

The graphical presentation module INGO

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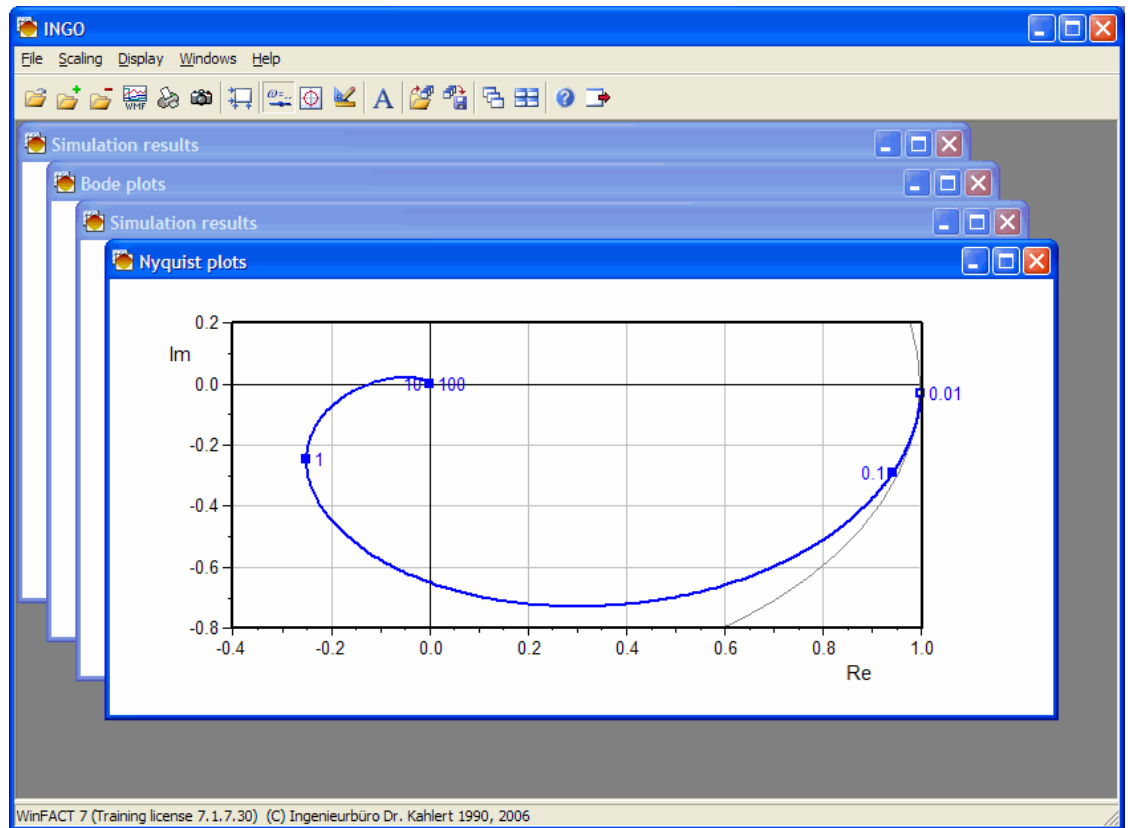
Overview

INGO enables the graphical presentation of WinFACT-files of the following types:

- Simulation results (extension SIM)
- General pairs of values (extension XY)
- Trajectory fields (extension MXY)
- Bode diagrams (extension BD)
- Nyquist plots (extension OK)
- 3D-characteristic diagrams respectively contour lines (extension FWM)

For the export of graphics INGO offers an export function based on the Windows Metafile Format (WMF files). This vector oriented format allows a later processing of the graphics with other Windows applications without loss of quality. The printer output of INGO allows the sizing of the axes in mm so that a manual analysis of the printing is done easily.

The user interface of INGO is based on the Windows Multi Document Interface (MDI); that means that any number of graphic windows can be opened at the same time and each window can contain any number of curves. Each curve can be represented in line or marker form. The following screenshot shows a typical main window of INGO containing different graphic windows.



INGO main window with some graphic windows

Program options

Opening a new graphic window

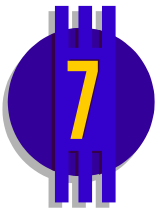


A new, empty graphic window can be opened by the FILE | OPEN... menu option resp. the corresponding button of the toolbar. When opening the new window the name of the first file to be loaded into the window has to be specified. The type of this file (e. g. SIM) automatically specifies the type of the graphic window; so if new curves are added to this window later, only the corresponding file types are displayed within the File Open-dialog box.

