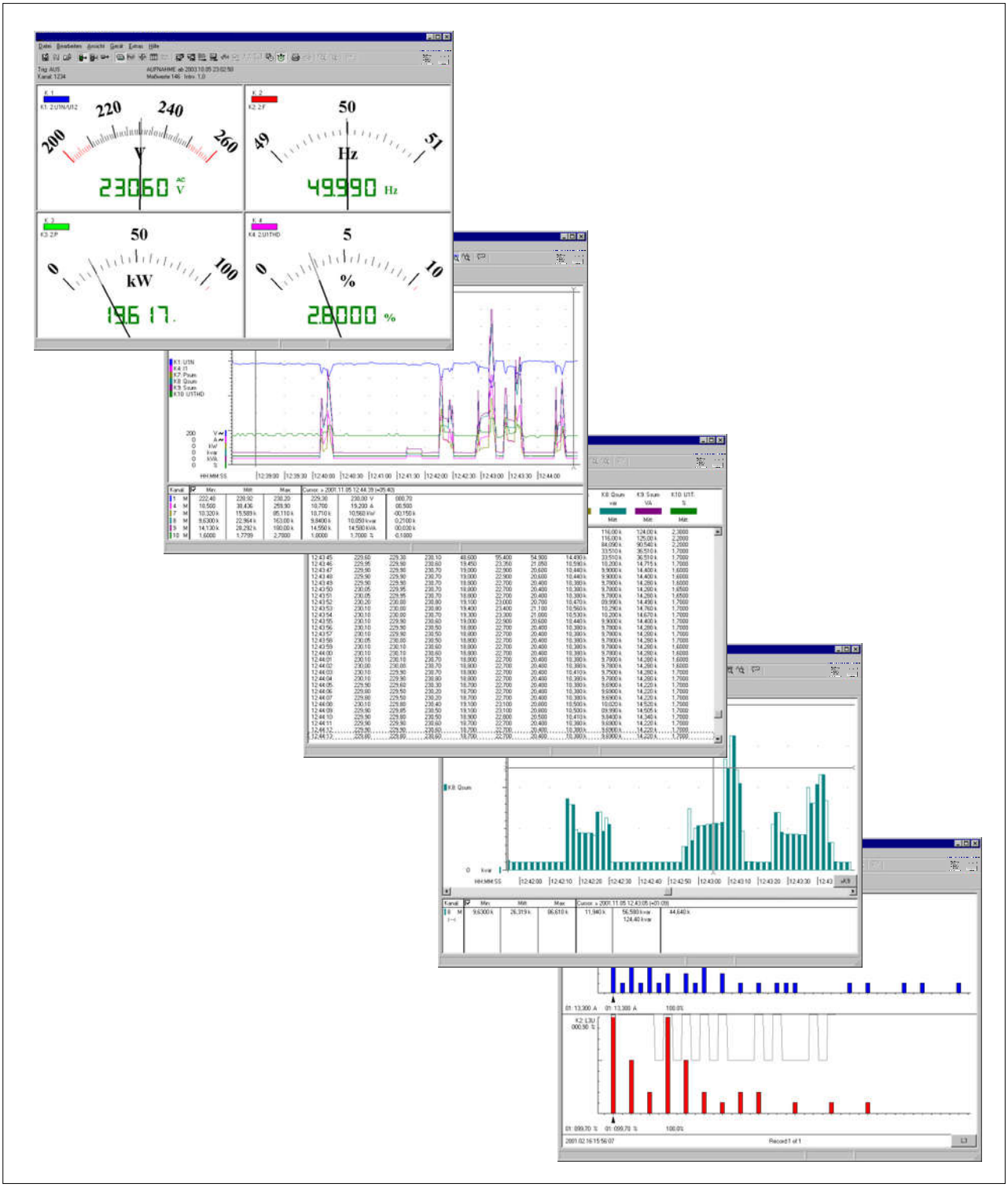
METRAwin 10

Parameters Configuring and Analysis Software for Electrical Measuring Instruments



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We make every effort to keep these instructions up-to-date in accordance with the latest software version. It is nevertheless possible that differences may exist between the software and the instructions. Further information may be provided in a README.TXT file in your program directory.

Subject to change without notice.

Preface

Purpose of the Program

METRAwin 10 software is a PC program for visualizing, recording, evaluating and documenting measurement data from various electrical measuring instruments included in our product range. It can also be used with several instruments for remote control and/or configuration of device functions.

Contents of these Operating Instructions

This document describes the use of the general program functions provided by the software.

The program's device-specific functions are described in a separate document, which can be accessed by clicking **Device Functions** in the **Help** menu. Further information regarding device-specific functions is included in the operating instructions for the respective devices.

Note on reading this document at a PC monitor with Adobe Reader™

The electronic version of the document contains numerous cross-references with hyperlinks. For purposes of identification, these appear in blue with underlining, and simplify location of the texts to which reference is made. The monitor jumps to the referenced text after clicking the blue, underlined term. If you then wish to return to the previous text, use the [Alt+←] key combination or click the ⇦ symbol in the Acrobat Reader tool bar.

Target Group

These instructions are intended for users of the software.

The software is designed for use with the Microsoft Windows® operating system. Users must be familiar with basic Windows® functions.

Scope of Validity

These instructions are valid for METRAwin 10 as of version 6.20.

Note

The version number can be displayed by clicking **About** in the **Help** menu.

Support

If you have any questions about using this software, please contact:

- Your GOSSEN METRAWATT dealer
- The contact address which can be accessed by clicking **About** in the **Help** menu

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1 Specification

1.1 Application and Features

METRAwin 10 PC software is a multilingual measurement data logging program for recording, visualizing, evaluating and documenting measured values with reference to time from various electrical measuring instruments included in our product range. It can also be used to configure the parameters of some instruments.

As a rule, the PC and the measuring instrument communicate via a real COM port (RS232) or virtual COM port being assigned to an USB interface. Depending upon the instrument series, one or several instruments can be connected directly, or via special interface adapters or transformers. However, simultaneous communication with different types of instruments is not possible.

For detailed information regarding connection and communication options, please refer to the operating instructions for the respective instrument, as well as the device-specific online help included with the software which can be accessed by clicking **Device Functions** in the **Help** menu.

Operating Modes

Depending upon device type, one or several of the following operating modes are possible:

Device Configuration



If supported by the device: remote setup and remote querying of device-specific functions and parameters such as measuring function, measuring range, hook-up configuration and memory parameters. Frequently used device settings can be saved to configuration files for easy recall.

Online Recording of Measurement Data



Read-in, display and recording of momentarily measured data from the interconnected device. The following operating parameters apply in this case:

- Number of measuring channels: up to 10
- Start recording: manual, triggered by measured value or time
- Recording mode: > Time controlled with a sample interval of 0.05 s* ...1 s ...60 min.
  > Manually controlled
  > Measured value controlled when exceeding limit/delta value
- Recording duration: max. 10 million intervals (automatic restart is possible)

* Depending upon device type, measuring function, number of measuring channels and communication mode (e.g. via modem), sample intervals of less than 1 sec cannot be used.

Reading Out and Visualizing Stored Data



If supported by the device: read-in and display of offline data recorded to device memory

Presentation and Analysis of Measurement Data

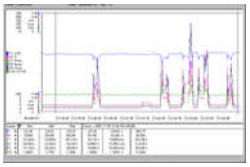
For purposes of analysis, data recorded online or read in from the device's memory can be displayed in various formats:

Y-t Recorder



Acquired measured values for up to six measured quantities ("channels") are displayed at the monitor as a line diagram with a horizontal time axis. The amplitudes and time axes of the signals can be expanded ("zoomed") or compressed, and measured off with two cursors. Absolute time axis scaling with date and time, or time axis scaling relative to the point in time at which recording is begun can be selected.

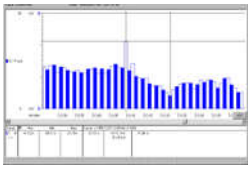
Labels with positions fixed within the image or fixed in time can be inserted into the representation for purposes of labeling or identification.



Y-t Bargraph



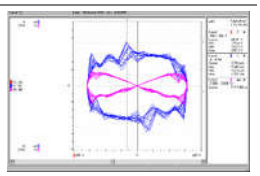
As an alternative to display in the form of a line diagram, the individual measuring channels can be represented in the form of a Y-t diagram as vertical bars, also measured off with cursors.



X-Y Recorder



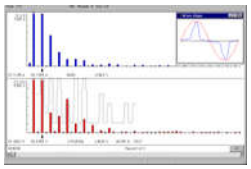
Acquired measured values for up to four measured quantities are displayed as an X-Y diagram. Any desired channel is assigned to the X abscissa, and the other three channels are assigned to ordinates Y1 through Y3. The signals can be measured off with two cursors.



FFT Bargraph



Measurement data available from instruments equipped with FFT (fast Fourier transformation) are represented as a frequency spectrum with vertical bars. Limit value marker lines can be displayed for various standards, or in a user-defined fashion.

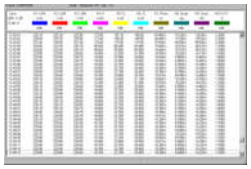


Data Logger



Measured values from up to 12 channels, as well as the time at which they were recorded, are displayed at the monitor numerically in clear-cut tabular format.

Measured values can be copied to the clipboard or be exported to a TXT file for use with other programs.



Multimeter



(Only available during online recording)
Transmitted measured values from up to four freely selectable channels are displayed at the monitor in the online mode in digital format with an additional analog scale, or as an analog indicator with additional digital display.

The respective scale ranges are individually adjustable, and can be furnished with limit values.



Processing and Manipulating Measurement Data

Formula Editor



The program includes a high performance formula editor. This allows for arithmetic processing and linking of data recorded online or read in from device memory.

Deleting Data

Unnecessary segments at the beginning or the end of the measurement series can be deleted from the data record.

Copying and Exporting Data

The graphic representations of the measurement series can be copied to the Windows clipboard as bitmaps, and pasted from there to other programs.

Also the numeric values of the channels selected for the data logger view can be carried into other programs via clipboard completely (65.536 lines max.) or as excerpts. Alternatively or if more than 65.536 lines, the values can be exported in their entirety to a TXT file

Time Shift

The measurement series of the individual measuring channels can be shifted in relation to one another along the time axis. This facilitates, for example, the comparison of measurements which have been executed one after the other by “superimposing” the measuring curves.



Note

Further options for data manipulation – e.g. editing individual measured values – have been intentionally omitted.

Printing Options

Print



The program offers diverse printing options for documenting measurements on paper. Measurement data can be printed in their entirety or as excerpts as a numeric table or as a graphic in the respectively selected display mode (except for the multimeter view).

As is customary with laboratory recorders, a Y-t chart with true-to-scale time axis (e.g. 1 cm per minute) which extends over more than one page is also possible – even during online recording, and for up to 10 channels simultaneously.

Depending upon device type, further documentation options are also available, for example printing of event lists or device configuration data.

Archiving Measured Data and Settings

Measurement data which have been recorded online or read in from device memory can be saved to a measurement data file (*.MDF) with a program-specific, compressed data format together with program parameters for the representation and processing of measurement data (e.g. channel colors and designations, formulas, linearization tables and recording parameters), as well as for communication (COM port, baud rate etc.).

If the device can be remote controlled with the program, the corresponding parameters can also be saved to specific device settings files for reuse.

1.2 System Requirements

Hardware Requirements

METRAwin 10 can be run on PCs, notebooks, tablets which use the Microsoft® Windows Operating System and fulfill the following minimum requirements:

- Processor: 500 MHz or faster
- RAM: 256 MB or more
- Hard disk: at least 60 MB available memory
- Screen resolution: at least 800 x 600 pixels
- Mouse or other pointing device
- depending on device and/or interface adapter: RS 232 serial port or USB port(s)
- for print-outs (registration form, manuals, measurement protocols): A Windows supported printer
- for software installation: CD ROM drive or internet access

Operating System

METRAwin 10 is compatible with the following operating systems:

- Microsoft® Windows 98, 2000, XP, Vista, 7 (32/64 bit), 8 (32/64 bit), 10 (32/64 bit)

Miscellaneous

A PDF viewer software (e.g. Adobe® Reader, Foxit Reader) is required in order to view and print the integrated PDF help documents (manuals). Such software is available free of charge in the internet.

For the registration of the software either an email program or a word processing program for RTF files (MS Word, OpenOffice, etc.) is required in order to send the automatically generated registration form electronically or by fax.

2 Installing and Uninstalling the Program

2.1 Installation

A *Setup.exe* file is included on the supplied CD ROM. The program is installed in dialog with the user by executing this file. The installation directory and the program file folder can be selected as desired.

METRAwin 10 software is available in several variants for different measuring instruments. These software variants can be installed to the same directory, as long as only the last digits of the respective version numbers vary from each other (e.g. 5.04 and 5.01). However, the version with the highest number must be installed last.

2.2 Uninstalling

If desired, the program can be uninstalled by selecting **Programs** from the **Start** menu and clicking the **Uninstall** function under **METRAwin 10**.

3 Operation

3.1 Starting and Closing the Program

Starting the Program

In order to start the program:

- Double click the METRAwin 10 icon on the Windows desktop.

or

- Select the program from the Windows start menu:
  Start : Programs : METRAwin 10 : METRAwin 10

⇒ The program is started.

Closing the Program

In order to close the program:

- Click **Exit** in the **File** menu.

or

- Simultaneously press the **Alt+F4** keys.

or

- Click the **Close** icon at the upper right-hand corner of the title bar.

⇒ The program is closed.

Note

When the program is closed, the selected language setting, as well as other software parameters (view parameters, channel names and colors, communication parameters, configuration of the context menu etc.), are automatically saved. When the program is restarted, the last used settings are still valid.

3.2 Changing the User Interface Language

When the program is started for the first time, the language which was selected during installation is used for the user interface. Other languages can be selected by clicking **English, German, French** etc. under **Language** in the **Options** menu. The program always starts with the last selected language.

Note

The user interface language can only be changed as long as no files are open and online recording is inactive; “Status: INACTIVE” is displayed in the **Status Bar**.

3.3 Structure of the Graphic User Interface

The METRAwin 10 program window is subdivided into six segments:

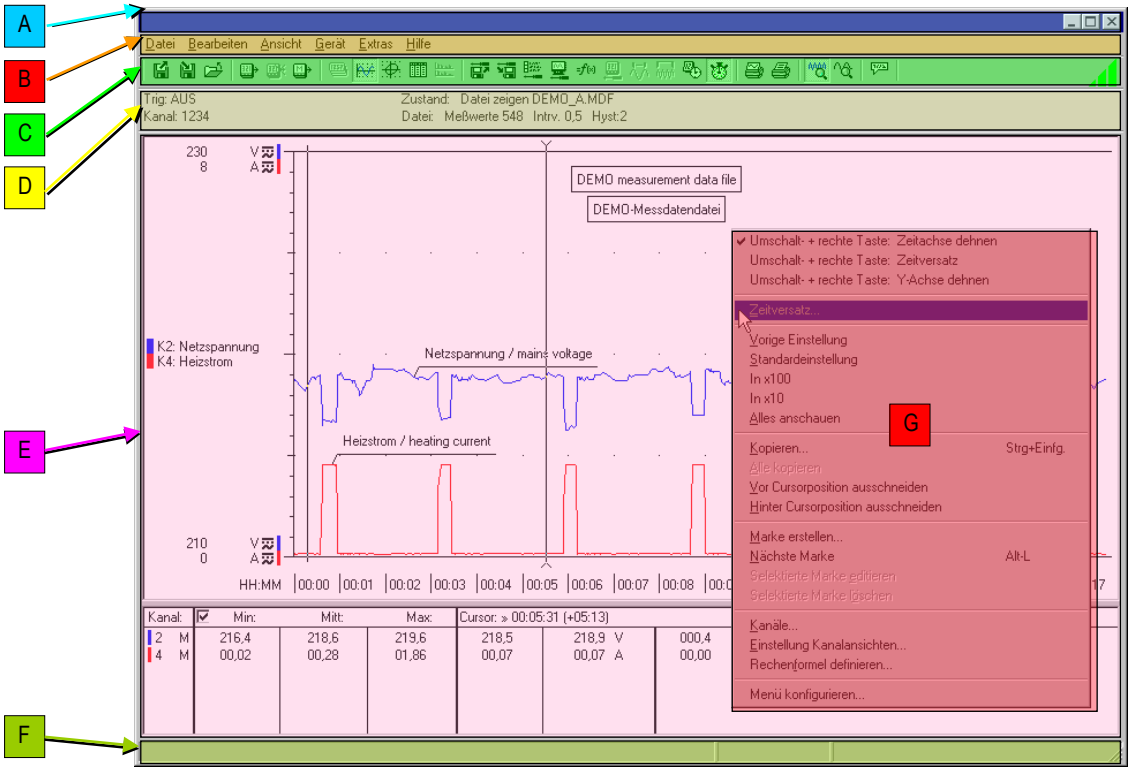


Figure 3.3 a: Segments of the Program Window

A) Title Bar

The horizontal bar at the top of the program window displays the program name, and additionally includes the system menu to the left (can be opened with the program icon), and the buttons to the right for **minimizing**, **maximizing** and **closing** the program window.

B) Menu Bar

The menu bar includes the names of the main menus from which the various menu functions and submenus can be accessed.

C) Tool Bar

The smart icons in the tool bar allow for quick access to frequently used commands and functions. The function of any given icon can be displayed by moving the mouse pointer to it, and is executed by clicking the icon. The tool bar can be hidden by clicking **Tool Bar** in the **View** menu.

D) Status Bar

Information regarding the status of certain program functions is displayed continuously in the status bar. The meaning of any given status field appears in the info bar (F) when the mouse pointer is moved to the respective field.

E) Work Area

Measurement data are displayed in various views for analysis and processing in this main field, and various dialog boxes are opened here as well.

F) Info Bar

Notes and explanations are displayed in the bar at the bottom edge of the program window regarding elements in the status bar and in the work area at which the mouse pointer is positioned (buttons, entry fields etc.).

G) Context Menu

A configurable **Context Menu** appears when the right mouse button is clicked with the mouse pointer in the work area, which allows for quick access to frequently used functions.

3.4 Context Menu

A context menu appears after clicking the right mouse button with the mouse pointer in the work area. Just like the tool bar, it allows for quick access to frequently used functions.

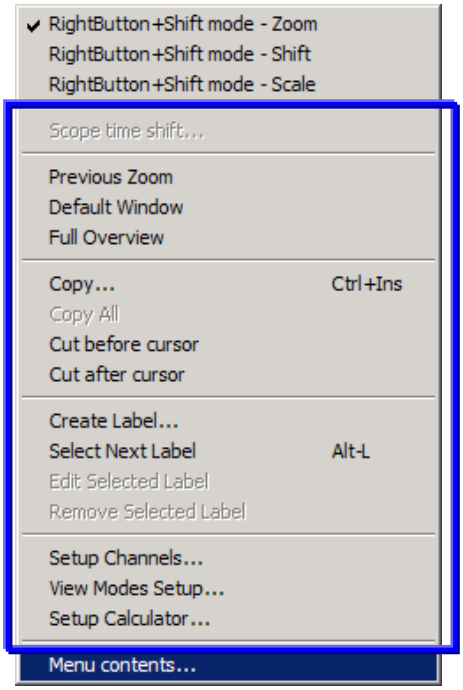


Figure 3.4.a: The Configurable Context Menu

Context Menu :

Menu contents

With the exception of the bottommost and the top three menu items, the contents of this menu can be set up as desired to include any of the menu items from the main menus and any of the functions from the tool bar:

1. Select **Menu contents** in the context menu.

⇒ The **Menu Items Selection** dialog box appears. The list at the left-hand side of this dialog box displays all of the menu items which are still available for inclusion in the context menu.

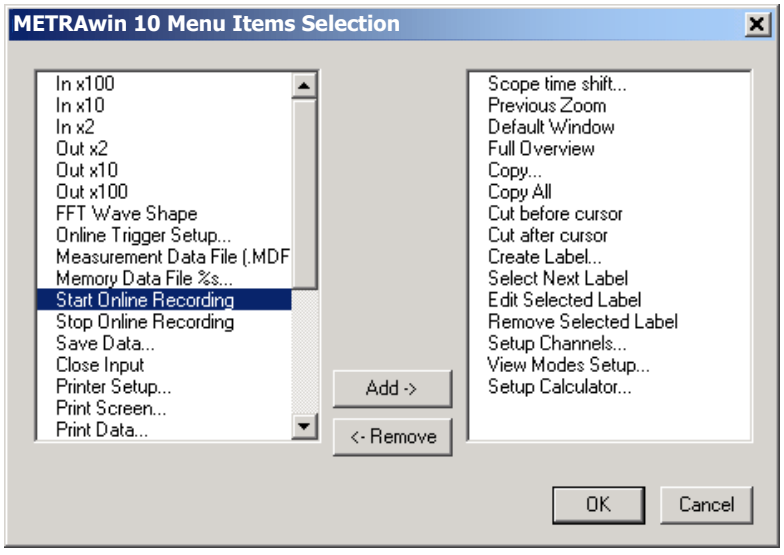


Figure 3.4.b: Dialog Box for Selecting Menu Items for the Context Menu

2. Menu items in the lists can be selected by clicking them with the **left mouse button**, and can be added to or removed from the right-hand list with the [**Add ->**]

or [**<- Remove**] button respectively. Several menu items can be selected simultaneously by pressing and holding the [**Ctrl**] key while making selections with the left mouse button.

3. Click the [**OK**] button in order to acknowledge your changes to the menu configuration, or the [**Cancel**] button in order to close the dialog box without making any changes to the menu configuration.

Note

The current configuration of the context menu is automatically saved to memory when the program is exited. However, the current menu configuration can also be saved to a specific software settings file together with other software parameters (see **Save Setup** in the **Options** menu to this end).

The top three menu items in the context menu make it possible to specify which action should be executed when the right mouse button is pressed and held and the mouse is dragged while holding the shift key [⇧] depressed in the Y-T recorder view:

- **Zoom**
  Stepless expansion of the measured values included within a selectable period of time, all the way up to the full width of the horizontal time axis
- **Shift**
  Shifting of measurement channels along the horizontal axis
- **Scale**
  Expand Y-axis scaling

3.5 Menu Bar

3.5.1 Overview of Menu Functions

File Menu		
	Open File ► Measurement Data File (.MDF)	Open a file to which measurement data have been previously saved.
	Open File ► Memory Data File (.MD~)	Open a file to which raw measurement data read in from the device memory have been previously saved.
	Start Online Recording	Read in, display and save live measurement data to buffer memory.
	Stop Online Recording	Stop online recording of live measurement data.
	Save Data	Save read in measurement data, added elements and format parameters to a file.
	Close Input	Close the currently displayed recording or a previously opened measurement data file.
	Printer Setup	Select and set up a previously installed printer.
	Print Screen	Print measurement data from the current display mode as a graphic.
	Print Continuous	Print measurement data as a continuous chart in the form of a Y-T diagram.
	Print Data	Print measurement data as a numeric table.
	Printing Event List	Print events data as a chronological list.
[Alt+F4]	Exit	Exit the program.

Edit Menu		
[Ctrl+C]	Copy	Copy an image or a data excerpt to the clipboard (data export).
	Copy All	Copy all measurement data from the data logger view to the clipboard (data export); limited to 65.536 lines max.
	Cut before cursor	Delete all data previous to the point in time selected with the cursor.
	Cut after cursor	Delete all data after the point in time selected with the cursor.
	Copy All	Save all measurement data from the data logger view to a TXT file with tabs as separators (data export).
	Labels► Create Label	Insert labels to the recorder view.
[Alt+L]	► Select Next Label	Select and position a label.
	► Edit Selected Label	Edit a label.
	► Remove Selected Label	Delete a label.
	Scope time shift	Shift measuring channels along the horizontal axis.

View Menu		
	Multimeter	Display live measured values in digital or analog multimeter format.
	Y-T Recorder	Display measured values as a Y-T line diagram.
	X-Y Recorder	Display measured values as curves in an X-Y diagram.
	Data Logger	Display measured values in a numeric table.
	FFT Bargraph	Display measurement data for harmonics as a Y-f bargraph (frequency spectrum).
	Time Display	Select format for time axis scaling or recording time indication.
	Sizable Windows	Adapt the graphic representation to the window size

	Tool Bar	Show/hide the tool bar.
	FFT Wave Shape	Show/hide reconstructed signal waveshapes in the FFT bargraph view of measurement data from devices with harmonic analysis.
	Zoom	Zoom/compress the horizontal time axis in fixed steps.
	View Modes Setup	Select the channels to be displayed in the various views.

Device Menu		
	Device Type ►	Set the program for work with another device type.
	Communication	Set up communication parameters.
	Setup Device	Configure the parameters of the connected device.
	Read Memory	Read out measurement data which have been saved to memory at the connected device.

Options Menu		
	Setup Channels	Open the dialog box for setting up the channels.
	Sample Interval	Set up the memory mode and the sample interval for online recording.
	File Size	Specify the maximum number of measuring intervals to be recorded online.
	Language ►	Change the program menus, commands and descriptions to a different language.
	Read Setup	Recall stored program setup parameters.
	Save Setup	Save current program setup parameters to a file.

Help Menu		
[F1]	Program Functions	Open the PDF file with a description of general program functions.
	Device Functions	Open the PDF file with a description of device-specific program functions.
	About ...	Display information regarding program version and the contact address.

3.5.2 File Menu

File:

Open a file to which measurement data have been previously saved.

Open File ▶ Measurement Data File (.MDF)

 [F3]

In the **Open File** dialog box which then appears, you are prompted to select or enter the **File Name** of the measurement data file to be opened (**file type: **.MDF***). As a default function, the last saved or opened file is suggested.

Files located on local drives, or on network drives to which a connection has been established, can be opened. Select the directory path to the desired file in the **Look in** dialog box.

You can always access the **Data** directory which was created during installation of METRAwin 10 under the program directory and is used as a standard directory for saving measurement data and memory data files by clicking the [**Default data directory**] button. After the program is installed, this directory includes several sample measurement data files (*DEMO_~.MDF*).

By clicking a file in the file list, it is selected as the measurement data file to be opened. If a comment text was entered when the selected file was saved, the text appears in the **Comment** field.

Click [**Open**] in order to open the selected file.

⇒ The measured values which have been saved to the file are displayed at the monitor, and can be viewed with the help of the scroll bars. The type of representation (e.g. data logger) can be changed in the **View Menu** while viewing the data.



Note 1

Measurement data files include the following elements:

A) Measured values read in from the measuring instrument, as well as parameters which are directly associated with them, for example units of measure, sample interval and point in time of recording, and information regarding the origin (device type) and type of measured data

B) Elements which may have been added by the user such as labels, formulas and file comments

C) Format parameters which are relevant for the representation or print-out of measured data such as channel selection and designations, axis scaling etc.

After opening a measurement data file, file elements B) and C) can be modified if required and the file can be saved with the entered changes, using a new filename if desired. With the exception of the labels, the settings for these elements remain active after the file is closed.



Note 2

When a measurement data file is opened which contains measurement data from a device type other than the one currently selected under **Device Type** in the **Device** menu, the program switches to the current device type after acknowledgement of the prompt which appears in this case. If this program variant is not available, i.e. if the required device-specific program module has not been installed or enabled, the following message appears “Device is not installed - <*device type designation*>”.



