

Software description

SSM 3000

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1 General

1.1 SSM 3000 Software (c) ZERA GmbH



The sub standard meter control program (SSM 3000 software) is a Windows application allowing to enlarge the possibilities of the ZERA test devices

COM3000

COM3003

COM1000

COM303-1

COM303-2

COM303-3

EPZ303-X

EPZ3001

EPZ3005

MT30

MT300

MT310

MT3000

MT681

MT781
MT786
RMM303-X
RMM3000
RMM3001
TPZ108
TPZ306
TPZ308

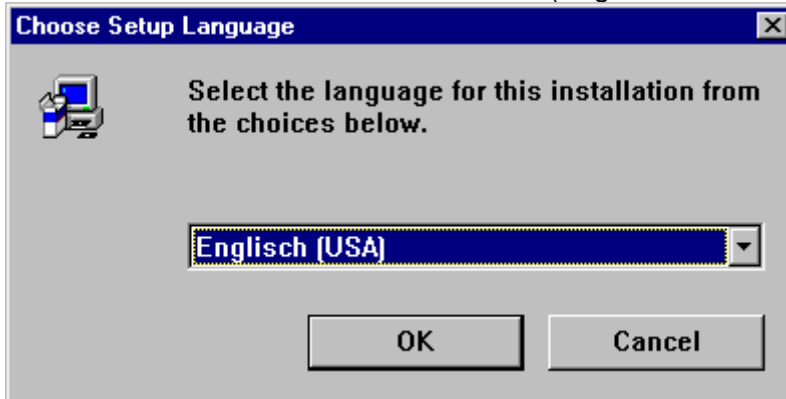
by extensive functions. Almost all functions which are put at your disposal by these devices can be operated comfortably due to this control program. All measured variables determined by these devices are represented in different views in a clear manner. Moreover you will find operator interfaces which have been implemented in the program for special measurements as e.g. energy comparison measurement the accuracy test or different reference measurements. For storing the measurement results and for the administration of the type-referring data of the devices to be tested the working standard control program puts extensive database functions at your disposal. By activating contents you will get more information from the Online help.

1.2 Installation

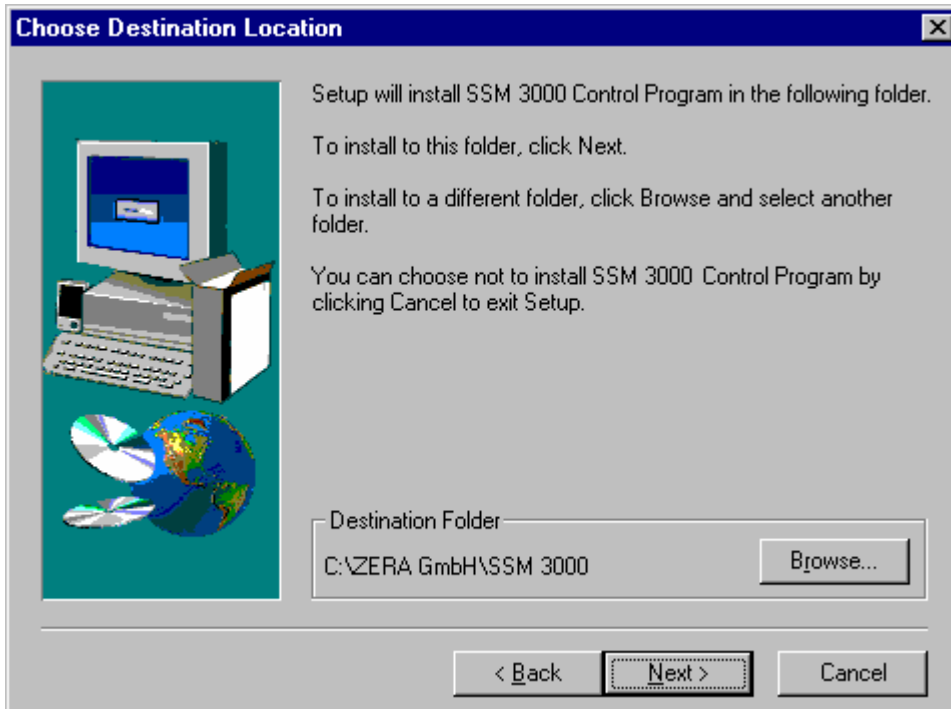
The following steps have to be taken for installation of SSM 3000 Software:

1. Make sure that the serial ports which are needed for the operation are working correctly. This can be done with Hyperterminal (Start - Accessories) and a connector with pin 2 and pin 3 connected. The port can be tested by selecting the port on which this connector is connected and inputting data by keyboard. This data should appear on the terminal view.
2. Connect all devices on the serial ports.
3. If there is already an older version of SSM 3000 Software installed on your computer this must be uninstalled before installing the new version (Start – Settings – Control panel – Software). All common components must be deleted. If the list for installed software contains the entries 'Access Runtime' or 'SSM 3000 printing functions' these components must be uninstalled too.
4. Insert the CD of the SSM 3000 into your CD-ROM drive. If the setup program should not start automatic please start the program 'setup.exe' in the root directory of the CD.