Adding and deleting curves

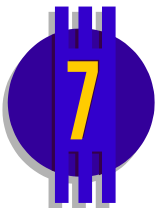


To add a new curve to the active graphic window, use the FILE | ADD... menu option resp. the corresponding button of the toolbar. Naturally the specified file has to be of the same type as the files already displayed in this window. A graphic window of SIM, XY, MXY, BD or OK type can contain any number of curves. FWM files in contour line representation also can contain several files, whereas FWM files in 3D graphic representation can only contain a single graphic.



Curves contained in the active graphic window can be deleted via the FILE | DELETE... menu option or the corresponding toolbar button. The dialog called by this option contains a list with all curves where the curve to be deleted can be selected from.

Loading and saving desktops



INGO allows loading and saving of complete desktops, i. e. arrangements of graphic windows and their diagrams. For this purpose the menu options FILE | LOAD DESKTOP... and FILE | SAVE DESKTOP... resp. the corresponding toolbar buttons can be used. Desktops are saved in files with the extension IDT (for *INGO DeskTop*). Besides the diagrams all individual settings as scaling modes, window titles etc. are saved within the files.

Scaling the axes

By default the axes of a diagram are scaled in such a way that all curves of the corresponding graphic window are completely within the axes range. A modification of this automatical mode can be made via the SCALING | SCALING... menu option resp. the corresponding button of the toolbar and the corresponding dialog box.



Note: FWM files do not contain any information about the *x*- resp. *y*-range of values. Thus the *x*- and *y*-axis of this file type is scaled corresponding to the *number* of base points within the file. If the file e. g. contains a 10x10 matrix, the *x*- and *y*-axes are scaled from 0 up to 10. So a user-defined scaling of axes for this type has no effect!

Scaling

Scaling mode
☒ Automatic ☐ manual

x-Axis
 From: 0 to: 48.90000153
 Intervals: 10 ☒ auto
 Intermediate markers: 1

y-Axis
 From: 0 to: 1.092908502
 Intervals: 5 ☒ auto
 Intermediate markers: 1

☒ Unit circle in Nyquist plot
☐ Force circular unit circle

OK Cancel

Dialog for scaling axes of XY, MXY, SIM, OK or FWM files. In case of manual scaling the number of axes divisions can be specified automatically or manually (in last case the number of ticks also has to be specified)

Scaling

Mode
 Scaling: ☒ Automatic ☐ Manual

☒ Separated diagrams for gain and phase
☒ Gain in dB

Frequency
 From: 0.1000000015 to: 10

Gain [dB]
 From: -39.91314697 to: 20

Gain
 From: 0.01010049507 to: 10

Phase (degree)
 From: -179.4212799 to: -0.5787255764

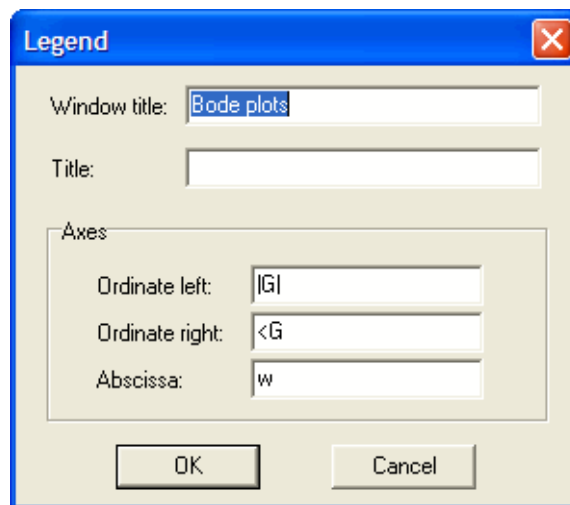
OK Cancel

Dialog for scaling of BD files

Display options

Labelling graphics

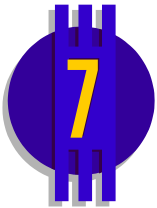
A user-defined caption for the active graphic window and some other comments can be specified via the DISPLAY | LEGEND... menu option (see screenshot below).