Note 3

An open measurement data file must be closed by clicking **Close Input**  in the **File** menu before another measurement data file can be opened. It is not possible to open more than one measurement data file at a time.



Note 4

Further Information regarding elements in this dialog box can be accessed via the direct help function: First click **?** in the title bar of the window, and then click the element for which help is required. A popup window with an appropriate explanation appears. This explanation can also be displayed by clicking the element with the right mouse button and then clicking **Direct help** in the menu which then appears.

File:

Open File ▶
Memory Data File (.MD~)

Open a file to which raw measurement data read in from device memory have been previously saved.

In the **Open File** dialog box which then appears, you are prompted to select or enter the **File Name** of the memory data file to be opened (**file type **.MD~***; ~ is device-dependent). As a default function, the last saved or opened file is suggested.

Files located on local drives, or on network drives to which a connection has been established, can be opened. Select the directory path to the desired file in the **Look in** dialog box.

You can always access the **Data** directory which was created during installation of METRAwin 10 under the program directory and is used as a standard directory for saving measurement data and memory data files by clicking the [**Default data directory**] button.

- By clicking a file in the file list, it is selected as the memory data file to be opened.
- Click [**Open**] in order to open the selected file.

⇒ The **Read Device Memory** dialog box appears. The content of this memory is device-specific, and is thus described in greater detail in the device-specific program documentation (see **Device Functions** in the **Help** menu).

In any case, the dialog box displays a list with information concerning quantity, type and time of the recordings included in the selected memory data file.

- Click the desired recording(s) or measured quantity(ies) in order to select it (them) for analysis. Channels can be added to or removed from the selection by pressing and holding the [**Ctrl**] key as required in each individual case.
- Then click the [**Display data from file**] button.

⇒ Measured values from the selected recording(s) or measured quantity(ies) appear at the monitor and can be analyzed, edited and printed in various views, and finally saved to a measurement data file (**.MDF*).

Note 1

Depending upon device type, a memory data file may include:

- Raw measurement data which have been simultaneously read out of the measurement data memory(ies) or one or more devices (original memory content)
- With one or more recordings (measurement series)
- Of one or more measured quantities

Note 2

Any number of measurement data files can be generated from a memory data file.

File: **Read-in, display and save live measurement data to buffer memory.**

Start Online Recording

 [**F4**]

The program is switched from the “INACTIVE” state to the “RECORDING” mode. Live measurement data acquired from the connected device(s) are read in via the selected interface, are represented in the work area at the program’s user interface and are stored to a temporary file located in the directory which is used specifically for this purpose.

- The following settings must be configured or checked before online recording is started:

1. Make sure that the connected device type has been selected under **Device Type** in the **Device** menu.
2. Establish the actual connection to the device(s), open the **Channels Setup** dialog box by clicking **Setup Channels** in the **Options** menu and select the required communication parameters in the ***Input Setup*** section. Alternatively, these parameters can be selected in the **Communication** **Setup** dialog box, which can be accessed by clicking **Communication** in the **Device** menu.



Note

For detailed information regarding connection and communication options, as well as settings required for the measuring instrument, please refer to the operating instructions for the respective instrument, as well as the device-specific program documentation included with the software which can be accessed by clicking **Device Functions** in the **Help** menu.

3. Execute a communication test by clicking the [**TEST...**] button in the **Channels Setup** or **Communication Setup** dialog box.

   ⇒  This icon in the tool bar indicates active communication:
   Green lamp on = PC is transmitting data to the device.
   Red lamp on = PC is receiving data from the device.

4. After successful completion of the communications test, the **Channels Setup** dialog box offers you the opportunity of selecting the desired ***Active Channels*** for online recording from all available measuring channels. Measurement data are subsequently read in for the selected channels only.
5. If required, the following settings can be entered in the **Channels Setup** dialog box:
   - If other ***Channel Names*** will be used instead of the default names, they must be entered to the appropriate fields.
   - If colors other than the currently selected ***Channel Colors*** are desired, click the color symbol which is allocated to the respective channel and assign other colors to the channel with the help of the **Color Setup** dialog box which then appears.
   - If read in measurement values need to be recorded by certain channels after conversion with a linearization curve instead of directly, click the checkbox for the respective channel in the ***Lineariz.-Table*** section and make the necessary entries to the **Lin. Setup Table** which then appears.
   - If actual storage of the measured values should not take place until certain trigger criteria have been fulfilled after beginning online recording, click the [**Online Trigger Setup...**] button and enter the necessary settings to the **Online Trigger Parameters** dialog box which then appears.
   - If calculated channels need to be displayed in addition to real “active measuring channels” during online recording, activate the ***Calculated Channels On*** checkbox and open the **Formula Definition** dialog box by clicking the [**Formulas ...**] button. Define the required formula(s) here, and check to make sure that the specified mathematical operations are applicable to the selected “active measuring channels”.

Note

The above mentioned settings for channel designations, channel colors and formulas, as well as selection of the measuring channels to be displayed in various views described below, can also be entered or changed during recording, or after recording has been ended.

6. Open the **Set Channel Views** dialog box by clicking the [**Channel Views ...**] button, and select which of the available real and calculated channels will be displayed in the respective display mode.
7. Close the **Channel Settings** dialog box by clicking [**OK**] in order to acknowledge the entered settings.
8. Open the **Set Sample Interval** dialog box by clicking **Sample Interval** in the **Options** menu, and select the interval at which measurement data which are being read in or calculated will be recorded.
9. Open the **Buffer Size** dialog box by clicking **File Size** in the **Options** menu and select the maximum number of measuring points (intervals) which will be recorded.

▸ Then start online recording by clicking the  icon, by clicking **Start Online Recording** in the **File** menu, or by pressing the [**F4**] function key.

Measurements are displayed in the work area at the program's user interface. The type of display can be changed in the **View menu**. Measured values are stored to a temporary file on the hard disk. They are not permanently stored to a measured data file until the **Save Data** command is clicked in the **File** menu.

Click **Stop Online Recording** in the **File** menu in order to end recording

Note 1

When online recording is started, the program (re)establishes communication with the measuring instrument(s), and checks for (continued) availability of the selected measuring channels, as well as applicability of the specified linearization tables and formula if necessary. The program then creates a temporary file of the required size which is initially filled with spaces only. Depending upon the number of measuring channels and the selected size of the buffer file, this may take just a few seconds, or as ling a several minutes.

Note 2

An appropriate message is displayed after the number of recorded measuring intervals has reached the defined size of the buffer file. However, the current recording is not stopped as a result. As of this point in time, the oldest received data are lost because only the defined maximum number of received measuring points is retained in the temporary file (first-in first-out buffer memory).

File : **Stop online recording of live measurement data.**

Stop Online Recording



[**F4**]

The program is switched from the “RECORDING” mode to the “Browsing Data” state.

Communication with the connected measuring instrument(s) is ended, and no further measured values are read in and stored to buffer memory.

If the multimeter display mode was initially selected, the program is switched to the data logger view.

The measurement data which have been saved to the temporary file can now be analyzed using the various available views, processed, printed out in various formats and saved to a measurement data file for archiving.



Note 1

If more measuring intervals have been read in than specified before recording with the **File Size** function in the **Options** menu, the temporary file only includes the defined period of time up through the end of recording. Measurement data from the previous, extra measuring intervals are lost (first-in first-out buffer memory).



Note 2

Once an online recoding has been ended, it cannot be resumed. The currently displayed recording must be closed or saved to a measurement data file before a new recording can be started.



Note 3

Communication which may have been established with the measuring instrument via a modem or Ethernet/Internet is <u>not</u> broken off when online recording is ended. Click the appropriate symbol in the status bar in order to break off communication, and acknowledge the security prompt which then appears.



Icon for active modem connection



Icon for active Ethernet/Internet connection

File :

Save read in measurement data, added elements and format parameters to a file.

Save Data



You are prompted to enter a ***file name*** in the **Save as ...** dialog box which then appears. The default ***file type*** is MDF (measurement data file), which should not be changed. The file is saved to the currently selected directory if you do not select another directory path.

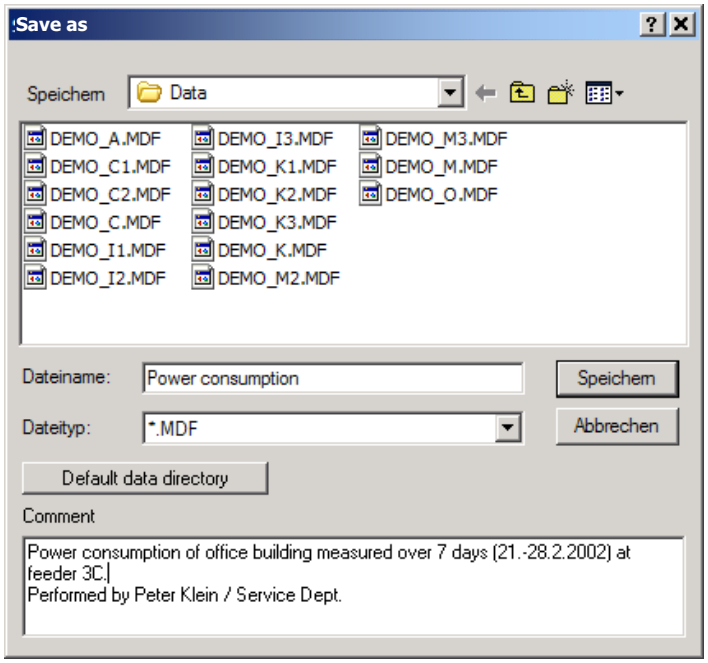


Figure 3.5.2-a: Dialog Box for Saving Measurement Date

Files can be saved to local drives, or to network drives to which a connection has been established. Select the desired directory path to which the file will be saved in the ***Save to*** dialog box.

You can always access the **Data** directory which was created during installation of METRAwin 10 under the program directory and is used as a standard directory for saving measurement data and memory data files by clicking the [**Default data directory**] button.

A text with up to 200 characters including 4 lines can be entered to the ***Comment*** field as a description of the data included in the file. This comment text appears in the **Open** dialog box before a measurement data file is opened after the file has been selected from the list.

Click [**Save**] in order to save the measurement data file using the entered file name.

If you enter the name of an already existing file, you are asked whether or not the existing file should be overwritten.



Note 1

Measurement data files include the following elements:

A) Measured values read in from the measuring instrument, as well as parameters which are directly associated with them, for example units of measure, sample interval and point in time of recording, and information regarding the origin (device type) and type of measured data

B) Elements which may have been added by the user such as labels, formulas and file comments

C) Format parameters which are relevant for the representation or print-out of measured data such as channel selection and designations, axis scaling etc.

Note 2

Further Information regarding elements in this dialog box can be accessed via the direct help function: First click **?** in the title bar of the window, and then click the element for which help is required. A popup window with an appropriate explanation appears. This explanation can also be display by clicking the element with the right mouse button and then clicking **Direct help** in the menu which then appears.

File :

Close the currently displayed recording or a previously opened measurement data file.

Close Input

[**Alt+F3**]

The active channels stop measurement. The displays in the work area are cleared, and the program returns to the “INACTIVE” state.

If any of the acquired measurement data have not yet been saved when recording is exited, or if changes have been made to the file, you are prompted to save the data or changes to a measurement data file via the **Save as** dialog box.

File :

Select and set up a previously installed printer.

Printer Setup

This command opens the **Printer Setup** dialog box which allows you to select and configure an installed printer for printing out measurement data.

Refer to your Windows handbook or the operating instructions for your printer for detailed information regarding printer setup and configuration.

File :

Print measurement data from the current display mode as a graphic

Print Screen

The option prints out measured data as a graphic in the format used by the currently selected display mode.

The **Printing Title** dialog box appears first with the following options:

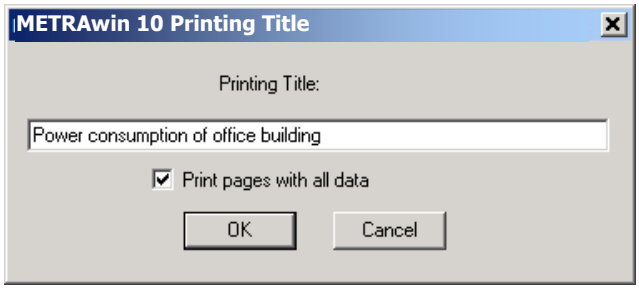


Figure 3.5.2-b: The Printing Title Dialog Box

- ***Printing Title*** entry field:

  A text can be entered here which is printed as a header on all pages. The default entry is the current date and the file name.

- ***Print pages with all data*** checkbox:
  - Do not activate the checkbox if you only want to print a single page with the currently displayed time segment.
  - Activate the checkbox if you want to print out the entire period of time included in the file for the displayed channels.

  ⇒ When the Y-T diagram is printed, the currently selected zoom factor is used. Thus the number of printed pages is equal to: (overall measuring time period) / (displayed measuring time period).

  ⇒ If all data are printed in the data logger view, the number of printed pages is equal to: (number of samples) / (number of displayed samples).

  Please note that a large number of pages may be printed depending upon view and file size.

Example

A file includes measurement data covering a period of 17 minutes and 45 seconds. The time segment which is currently displayed in the Y-T diagram is 6 minutes. If the screen is printed with all data, 3 pages are printed out: (17 min + 45 sec) / (6 min) = 2.95 = 3 pages.

After acknowledging your entry by clicking [**OK**], the **Print** dialog box appears allowing you to select the desired printer and configure its attributes if necessary.

Printing is started after clicking the [**OK**] button.

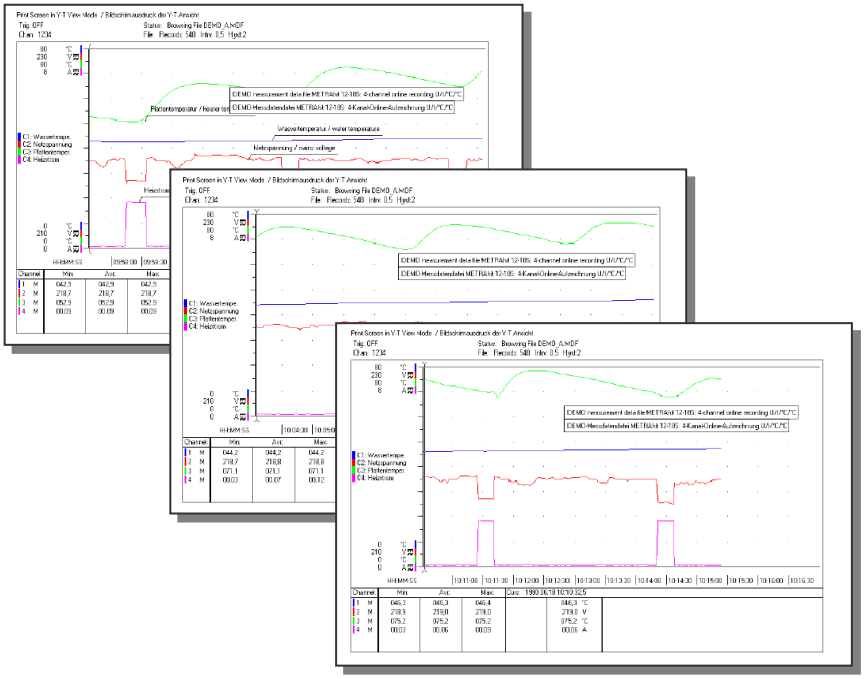




Figure 3.5.2-c: Screen Print of a Y-T Recorder View with All Included Data

Figure 3.5.2-d: Screen Print for FFT Bargraph, X-Y Recorder and Data Logger Display Modes

	Note 1 Although it is possible, it is hardly sensible to use these print options while online recording is taking place. The **Print Continuous** printing mode is intended for this purpose.
	Note 2 When making print-outs with this print option, it is advisable to select the ***Landscape*** paper format in **Printer Setup**.
	Note 3 If printing is faulty, change the settings for graphics printing (resolution, smoothing etc.) for the selected printer under **Attributes** in **Printer Setup**, or try using another printer. Alternatively, a screenshot can be copied to the clipboard by clicking **Copy** in the **Edit** menu, pasted to another graphic or word processing program and printed out from there.

File: **Print measurement data as a continuous chart in the form of a Y-T diagram.**

Print Continuous

This print option makes it possible to print out measurement data which are being acquired online or are contained in a measurement data file in the form of a Y-T diagram on consecutive pages with true-to-scale time axis (e.g. 1 cm per minute) and grid lines. A chart like those obtained from laboratory line recorders can be assembled by attaching the consecutive pages to each other.

Characteristic curves for up to 10 real and calculated channels can be printed out simultaneously. These channels can be distributed to as many a six different groups. A separate grid is created for each group.

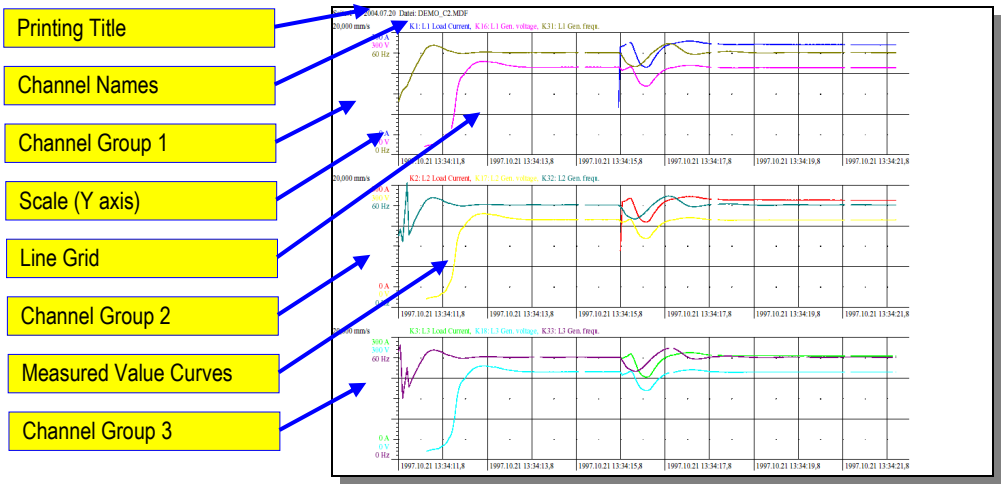


Figure 3.5.2-e: Continuous Printing Elements

1. First of all, start an online recording or open the measurement data file which will be printed.

Note

Continuous sampling with the shortest possible ***sample interval*** (e.g. 1 second) should be selected for online recording in order to assure good resolution. However, a slow communications connection, a large number of channels, or measuring instrument-specific characteristics may necessitate a larger sample interval.

2. Open the **Continuous Printing Setup** dialog box and enter the parameters described below:

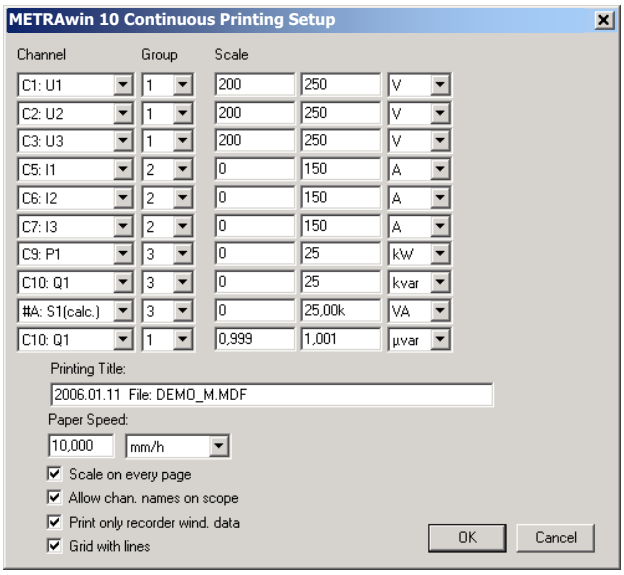


Figure 3.5.2-f: Dialog Box with Parameters for Continuous Printing

- Select the channels for which a chart will be printed with the help of the ***Channel*** selection boxes. Select the ***OFF*** option for channels which will not be printed out.
- The channels can be arranged in groups. Assign channels which need to be printed out together in a single grid to the same ***Group***. It is advisable to group channels together which have the same units of measure or scale divisions.
- Select the Y-axis scaling which will be used for each channel. Enter each respective scale bottom-end value to the appropriate ***Scale*** fields to this end, and select the correct unit of measure.
- A text can be entered to the ***Printing Title*** field, which will then be printed on all pages as a header. The default entry is the current date and the file name.
- Scaling of the time axis is set up with the ***Paper Speed*** function. Select the unit of measure first (***mm/h***, ***mm/min***, ***mm/s***, ***mm/ms***, ***mm/µs***, ***mm/ns***, or the reciprocal value ***h/mm***, ...), and then enter the desired numeric value.

  The maximum selectable feed rate for continuous printing during online recording is 5 mm per second (= 300 mm/min, =0.0050 mm/ms, = 0.2 s/mm, ...). Slow printers may necessitate a lower feed rate.

  When selecting a feed rate, don't forget that a large number of pages may be printed depending upon the period of time to be recorded (see also note below in this respect).
- Activate the ***Scale on every page*** checkbox if you want Y-axis scaling to be printed on each page. Otherwise the scale will only be printed on the first page.
- If the ***Allow chan. Names on scope*** checkbox is activated, the designations of the channels included in each grid are printed above it.
- If a measurement data file is open and only a portion of the included time period is displayed in the **Y-T recorder** view, the ***Print only recorder window data*** checkbox can be activated if you only want to print displayed time period. This option is disabled during online recording.
- If the ***Grid with lines*** checkbox is activated, the grid in the print-out consists of continuous, uninterrupted lines. Otherwise, crosshairs and dots are printed which imply the grid structure.

3. Acknowledge your entries by clicking [**OK**].

⇒ If impermissible values have been entered for ***Paper Speed*** or ***Scale***, an appropriate message appears, under certain circumstances along with indication of the permissible range of values. Acknowledge this message and correct the effected parameters.

⇒ If all entries are correct, the **Print** dialog box appears allowing for selection of the printer to be used.

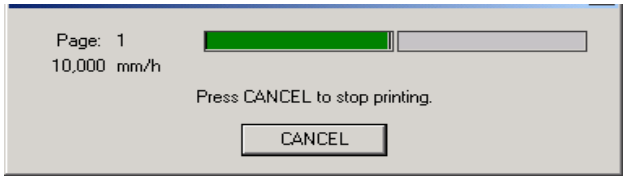
4. Select the desired printer in the **Print** dialog box. Printing is started after clicking the [**OK**] button.

⇒ If a color printer is used, the measured value curves are printed with the colors selected in the **View Modes Setup** dialog box.

⇒ If a black and white printer is used, various types of dashed lines are used to represent the different colors.

⇒ In the case of printing during online recording, the smallest possible section is always printed depending upon printer type and printer driver. However, many printers don't start printing until a full page is ready, for example laser printers.

⇒ A small window is displayed which indicates printing progress:



Printing can be aborted by clicking the [**Cancel**] button.

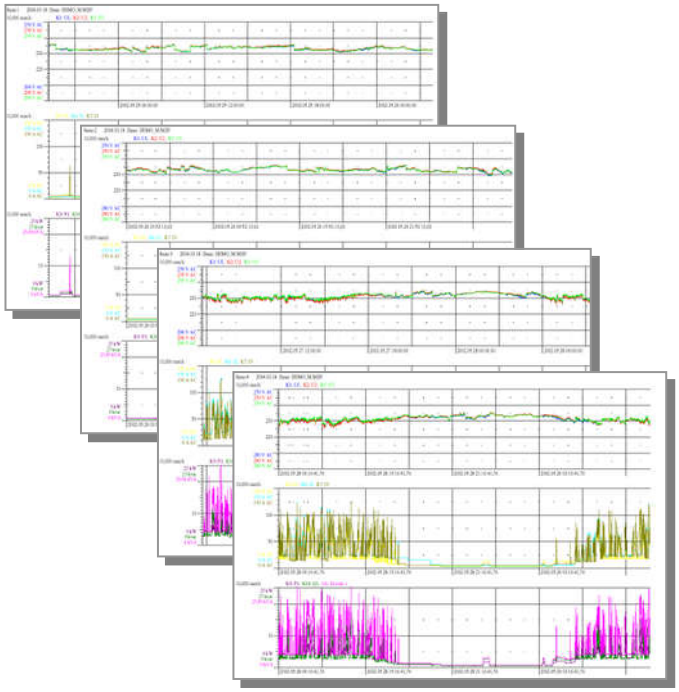


Figure 3.5.2-g: Continuous Printing of 9 Channels Distributed to 3 Groups

Note 1

Continuous printing during online recording:

After printing has been started, acquired measurement data are still visualized in the work area in the program window. However, program functions can no longer be accessed, for example changing the display mode. Online recording is not ended when printing is stopped.

Note 2

Continuous printing of a measurement data file:

The following procedure is recommended in this case:

- Observe the measurement data from the channels to be printed out with the Y-T recorder view.
- If you do not want to print out the complete recording time period, select the time period to be printed using the **Zoom** function in the **Context Menu**.
- Insert one cursor at the beginning, and one at the end of the time axis. The value for the time period and the minimum and maximum values contained therein for the displayed measuring channels are included in the table underneath the diagram (see elements R, T and V under **Y-T Recorder** in the **View** menu). These are helpful in determining the ***Scale*** and ***Paper Speed*** values which are entered to the **Continuous Printing Setup** dialog box.

File: **Print measurement data as a numeric table.**

Print Data



This option prints out available measurement data as text in a numeric table.

Measurement data are printed from the channels which are represented in the currently selected display mode. This print option must thus be executed from the **Data Logger** view, if data are to be printed from more than 6 channels.

1. The **Printing Title** dialog box appears first with the following options:
   - ***Printing Title***:
     A text can be entered here which is printed as a header on all pages. The default entry is the current date and the file name.
   - ***Print only data from current window***:
     - Activate this checkbox if only those values included in the currently represented time period for the displayed channels should be printed.
     - Do not activate the checkbox if you want to print out the entire period of time included in the file for the displayed channels.

     Please note that a large number of pages may be printed depending upon the number of intervals to be included in the print-out.
2. Upon acknowledging your entry by clicking [**OK**], the **Print** dialog box appears allowing you to select the desired printer and configure its attributes if necessary.
3. Printing is started by clicking the [**OK**] button.

⇒ Data are printed with a fixed font size using the printer's standard font.

⇒ A key is printed as a header on the first page.

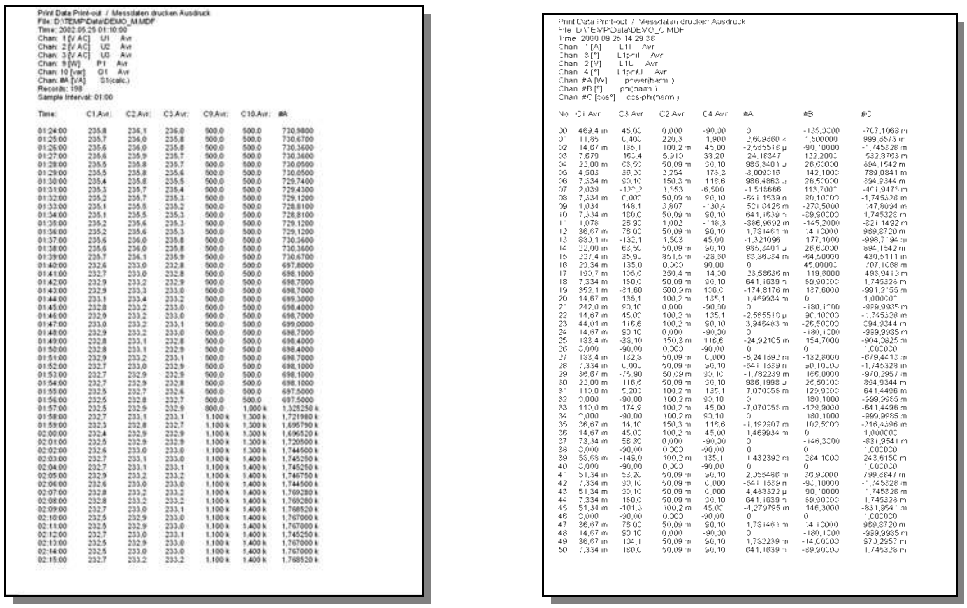


Figure 3.5.2-h: Measurement Data Print-Outs from the Y-T Recorder and FFT Bargraph Views



Note

If measurement data for harmonics need to be printed from the **FFT Bargraph** view, a separate page is printed for each measuring time point with all measured harmonics.

