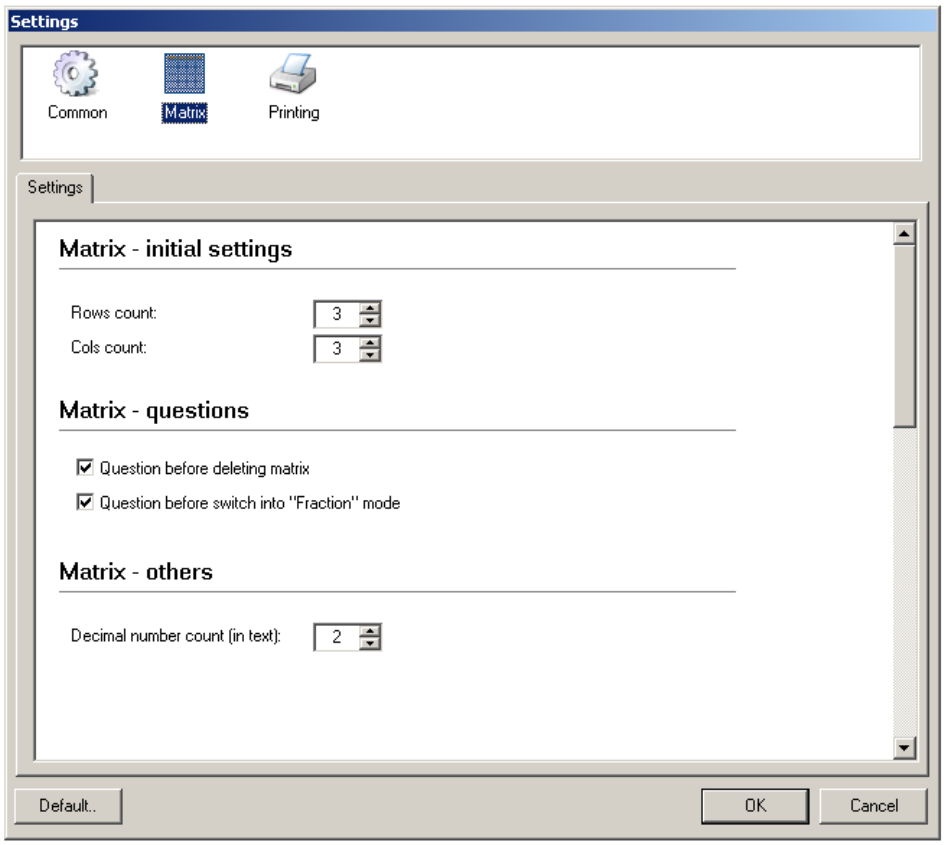
This is standard Windows printer settings dialog (Picture 16). User can select here for example virtual pdf printer (if this virtual driver is installed on the computer).



Picture 16 – "Printer setting" dialog

7.7 "Settings" dialog

This window is used for application settings (Picture 17):



Picture 17 – “Settings” dialog

At left-bottom in dialog is "**Default**" button. By this button is possible to re-read default settings. Warning - all your settings will be lost !

7.7.1 Settings dialog – Page “Common”

On this page are settings in relation to the application (Table 10).

Table 10 - Descriptions of “Common” page in Settings dialog

Setting name	Description
Backup existing file before saving	After first saving - or after "**Save as**" saving is possible to backup this old overridden file. If this setting is active, before overriding is maked .**tsp**~ copy of old file. If this .**tsp**~ exists too, that .**tsp**~ file is copied into .**tsp**~ with *yyyymmddhhmmsszzz* identification (for example is created test_examples.tsp~20110114081549905 file).
Check web updates after start application	When is checked, then after application start is performed check for new web update (if web net connection is present).

7.7.2 Settings dialog – Page “Matrix”

On this page are settings in relation to the matrix (Table 10).

Table 11 - Descriptions of “Matrix” page in Settings dialog

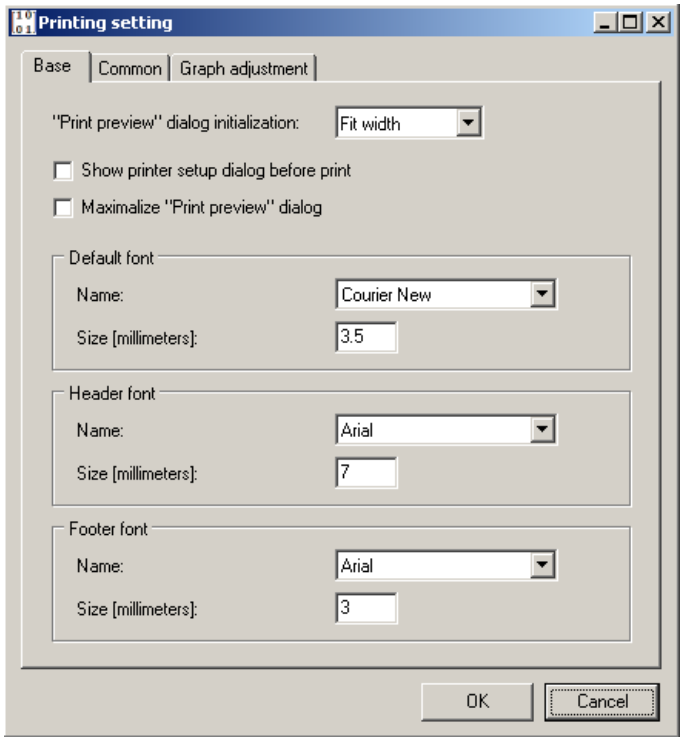
Setting name	Description
Rows count	Default rows count for new matrix.
Cols count	Default columns count for new matrix.
Question before deleting matrix	If it is enabled, shown confirmation question before matrix deleting.
Question before switch into "Fraction" mode	If it is enabled, shown confirmation question before switching to fraction mode. That could cause lost of some data (for example 0.495 -> 1/2).
Decimal number count (in text):	Count of decimal number in matrix for real mode.