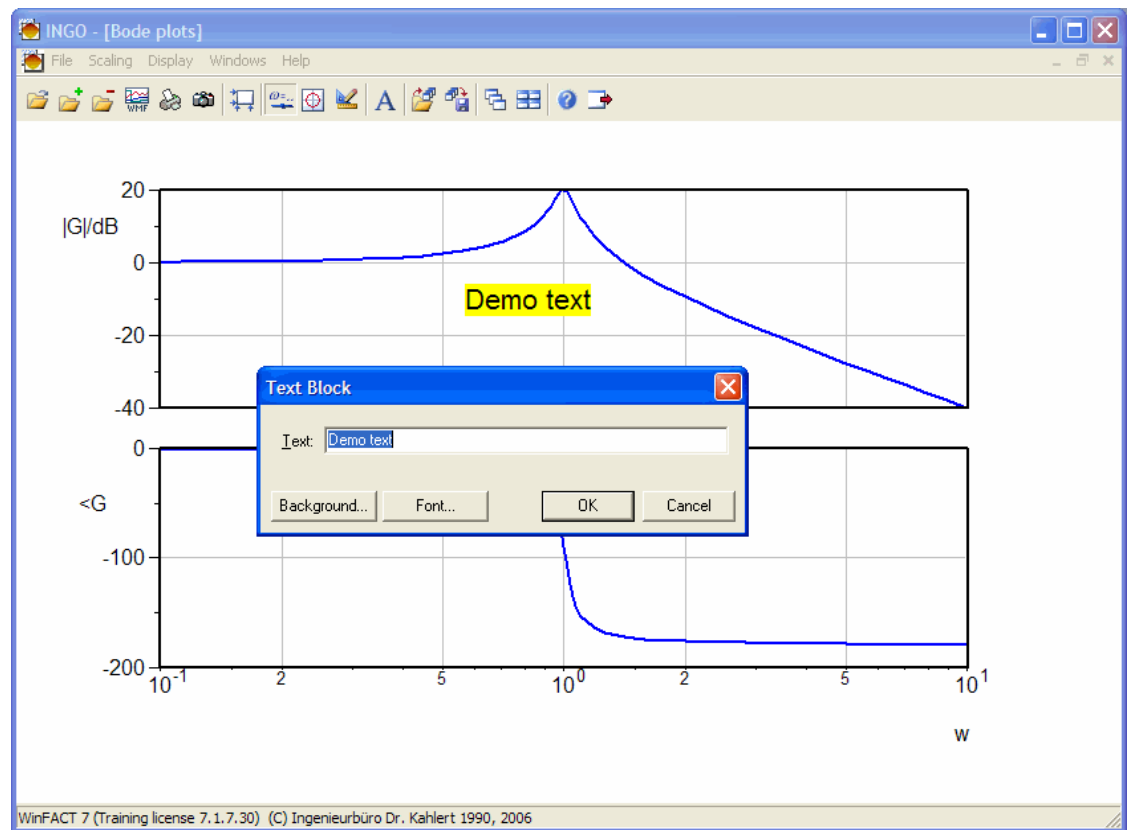
Specifying the graphic legend

The following options can be specified within this dialog:

- *Window title* specifies the caption of the graphic window
- *Title* specifies an additional comment displayed directly above the diagram
- *Ordinate left* specifies the description of the left ordinate
- *Ordinate right* specifies the description of the right ordinate
- *Abcissa* specifies the description of the abscissa