File : **Print events data as a chronological list.**

Printing Event List

The print option can only be selected when a file with events data (from a power quality analyzer) is displayed. It prints out available events information in text format in chronological order.

1. The **Printing Title** dialog box appears first with the following options:

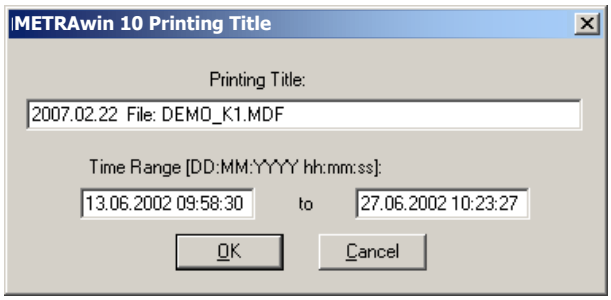
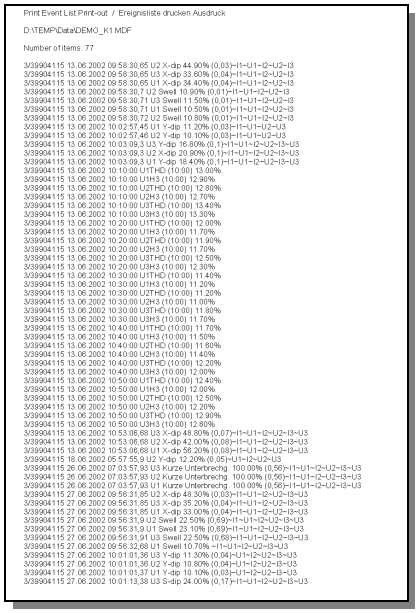


Figure 3.5.2-i:
Entry of a Header and Selection of the Events Time Range to be Printed in the **Printing Title** Dialog Box

- ***Printing Title***:
  A text can be entered here which is printed as a header on all pages. The default entry is the current date and the file name.
- ***Time Range***:
  As a default entry, the point of time at which the first event occurred appears in the left-hand field, and the point of time at which the last event occurred appears in the right-hand field, so that all events are printed out. If you want to limit the time period for the events to be printed out, enter the desired starting time to the left-hand field and the desired ending time to the right-hand field. Use the specified date and time formats for your entries.

2. After acknowledging your entries with the [**OK**] button, the **Print** dialog box appears allowing for selection and configuration of the desired printer.
3. Printing is started by clicking the [**OK**] button.

⇒ Data are printed with a fixed font size using the printer's standard font.


Print Event List Print-out / Ereignisliste drucken Ausdruck

D:\TEMP\Data\DEMO_K1.MDF

Number of items : 77

3/39904115 13.06.2002 09:58:30,65 U2 X-dip 44.90% (0,03)~I1~U1~I2~U2~I3
3/39904115 13.06.2002 09:58:30,65 U3 X-dip 33.60% (0,04)~I1~U1~I2~U2~I3
3/39904115 13.06.2002 09:58:30,65 U1 X-dip 34.40% (0,04)~I1~U1~I2~U2~I3
3/39904115 13.06.2002 09:58:30,7 U2 Swell 10.90% (0,01)~I1~U1~I2~U2~I3
3/39904115 13.06.2002 09:58:30,71 U3 Swell 11.50% (0,01)~I1~U1~I2~U2~I3
3/39904115 13.06.2002 09:58:30,71 U1 Swell 10.50% (0,01)~I1~U1~I2~U2~I3
3/39904115 13.06.2002 09:58:30,72 U2 Swell 10.80% (0,01)~I1~U1~I2~U2~I3
3/39904115 13.06.2002 10:02:57,45 U1 Y-dip 11.20% (0,03)~I1~U1~U2~U3
3/39904115 13.06.2002 10:02:57,46 U2 Y-dip 10.10% (0,03)~I1~U1~U2~U3
3/39904115 13.06.2002 10:03:09,3 U3 Y~dip 16.80% (0,1)~I1~U1~I2~U2~I3~U3
3/39904115 13.06.2002 10:03:09,3 U2 X~dip 20.90% (0,1)~I1~U1~I2~U2~I3~U3
3/39904115 13.06.2002 10:03:09,3 U1 Y~dip 19.40% (0,1)~I1~U1~I2~U2~I3~U3
3/39904115 13.06.2002 10:10:00 U1THD (10:00) 13.00%
3/39904115 13.06.2002 10:10:00 U1H3 (10:00) 12.90%
3/39904115 13.06.2002 10:10:00 U2THD (10:00) 12.80%
3/39904115 13.06.2002 10:10:00 U2H3 (10:00) 12.70%
3/39904115 13.06.2002 10:10:00 U3THD (10:00) 13.40%
3/39904115 13.06.2002 10:10:00 U3H3 (10:00) 13.30%
3/39904115 13.06.2002 10:20:00 U1THD (10:00) 12.00%
3/39904115 13.06.2002 10:20:00 U1H3 (10:00) 11.70%
3/39904115 13.06.2002 10:20:00 U2THD (10:00) 11.90%
3/39904115 13.06.2002 10:20:00 U2H3 (10:00) 11.70%
3/39904115 13.06.2002 10:20:00 U3THD (10:00) 12.50%
3/39904115 13.06.2002 10:20:00 U3H3 (10:00) 12.30%
3/39904115 13.06.2002 10:30:00 U1THD (10:00) 11.40%
3/39904115 13.06.2002 10:30:00 U1H3 (10:00) 11.20%
3/39904115 13.06.2002 10:30:00 U2THD (10:00) 11.20%
3/39904115 13.06.2002 10:30:00 U2H3 (10:00) 11.00%
3/39904115 13.06.2002 10:30:00 U3THD (10:00) 11.80%
3/39904115 13.06.2002 10:30:00 U3H3 (10:00) 11.70%
3/39904115 13.06.2002 10:40:00 U1THD (10:00) 11.70%
3/39904115 13.06.2002 10:40:00 U1H3 (10:00) 11.50%
3/39904115 13.06.2002 10:40:00 U2THD (10:00) 11.60%
3/39904115 13.06.2002 10:40:00 U2H3 (10:00) 11.40%
3/39904115 13.06.2002 10:40:00 U3THD (10:00) 12.20%
3/39904115 13.06.2002 10:40:00 U3H3 (10:00) 12.00%
3/39904115 13.06.2002 10:50:00 U1THD (10:00) 12.40%
3/39904115 13.06.2002 10:50:00 U1H3 (10:00) 12.00%
3/39904115 13.06.2002 10:50:00 U2THD (10:00) 12.50%
3/39904115 13.06.2002 10:50:00 U2H3 (10:00) 12.20%
3/39904115 13.06.2002 10:50:00 U3THD (10:00) 12.90%
3/39904115 13.06.2002 10:50:00 U3H3 (10:00) 12.80%
3/39904115 13.06.2002 10:53:06,68 U3 X~dip 48.80% (0,07)~I1~U1~I2~U2~I3~U3
3/39904115 13.06.2002 10:53:06,68 U2 X~dip 42.00% (0,08)~I1~U1~I2~U2~I3~U3
3/39904115 13.06.2002 10:53:06,68 U1 X~dip 56.20% (0,08)~I1~U1~I2~U2~I3~U3
3/39904115 18.06.2002 05:57:55,9 U2 Y~dip 12.20% (0,05)~U1~I2~U2~U3
3/39904115 26.06.2002 07:03:57,93 U3 Kurze Unterbrechg. 100.00% (0,56)~I1~U1~I2~U2~I3~U3
3/39904115 26.06.2002 07:03:57,93 U2 Kurze Unterbrechg. 100.00% (0,56)~I1~U1~I2~U2~I3~U3
3/39904115 26.06.2002 07:03:57,93 U1 Kurze Unterbrechg. 100.00% (0,56)~I1~U1~I2~U2~I3~U3
3/39904115 27.06.2002 09:56:31,85 U2 X~dip 48.30% (0,03)~I1~U1~I2~U2~I3~U3
3/39904115 27.06.2002 09:56:31,85 U3 X~dip 35.20% (0,04)~I1~U1~I2~U2~I3~U3
3/39904115 27.06.2002 09:56:31,85 U1 X~dip 33.00% (0,04)~I1~U1~I2~U2~I3~U3
3/39904115 27.06.2002 09:56:31,9 U2 Swell 22.50% (0,69)~I1~U1~I2~U2~I3~U3
3/39904115 27.06.2002 09:56:31,9 U1 Swell 23.10% (0,69)~I1~U1~I2~U2~I3~U3
3/39904115 27.06.2002 09:56:31,91 U3 Swell 22.50% (0,68)~I1~U1~I2~U2~I3~U3
3/39904115 27.06.2002 09:56:32,68 U1 Swell 10.70% ~I1~U1~I2~U2~I3~U3
3/39904115 27.06.2002 10:01:01,36 U3 Y~dip 11.30% (0,04)~U1~I2~U2~I3~U3
3/39904115 27.06.2002 10:01:01,36 U2 Y~dip 10.80% (0,04)~U1~I2~U2~I3~U3
3/39904115 27.06.2002 10:01:01,37 U1 Y~dip 10.10% (0,03)~U1~I2~U2~I3~U3
3/39904115 27.06.2002 10:01:13,38 U3 S~dip 24.00% (0,17)~I1~U1~I2~U2~I3~U3

Figure 3.5.2-j: Events List Print-Out

File :

Exit

[**Alt-F4**]

Exit the program.

This menu item closes the program, as well as any file which has not yet been exited.

If acquired measurement data have not yet been saved, or if the open file has been changed, you are asked if you would like to save the data or changes.

- Click [**Yes**] if you want to save the data or changes.
- Click [**No**] if you do not want to save the data or changes.
- Click [**Cancel**] if you do not want to exit the program.

Note

When the program is exited, the selected language setting, as well as other software parameters (view parameters, channel names and colors, communication parameters, configuration of the context menu etc.), are automatically saved to a software settings file (*MULTIMTR.INI*). When the program is restarted, the last used settings are still valid.

3.5.3 Edit Menu

Edit :

Copy an image or a data excerpt to the clipboard (data export).

Copy

[**Ctrl+C**] or [**Ctrl+ Insert**]

The selected data are copied to the clipboard, from which they can be pasted to other programs, for example Microsoft Word or Excel.

- The selected image range is copied as a bitmap in the **Y-T Recorder**, **X-Y Recorder** and **FFT Bargraph** views.
- In the **Data Logger** view, data is copied alphanumerically in ASCII format (time and column headers as a character string, and measured data as real numbers). This function is limited to 65.536 lines.

▶ Start the copying process by clicking the corresponding menu function, or with the help of the [**Ctrl+C**] or the [**Ctrl+Insert**] key combination.

⇒ The mouse pointer changes its appearance:

(image range cursor) or (data range cursor)

▶ Position the cursor at the starting point of the image or data range to be copied, and press and hold the left mouse button while dragging the mouse to the end point. Release the mouse button.

⇒ The selected data are now on the clipboard.

▶ Switch to the program to which the data will be copied. Paste the data to the desired location with the [**Ctrl+V**] or the [**Shift+Insert**] key combination.

Examples

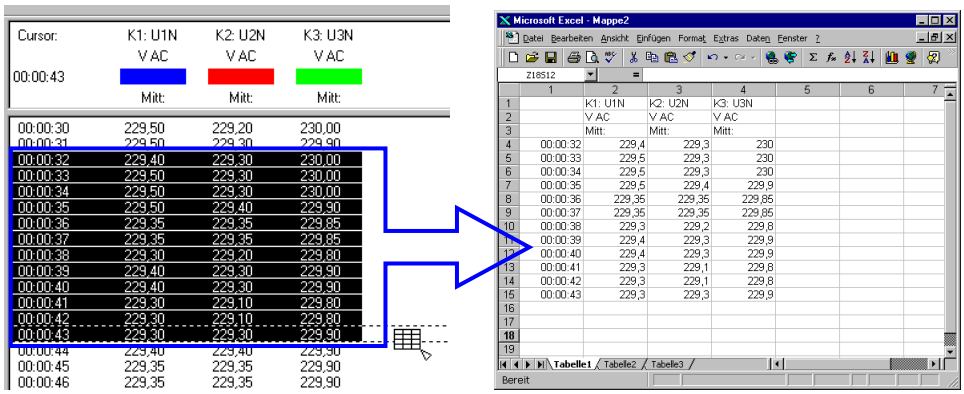


Figure 3.5.3-a: Copying Measurement Data to Microsoft Excel

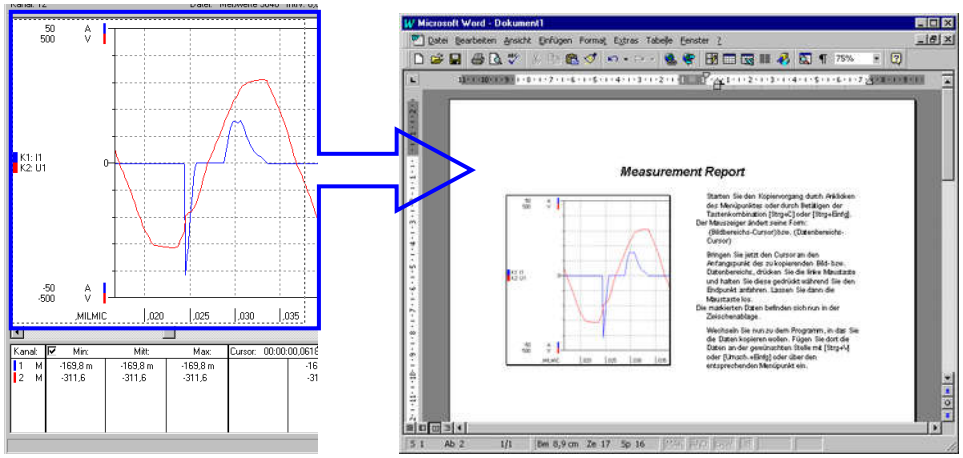


Figure 3.5.3-b: Copying an Excerpt of an Image to Microsoft Word

Note 1

The **Copy** function in the **Edit** menu can only be executed if measurement data are displayed in the work area, but not during online recording.

Note 2

If a period of time which is larger than the period displayed in the work area needs to be copied in the data logger view, drag the cursor beyond the lower edge of the work area and all the way down to the bottommost data record during selection, and then additionally press the scroll down key [↓].

Note 3

Any view of the entire program window can be copied to the clipboard as a bitmap by activating the [**Alt+Print**] key combination, and pasted to another document as described above.

Edit : **Copy all measurement data from the data logger view to the clipboard (data export).**

Copy All

All time values and measured values for the channels which appear in the **Data Logger** display are copied to the clipboard in ASCII format (time and column headers as character strings, and measured data as real numbers) from which they can be pasted to other programs such as Microsoft Word and Excel.

- After clicking the menu function, you are asked whether or not you want to copy all of the measuring points.
- The data are copied to the clipboard after acknowledging with [**Yes**].
- Switch to the program to which the data will be copied. Paste the data to the desired location with the [**Ctrl+V**] or the [**Shift+Insert**] key combination.

Edit : **Delete all data previous to the point in time selected with the cursor.**

Cut before cursor

Measurement data from all of the channels included in the file which are located to the left of the point in time specified with the cursor are deleted from the file.

With the help of the **Cut after cursor** function, superfluous time ranges at the beginning or the end of a recording can thus be removed from the measurement data file.

- View the measurement data included in the file from which data will be deleted in the **Y-T Recorder** or **Data Logger** view, and position the cursor at the point in time prior to which data will be deleted.
- Click **Cut before cursor** in the **Edit** menu and acknowledge the security prompt which now appears by clicking [**Yes**].
- If the displayed data had already been saved to a measurement data file, the **Save file as** dialog box appears and prompts you to save the file from which data will be deleted under a different name if desired.

⇒ After acknowledging the security prompt, or after saving the changed file, all of the measurement data to the left of the cursor position are deleted.

Note 1

The deletion of measurement data affects all of the channels included in the file, i.e. channels which may not be displayed in the current view as well.

Note 2

Deletion of data does not change the time reference of the remaining measured values. Even when represented with **Relative Time**, the time points still make reference to the original point in time at which recoding was started.

Edit : **Delete all data after the point in time selected with the cursor.**

Cut after cursor

Measurement data from all of the channels included in the file which are located to the right of the point in time specified with the cursor are deleted from the file.

The procedure is analogous to the procedure described under **Cut before cursor**.

Edit : **Export all measurement data from the data logger view to a text file (data export).**

Export all

All time stamps and measured values as well as the data given in the column headers for the channels which appear in the **Data Logger** view are stored to an ANSI coded text file with tabs as separators. From such files data can be imported into many other spreadsheet programs or measurement data analysis software (e.g. DranView, LabView, Microsoft Excel).

- Clicking the menu function opens the dialogue window **Save as** and you are prompted to enter a ***File name***. The ***File type*** is defined as *TXT*.
- Click [**Save**] to store the file in the selected directory.

Edit : **Insert labels to the recorder view.**

Labels

► Create Label



Labels with a one-line text which explain the displayed measurement data can be inserted in the **Y-T Recorder** and **X-Y Recorder** views.

- In the **Y-T Recorder** view, the position of each label can be anchored to any desired position within the diagram (***Fixed in Window***), or to a certain time point along the time axis (***Fixed in Time***).

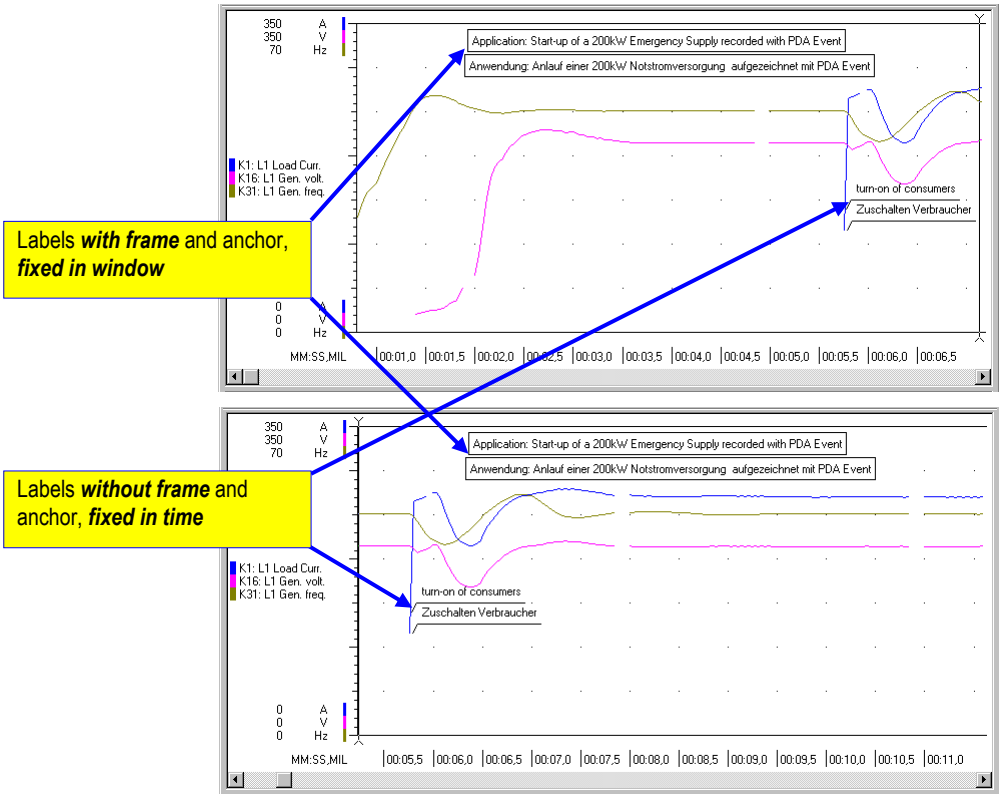


Figure 3.5.3-c: Inserted Labels in the Y-T Recorder View

- In the **X-Y Recorder** view, labels can only be fixed to any desired position within the diagram.
- In order to create a label, click **Labels** and then **Create Label** in the **Edit** menu, or click the corresponding icon in the tool bar.

⇒ The **Recorder Text Label** dialog box appears:

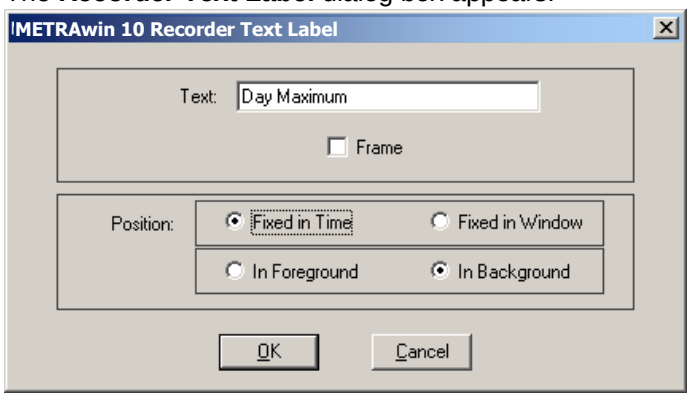


Figure 3.5.3-d: Dialog Box for Creating and Editing Labels

- Enter the desired label text to the ***Text*** entry field. The text may include up to 200 characters. However, the text may have to be kept shorter in order to fit it into the diagram depending upon monitor resolution and the selected program window size.
- Activate the ***Frame*** checkbox if the label should be displayed with a frame.
- Specify the label's ***Position***.
  - Priority relative to recorded curves:
    In Foreground: The label is in front of the recorded curves.
    In Background: The label is behind of the recorded curves.
  - Anchoring within the Y-T diagram:
    Fixed in Time: The label is attached to a certain time position and moves horizontally when the displayed time window is shifted.
    Fixed in Window: The label remains at the selected position within the diagram.

⇒ After closing the dialog box by acknowledging with [**OK**], the newly created label appears in the diagram at the current cursor position.

▶ Select Next Label **Select and position a label.**

[**Alt+L**] In order to position a previously created label at a specific point:

- Select the label:
  - By double clicking the label, or
  - By clicking **Text** and **Next Label** in the **Edit** menu, or
  - With the help of the [**Alt+L**] key combination
- Move the label to the desired position by dragging it with the mouse pointer, or with the help of the scroll keys [←↑↓→].
- Unselect the label by clicking next to it.

▶ Edit Selected Label **Edit a label.**

In order to edit the text or the attributes of a label:

- Select the label as described above, and then click **Labels** and **Edit Selected Label** in the **Edit** menu.

⇒ The **Recorder Text Label** dialog box appears once again (→ Figure 3.5.3-d) with the attributes of the selected label.

- Make the desired changes and acknowledge by clicking [**OK**].
- Unselect the label by clicking next to it.

▶ Remove Selected Label

Delete a label.

In order to delete a label:

- First select the effected label as described above.
- Then click **Labels** and **Remove Selected Label** in the **Edit** menu, or press the [**Del**] key.

Edit :

Shift measurement channels along the horizontal axis.

Scope time shift

This command opens the **Scope time shift** dialog box for shifting measuring channels along the time axis relative to one another.

See **Shift** under **Context Menu** on page 47 for a description of the function and the utilized procedure.

3.5.4 View Menu

View : **Display live measured values in digital or analog multimeter format.**

Multimeter



Live measured values acquired during online recording, or derived from acquired values from up to four channels by means of formulas, are displayed in the work area as digital indicator instruments with additional analog scale, or as analog indicator instruments with optional digital display.

The type of multimeter display can be selected in the **Multimeter** section of the **View Modes Setup** dialog box (→ page 63). This dialog box also allows you to select which of the real and calculated channels will be displayed in the multimeter view.



Figure 3.5.4-a:
Selecting the Type of Multimeter Display and the Channels which will Appear with the **View Modes Setup** Dialog Box

• ***Digital* multimeter:**

Measurement results appear at a digital display with an additional analog scale for each selected channel.

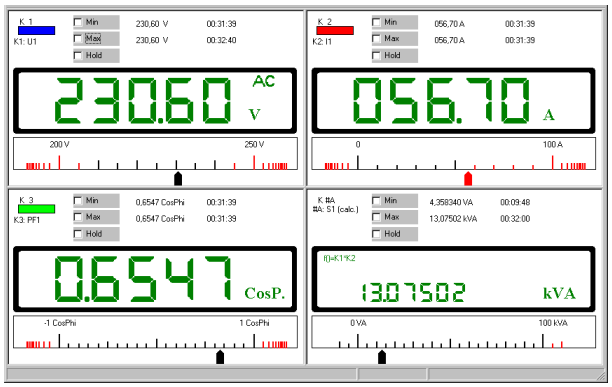


Figure 3.5.4-b:
Representation of Four Channels in the *Digital* Multimeter View

C1: Analog scale, manually scaled, with min. and max. limit values
C2: Analog scale, manually scaled, with max. limit value
C3: Analog scale, manually scaled, zero point at center
C4 (calculated channel): Analog scale automatically scaled

The smallest and largest acquired measured values of the current measurement are displayed with time of occurrence in the **Min** and **Max** lines.

- Ascertainment of the smallest and largest values can be restarted by clicking **Min** or **Max**.
- You can save the currently displayed value and the point in time at which it was measured with the **Hold** function.

• ***Analog* multimeter:**

The measured value is displayed in a fashion which resembles an analog indicator instrument.

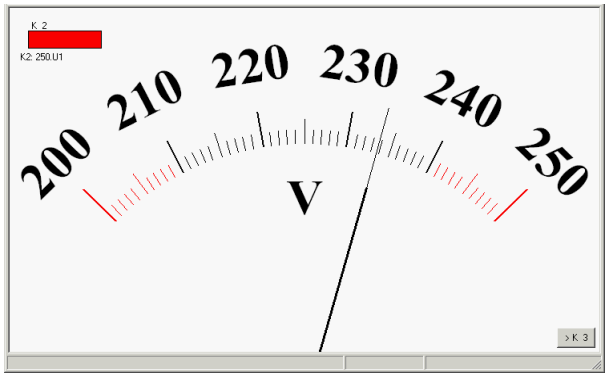


Figure 3.5.4-c:
Representation of a Single Channel Only in the *Analog*, *Full Screen* Multimeter View

The display can be switched to the next channel which has been selected for the multimeter view by clicking the >C ... button at the bottom right of the work area.

• ***Analog+Digital* Multimeter:**

Measurement data are represented as an analog indicator instrument, and numerically.