7.7.3 Settings dialog – Page “Print”

On this page is only one button that call “Printing settings” dialog.

7.8 “Printing settings” dialog

This dialog () is used for setting printer output, especially for output through “Print preview” dialog.

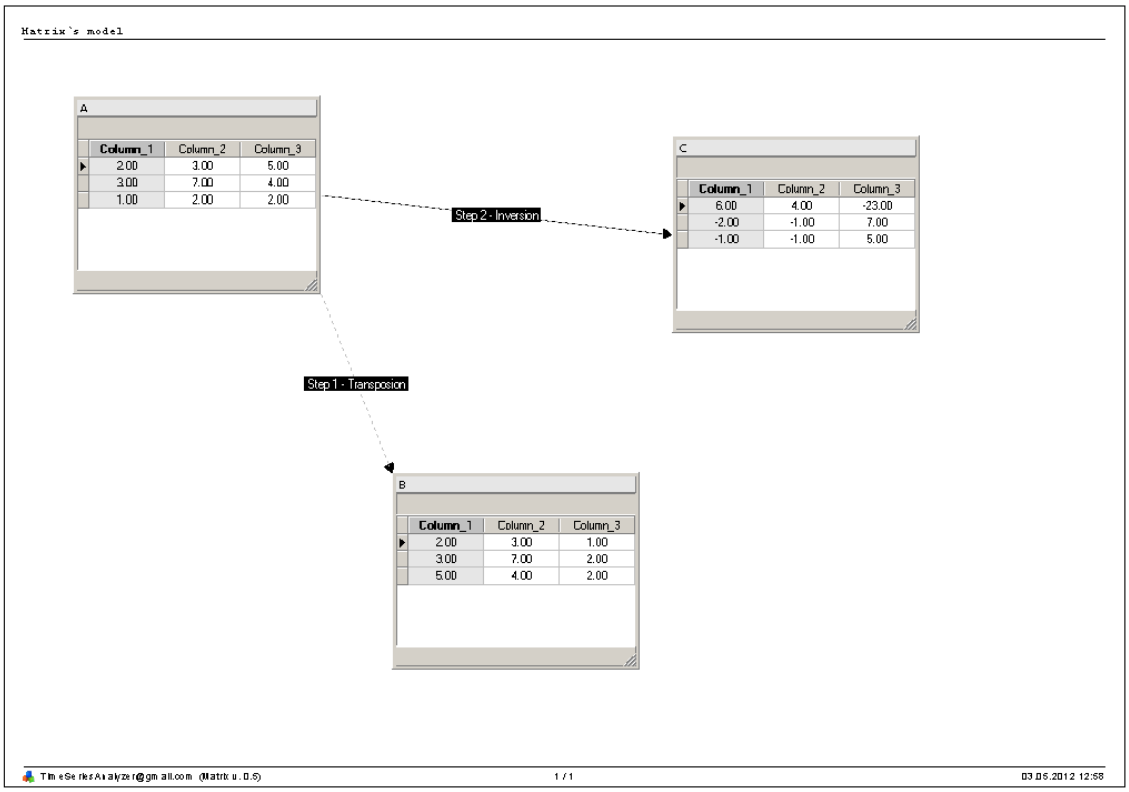


Picture 18 – “Printing settings” dialog

8. Printing

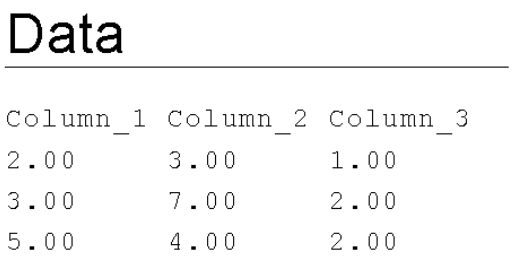
If you want print data, you can choice:

1. Print all model (Picture 19).



Picture 19 – model printing

2. Print data of active matrix (Picture 20).



Picture 20 – active matrix data printing

9. Appendix

9.1 Version changes

Information's about version changes has been moved into this web address.

9.2 Images list

Picture 1 - "Matrix Abacus Calculator" program 5
Picture 2 - program icon 7
Picture 3 - Program submenu 13
Picture 4 – Data-matrix submenu 14
Picture 5 – Math-operation submenu 15
Picture 6 - Project submenu 16
Picture 7 - Help submenu 17
Picture 8 – List popup menu 18
Picture 9 – Main toolbar 19
Picture 10 – "About program" window 21
Picture 11 – Advanced export dialog - the first page 22
Picture 12 – Confirmation after successfully advanced export 22
Picture 13 – "Matrix properties" dialog 23
Picture 14 – "Matrix wizard" dialog 23
Picture 15 – "Print preview" dialog 24
Picture 16 – "Printer setting" dialog 24
Picture 17 – “Settings” dialog 25
Picture 18 – “Printing settings” dialog 27
Picture 19 – model printing 28
Picture 20 – active matrix data printing 28

9.3 Tables list

Table 1 – List of examples (\examples subdirectory) 12
Table 2 - Program submenu description 13
Table 3 – Data-matrix submenu description 14
Table 4 – Math-operation submenu description 15
Table 5 - Desktop submenu description 16
Table 6 - Help submenu description 17
Table 7 - List popup menu descriptions 18
Table 8 - Main toolbar items decryptions 19
Table 9 - Options descriptions in "Advanced file export" dialog 22
Table 10 - Descriptions of “Common” page in Settings dialog 25
Table 11 - Descriptions of “Matrix” page in Settings dialog 26