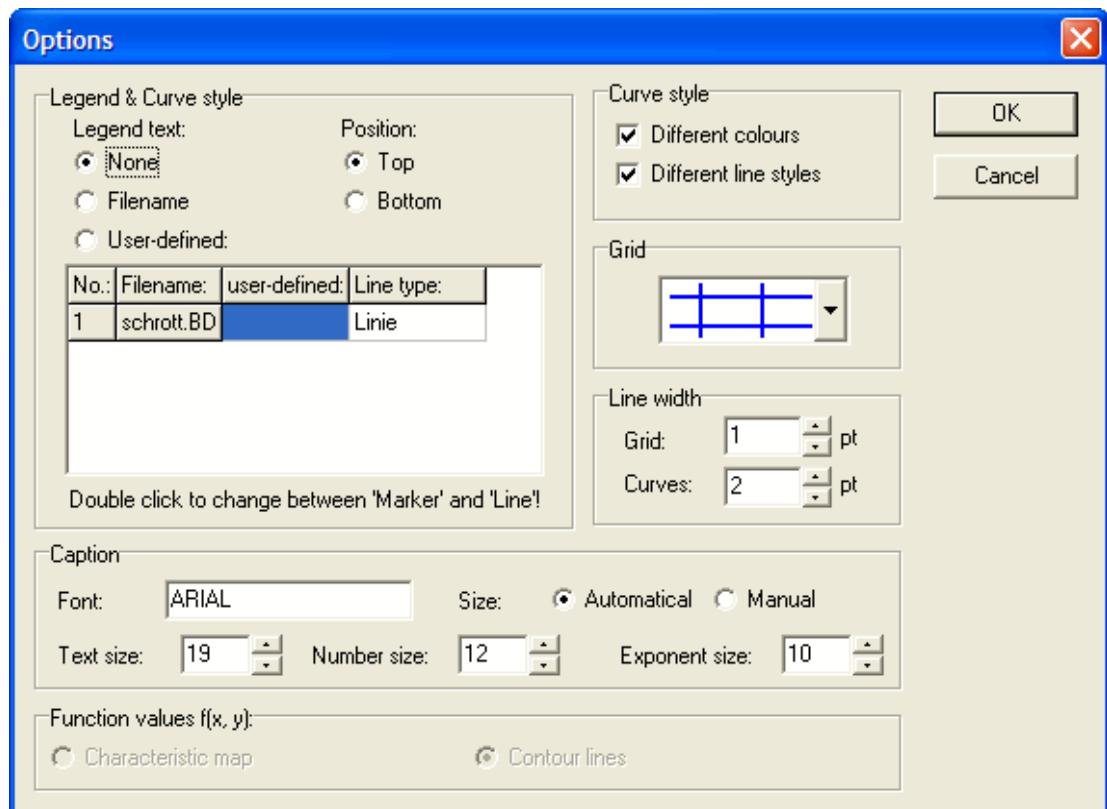


Furthermore the menu option FILE | INSERT TEXT BLOCK or a right mouse click within the graphic window allows a flexible lettering of the diagram. The inserted text block can be modified by a double click. Besides the text font also the text colour and the background colour can be specified (see screenshot below). By keeping the left mouse button pressed the text block can be moved at any position.

*Editing a text block*

Display options

Via the DISPLAY | OPTIONS... menu option you can call a dialog box for the specification of further options regarding the appearance of the graphic window.



Display options dialog box

This dialog box contains the following options:

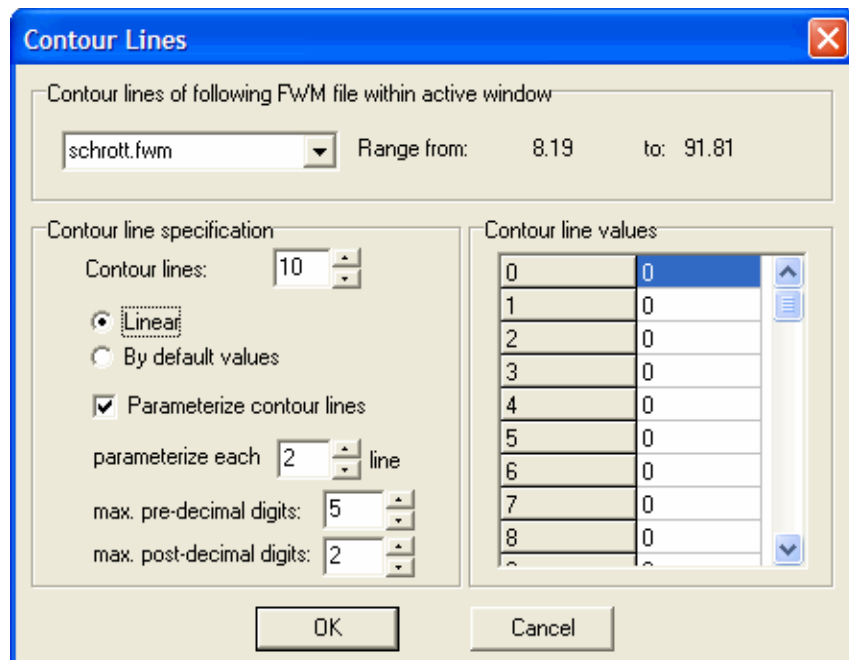
- **Specification of legend and curve styles**
The curves can be displayed without legend, with a filename-based legend or with a user-defined legend. In addition to that each single curve can be displayed in line form or in marker form (e. g. for the representation of single measured points). The legend can be positioned at the top or the bottom of the diagram.
- **Curve style**
To distinguish the curves of the graphic window, all curves can be displayed in different colors and/or different line styles.
- **Grid**
The grid type can be specified via the *Grid* group box.
- **Line width**
All curves as well as the grid can be drawn with line widths from 1 up to 5 points.