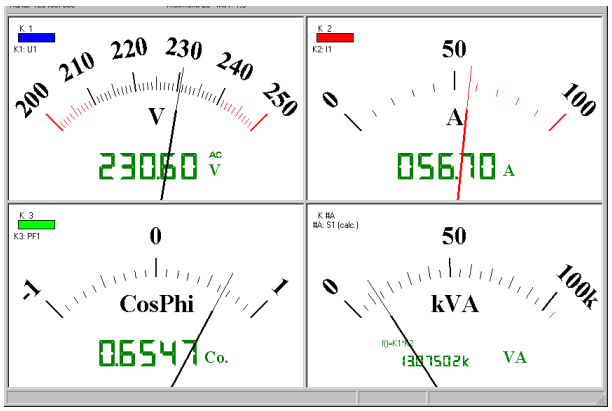


Figure 3.5.4-d:
Representation of Four Channels in the *Analog+Digital* Multimeter View

C1: Manually scaled (expanded), with min. and max. limit values
C2: Manually scaled, with max. limit value
C3: Manually scaled, zero point at center
C4 (calculated channel): Automatically scaled

• ***Full Screen* display mode:**

The multimeter display for a single channel appears enlarged over the entire surface of the work area. If several channels have been activated for the multimeter view, an icon appears at the bottom right of the work area which allows you to switch from one channel to the next (→ Figure 3.5.4-c).

Analog display scaling:

The scale range for analog display can be defined individually for each channel:

- Click any point within the analog scale, and the **Scale Range** dialog box appears.

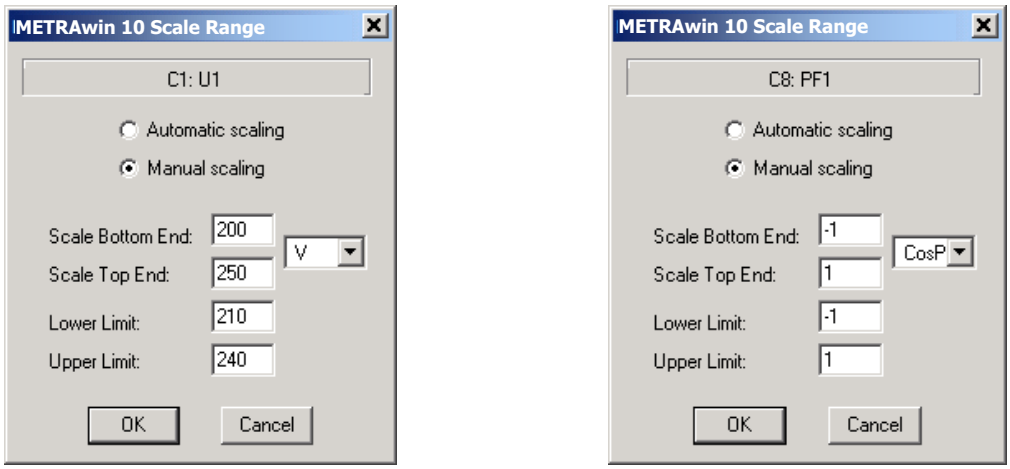


Figure 3.5.4-e: Dialog Box for Scaling the Analog Scale Individually for Each Channel

- With this dialog box you determine whether the measuring range will be selected and switched ***automatically***, or if you want to select the **Scale Bottom End** and **Scale Top End *manually***, for example in order to obtain an expanded scale (zoom), or a scale with its zero point at the center.
- In addition to this, you can enter a **Lower Limit** and/or an **Upper Limit** within the manual scale range.

⇒ Portions of the scale range which lie outside of the limit values appear in red. If the measured value exceeds the upper limit value or falls short of the lower limit value shown in the scale, the color of the pointer changes from black to red.

- Acknowledge your entries and close the dialog box by clicking [**OK**].

⇒ If you enter impermissible scale values, a message appears with instructions for correction.

	Note 1 Regardless of the setting selected for the sample interval, measured values in the multimeter view are refreshed approximately once per second, assuming that the connected measuring instrument(s) supply measured values quickly enough.
	Note 2 The number of decimal places in the digital display depends upon the connected measuring instrument and its measuring ranges.
	Note 3 Values selected for scaling the analog scale apply equally to scaling of the Y-axis in the Y-T recorder view, and vice versa.

View :

Display measured values as a Y-T line diagram.

Y-T Recorder



Curves for measured values from up to six real or calculated channels are displayed in the work area as a line diagram with horizontal time axis.

The channels' measuring curves appear in the colors and with the assignments previously selected in the **Channels Setup** dialog box under **Setup Channels** in the **Option** menu, and under **View Modes Setup** in the **View** menu.

The amplitudes (→ **Scale** in the **Context menu**) and the time axes (→ **Zoom**) of the signals can be zoomed or compressed, and measured off with two cursors (→ **Cursor Logic**).

Absolute time axis scaling with date and time, or time axis scaling ***relative*** to the point in time at which recording is begun (→ **Time Display** in the **View** menu) can be selected.

The displayed curves consist of measurement data which may be modified by means of the linearization table and/or a formula. The scaling of calculated channels appears in a scientific format, or with prefix symbol (settings in the **Options** menu under **Setup Channels ... : Calculator Setup**).

Labels with fixed window or time positions can be inserted into the representation for the purpose of labeling or identification (→ **Labels** in the **Edit** menu).

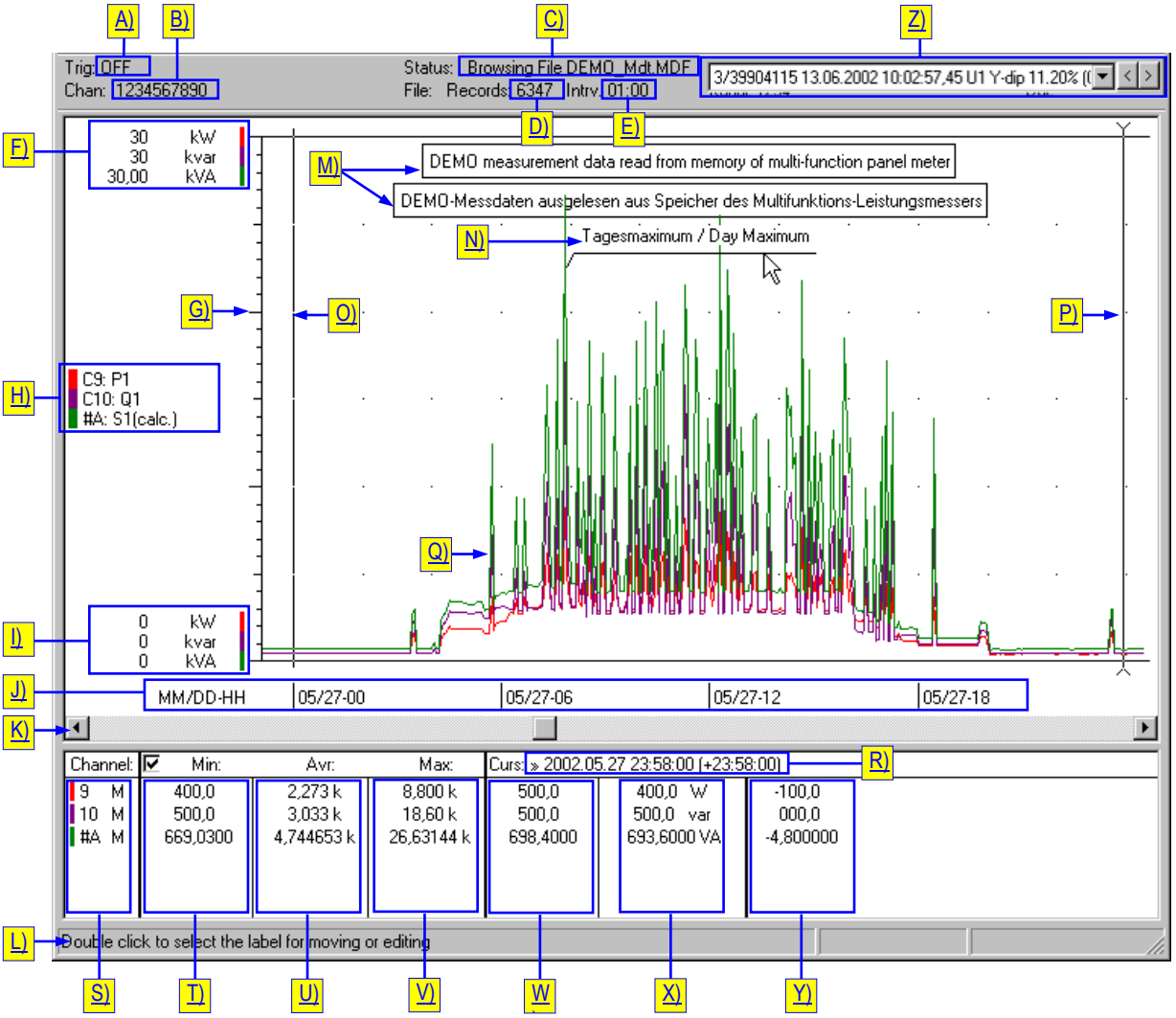


Figure 3.5.4-f: View of Measurement Data as Y-T Line Diagram

Description of Elements Displayed in the Y-T Recorder View

A) Current status or selected mode for the online trigger

- **Trig: OFF** All trigger functions are deactivated
- **Trig: 10%** Trigger is active and pre-trigger is set to 10%
- **Filter: ><** Store if outside lo-hi trigger
- **Filter: ><** Store if within lo-hi trigger
- **Trig: 14:03:45** Trigger event occurred at 14:03:45 o'clock

B) Channel numbers of all active, real measuring channels

- Channel**: 1234** Channels 1 through 4 present/selected as measuring channels
- **Channel: 1234** Same as above; a trigger event has occurred at channel 2.

C) Current recording status or displayed file

- **Status: INACTIVE <*Device Type*>**
  The program is currently set up for communication with the specified device type. No measured values are displayed, because neither a measured data file is open nor is online recording currently active.
- **Status: Recording from <*Date Time*>**
  Online recording of measurement data has been active since the specified point in time.
- **AUTO SAVE 003 <*Date Time*>**
  Online recording of measurement data with auto-save (upon reaching the buffer memory limit) has been active since the specified point in time. Two measurement data files have already been generated.
- **Status: Browsing Data**
  Measured values acquired online or read in from a memory data file are displayed. However, they have not yet been saved to a measurement data file.
- **Status: Browsing File <*file name*>**
  Measured values included in the specified measurement data file are displayed.

D) Number of stored measuring intervals (samples)

E) Selected sample interval

- **Intrv. ~~~** Manual or non-periodic sampling
- **Intrv. 01:00** Continuous sampling with a 1 minute interval
- **Intrv. 5.0 Hyst:20** Delta sampling every 5 sec. with 20 digit hysteresis
- **Intrv. 1.0 AUTO SAVE 001 (5)**
  Continuous sampling with a 1 second interval with auto-save to a measurement data file upon reaching the buffer memory limit. No more than 5 files will be generated.

F) Top-end value and unit of measure for the Y-axis individually for each displayed measuring channel. The color symbol identifies channel assignments.

- ▸ The **Scale Range** dialog box is opened by clicking a color symbol, and Y-axis scaling can be changed for the respective channel.

G) Scale division lines in the Y-axis scale. If two or more channels are displayed, scale division lines only appear if the program finds suitable common divisors for all displayed scale ranges.

H) Key with color, number and designation of displayed measuring channels (C1, C2, ... = real channels; #A, #B, ... = calculated channels).

- ▸ Any incompletely displayed channel designations appear in their entirety in the info bar when the mouse pointer is positioned at the respective channel in the key.

- The **View Modes Setup** dialog box is opened by clicking the key (→ page 63). Select the measuring channels to be displayed in the **Y-T Recorder** section of this dialog box.

I) Scale bottom-end value and unit of measure for the Y-axis individually for each displayed measuring channel. The color symbol identifies channel assignments.
- The **Scale Range** dialog box is opened by clicking a color symbol, and Y-axis scaling can be changed for the respective channel.

J) Time axis scaling (T) as selected in the **View** menu under **Time Display**.

K) Horizontal scroll bar for scrolling through the displayed time range.

L) The info bar displays notes and explanations regarding elements in the status bar, as well as in the work area, at which the mouse pointer is positioned.

M) Inserted label with frame, and with position “fixed in window”.

N) Inserted label with position “fixed in time”.

O) Passive cursor

P) Active (last moved) cursor

Q) Measured value curves for the selected channels represented in line recorder format.

R) Absolute or relative time at the position of the active cursor, as well as time difference between the active and the passive cursors (in parentheses).

S) Color code and channel number of the measuring channels listed in the table. 1, 2, 3, ... = real channels; #A, #B, ... = calculated channels.

An “M” next to a channel number indicates that the Y-axis has been manually scaled for the respective channel.
- The **Scale Range** dialog box is opened by clicking a color symbol, and Y-axis scaling can be changed for the respective channel.

T) Minimum measured value within the time period between the two cursor positions.
- Both of the cursors in the Y-T diagram jump to the position of the respective value when a minimum value is clicked.
- The display of minimum, average and maximum values can be shown or hidden with the help of the respective checkbox in the table header.

U) Arithmetic average value of all measured values of the respective channel within the time period between the two cursors.
- The display of minimum, average and maximum values can be shown or hidden with the help of the respective checkbox in the table header.

V) Maximum measured value within the time period between the two cursor positions.
- Both of the cursors in the Y-T diagram jump to the position of the respective value when a maximum value is clicked.
- The display of minimum, average and maximum values can be shown or hidden with the help of the respective checkbox in the table header.

W) Measured values at the left-hand cursor.

X) Measured values with unit of measure at the right-hand cursor.

Y) Difference between the measured values at the right and left-hand cursors.

Z) Event selection list for selecting the event to be displayed. This element is only included when event measurement data from mains analyzers are displayed.
- The events list is opened by clicking the button, after which the event to be displayed can be selected.
- The display can be switched to the next or the previous event with the > and < buttons.

Select channels to be displayed in the Y-T recorder view.

Up to six channels which will be displayed in line recorder format can be selected in the **Y-T Recorder** section of the **View Modes Setup** dialog box:

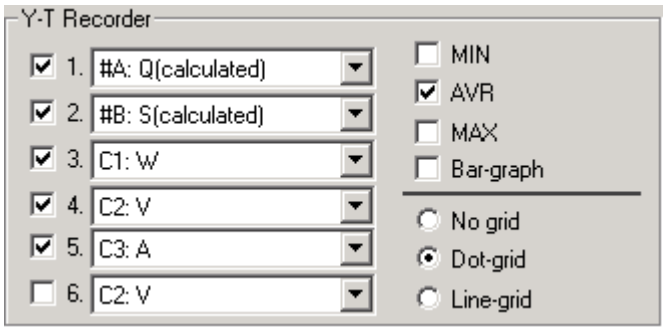


Figure 3.5.4-g: Assignment of Channels to be Displayed in the Y-T Recorder View in the **View Modes Setup** dialog box

- Activate/deactivate the line recorder channels with checkboxes 1 through 6.
- Assign the real (active) or calculated measuring channel to be displayed to each line recorder channel using the respective channel selection lists.

Note

Channels created by means of formulas (namely channels #A, #B, ...) are only included in the channel selection list (above real channels C1, C2, ...), if ***Calculator ON*** is activated in the **Channels Setup** dialog box.

In the case of online recording, the program reads in currently measured values from the connected measuring instrument for the selected active channels as quickly as possible. Exactly how fast these data are read in depends upon the type of measuring instrument and its current measuring function, as well as the number of measuring channels and the type of communications link. Incoming measurement data are stored to the temporary file according to selections made in the **Sample Interval Setup** dialog box. Three values are saved per sample interval for each real measuring channel:

Min: lowest acquired value within the interval period

Max: highest acquired value within the interval period

Avr: arithmetic mean value (average value) of all measured values acquired during the interval period, except in the case of ***Manual Sampling***: instantaneous measured value upon clicking the [**STORE**] button.

If calculated channels have also been set up, calculation is based upon average values.

- The ***MIN/AVR/MAX*** checkboxes are used to specify which saved measured values will be displayed as a Y-T line diagram. If display of all three measurement types is activated, three lines of identical color are generated for each active line recorder channel (→Figure 3.5.4-i).

Selection of the measurement types has a similar effect on the representation of line recorder channels with compressed time axis (e.g. in the “Display all” view), and with a large number of sampled values. The following figures provide vivid examples.

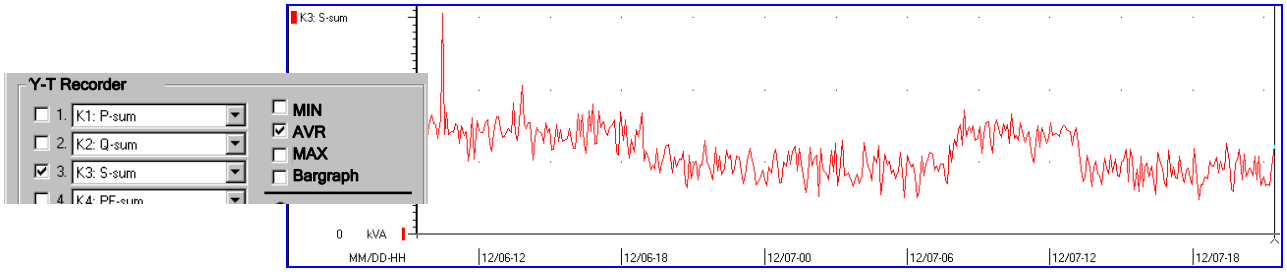


Figure 3.5.4-h: The average value line recorder curve for a measuring channel with compressed time axis suppresses any brief measured value fluctuations.

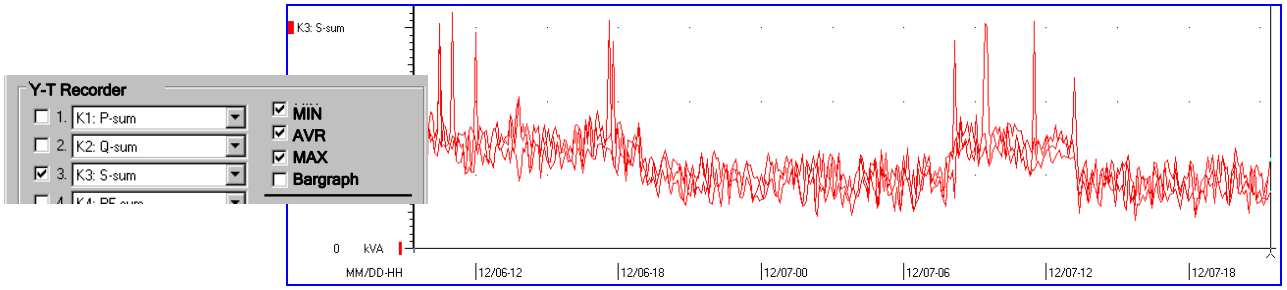


Figure 3.5.4-i: Despite compressed time axis, the representation of the line recorder curves for minimum, maximum and average values for a given measuring channel shows measured value fluctuations.

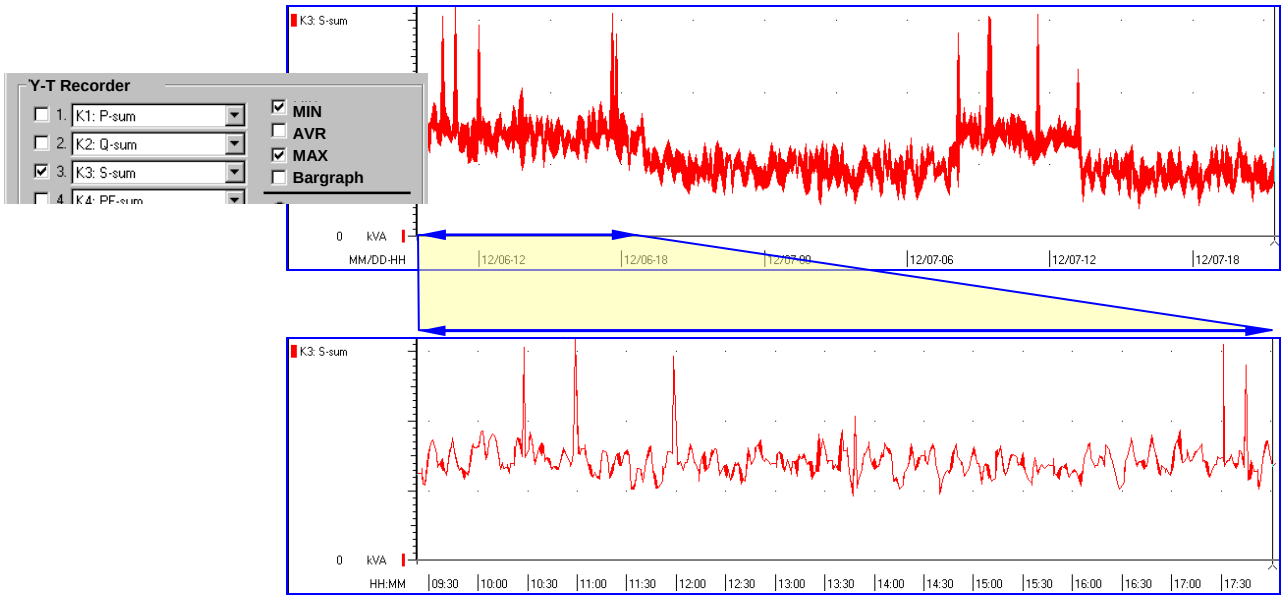


Figure 3.5.4-j: A compressed measuring channel display with MIN+MAX measurement type is displayed as a band which becomes thinner and thinner as the zoom factor is increased.

Displaying Measured Values as a Y-t Bargraph

Real or calculated channels which have been selected for the Y-T recorder view can also be displayed individually in the form of a bargraph.

- Activate the ***Bargraph*** checkbox in the **Y-T Recorder** section of the **View Modes Setup** dialog box (→ page 63) to this end.

⇒ Consecutive sampled values are displayed alternately as colored and white, vertical bars.

⇒ The active cursor appears in the form of crosshairs. The amplitude of the horizontal cursor is displayed in the cursor field in the table. The amplitude of the measuring symbol is above this.

- In order to switch the bargraph display to the next selected Y-T recorder channel, click the >C... button at the bottom right of the diagram.

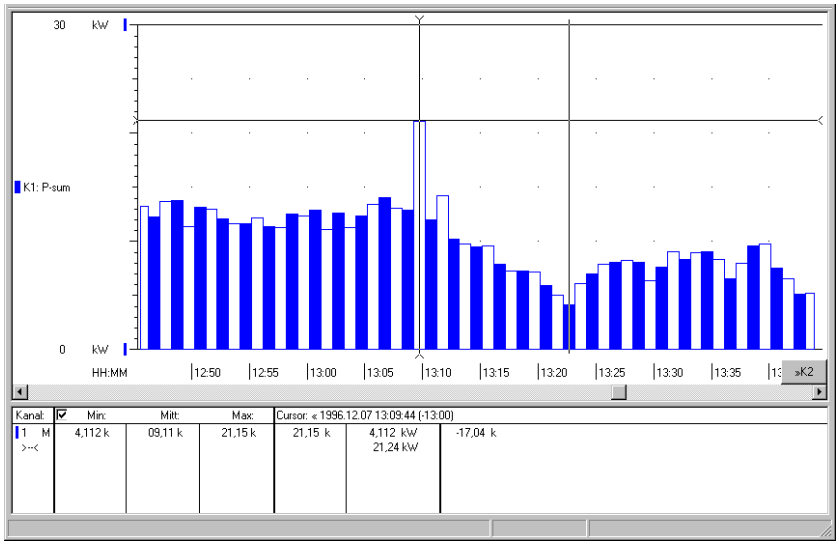


Figure 3.5.4-k: View of Measurement Data as Y-T Bargraph

Show/hide the grid in the Y-T diagram.

A grid consisting of lines or dots can be displayed in the d Y-T recorder view diagram.

- Select the corresponding options field in the **Y-T Recorder** section of the **View Modes Setup** dialog box (→ page 63) to this end:
  - ***No grid***
  - ***Dot grid***
  - ***Line grid***

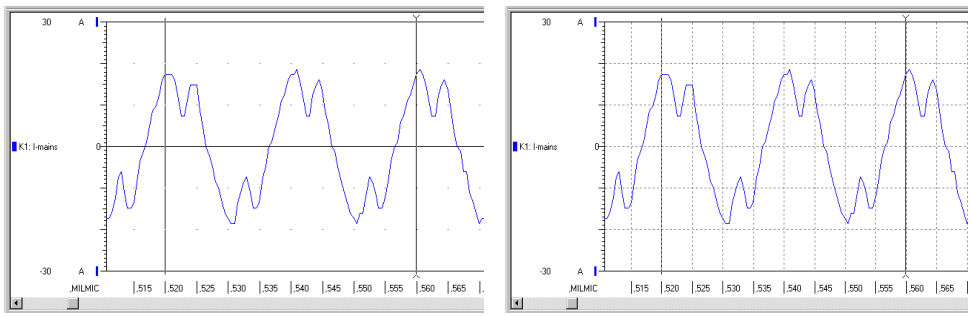


Figure 3.5.4-l: Y-T Diagram with Dot or Line Grid

Cursor Logic

When a measurement data file is opened, both cursors are initially positioned at the left-hand edge of the Y-T diagram. The closest cursor is caused to jump to the current mouse pointer position by clicking within the diagram, and then becomes the active cursor. Double clicking causes both cursors to jump to the current mouse pointer position. The active cursor can be dragged by pressing and holding the mouse button, and moving the mouse. The active cursors can also be moved with the help of the [←] and [→] scroll keys on the keyboard.

View : Y-T Recorder : Context Menu :

Stepless expansion of the measured values included within a selectable period of time all the way up to the full length of the horizontal time axis

Zoom

Proceed as follows in order to zoom a section of the time axis:

- Position the mouse pointer at the beginning of the section to be zoomed.
- Press and hold the Shift key [⇧] and the right mouse button.

⇒ The mouse pointer is turned into a magnifying glass icon .

- Move the magnifying glass icon horizontally to the end of the section to be expanded, which is selected by the box which then appears.
- Release the Shift key and the right mouse button.

⇒ The series of measured values which was previously selected with the box has now been zoomed over the full length of the time axis. Any details which may not have been discernible before now become visible.

⇒ You can move the zoomed time interval using the scroll bar below the diagram or by moving the scroll wheel on your mouse.

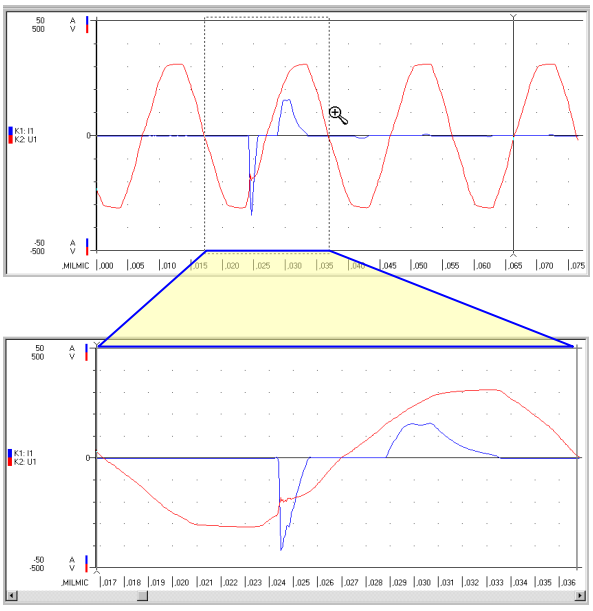


Figure 3.5.4-m: Zooming the Time Axis in the Y-T Recorder View

Notes

- Conversely, the time axis can also be compressed by pressing and holding the Ctrl key instead of the shift key.
- Zooming or compressing of the time axis can be undone by clicking **Zoom** and then **Previous Zoom** in the **View** menu.
- Alternatively, stretching and compressing the time axis is possible by turning the scroll wheel on the mouse while holding down the Shift key [⇧].
- The time axis can also be zoomed or compressed by a predefined factor using the **In x2 / x10 / x100** or **Out x2 / x10 / x100** functions under **Zoom** in the **View** menu.