- Function values $f(x, y)$

This setting specifies, whether a FWM file is represented in contour line form or as a 3D graphic.

Specific options for FWM files

For the representation of FWM files in contour lines resp. 3D form some additional options are available. These can be reached via the DISPLAY | CONTOUR LINES... resp. DISPLAY | CHARACTERISTIC MAP... menu option. In case of a contour line representation the following dialog box appears.



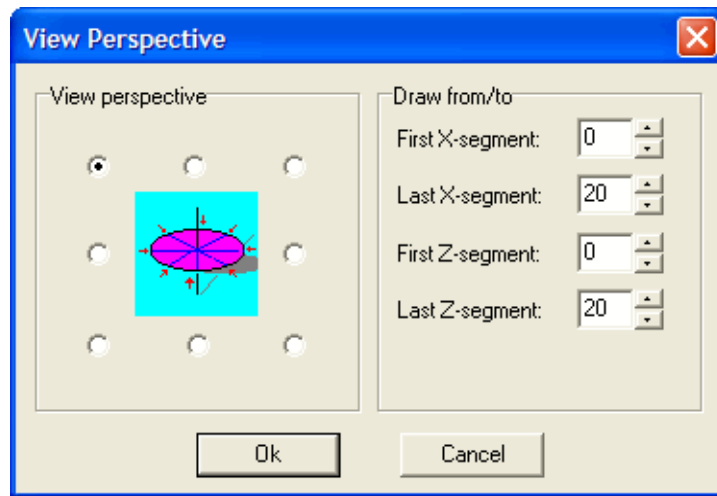
Contour lines options

This dialog specifies the contour line values for which the calculation is executed. If the graphic window contains more than one file, the file that has to be modified first has to be selected via the combo box in the upper left corner of the dialog:

- If the mode *Linear* is selected, the number of contour lines specified in the *Contour lines* edit field is drawn. The contour line values are taken linear from the function value range. This range is displayed beside the combo box.
- If the mode *By default values* is selected, the values specified by the user in the Contour line values grid are used.

- By activating the *Parameterize contour lines* checkbox each contour line can be labelled with the corresponding contour value. If many lines are drawn, it might be recommended not to label each line. This can be managed by specifying the desired value in the each edit field. The output format for the contour value can then be specified in the edit fields below.

In case of a 3D graphic representation the dialog box appears as following.





3D graphic options


This dialog allows the specification of the user's viewpoint as well as the specification of the displayed segments of the graphic.