View : Y-T Recorder :
Context Menu :

Shift

Shift measurement channels along the horizontal axis.

If an open measurement data file contains measurement series from at least two channels, the individual measuring channels can be shifted along the time axis relative to one another. This facilitates, for example, the comparison of measurements which have been executed one after the other by “superimposing” their signal curves.

The procedure for shifting measuring series along the time axis is explained below with the help of an example.

Example

Power consumption for a power consumer was recorded to memory twice by a measuring instrument with reference to real time using a 4 day interval, each time for a period of several hours. The two measurement series were read out of device memory, visualized and saved to a measurement data file. Now the two measurement series will be compared with each other with reference to time of day.

1. Click in the Y-T diagram with the right mouse button and activate the **RightButton+Shift mode - Shift** option in the **context menu** which then appears.
2. Position the mouse pointer at the line recorder curve to be shifted.
3. Press and hold the shift key [⇧], and acknowledge by pressing the right mouse button.

⇒ The mouse pointer turns into a time shift cursor .

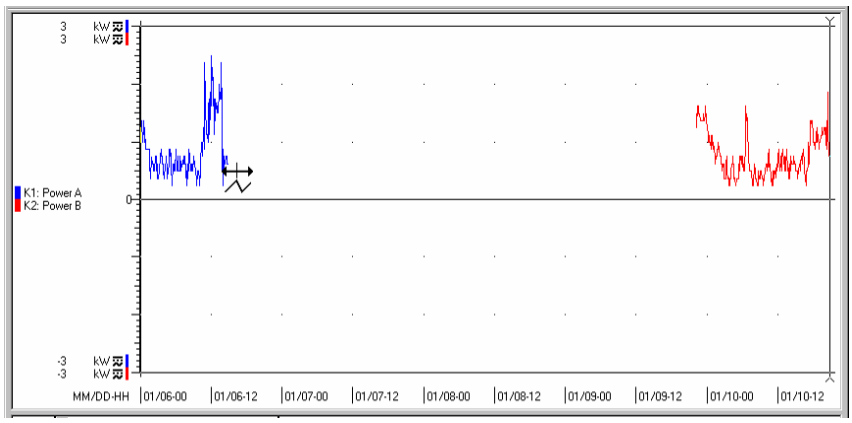


Figure 3.5.4-n: Start time shift by clicking the line recorder curve to be shifted.

4. Continue to hold the mouse button and the shift key depressed, and drag the time shift cursor along with the line recorder curve horizontally to the desired new position.

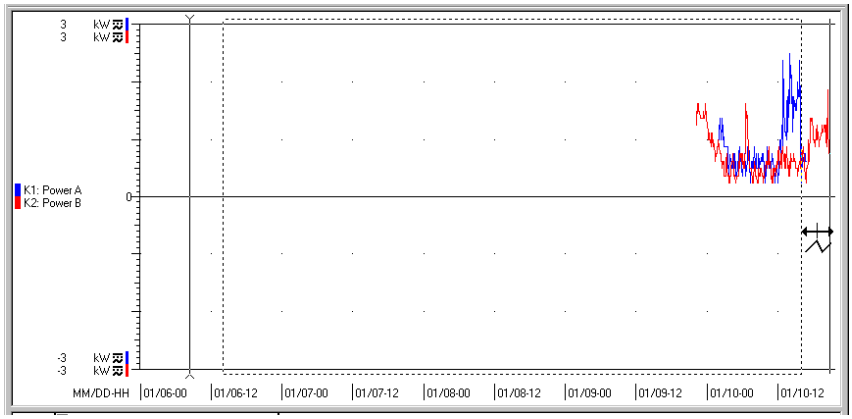


Figure 3.5.4-o: Shifting the Line Recorder Curve to the New Position

5. Release the right mouse button and the shift key.

⇒ The **Scope time shift** dialog box appears. This dialog box displays the time value for the executed shift (in this case 98:39:00 [hh:mm:ss]) for the respective channel in the **New shift** entry field.

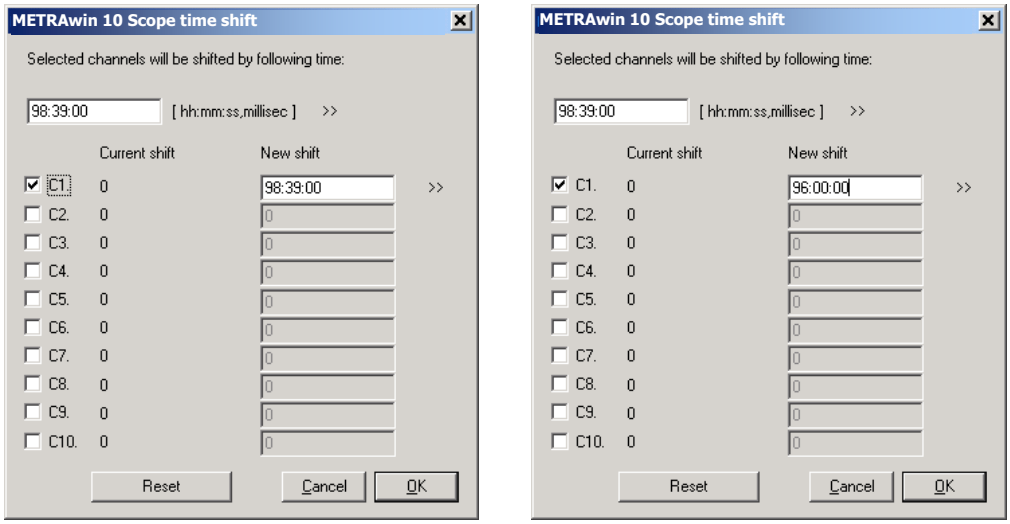


Figure 3.5.4-p: Double check or enter the time shift value.

6. The following settings can now be made in the **Scope time shift** dialog box:
   - If the suggested time shift needs to be applied to additional real channels included in the file, activate the checkboxes (**C1** ... **C10**) which are assigned to the respective channels. This is also possible for channels which are not displayed in the current view.
   - If you want to use a time shift value other than the one suggested for certain channels, enter the desired values to the respective **New shift** entry fields. Time values can be entered in either the ***hh:mm:ss,00*** format, or in seconds (e.g. ***3600*** = 01:00:00).
   - If you want to undo a previously executed time shift, click the [**Reset**] button. This resets the time shift values for all included channels to 0 (zero).

   In the example provided here, only channel C1 is to be shifted, but not by the recommended value, but rather by exactly 4 days = 96 hours, in order to retain reference to actual time of day. For this reason, ***96:00:00*** must be entered to the **New shift** entry field for **C1**.

7. Click the [**OK**] button in order to execute the specified time shift for the channels, or click [**Cancel**] in order to close the dialog box without changing the measuring channels' position in time.

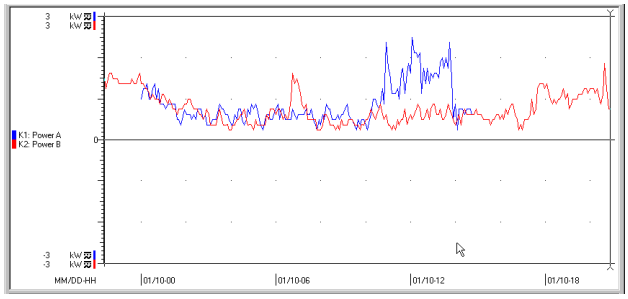


Figure 3.5.4-q: Zoomed View of the Channels after Time Shifting

Note 1

Use of the time shift function is only possible after the measurement series acquired online or read in from memory data files have been saved to a measurement data file. If this is not yet the case, a message appears prompting you to create a measurement data file.

Note 2

When channels are shifted along the time axis it may be the case that new measured values are generated by the program by means of interpolation for the shifted channels, as well as for channels which remain in their original positions.

Example: Section 1 of the following figure shows the measured values and the pints in time at which they were recorded for two channels before time shifting. It is apparent that the measurement series for both channels were recorded using an interval of 5 minutes. In section 2, the measurement series are displayed with a time shift of 96 hours (= whole number multiple of the interval) for channel 1. In section 3, channel 1 has been shifted 96 hours and 3 minutes (= non whole number multiple of the interval). This results in the occurrence of

recording time points for which there are no measured values for some channels. The program generates artificial measured values for these time points by means of linear interpolation, which lie between the previous and the next measured values.

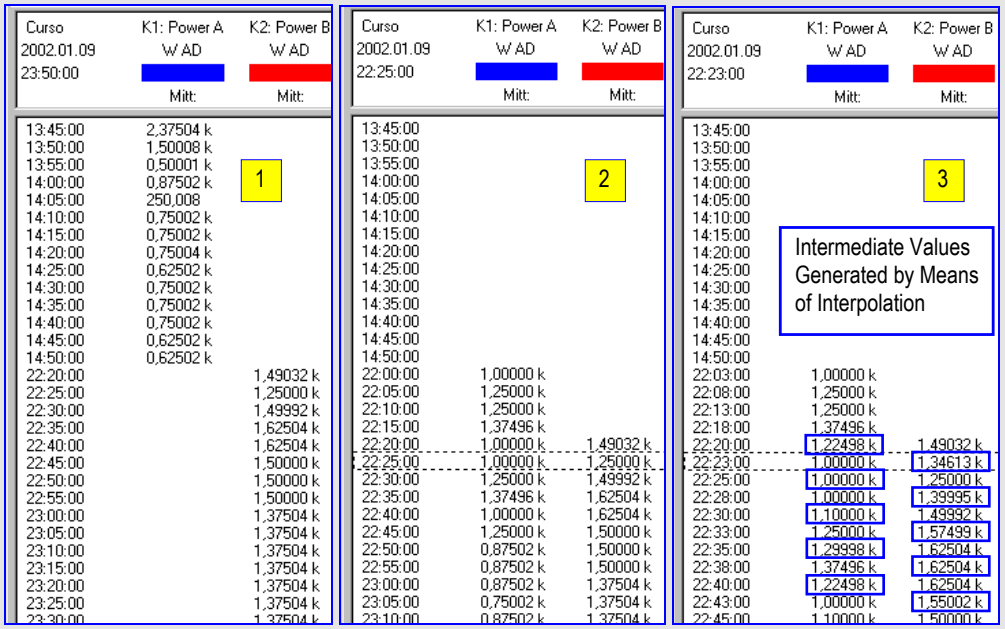


Figure 3.5.4-r: Measurement Series Before and After Time Shift with Various Shifting Values

Note 3

Shifted channels loose their original reference to time. As long as the file is not saved again, the original time reference can be restored by clicking the [**Reset**] button in the **Scope time shift** dialog box. It may thus be advisable to save the edited file under a different name.

View : Y-T Recorder :
Context Menu :

Scale

Expanding Y-Axis Scaling

The Y-axis can be scaled in the **Y-T Recorder** measurement data view individually for each displayed measuring channel either automatically or manually. The automatic scaling function is similar to automatic measuring range selection for a measuring instrument: Depending upon the highest and lowest measured values for a given measuring channel in the currently displayed time window, the program selects a scale range which is adequately large for their representation. As a rule, these scale ranges are symmetric to a zero line (bipolar, zero point at the center), and if applicable are identical to the respective measuring ranges of the measuring instrument from which the measured values originate.

If the signal course only uses a small portion of the scale range of the Y-axis in the Y-T diagram, various options are available for expanding this range:

- Individually for each displayed measuring channel
- Combined for several measuring channels simultaneously

Proceed as follows in order to expand scaling of the Y-axis in the Y-T diagram:

1. Click within the diagram with the right mouse button and activate the **RightButton+Shift mode - Scale** option in the context menu which then appears.
2. Position the mouse pointer within the diagram with reference to the Y-axis at the level of the scale value which will become the new scale top-end value. A position just above the highest display value is usually selected.
3. Press and hold the shift key [⇧], and acknowledge by pressing the right mouse key.

⇒ The mouse pointer is turned into a coordinate icon .

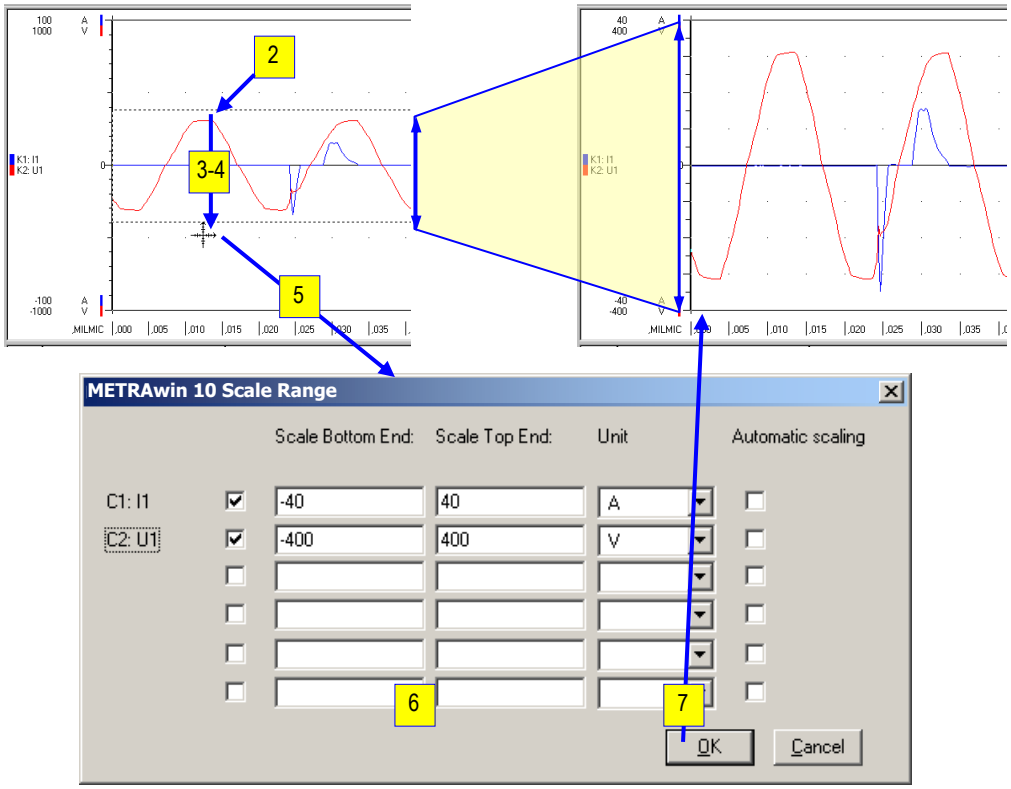


Figure 3.5.4-s: Expanding the Y-Axes in the Y-T Recorder View

4. Move the icon vertically to the bottom end of the section to be expended, which is selected by the box which then appears.
5. Release the shift key and the right mouse button.

⇒ The **Scale Range** dialog box appears. This dialog box displays the new values for the Y-axis, as well as their **unit** of measure, for all channels represented in the

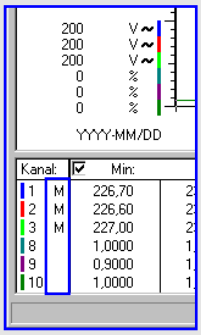
diagram in the **Scale Bottom End** and **Scale Top End** entry fields.

6. The following changes can now be made as required:
   - If expansion should not be applied to a certain channel, deactivate the checkbox for the respective channel. Scaling for this channel remains unchanged.
   - If automatic scaling should be used for a certain channel, activate the **Automatic scaling** checkbox for the respective channel. In this case, the values in the **Scale Bottom End** and **Scale Top End** entry fields are meaningless.
   - If you would like to use values other than the suggested scale top and bottom-end values or units of measure for certain channels, enter the desired values to the corresponding entry fields.
7. Click the [**OK**] button in order to execute Y-axis expansion with the specified parameter values, or click the [**Cancel**] button in order to close the dialog box without changing Y-axis scaling.

⇒ OK: The measured value curve which previously remained within the height defined by the frame has now been expanded over the entire length of the Y-axis. Any details which may not have been discernible before now become visible.

Note 1

Channels with manual Y-axis scaling are identified in the table underneath the Y-T diagram with an "**M**".



As an alternative to the above described procedure for expanding the Y-axis, the scaling of a single channel can also be changed by clicking the **color symbol** of the respective channel in the table, or by clicking next to the Y-axis. In this case as well, the **Scale Range** dialog box, appears but only displays the entry and selection fields for the effected. channel After entering and acknowledging the desired values for **Scale Bottom End** and **Scale Top End**, scaling for the selected channel is changed.

This procedure can also be used to change scaling during online recording!

Note 2

An error message appears if impermissible scale top and bottom-end values are entered.

Note 3

Y-axis scale division lines are only displayed if the program finds suitable common divisors for all displayed scale ranges.

View :

Display measured values as curves in an X-Y diagram.

X-Y Recorder



Measured values for up to four measured quantities are displayed as curves in an X-Y diagram. Any desired channel is assigned to the X abscissa, and the other three channels are assigned to ordinates Y1 through Y3.

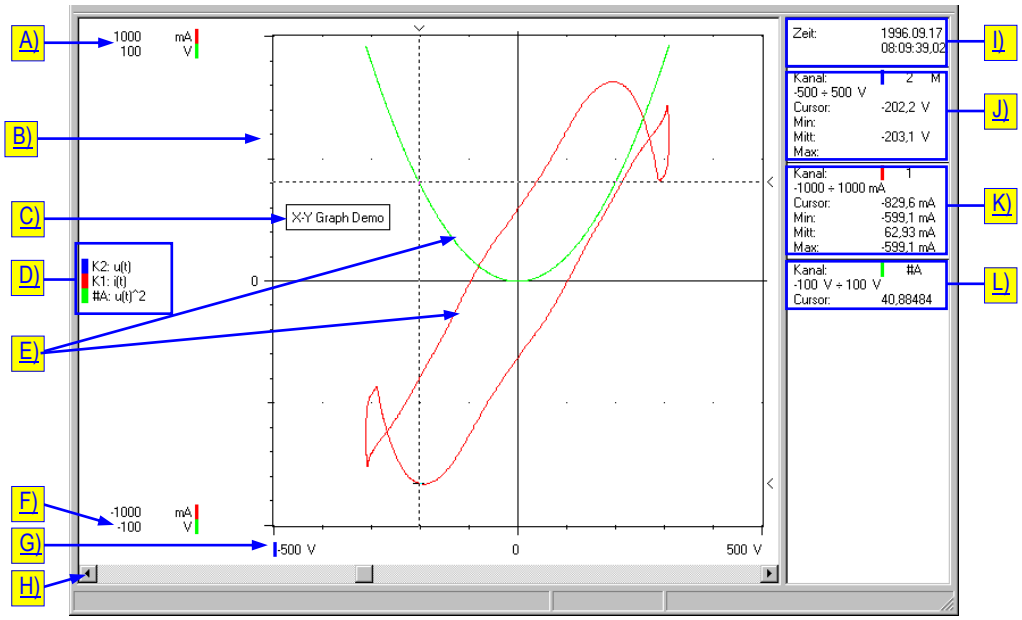


Figure 3.5.4-t: View of Measurement Data as Curves in an X-Y Diagram

The measuring curves for the channels are identified with the colors assigned to them with the help of the **Channels Setup** dialog box under **Setup Channels** in the **Options** menu.

You can jump to a specific measuring point with the cursor (click the mouse button with the mouse pointer in the diagram), and read the respective measured values and associated point in time from the table.

Labels can be inserted into the representation for explanation (→ **Labels** in the **Edit** menu).

Significance of Elements Displayed in the X-Y Recorder View

A) Scale top-end value and unit of measure for the Y-axis individually for each displayed measuring channel. The color symbol identifies channel assignments.
   - The **Scaling** dialog box is opened by clicking a color symbol, and Y-axis scaling can then be changed for the respective channel.

B) Scale division lines in the Y-axis scale. If two or more channels are displayed, scale division lines only appear if the program finds suitable common divisors for all displayed scale ranges.

C) Inserted label with frame.

D) Key with color, number and designation of displayed measuring channels as specified in the **Channels Setup** dialog box.
   C1, C2, ... = real channels
   #A, #B, ... = calculated channels
   - Any incompletely displayed channel designations appear in their entirety in the info bar when the mouse pointer is positioned at the respective lines in the key.
   - The **View Modes Setup** dialog box is opened by clicking the key, for example in order to select other channels for display.

E) Measured value curves for the selected channels as function Y = f(X).

F) Scale bottom-end value and unit of measure for the Y-axis individually for each displayed measuring channel. The color symbol identifies channel assignment.
   - The **Scaling** dialog box is opened by clicking a color symbol, and Y-axis scaling can then be changed for the respective channel.

G) Scale bottom-end value and unit of measure of the X-axis. The color symbol identifies channel assignment.
   - The **Scaling** dialog box is opened by clicking the color symbol, and X-axis scaling can then be changed.

H) Horizontal scroll bar for scrolling through the displayed time range.

I) Absolute or relative time at the position of the cursor.

J) X-channel measurement

K) Y1-channel measurement

L) Y2-channel measurement

Selecting the Channels to be Displayed in the X-Y Recorder View

Channels are selected in the **X-Y Recorder** section of the **View Modes Setup** dialog box (→ page 63):

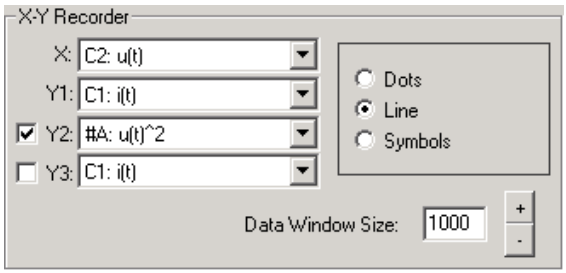


Figure 3.5.4-u:
Selection of Channels to be Displayed in the X-Y Diagram Using the **View Modes Setup** Dialog Box

This dialog box is also used to specify how many consecutive **measuring points** will be used for real or calculated channels for representation of the curve. If the measurement data file includes more than this number of measuring points, the represented time period can be shifted within the entire recording time period with the help of the scroll bar underneath the diagram. Alternatively, the scroll wheel on the mouse can be used.

Beyond this, the dialog box is also used to specify whether the measured values will appear as ***Dots*** or ***Symbols***, and if the dots will be connected by a ***Line***.

View : **Display measured values in a numeric table.**

Data Logger



Measured values from up to 12 channels, as well as the time at which they were recorded, are listed chronologically in a numeric table.

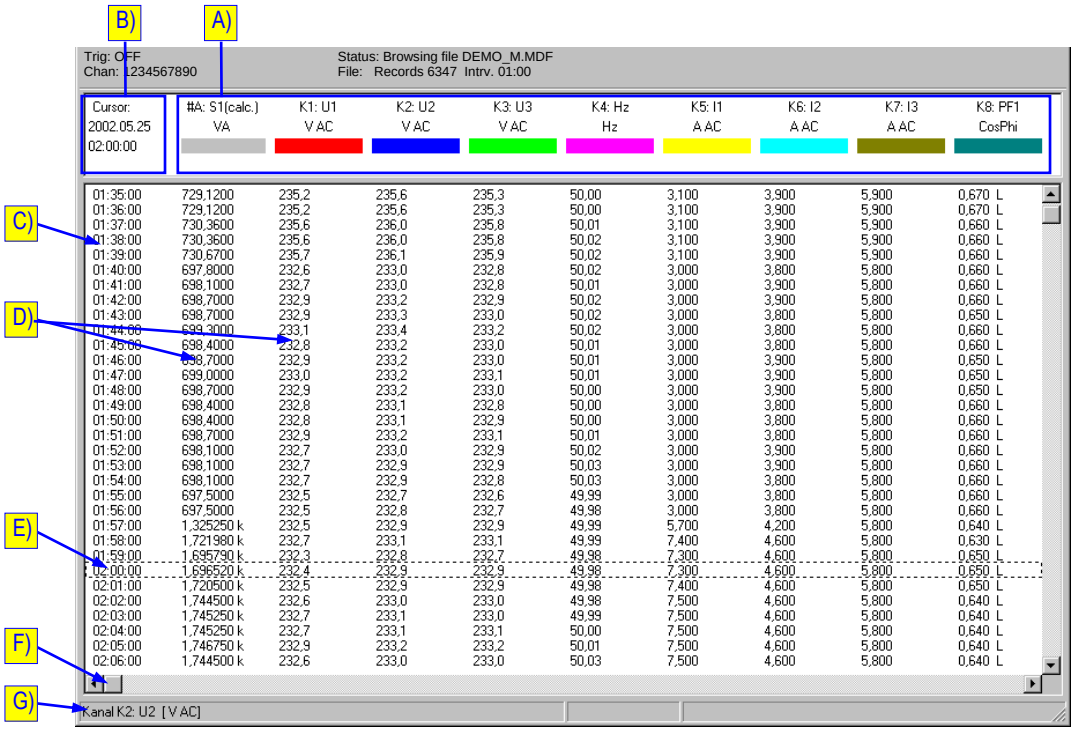


Figure 3.5.4-v: Data Logger View of Measurement Data as a Measured Value Table

Significance of the Elements Displayed in the Data Logger View

A) Measured value column headers:
Show the respective channel numbers, (C1, C2, ... = real channels; #A, #B, ... = calculated channels), their designations, unit of measure and color code. In the case of measurement data from an online recording, the type of measurement (min, average, max) is also specified for the displayed measured values.

- If the mouse pointer is moved to a column header with an incompletely displayed channel designation, the full designation appears in the info bar (G).
- The **View Modes Setup** dialog box is opened by clicking a column header (→ page 63). The measuring channels to be displayed are selected as described below in the **Logger** section.

B) Time column header: Displays time at the current cursor position (E).
Absolute time with date and time or time ***relative*** to the point in time at which recording is begun can be displayed (→ **Time Display** in the **View** menu).

C) The time column displays absolute or relative recoding time points.

D) Measured values at the point in time of recording.

- If the mouse pointer is moved to a measured value, the point in time at which it was recorded appears in the info bar as well (G).

E) The selected line corresponds to the position of the active cursor in the Y-T recorder view.

F) Horizontal scroll bar

G) The info bar displays notes and explanations regarding the elements at which the mouse pointer us positioned.

Selecting Channels to be Displayed in the Data Logger View

Selection of the channels to be displayed in data logger columns 1 through 12 is made in the **Logger** section of the **View Modes Setup** dialog box. There are two possible procedures depending upon the type of measurement data recording:

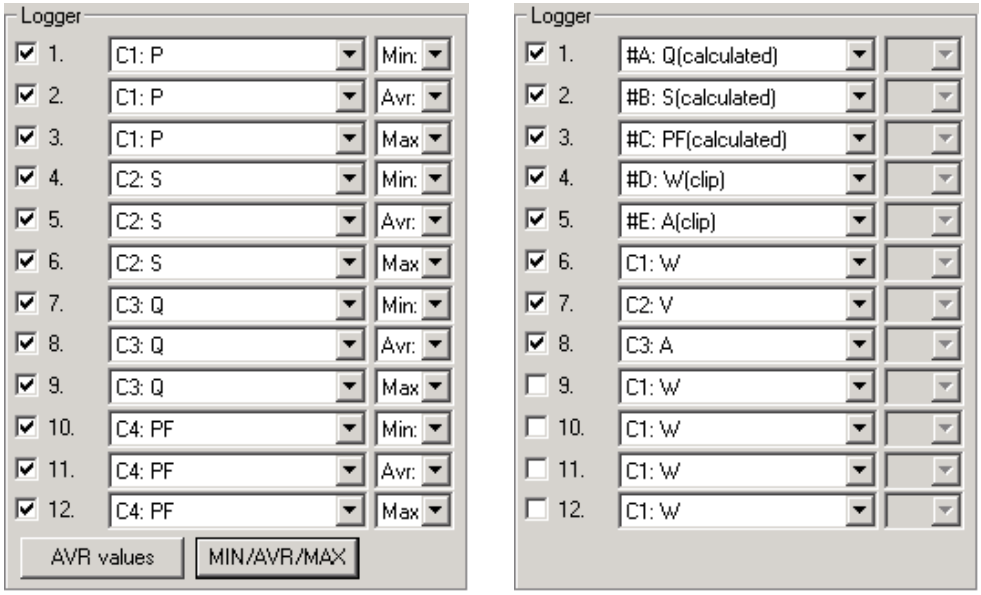


Figure 3.5.4-w: Selection of Channels to be Displayed in the Data Logger Table with the Help of the **View Modes Setup** Dialog Box; Left with Measurement Data from an Online Recording, Right with Data from Device Memory and Calculated Channels

- **Measurement data originate from an online recording:**

  In the case of online recording, the program reads in currently measured values from the connected measuring instrument for the selected active channels as quickly as possible. Exactly how fast these data are read in depends upon the type of measuring instrument and its current measuring function, as well as the number of measuring channels and the type of communications link. Incoming measurement data are stored to the temporary file according to selections made in the **Sample Interval** dialog box. Three values are saved per sample interval for each real measuring channel:

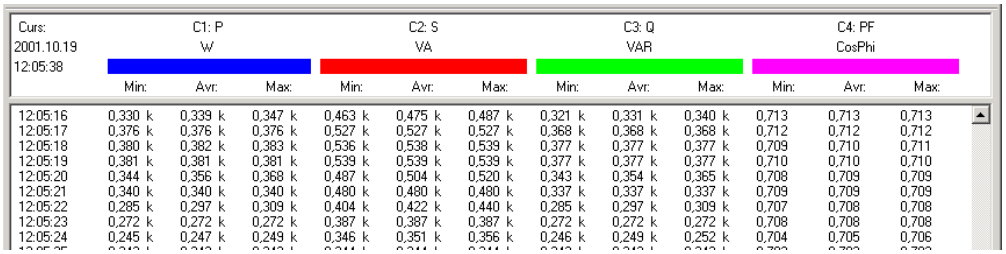
  Min: lowest acquired value within the interval period

  Max: highest acquired value within the interval period

  Avr: arithmetic mean value (average value) of all measured values acquired during the interval period, except in the case of ***Manual Sampling***: instantaneous measured value upon clicking the [**STORE**] button.

  If calculated channels have also been set up, calculation is based upon average values.

  - After clicking the [**MIN/AVR/MAX**] button in the **Logger** section, representation of minimum, average and maximum values is selected automatically for up to the first four active channels (→ Figure 3.5.4-w left and Figure 3.5.4-x).
  - If the [**AVR values**] button in the **Logger** section is clicked, representation of average values is automatically selected for all active channels.
  - If you would like to display other channels, select the channel to be displayed and its measurement type individually for each of the data logger columns from **1** through **12** using the corresponding selection lists.



Curs:	C1: P			C2: S			C3: Q			C4: PF		
2001.10.19	W			VA			VAR			CosPhi		
12:05:38	Min:	Avr:	Max:	Min:	Avr:	Max:	Min:	Avr:	Max:	Min:	Avr:	Max:
12:05:16	0,330 k	0,339 k	0,347 k	0,463 k	0,475 k	0,487 k	0,321 k	0,331 k	0,340 k	0,713	0,713	0,713
12:05:17	0,376 k	0,376 k	0,376 k	0,527 k	0,527 k	0,527 k	0,368 k	0,368 k	0,368 k	0,712	0,712	0,712
12:05:18	0,380 k	0,382 k	0,383 k	0,536 k	0,538 k	0,539 k	0,377 k	0,377 k	0,377 k	0,709	0,710	0,711
12:05:19	0,381 k	0,381 k	0,381 k	0,539 k	0,539 k	0,539 k	0,377 k	0,377 k	0,377 k	0,710	0,710	0,710
12:05:20	0,344 k	0,356 k	0,368 k	0,487 k	0,504 k	0,520 k	0,343 k	0,354 k	0,365 k	0,708	0,709	0,709
12:05:21	0,340 k	0,340 k	0,340 k	0,480 k	0,480 k	0,480 k	0,337 k	0,337 k	0,337 k	0,709	0,709	0,709
12:05:22	0,285 k	0,297 k	0,309 k	0,404 k	0,422 k	0,440 k	0,285 k	0,297 k	0,309 k	0,707	0,708	0,708
12:05:23	0,272 k	0,272 k	0,272 k	0,387 k	0,387 k	0,387 k	0,272 k	0,272 k	0,272 k	0,708	0,708	0,708
12:05:24	0,245 k	0,247 k	0,249 k	0,346 k	0,351 k	0,356 k	0,246 k	0,249 k	0,252 k	0,704	0,705	0,706

Figure 3.5.4-x: Data Logger View of Minimum, Average and Maximum Values from Four Measuring Channels from an Online Recording

- **Measurement data originate from a recording which has been saved to device memory:**

  In this case, whether or not the measured values will be recorded during the sample interval as instantaneous values, average values, minimum values or maximum values depends upon the memory function of the respective measuring instrument. The type of measurement utilized while storing the values cannot be detected by the program. Thus there is no option for selecting the type of measurement (Min/Avr/Max) during selection of the channels to be displayed in the data logger view, and consequently this information is not specified in the column headers (→Figure 3.5.4-v). However, with some measuring instruments the type of measurement used to acquire the stored measured values is identified by means of a symbol added to the measured quantity:

  ^ = maximum value
  = = average value
  v or _ = minimum value
  No symbol = instantaneous value

Note

Channels created by means of formulas (namely channels #A, #B, ...) are only included in the channel selection list (above real channels C1, C2, ...), if the ***Calculator ON*** checkbox is activated in the **Channels Setup** dialog box.

View :

Display measurement data for harmonics as a Y-f bargraph (frequency spectrum).

FFT Bargraph



Measurement data (harmonics) available from mains analyzers equipped with FFT (fast Fourier transformation) are represented as a frequency spectrum with vertical bars.

The representation shows voltage harmonics (bottom) and current harmonics (top) for a single phase in two diagrams with horizontal frequency axis. If measurement data are available for more than one phase, the display can be switched to the other phases by clicking the button at the bottom right.

Limit value marker lines can be displayed in the diagrams for various standards, or in a user-defined fashion (→ click **Setup Channels** and then **FFT Setup** in the **Options** menu).

A separate window with variable size and position can be displayed by clicking **FFT Wave Shape** in the **View** menu, which shows the waveshape which has been reconstructed by means of inverse transformation. The prerequisite for this function is that measurement data are available which include amplitude and phase angle for each harmonic.

A harmonic can be selected with an arrow cursor, whose associated measured values are then displayed numerically underneath the diagram. A scroll bar is provided for scrolling through the entire recording time period. If the display is switched to the **Y-T Recorder** or **Data Logger** view, the course of the measured values in time is displayed for the selected harmonic.

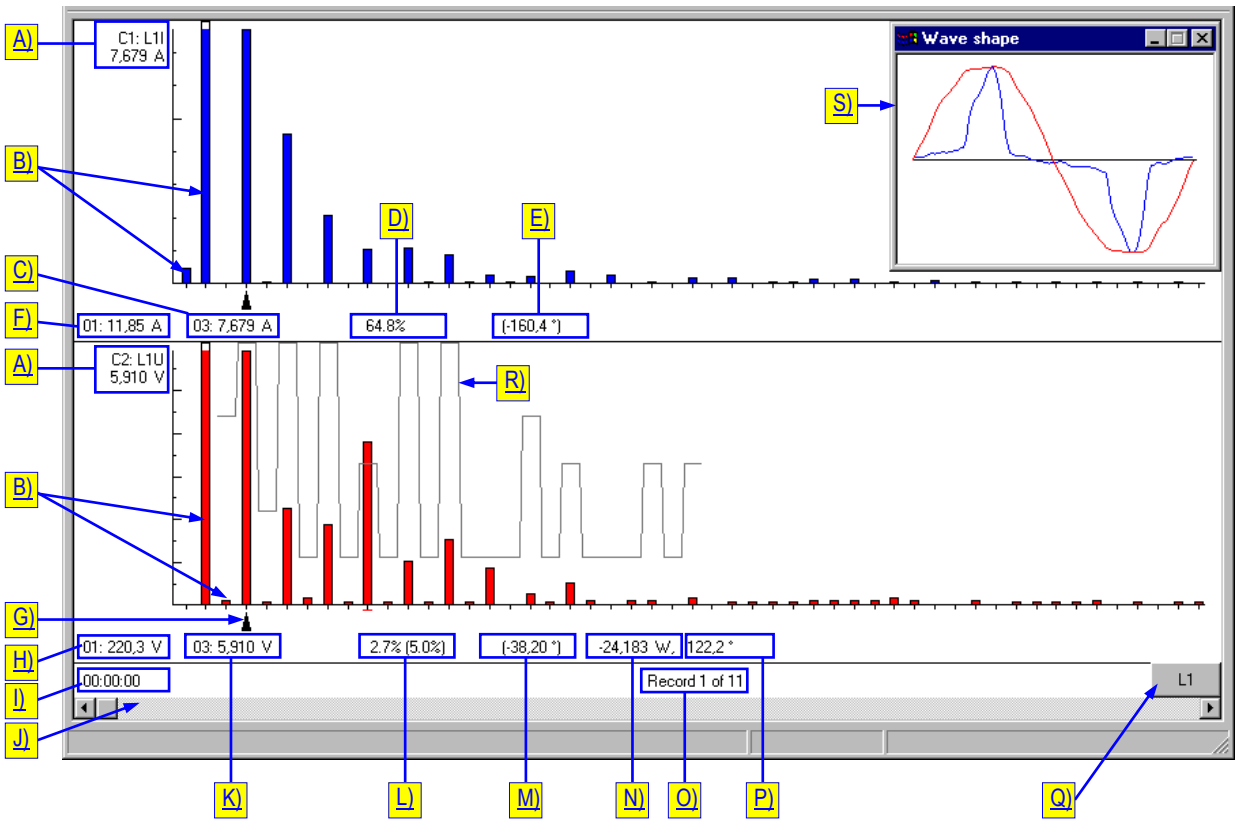


Figure 3.5.4-y: View of Measurement Data for Harmonics as a Y-f Bargraph

Significance of Elements Displayed in the FFT Bargraph View

Note

Some of the elements described below only appear if appropriate measurement data are received from the measuring instrument.

A) Labeling and scaling of the Y-axis:

- Channel number (C1 or C2)
- Measured quantity designation (L1I = phase 1 current, L1U = phase 1 voltage)
- Scale top-end value and unit of measure for the Y-axis (harmonics amplitude in A_{RMS} or V_{RMS}, or as a percentage).

▸ The **Scale Range** dialog box is opened by clicking the Y-axis, or next to it, and Y-axis scaling can then be changed:

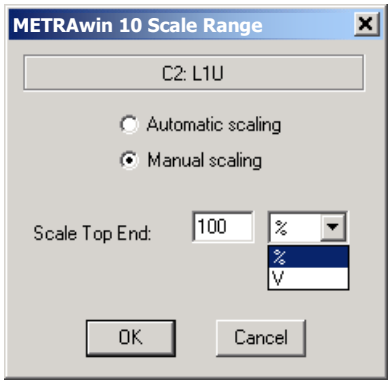


Figure 3.5.4-z:
Dialog Box for Setting Y-Axis Scaling

- ***Automatic scaling***: Automatic scaling to the strongest harmonic, i.e. scale top-end value and unit of measure correspond to the highest measured value for the harmonics (without fundamental component) which currently appear in the diagram. The bar for the fundamental component (first harmonic) is normally represented in a truncated fashion for this reason.
- ***Manual scaling***: The top-end value of the Y-axis is fixed to the value entered to the ***Scale Top End*** field. If measurement values for harmonics are available as absolute measured quantities in A or V, relative scaling as a percentage of the measured value for the fundamental component can be selected as an alternative.

B) Measured values for harmonics displayed as spectral bargraphs:
00 = DC component
THD = total harmonic distortion
01 = fundamental component
02 ... n = n^{th} harmonic

C) Ordinal number and measured value of the selected current harmonic (in A_{RMS} or as a percentage, as received from the measuring instrument).
If a limit value marker line appears:

- The limit value for the selected harmonic is specified in parentheses.
- Measured values which exceed a limit value are display in red.

D) Calculated relationship of the selected current harmonic relative to the fundamental component as a percentage:

$$\frac{(\text{Value of the selected current harmonic})}{(\text{Value of the fundamental current component})} \times 100\%$$

E) Phase position of the selected current harmonic relative to the fundamental voltage component in angular degrees.

F) Ordinal number and measured value of the fundamental current component as received from the measuring instrument.

G) The arrow cursor identifies the harmonics whose measured values are numerically displayed underneath the diagrams.
   - The arrow cursor can be moved in order to select a harmonic by clicking in the diagram and dragging horizontally; as an alternative, the arrow cursor can be moved with the [←] and [→] scroll keys.

H) Ordinal number and measured value of the fundamental voltage component as received from the measuring instrument.

I) Point in time of recording, with absolute or relative reference to time (→ **Time Display** in the **View** menu).

J) Horizontal scroll bar for selecting the displayed point in time of measurement within the overall recording period; the [↑] and [↓] scroll keys can be used as an alternative.

K) Ordinal number and measured value of the selected voltage harmonic (in V_{RMS} or as a percentage, as received from the measuring instrument).
If a limit value marker line appears:
   - The limit value for the selected harmonic is specified in parentheses.
   - Measured values which exceed a limit value are display in red.

L) Calculated relationship of the selected voltage harmonic relative to the fundamental component as a percentage:
$$\frac{(\text{Value of the selected voltage harmonic})}{(\text{Value of the fundamental voltage component})} \times 100\%$$

M) Phase position of the selected voltage harmonic relative to the fundamental voltage component in angular degrees.

N) Calculated active power of the selected harmonic: $U_{harmon} \times I_{harmon} \times \cos \varphi$.

O) Consecutive number of the displayed measuring interval and total number of recorded intervals.

P) Phase position of the selected current harmonic relative to the voltage harmonic (= phase shift angle φ).

Q) Button for switching the display to another phase.

R) Limit value marker line displayed in accordance with selections made with the **FFT Setup** function under **Setup Channels** in the **Options** menu.

S) Displayed wave shape which has been reconstructed from measurement values for fundamental component and harmonics by means of inverse transformation (→ **FFT Wave Shape** in the **View** menu).

View : **Select a format for time axis scaling or recording time indication.**

Time Display Scaling of the time axis for the Y-T recorder and data logger views can be displayed as absolute or relative time.

Switching between absolute and relative time is also possible during online recording.

► **Absolute Time**  Date and time at the point in time of recording

► **Relative Time**  Time elapsed since recording was started

Note

In the case of online recording, absolute time is derived from system time at the utilized PC. If the displayed measurement data originate from device memory, specified times make reference to the measuring instrument's (real-time) clock at the point in time of recording.

For this reason, make sure that the respective clock is set correctly before measurement data recording is started!

View : **Adapt the graphic representation to the window size.**

Sizable Windows The size of the graphics displayed in the work area can be adjusted with this setting. If the **Sizable Windows** option is selected in the **View** menu, the graphics are ideally adapted to the size of the program window.

If this option is not selected, an excerpt of the graphic appears in a standard size reaching to the edge of the window if the program window is reduced in size. Any desired excerpt can then be displayed with the help of the scroll bar which appears in this case.

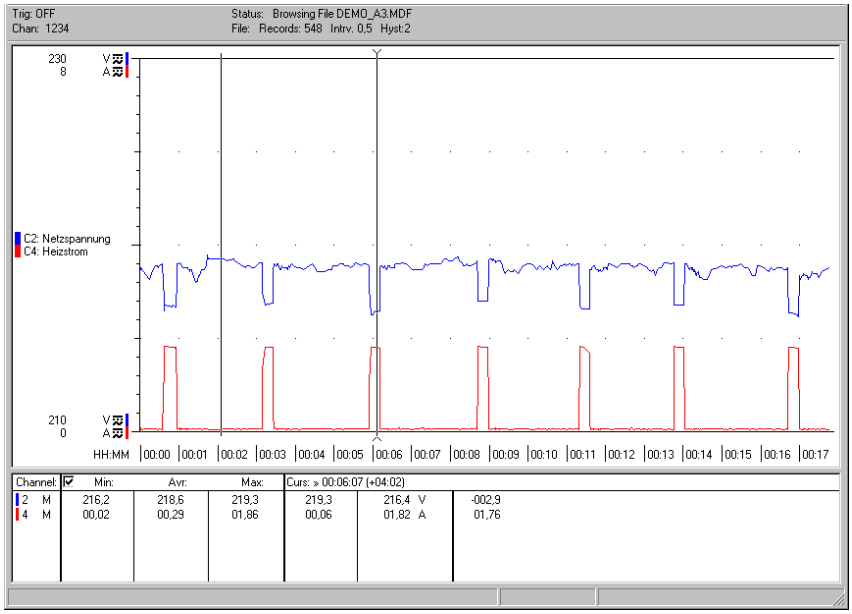


Figure 3.5.4-aa: Standard Display of a Y-T Recorder Graphic with Maximized Program Window

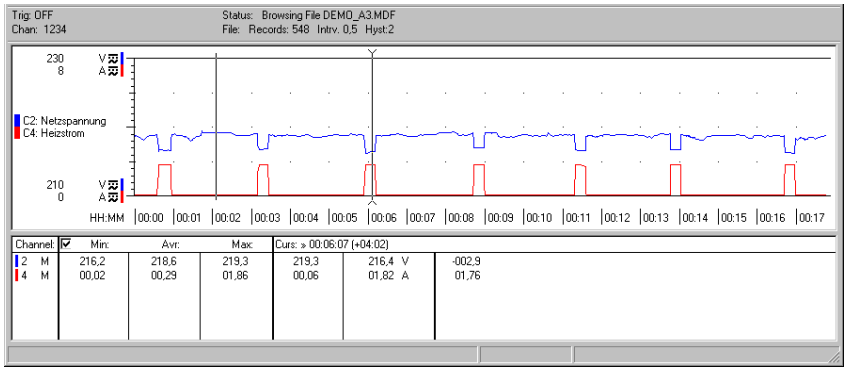


Figure 3.5.4-bb: Scaled, Full Display of a Y-T Recorder Graphic with a Program Window with Reduced Height

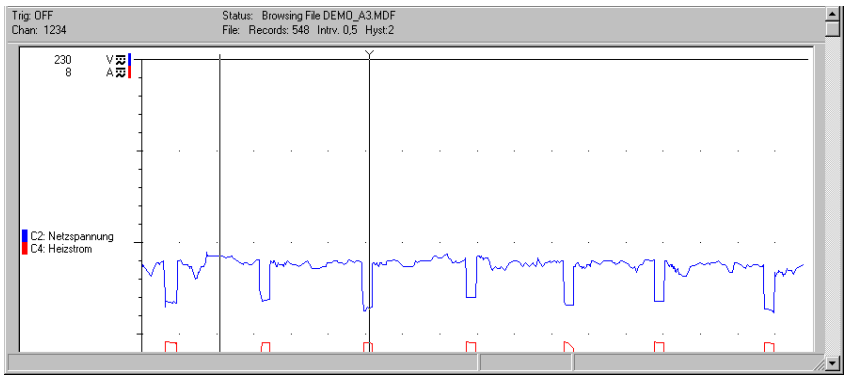


Figure 3.5.4-cc: Unscaled, Display of an Excerpt from a Y-T Recorder Graphic with a Program Window with Reduced Height

Example

The multimeter view of live measurement data can also be scaled to the window size. In this way, for example, you can keep an eye on current measurement data from the measuring instrument in a reduced program window while simultaneously working with another application.

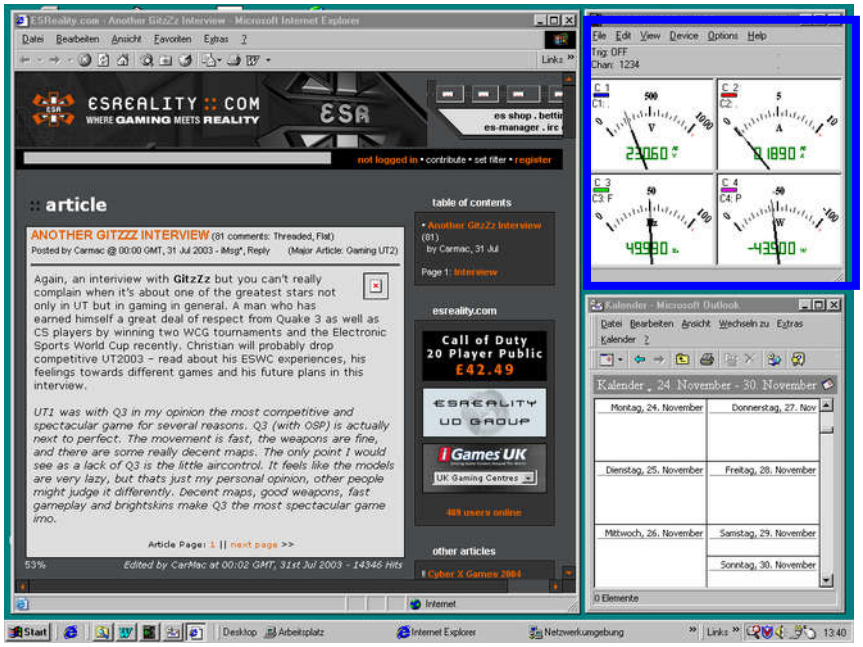


Figure 3.5.4-dd: Scaled, Full Multimeter Display of Four Channels with a Minimized Program Window Next to Other Applications

View :

Tool Bar

Show/hide the tool bar.

The tool bar can be shown or hidden with the help of this menu function.



The tool bar contains buttons which can be used to quickly execute commands without accessing the menus. The functions assigned to the buttons appear in the form of so-called quick-info when the mouse is positioned at the respective button.

Note

Just like the tool bar, the **Context Menu** also allows for quick access to frequently used functions

View :

FFT Wave Shape

Show/hide the reconstructed signal waveshapes in the FFT bargraph view of measurement data from devices with harmonic analysis.

If FFT measurement data from instruments with harmonic analysis are displayed in the FFT bargraph view, a window can be opened or closed with this menu function, in which the program represents the reconstructed wave shape of the analyzed signals by means of inverse transformation based upon available measured values.

The prerequisite for reconstruction of the wave shape is that the measurement data include amplitude as well as phase angle for the harmonics. Please refer to the operating instructions for the measuring instrument or the device-specific program documentation under **Device Functions** in the **Help** menu for detailed information.

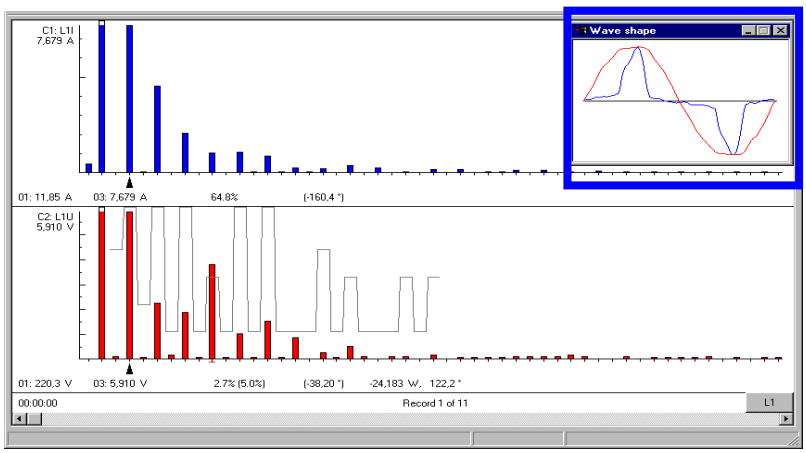


Figure 3.5.4-ee: Displayed Wave Shape Derived from Represented FFT Measurement Data

Notes

- The size of the wave shape window can be changed by clicking the window frame and dragging.
- If you would like to print out the reconstructed FFT wave shape as a diagram or export it to another application, enlarge the wave shape window until it fills up the entire work area and then select the appropriate option, namely **Print Screen** from the **File** menu, or **Copy** from the **Edit** menu.

View : **Zoom/compress the horizontal time axis in fixed steps.**

Zoom

With the help off the zoom function, the horizontal time axis can be expanded or compressed in the graphic **Y-T Recorder** view, in order to be able to recognize details along the time axis, or to gain an overview of a larger time period.

One of the following options can be selected under **Zoom** in the **View** menu in order to change the scale of the time axis:

► Previous Zoom The scale of the time axis is returned to its previous setting.

► Default Window The scale of the time axis is set such that the length of the portion of the time axis which is actually displayed corresponds to 100 times the sample interval.



► In x2 / x10 / x100 The scale of the time axis is expanded by a factor or 2, 10 or 100.

► Out x2 / x10 / x100 The scale of the time axis is compressed by a factor or 2, 10 or 100.

► Full Overview The scale of the time axis is set such that the length of the portion of the time axis which is actually displayed corresponds to the entire recording period.



View : **Select the channels to be displayed in the various views.**

View Modes Setup



This menu function opens the **View Modes Setup** dialog box. This dialog box is used to specify which of the real or calculated measuring channels, which have already been defined in the **Channels Setup** dialog box, will be displayed in the ***Y-T Recorder***, ***X-Y Recorder***, ***Logger*** and ***Multimeter*** views.

Detailed information regarding setting options is included in the descriptions of the respective views on pages 43, 52, 54 and 37.