Special options for Nyquist plots

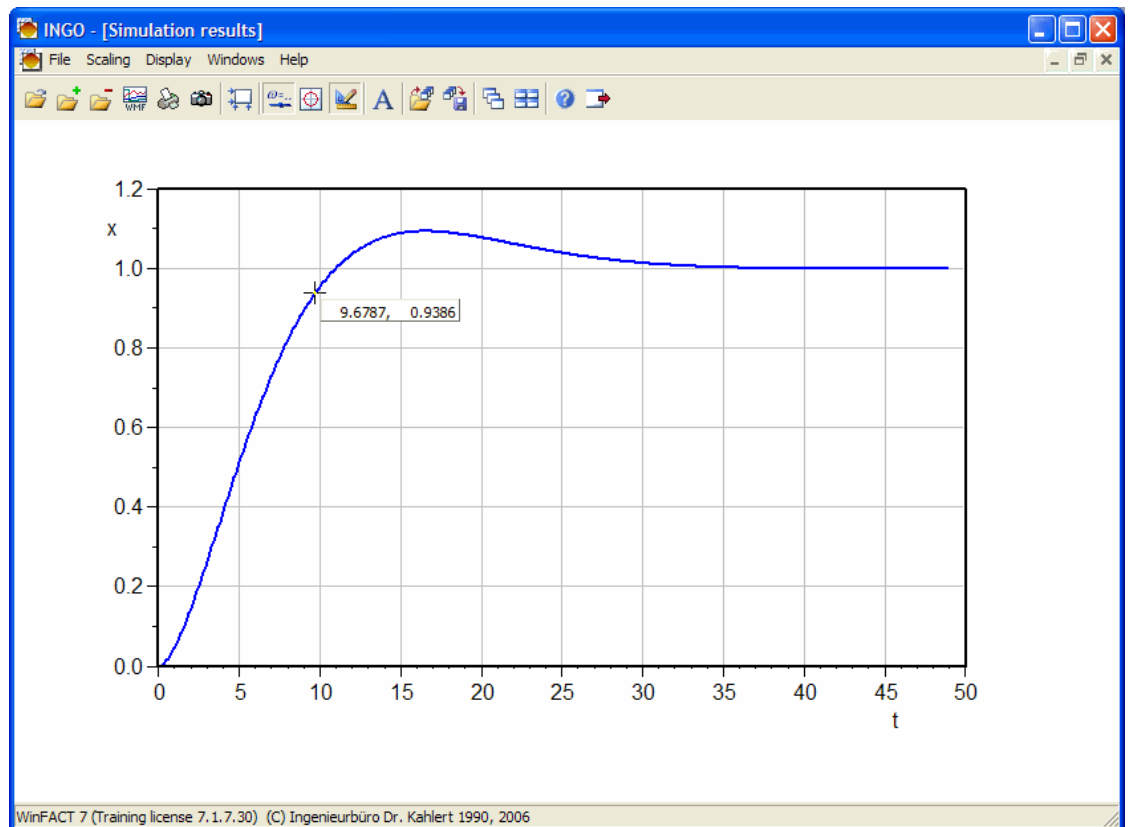


Diagrams with Nyquist plots can be supplemented by a unit circle, e. g. to allow a stability analysis. This option can be enabled via the scaling dialog. If the toolbar button  is pressed this unit circle is always forced to be "real" circular independent of the current screen resolution and window size, for this purpose the scaling of the axes is adjusted in a proper way. Furthermore the Nyquist plot can be drawn with the frequency ω used as a curve parameter; this option is activated via the  button of the toolbar.

Measurement mode

Via the DISPLAY | ACTIVATE MEASUREMENT MODE menu option resp. the  button the measurement mode can be activated. If this mode is active, the

mouse cursor is supplemented by a small hint window (tooltip) containing the coordinates of the current mouse position (see screenshot below).



Main window with activated measurement mode

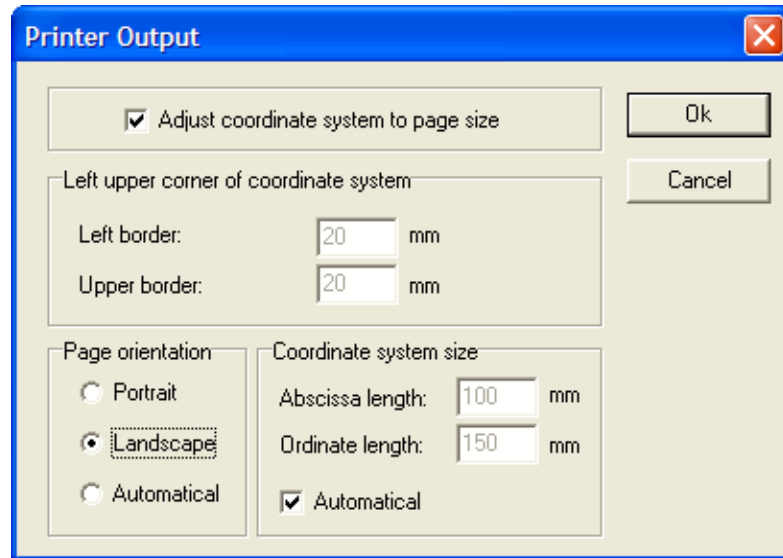
Output options

File export

The contents of each graphic window can be exported in Windows Metafile format (WMF files). This file format can be imported into nearly any other Windows application (e. g. word processing or graphic applications) later for further processing. To export the contents of the active graphic window, use the FILE | EXPORT... menu option or the corresponding button of the toolbar and specify the name of the WMF file.

Printer output

To print the contents of the active graphic window, use the FILE | PRINT... menu option resp. the printer button of the toolbar. The screenshot below shows the corresponding printer dialog which allows the setting of some printer specific options.



Settings for printer output

The dialog offers two basic modes:

- If the mode *Adjust coordinate system to page size* is selected, the printer output uses the full format of the current printer page. The orientation of the output can be selected within the *Page orientation* group box.
- If the mode *Adjust coordinate system to page size* is deactivated, the position and size of the output is user-defined via the diagram origin resp. Coordinate system size group box. If the coordinate system size is selected as automatic, INGO determines the size in such a way that the output uses the paper size in a most reasonable way.

Screenshot

The contents of the active graphic window can be copied to the Windows clipboard at any time via the FILE | BITMAP GRAPHIC TO CLIPBOARD resp. FILE | WMF GRAPHIC TO CLIPBOARD or the camera button of the toolbar.