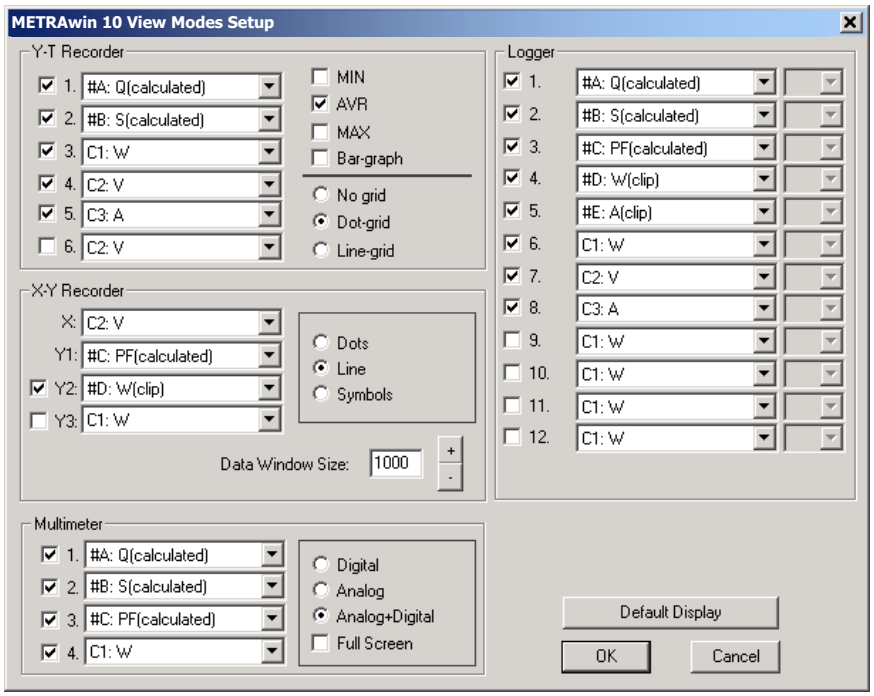


Figure 3.5.4-ff: Dialog Box for Configuring Channel Views

Note

Alternatively, the **View Modes Setup** dialog box can also be opened:

- By clicking the [**View Modes Setup**] button in the **Channels Setup** dialog box
- By clicking the channel key in the various measurement data views

3.5.5 Device Menu

Device : **Set the program for work with another device type.**

Device Type ► This command is used to select the type of measuring instrument which has been connected to the port at the PC. The command specifies how which data will be read in via the port, and changes several of the program's dialog boxes and configuration options.

Device: **Configuring the Port and the Communication Parameters**

Communication

Communication Test This menu command opens the **Communication Setup** dialog box. The PC port used for communication with the measuring instrument is selected and configured here, and a communication test can be executed as well.

Notes

- Settings cannot be entered to this dialog box if a file is open or if online recording is active; "Status: INACTIVE" is displayed in the **Status Bar**.
- Settings entered previously to this dialog box may be changed if the program is switched to another device type, or if stored software settings are uploaded.

The elements in this dialog box are identical to those in the **COM Port** section of the **Channels Setup** dialog box. Setup options vary depending upon the selected **Device Type**, and are listed below non-specifically.

Note

For detailed information regarding connection and communication options, as well as settings required for the measuring instrument, please refer to the operating instructions for the respective instrument, as well as the device-specific program documentation included with the software which can be accessed by clicking **Device Functions** in the **Help** menu.

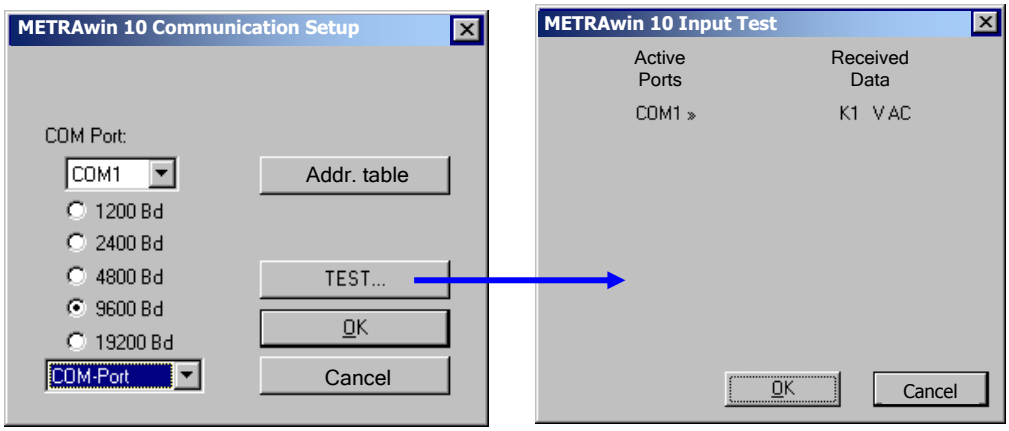


Figure 3.5.5-a: Dialog Box for Configuring Communication and Executing a Communication Test

- Select the utilized communications path in the bottom field:
  - ***COM Port***:
    Communication via the PC's serial COM port. For virtual COM ports as well, for example if a COM server or a USB-RS232 interface converter is used.
  - ***Modem*** (only displayed if supported by the measuring instrument):
    Communication via interconnected dial-up modems. When communication is first established, the **MODEM** dialog box appears to which the phone number and other modem control parameters are entered (→ **Device Functions** in the **Help** menu).
  - ***Internet*** (only displayed if supported by the measuring instrument):
    Communication via Ethernet/Internet using an Ethernet interface (NETBOX) at the measuring instrument. When communication is first established, the **MODEM** dialog box appears to which the IP address or web address (URL) is

entered (→ **Device Functions** in the **Help** menu).

- Select the PC's real or virtual COM port (***COM1*** ... ***COM8***) from the **COM Port** selection list at the top, to which the measuring instrument is connected either directly, or via modem, COM server or interface converter.

Note

If you have problems identifying the utilized COM port, you can look up the serial COM port assignments in the Windows Control Panel.

- If the utilized measuring instrument has a variable interface transmission speed, option fields appear in the dialog box allowing you to select the **baud rate** for the PC's COM port: ... / ***9600Bd*** / ***19200Bd*** / ...
  This setting must be identical to the baud rate selected at the measuring instrument (→ **Device Functions** in the **Help** menu).
- In the case of device types equipped with an RS 485 interface (2-wire bus), several devices can be connected to one another in bus topology over a distance of several hundred meters, in which case each instrument is assigned its own device address. After clicking the [**Addr. table**] button which appears in this case, a dialog box of the same name appears to which addresses for up to 10 interconnected devices can be entered. All of the addresses specified here can be chosen when selecting measuring channels in the **Channels Setup** dialog box.

Note

If only one or just a few devices are connected, it is advisable to enter only their addresses to the address list. This shortens delay time when communication links are being established, because the program only has to search for the addresses of the devices included in the list.

- A communication test for checking the selected interface settings can be started by clicking the [**TEST**] button. In the case of device types with unidirectional interface, the data transmission mode must first be activated (→ **Device Functions** in the **Help** menu)!

  ⇒ The  icon in the **Status Bar** indicates active communication:
  Green lamp on = PC is transmitting data to the device.
  Red lamp on = PC is receiving data form the device.

  ⇒ When communication is established via modem or Internet/Ethernet, the  or  icon also appears in the status bar.

  ⇒ If communication functions correctly, the addresses of the connected devices or their measured quantity(ies) are listed under ***Received Data*** in the **Input Test** window after a period of time (→ **Device Functions** in the **Help** menu). These are automatically activated as measuring channels in the **Channels Setup** dialog box after closing the window by clicking the [**OK**] button.

  ⇒ If data are not received correctly, "---" is displayed or an appropriate error message appears. If this is the case, check your interface settings in the program and at the measuring instrument, and inspect the condition of connector cables and any interconnected components.

Device : **Configure the parameters of the connected device.**

Setup Device



This menu command is only available if the utilized **Device Type** is capable of remote configuration. It opens the **Device Setup** dialog box which allows you to configure the connected measuring instrument's functions and operating parameters.

The characteristics displayed in this dialog box vary depending upon the selected **Device Type**. Refer to the device-specific instructions for this program for further details (→ **Device Functions** in the **Help** menu).

Device : **Read out measurement data which have been saved to memory at the connected device.**

Read Memory

 [**F5**]

This menu command opens the **Read Device Memory** dialog box which allows you to read out recorded measurement data stored to memory at the connected device, and save them to a memory data file.

The characteristics displayed in this dialog box vary depending upon the selected **Device Type**. Refer to the device-specific instructions for this program for further details (→ **Device Functions** in the **Help** menu).

3.5.6 Options Menu

Options : **Channels Setup**

Setup Channels



This menu command opens the **Channels Setup** dialog box. The port which will be used for communication can be selected and configured here, and active measuring channels, as well as their respective colors and designations, can be selected. In addition to this, subsequent dialog boxes are used to specify whether or not special linearization tables, formulas or trigger conditions will be applied to certain measuring channels.

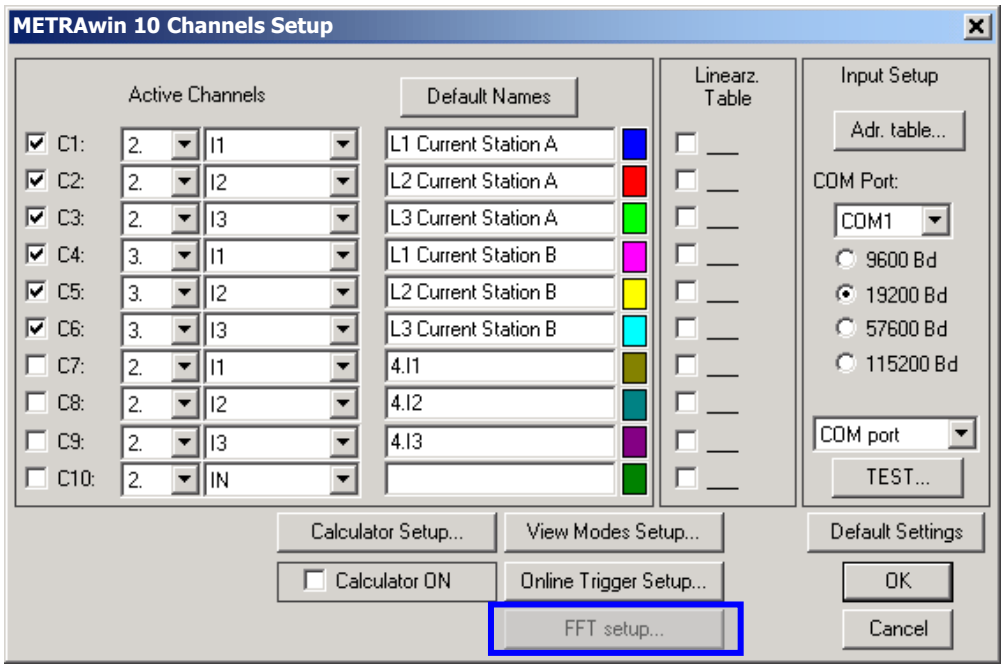


Figure 3.5.6-a: Dialog Box for Channel Setup

Options : Setup Channels:

Input Setup

The port at the PC which is used for communication with the measuring instrument is selected and configured in the **Input Setup** window pane, and a communication test can be executed as well. Setup options are device-specific, and are identical to those in the **Communication Setup** dialog box (→ page 64).

Options : Setup Channels:

Active Channels

The measuring channels to be recorded, ***C1*** ... ***C10***, are selected in the **Active Channels** window pane before online recording is started.

The respective measuring channels are activated or deactivated by clicking the checkboxes labeled ***C1*** through ***C10***.

The measured value to be displayed can be specified per channel by selecting the appropriate device address, and the measured quantity to be received from the respective measuring instrument. You can determine which measured quantities are available from which device address by executing a **Communication test** in advance (→ page 64).

Click the [**Default Names**] button if the active channel should be designated with its default name, or enter any desired ***Channel description*** (up to 30 characters) to the respective text fields. These entries can also be entered or changed later.

The color boxes show which color will be used to display each respective channel. If colors other than the currently selected ***Channel Colors*** are desired, click the color symbol which is allocated to the respective channel and assign other colors to the channel with the help of the **Color Setup** dialog box which then appears. The color settings can also be changed later at any time.

Options : Setup Channels : **Defining Linearization Tables for Converting Incoming Measured Values**

Linearization Table

Linearization tables are used to convert measured values read in for a measuring channel (from an online recording or a memory data file) into another value with the same or a different unit or measure. A linear or a non-linear relationship may exist between the output value (destination) and the input value (source). In the case of linear relationship, two intermediate points (value pairs) suffice for the linearization table, but in the case of non-linear relationships (e.g. conversion of mV values from a thermocouple into temperature values [°C]) the linearization curve must be defined by a corresponding number of intermediate points depending upon the desired degree of accuracy.

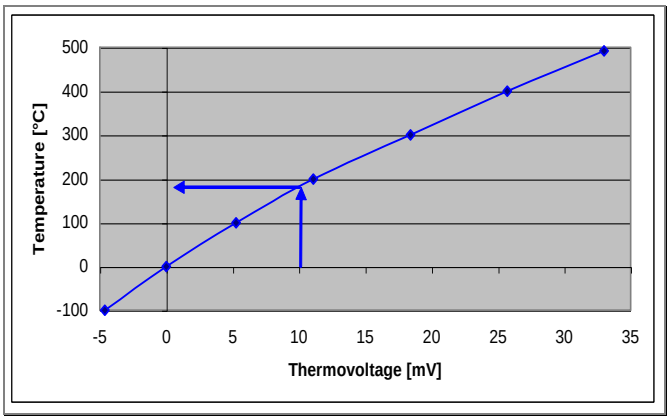


Figure 3.5.6-b: Definition of a Linearization Curve with Several Intermediate Points for Converting Thermo-voltage into the Corresponding Temperature Value

- In order to define a linearization table for a measuring channel, click the respective checkbox in the ***Lineariz.Table*** section and make the following entries to the **Linearization Table Setup** dialog box which then appears.

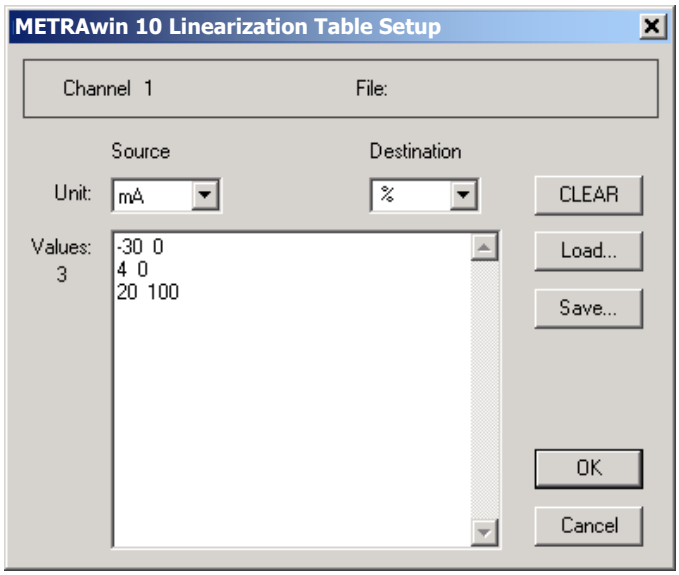


Figure 3.5.6-c: Dialog Box for Setting Up a Linearization Table

- Select the units of measure for the input quantity (***Source***) and the output quantity (***Destination***) with the corresponding selection lists. The ***Destination*** unit of measure can also be designated as desired with up to eight characters e.g. liter, kg, RPM etc.
- Enter the intermediate points for the linearization curve to the ***Values*** field, i.e. one source value per line along with the corresponding destination value separated by at least one blank space (see following examples).
- If you want to apply the newly defined linearization table to other channels as well, or in order to use it again for future measurements, open the dialog box for saving the table to a linearization table file (**.MDL*) under any desired file name by clicking the [**Save**] button. The file can then be read in again by clicking the

[**Load**] button.

- Click the [**OK**] button in order to close the **Linearization Table Setup** dialog box and activate the linearization table for the current measuring channel.

⇒ If the table is not saved to a data file as described above, a security prompt appears which can be acknowledged by clicking [**No**] if the table will only be used for the current case, and for the currently selected channel. However, the table values are preserved as long as a measurement data file is not opened and the program is not exited.

Example 1

Conversion of the measured output quantity (0 ... 1 A) of a current transformer into the primary current value acquired by the transformer (0 ... 1000 A)

	Source	Destination
Unit	*A*	*A*
Values	*0* *1*	*0* *1000*

Example 2

Conversion of 4 ... 20 mA (DC) into 0 ... 100%

	Source	Destination
Unit	*mA*	*%*
Values	*-30* *4* *20*	*0* *0* *100*

Example 3

Conversion of thermovoltage from a type J thermocouple (Fe-CuNi) with a 0° C cold junction into the measured temperature value in °C

	Source	Destination
Unit	*mV*	*°C*
Values	*-4.63* *0* *5.27* *10.78* *16.33* *21.85* *27.39*	*-100* *0* *100* *200* *300* *400* *500*

Notes

- A separate linearization table can be set up for each measuring channel.
- Linearization tables must be set up and activated before measurement data are read in. As opposed to the use of the **Calculator Setup** function, subsequent conversion of measurement data which have already been read in is not possible with linearization tables.
- "*LUT*" (linearized unit from table) is displayed as the unit of measure for *Received Data* for measuring channels with activated linearization table when the communication test is executed.
- When data are read in for measuring channels with activated linearization table, a prompt appears when read-in is started asking whether or not the linearization table(s) should be applied to measurement data from the measuring instrument.
- A linearization table can only be applied to a measuring channel if the unit of measure of the measured quantity being acquired continuously concurs with the source unit of measure specified in the table, including prefix (prefix symbol), i.e. changes such as mV ↔ V or Ohm ↔ kOhm ↔ MOhm are not permissible. It may be necessary to deactivate the auto-ranging function at the measuring instrument for this reason. An error message will otherwise appear when unit of measurement discrepancies occur.
- The resulting measurement data file contains the converted measured values only; the original input values are lost.

Options : Setup Channels : **Defining Formulas for Arithmetic Processing/Linking of Measuring Channels**

Calculator Setup



The **Calculator Setup** dialog box is opened by clicking the [**Calculator Setup**] button, and allows for mathematical processing or linking of measuring channels.

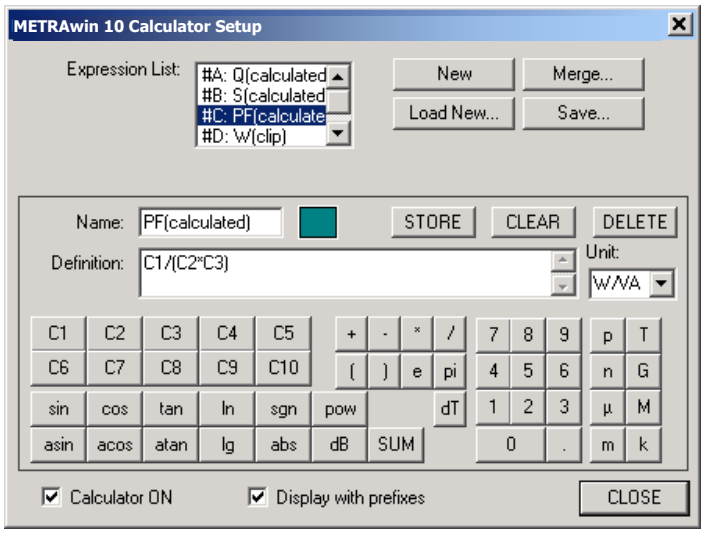


Figure 3.5.6-d:
Dialog Box for Defining Formulas

- Enter a name for the channel to be calculated to the ***Name*** field.
- After clicking the ***color box***, a window appears by means of which the color to be used for representation of the calculated channel can be selected.
- Define the formula in the ***Definition*** field by clicking the calculator keys, or with the help of the PC keyboard. The meanings and the syntax of the key functions are described in the following table.
- Select the unit of measure for the calculated measured quantity from the ***Unit*** selection list. The unit of measure can also be designated as desired with up to eight characters e.g. liter, kg, RPM etc.
- The formula is added to the formula list by clicking the [**STORE**] button.

⇒ The newly entered name appears in the ***Expression List*** at the top of the dialog box along with the identifying letter for the calculated channel, i.e. #A, #B, ...

- The [**CLEAR**] button can be used to clear current entries from the ***Definition*** field.
- The currently displayed formula is deleted from the formula list by clicking the [**DELETE**] button.
- All formulas are deleted when the [**New**] button at the top of the dialog box is clicked.
- All existing formulas are deleted and formulas are loaded from a file when the [**Load New ...**] button is clicked.
- The [**Merge...**] button adds new formulas from a file to those which already appear in the formula window.
- The [**Save...**] button is used to save all of the formulas included in the formula list to a formula file (**.MDC*).
- Activate the ***Calculator ON*** checkbox in order to make the calculated channels available in the channel selection lists for the various types of views.
- Activate the ***Display with prefixes*** checkbox if you would like the measured values to be displayed with prefix symbols (e.g. m (milli) corresponds to E-3 or k (kilo) corresponds to E3). Measured values are otherwise displayed in scientific format.

	Syntax	Description	Examples
Variables			
C1 … C10		Inserts the measured value of active measuring channel C*n* into the formula instead of *Number*.	
Mathematical Functions			
sin	**sin(***Number***)**	Yields the sine of a number. *Number* is the angle specified in degrees, whose sine is to be generated. If the angle is expressed in radian measure, it must be converted to degrees by multiplying by 180/pi.	sin(180) = 0 (zero) sin(270) = -1 sin(390) = 0.5 sin(8.6*180/pi)=0.73439
asin	**asin(***Number***)**	Yields the arc sine of a number. The arc sine is the angle whose sine is *Number*. The resulting angle is read out in degrees with a value between -90 and 90. If an arc sine needs to be expressed in radian measure, the respective results must be multiplied by pi/180. *Number* is the sine of the angle to be generated, and must lie within a range of -1 to 1.	asin(0.5) = 30 (degrees) asin(1) = 90 (degrees) asin(-1) = -90 (degrees) asin(1)*pi/180 = 1.57079 (=π/2 radian)
cos	**cos(***Number***)**	Yields the cosine of a number. *Number* is the angle specified in degrees, whose cosine is to be generated. If the angle is expressed in radian measure, it must be converted to degrees by multiplying by 180/pi.	cos(90) = 0 (zero) cos(180) = -1 cos(420) = 0.5 cos(8.6*180/pi)= -0.6787
acos	**acos(***Number***)**	Yields the arc cosine of a number. The arc cosine is the angle whose sine is *Number*. The resulting angle is read out in degrees with a value between 0 (zero) and 180. If an arc cosine needs to be expressed in radian measure, the respective results must be multiplied by pi/180. *Number* is the cosine of the angle to be generated, and must lie within a range of -1 to 1.	acos(0.5) = 60 (degrees) acos(1) = 0 (degrees) acos(-1) = 180 (degrees) acos(0)*pi/180=1.57079 (= π/2 radian)
tan	**tan(***Number***)**	Yields the tangent of a number. *Number* is the angle specified in degrees, whose tangent is to be generated. If the angle is expressed in radian measure, it must be converted to degrees by multiplying by 180/pi.	tan(45) = 1 tan(-45) = -1 tan(90) = 16.33178E15 (highest possible number, corresponds to infinity)
atan	**atan(***Number***)**	Yields the arc tangent of a number. The arc tangent is the angle whose tangent is *Number*. The resulting angle is read out in degrees with a value between -90 and 90. If an arc tangent needs to be expressed in radian measure, the respective results must be multiplied by pi/180. *Number* is the tangent of the angle to be generated.	atan(1) = 45 (degrees) atan(-1) = -45 (degrees) atan(8600) = 89.99334 atan(1)*pi/180=0.78539 8 (= π/4 radian)
ln	**ln(***Number***)**	Yields the natural logarithm of a number. Natural logarithms are based on constant e (2.7182818). *Number* is the positive real number whose natural logarithm will be generated.	ln(86) = 4.454347 ln(2.7182818) = 1
lg	**lg(***Number***)**	Yields the decadic logarithm of a number. *Number* is the positive real number whose decadic logarithm is to be generated.	lg(86) = 1.934498 lg(10) = 1; lg(1) = 0 lg(0.01) = -2

sgn	**sgn(***Number***)**	Yields the signum (sign) of a number. The signum is 1 for all numbers ≥ 0 (zero), and is –1 for all numbers < 0. *Number* is the real number whose signum is to be generated.	sgn(86) = 1 sgn(-7.234) = -1 sgn(0) = 1
abs	**abs(***Number***)**	Yields the absolute value (amount) of a number. The absolute value of a number is the unsigned number. *Number* is the real number whose amount is to be generated.	abs(-7.234) = 7.234 abs(86) = 86 abs(0) = 0
pow	*Number* **^***Power*	Yields the result of an exponentiated number. *Number* is the respective radix. All real numbers are permissible. *Power* is the exponent by means of which the radix will be exponentiated. *Power* = 0.5 yields the square root of *Number*.	5^2 = 25 8.6^3.2 = 978.1265 25^0.5 = 5
dB	**dB(***Number1***/***Number2***)**	Yields the boosting or attenuation factor (decibel) for current or voltage. The boosting or attenuation factor is 20 times the logarithmic relationship between two voltages or currents (20·lg(U1/U2)) with the unit of measure decibel (dB). Its value is positive where *Number1* > *Number2* (boosting), and negative where *Number1* < *Number2* (attenuation). Where *Number1* = *Number2* , its value is 0 (zero).	dB(10/1) = 20 dB(100/1) = 40 dB(10/10) = 0 dB(1/100) = -40 dB(0.708/1) = -3
SUM	**SUM:** *Number*	Generates the sum of all previous (measured) values of *Number*.	
dT	*Number* ***dT** SUM:(*Number* ***dT**)	Inserts the value of the time difference in seconds [s] to the previous measuring time point into the formula. In combination with the summation function (SUM), the function of an integral results: SUM:(*Number* *dT).	sin(30*pi/180)
Mathematical Operators			
+	*Num.1***+** *Num.2*	Adds *Num.1* and *Num.2*	
-	*Num.1***-** *Num.2*	Subtracts *Num.1* from *Num.2*	
*****	*Num.1*** *Num.2*	Multiplies *Num.1* by *Num.2*	
/	*Num.1/ Num.2*	Divides *Num.1* by *Num.2*	
( )	**(***expression***)**	Identifies the *expression* in parentheses as related.	
Mathematical Constants			
e	**e**	Inserts the value of mathematical constant “e” (2.718281828) into the formula. Constant e is the basis of the natural logarithm.	2*e = 5.436564
pi	**pi**	Inserts the value of Archimedes’ constant “pi” (3.141592654) into the formula.	2*pi = 6.283185 sin(30*pi/180) = 0.5
0 – 9 **.**	**456** **-27.5689** **0,567E3**	Numeric values are entered into the formula using the numeric and decimal buttons in the display, or the numeric keypad included with the PC keyboard. Commas may not be used as decimal pints.	
Decimal Power Sign (prefix) for Constants			
p **n** **µ** **m**	Constant **p** Constant **n** Constant **µ** Constant **m**	Multiplies the preceding numeric constant by the decimal power specified by the prefix (pico / nano / micro / milli). The prefix must be positioned directly after the constant (without a space).	86p = $86 \cdot 10^{-12}$ 50n = $50 \cdot 10^{-9}$ 1.75 = $1.75 \cdot 10^{-6}$ 25m = $25 \cdot 10^{-3}$ = 0.025
k **M** **G** **T**	Constant **k** Constant **M** Constant **G** Constant **T**	Multiplies the preceding numeric constant by the decimal power specified by the prefix (kilo / Mega / Giga / Tera). The prefix must be positioned directly after the constant (without a space).	86k = $86 \cdot 10^{3}$ = 86000 50M = $50 \cdot 10^{6}$ 1.75G = $1.75 \cdot 10^{9}$ 25T = $25 \cdot 10^{12}$

Notes

- Formulas can be defined and applied before as well as after measurement data have been read in (online or from a memory data file). They can also be subsequently added to already saved measurement data files.
- If formulas have already been defined and activated for the respective view before measurement data are read in, a formula message appears before read-in is started ("Variable #... cannot be calculated"), if a real channel which is required for executing the formula is not available.
- As opposed to using a **Linearization Table**, the prefix symbol for the unit of measure is permitted to change for a measuring channel used in the formula, for example mV ↔ V. The factor designated by the prefix is correctly applied in the formula.
- Up to ten formulas (#A ... #J) can be recorded in the formula list. Each formula must be assigned its own unique name.
- The formulas are saved to the measurement data files (*.MDF) as well as the software settings files (*.INI).

Example 1

For purposes of elucidation, the following illustrates how phase shifting between voltage and current (according to the inductive or capacitive characteristics of the power consumers) effects resulting active power in a single phase AC system. Several voltage and current signal periods were sampled by a measuring instrument at an interval of 0.5 ms and recorded to device memory to this end. After reading out data from device memory, the following are made available as real channels:
C1: u(t) [V] (sampled sinusoidal voltage signal)
C2: i(t) [A] (sampled sinusoidal current signal)

Formula #A with the ***Name*** *p(t)* and the ***Definition*** *C1*C2* is specified as the active power p(t) time characteristic and ***Unit*** *W* is assigned to it in the **Calculator Setup** dialog box.

The ***Calculator ON*** checkbox is activated for the display of all channels, and the ***Default Display*** is selected in the **View Modes Setup** dialog box.

Precisely 1 voltage signal period is expanded to the full width of the window in the Y-T recorder view with the **Zoom** function, and one cursor is positioned at the beginning, and one at the end of the period. The resulting measured value for active power P can be read from the **Avr:** table column underneath the diagram. The current signal curve i(t) can be shifted along the time axis with the help of the time **Shift** function – which is equivalent to a phase shift – and the effects on the signal p(t) and the measured value P can be observed.

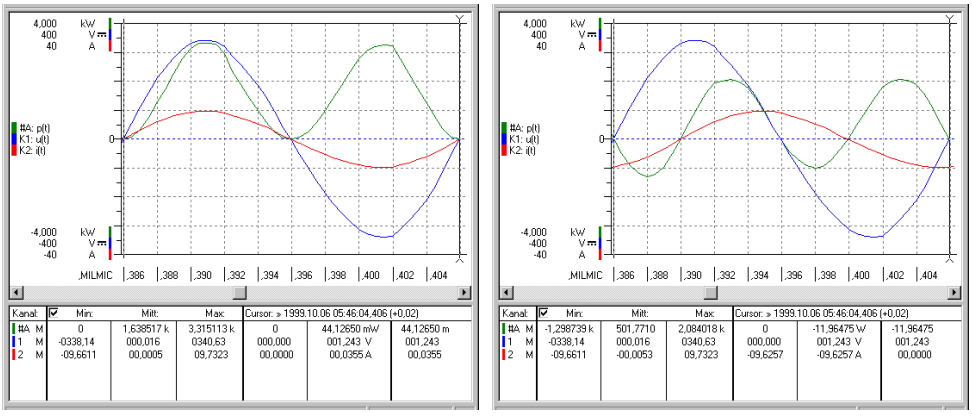


Figure 3.5.6-e: Y-T Views of Signal Curves u(t), i(t) and p(t) Without and With Phase Shifting

Example 2

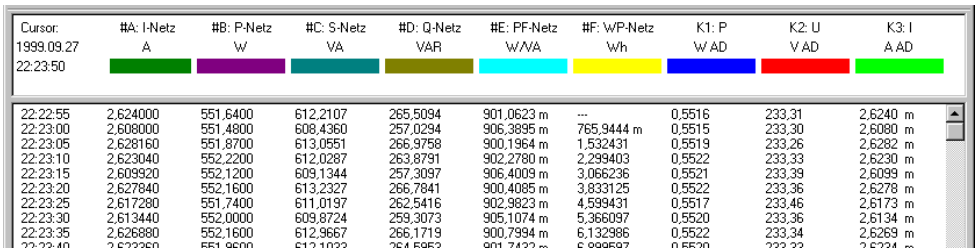
A power meter is used for measurement in a single phase AC system. It simultaneously generates measured values for voltage U in volts, current I in amperes and active power P in watts. Current is measured with a (clip-on) current transformer with a transformation ratio of 1000:1. The measured values are read in from this meter by means of online recording with a 5 second sample interval via the following measuring channels:
C1: P [W] (active power P_{meas} with no regard for the transformation factor)
C2: U [V] (directly measured line voltage)
C3: I [A] (measuring current I_{meas} with no regard for the transformation factor)

The following additional measured quantities can be generated by defining appropriate formulas:

Measurand (measured qty.)	**Derivation**	***Name*** (example)	***Definition***	***Unit***
Current I_{clip}	I_{meas} • 1000	I-line	C3*1000 or: C3*1k	A
Active Power P	P_{meas} • 1000	P-line	C1*1000 or: C1*1k	A
Apparent Power S	U • I	S-line	C2*C3*1k	VA
Reactive Power Q	$\sqrt{S^2 - P^2}$	Q-line	(((C2*C3)^2-C1^2)^0.5)*1k	VAR
Power Factor PF	P/S	PF-line	C1/(C2*C3)	W/VA
Active Energy WP	∫P • dt	WP-line	(SUM:C1*dT)*1000/3600	Wh

Comments:

- Due to the fact that the 1000:1 transformation ratio of the utilized current transformer is not yet taken into consideration for acquired measured values, values for the effected measuring channels, namely C1 (P) and C3 (I), are multiplied by a factor of 1000 (1k) in order to obtain measured values for the mains side.
- Due to the fact that measuring interval dT is specified in the formula for WP with the unit of measure seconds [s], and because the desired unit of measure for WP is Wh (watt hours), this is taken into consideration in the formula by dividing by 3600.
- If the formulas are already defined before online recording is started, the measured values for the calculated channels can be displayed during measurement. **Exception:** Values for WP are not calculated until the measurement data are saved to a measurement data file.



Cursor:	#A: I-Netz	#B: P-Netz	#C: S-Netz	#D: Q-Netz	#E: PF-Netz	#F: WP-Netz	K1: P	K2: U	K3: I
1999.09.27	A	W	VA	VAR	W/VA	Wh	W AD	V AD	A AD
22:23:50									
22:22:55	2,624000	551,6400	612,2107	265,5094	901,0623 m	---	0,5516	233,31	2,6240 m
22:23:00	2,608000	551,4800	608,4360	257,0294	906,3895 m	765,9444 m	0,5515	233,30	2,6080 m
22:23:05	2,628160	551,8700	613,0551	266,9758	900,1964 m	1,532431	0,5519	233,26	2,6282 m
22:23:10	2,623040	552,2200	612,0287	263,8791	902,2780 m	2,299403	0,5522	233,33	2,6230 m
22:23:15	2,609920	552,1200	609,1344	257,3097	906,4009 m	3,066236	0,5521	233,39	2,6099 m
22:23:20	2,627840	552,1600	613,2327	266,7841	900,4085 m	3,833125	0,5522	233,36	2,6278 m
22:23:25	2,617280	551,7400	611,0197	262,5416	902,9823 m	4,599431	0,5517	233,46	2,6173 m
22:23:30	2,613440	552,0000	609,8724	259,3073	905,1074 m	5,366097	0,5520	233,36	2,6134 m
22:23:35	2,626880	552,1600	612,9667	266,1719	900,7994 m	6,132986	0,5522	233,34	2,6269 m

Figure 3.5.6-f: Logger View of Calculated Quantities #A ... #F and Original Quantities C1 ... C3

Options : Setup Channels : **Setting Up Trigger Criteria for Online Recording**

Online Trigger Setup If, during online recording, measurement values should not actually be saved until certain trigger criteria have been fulfilled, click the [**Online Trigger Setup…**] button and enter the required settings to the **Online Trigger Setup** dialog box which then appears.

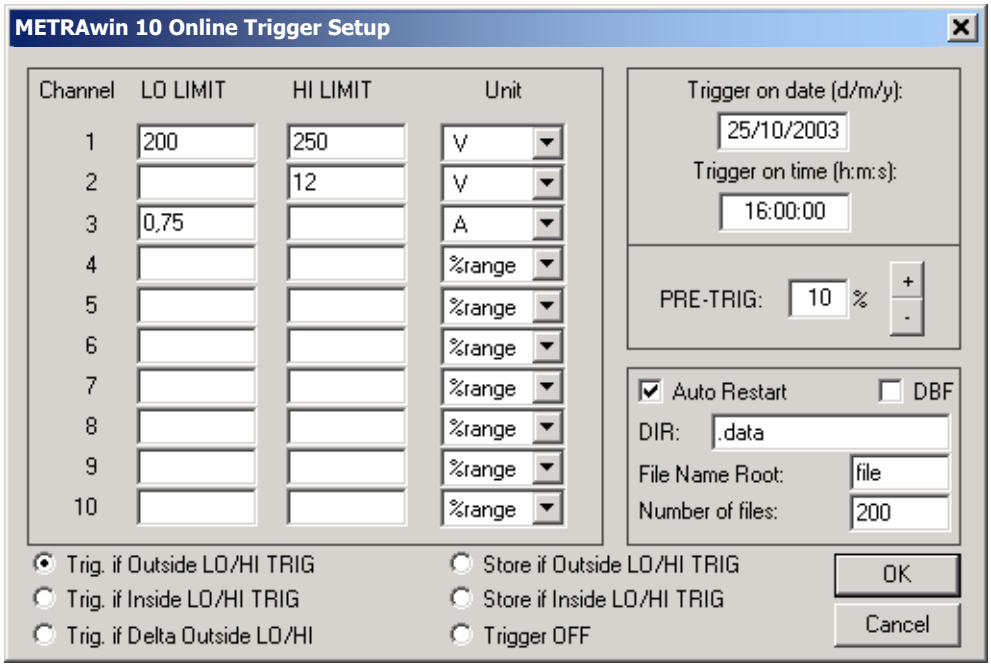


Figure 3.5.6-g: Dialog Box for Setting Trigger Criteria for Online Recording

The trigger function makes it possible to wait for the occurrence of certain measured values (events), and to specify the number of measurement data which will be saved after occurrence of such an event.

An event can also be a date and/or a time of day. In addition to the trigger function, settings entered here make it possible to save measurement data in a selective fashion (if measured values lie within or outside of an adjustable window).

Enter the upper and lower trigger limit values to the ***LO LIMIT*** and ***HI LIMIT*** fields.

Enter the unit of measure for the trigger to the ***Unit*** field. The trigger limit value can also be entered as a percentage of the measuring range (*%range*), or as a value from the linearization table (*LUT* – look up table).

Trigger on date is entered using the following format: *DD/MM/YYYY*

Trigger on time is entered using the following format *hh:mm:ss*

The bottom field is used to specify whether triggering will be caused by a trigger event, or if the trigger thresholds will be used to activate only those measured values which lie within or outside of one or several predefined windows. Select one of the six options:

Trigger OFF: deactivates the trigger function.

Trigger criteria:

- **Trig. if Outside LO/HI TRIG**
  Recording of all active channels is started as soon as a measurement value is not within the range defined by the **LO LIMIT** and the **HI LIMIT** for at least one channel.
- ***Trig. if Inside LO/HI TRIG***
  Recording of all active channels is started as soon as a measurement value lies within the range defined by the respective ***LO*** and the ***HI LIMITS*** for at least one channel.

- ***Trig. if Delta > LO/HI***
  Recording of all active channels is started when the difference between two consecutively received measured values is larger than the ***LO LIMIT*** (negative value corresponds to falling measured value) or the ***HI LIMIT*** (positive value corresponds to rising measured value) for at least one channel.

The trigger is activated when one of the specified trigger criteria for a given channel is fulfilled (OR operation).

Recording conditions:

- ***Store if Inside LO/HI TRIG***
  Only saves those measured values which lie within the range defined by the respective ***LO*** and ***HI LIMITS***.
- ***Store if Outside LO/HI TRIG***
  Only saves those measured values which lie outside of the range defined by the respective ***LO*** and ***HI LIMITS***.

If the recoding condition for one of the connected channels is fulfilled, data are also recorded for all other channels. An empty field does not signify a recording condition, i.e. data are only recorded for a connected channel without entry if the criterion which has been specified for one of the other channels is fulfilled.

PRE-TRIG

The pre-trigger can be set within a range of 0% to 100%.

It specifies how many measured values will be saved after an event has occurred until measurement is ended automatically.

This number depends upon the **File Size** which is selected in the **Options** dialog box.

Example:
File size: 100
Pre-trigger: 90%
After the event occurs, 10 measured values will be saved. Up to 90 previously received measured values are retained.

File size: 2000
Pre-trigger: 70%
After the event occurs, 600 measured values will be saved. Up to 1400 previously received measured values are retained.

Auto Restart

Auto-restart saves measurement data after the occurrence of a trigger event, and immediately restarts measurement.

Enter the desired directory path to the ***DIR*** field. ***File Name Root*** identifies the first portion of the consecutively numbered file names. ***Number of Files*** indicates the maximum number of files which will be created.

Options : Setup Channels : **Select the channels to be displayed in the various views.**

View Modes Setup Click the [**View Modes Setup**] button in order to open the **View Modes Setup** dialog box and select the channels which will be displayed in the various views (→ page 63).

Options : Setup Channels : **Default Settings** Default settings for channel setup and channel views can be restored by clicking the [**Default Settings**] button.

Options : **Set up the memory mode and the sample interval for online recording.**

Sample Interval



The options and parameters in the **Sample Interval Setup** dialog box are used to select time conditions for saving measured values during online recording.

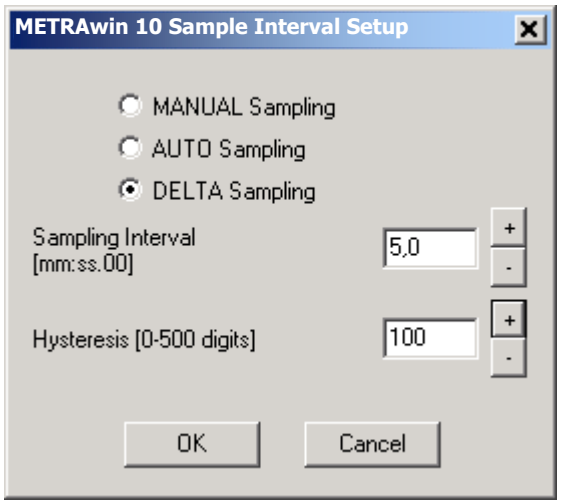


Figure 3.5.6-h:
Dialog Box for Setting the Sample Interval

After starting online recording, the program reads in currently measured values from the connected measuring instrument for the selected active channels as quickly as possible. Exactly how fast these data are read in depends upon the type of measuring instrument and its current measuring function, as well as the number of measuring channels and the type of communications link. One of the following options can be selected for saving incoming measured values to the temporary file:

MANUAL Sampling
If this sampling mode is selected, a button labeled [**STORE**] appears in the monitor. Current measured values for all active measuring channels are saved when this button is clicked.

AUTO Sampling
Measured values are saved continuously at the rate specified in the ***Sampling Interval*** entry field. The possible setting range for the sampling interval depends upon the utilized type of measuring instrument.



Note

Three values are saved per sample interval for each real measuring channel:
Min: lowest acquired value within the interval period
Max: highest acquired value within the interval period
Avr: arithmetic mean value (average value) of all measured values acquired during the interval period.

In the View Modes Setup dialog box is specified which measured values will be displayed in the various views.

DELTA Sampling
In this case as well, the program attempts to save measured values in accordance with the selected sample interval. However, saving is only executed if the difference of the respective measured value relative to the last measured value is greater than the value entered in digits to the **Hysteresis** field.

Options : **Specify the maximum number of measuring intervals to be recorded online.**

File Size



Set the maximum number of measuring intervals to be recorded (*1 ... 10,000,000*) in the **Online Storage Depth Setup** dialog box.

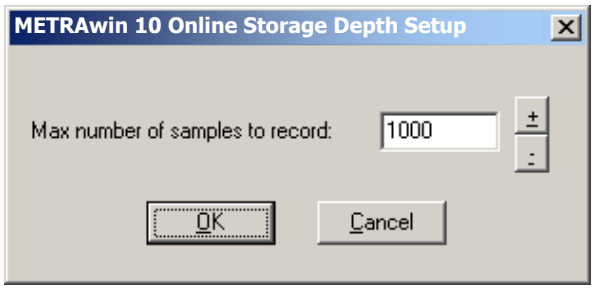


Figure 3.5.6-i: Dialog Box for Setting the Online Storage Depth



Note 1

After online recording has been started, the program creates a temporary file of the required size which is initially filled with spaces only. Depending upon the number of measuring channels and the selected buffer size, this file may range in size from just a few kilobytes to many megabytes, and the process may take from a few seconds to several minutes!



Note 2

An appropriate message is displayed after the number of recorded measuring intervals has reached the defined size of the buffer file. However, the current recording is not stopped as a result. As of this point in time, the oldest received data are lost because only the defined maximum number of received measuring points is retained in the temporary file (first-in first-out buffer memory).

Options : **Change the program menus, commands and descriptions to a different language.**

Language ►

The language for menus, commands and help texts can be changed with this menu function. However, this is only possible as long as no measurement data are being displayed (immediately after starting the program or after clicking **Close Input** in the **File** menu).

Options : **Register and unlock the program**

Register

Opens the dialog box for entering the registration data:

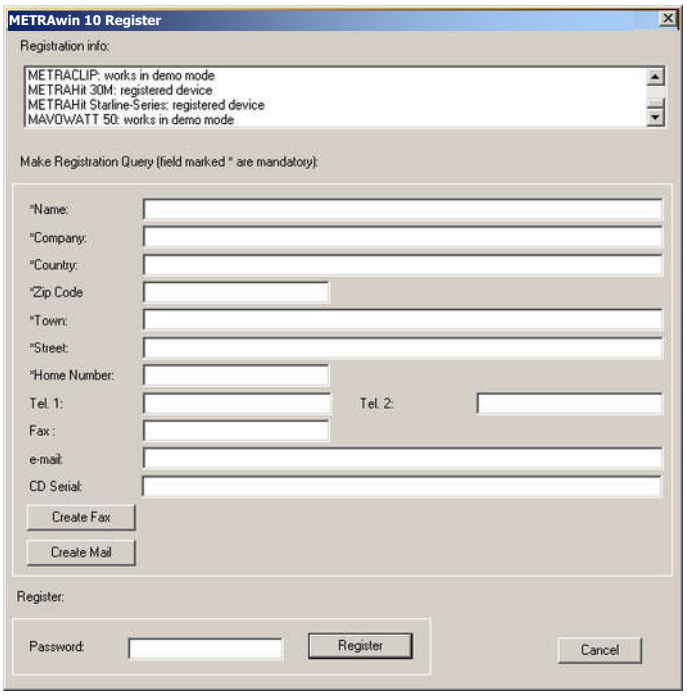


Abb. 3.5.6-j: Dialog Box for Entering the Registration Data

The Software must be registered and activated by registration number (password) in order to get full functionality permanently.

- For this purpose, fill in your contact information into the appropriate input fields. Pay special attention to the spelling of Company name as the generated registration code, among other things, is derived therefrom.
- Enter the *CD Serial* number given on the delivered program CD. If you have received the software as a download or by e-mail and do not have a CD serial number, you must attach a proof of purchase (invoice or receipt as a PDF or image file).

The request for registration number can be sent by fax or e-mail.

- Click on the button [**Create Fax**] or [**Create e-mail**].
- Mark in the opening dialog window the type of device(s) for which the software is to be registered and press [**OK**]. The choice depends on the purchased software version.

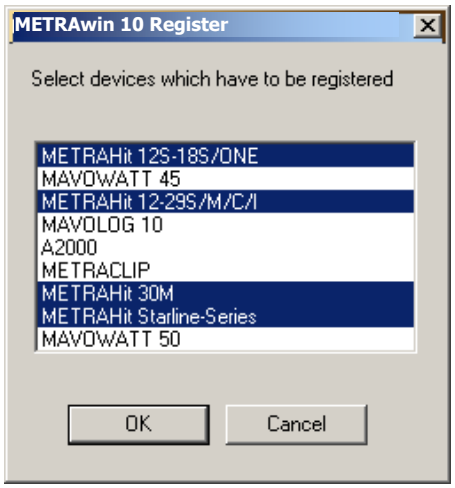


Abb. 3.5.6-k: Device Selection for Registering

- Send the form that opens by fax or e-mail to the given address.

⇒ You will receive in return the password by which the program can be activated permanently for the specified device type(s).

- For this purpose open again the **Register** dialog box, enter the **Password** received in the corresponding input field and click the [**Register**] button.

⇒ The program is now permanently activated. This can be checked in the field **Registration info**. After a reboot your company name will appear in the title bar of the program window.

Note 1

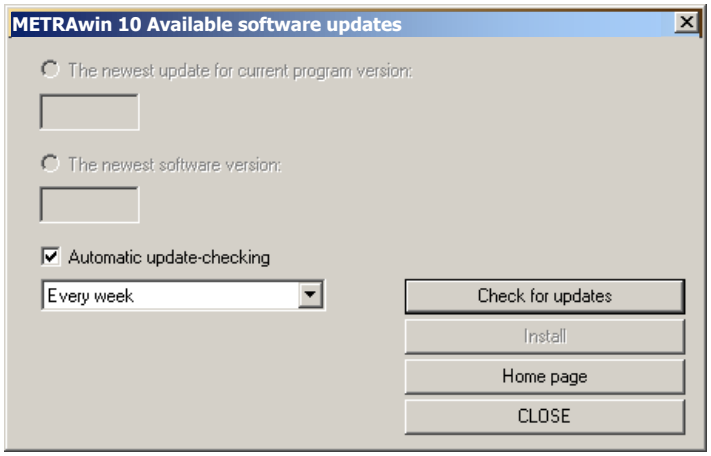
One licence of this software allows registration for only one company but an unlimited number of installations (Company Site Licence).

Note 2

Preserve a copy of the returned registration fax/e-mail including the password for the occasion of a re-installation becoming necessary!

Options : **Check if software updates are available**

Software Update If the PC has an Internet access, this feature allows checking whether for the present program version, an update is available.



Options : **Recall stored program setup parameters.**

Read Setup



This command reads in a setup from a file which has been previously stored with the **Save Setup** function. All parameters which can be configured in the **Options** menu are restored.

After exiting the program, the current setup is saved to a general file (multimtr.ini), and the respective settings are restored when the program is restarted.

Options : **Save current program setup parameters to a file.**

Save Setup



Current application-specific declarations in the **Options** menu are saved to an INI file for later access.

After exiting the program, the current setup is saved to a general file (multimtr.ini), and the respective settings are restored when the program is restarted.

3.5.7 Help Menu

Program Functions **Open the PDF file with a description of general program functions.**

This menu command starts Adobe Acrobat® Reader™ in a new window, and opens a PDF file which includes descriptions of general program functions.

Device Functions **Opens a PDF file with a description of device-specific program functions.**

This menu command starts Adobe Acrobat® Reader™ in a new window and opens a PDF document which includes descriptions of specific program functions and characteristics with reference to the measuring instrument which is currently selected under **Device Type** in the **Device** menu.

Online Support **Opens the website with information for technical support via Internet**

This menu command starts your Internet browser and opens a website which displays information how our technical support can assist you via Internet.

Read The License **Display information regarding program version and the contact address.**

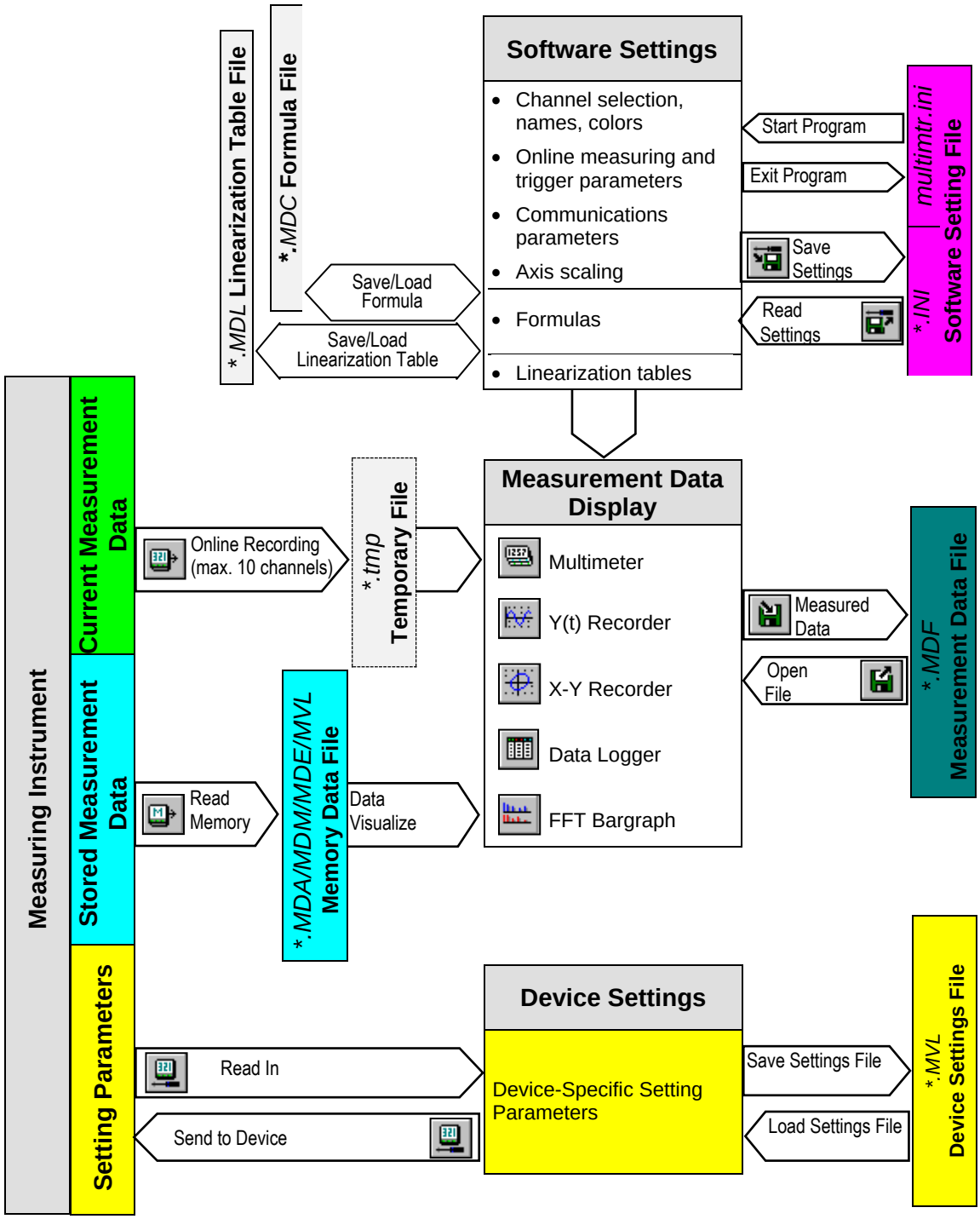
This menu command will start up your text editor and displays the license agreement in a new window.

About ... **Display information regarding program version and the contact address.**

This menu command opens a window which displays information regarding the revision level of the utilized program version, as well as the contact address for technical support.

4 Appendix

4.1 Schematic Diagram of Program Functions



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