5. The following dialog appears for selection of the language in which you want the SSM 3000 Software to be installed (English and German are available):

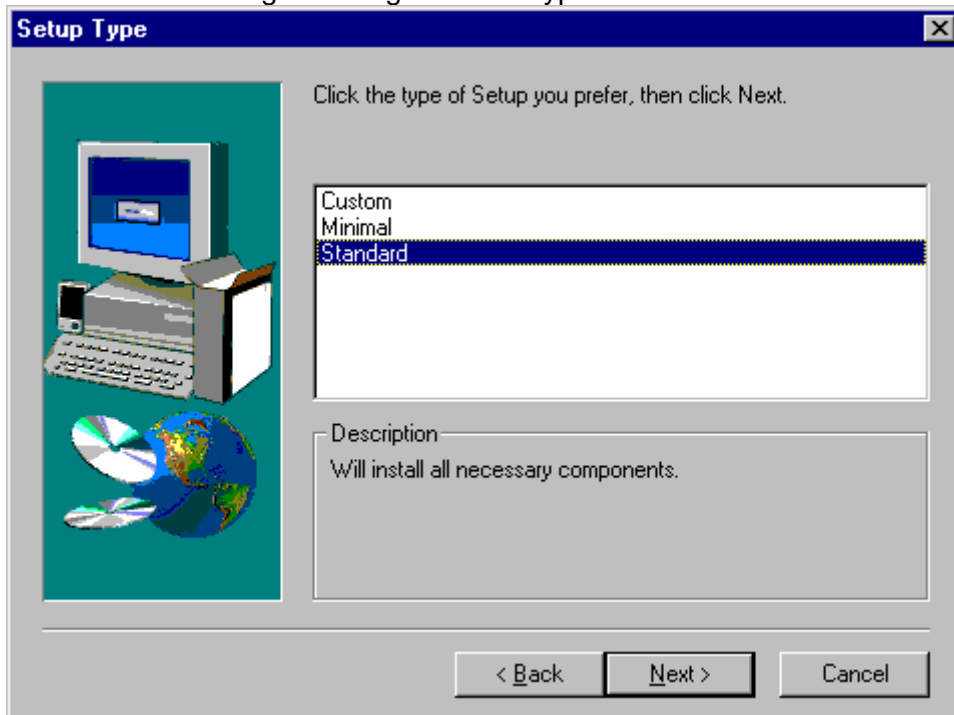


6. For the generation of the protocols SSM 3000 software need MS-Access 97. If this is not installed on your computer you are asked to install a free runtime version. Please follow the installation and choose 'Standard' for the installation option. After MS-Access is installed repeat point 4 and 5.
7. Please read the informations on the following dialogs. If you agree with the conditions select 'Next' resp. 'Yes'.
8. The following dialog shows the directory where the software will be installed:



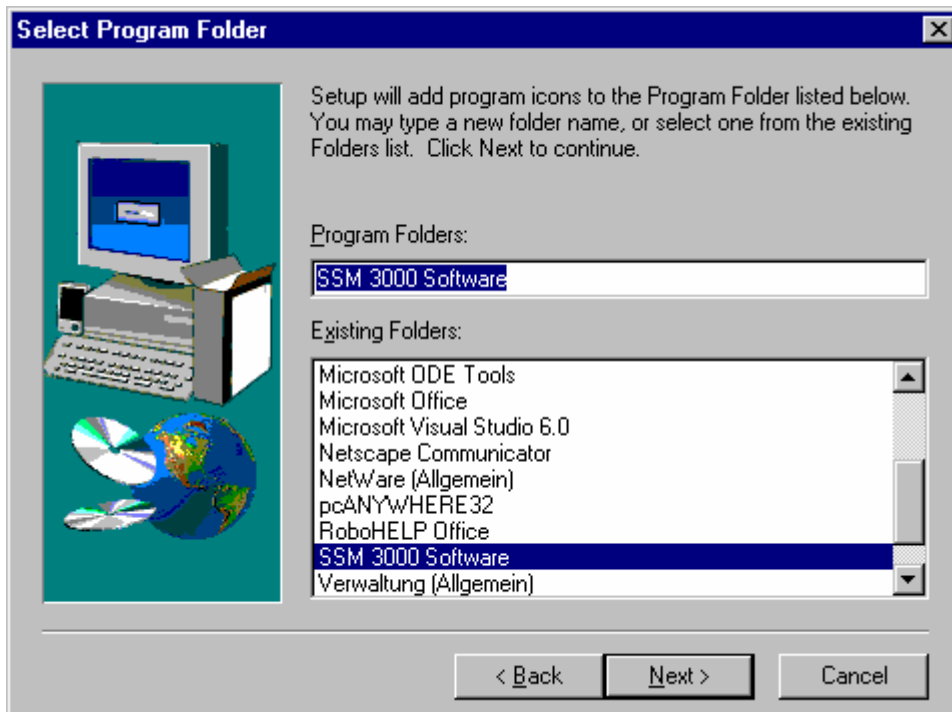
If you want to change the directory push 'Browse' and select another directory in the appearing dialog.

9. In the following dialog the type of installation is selected.

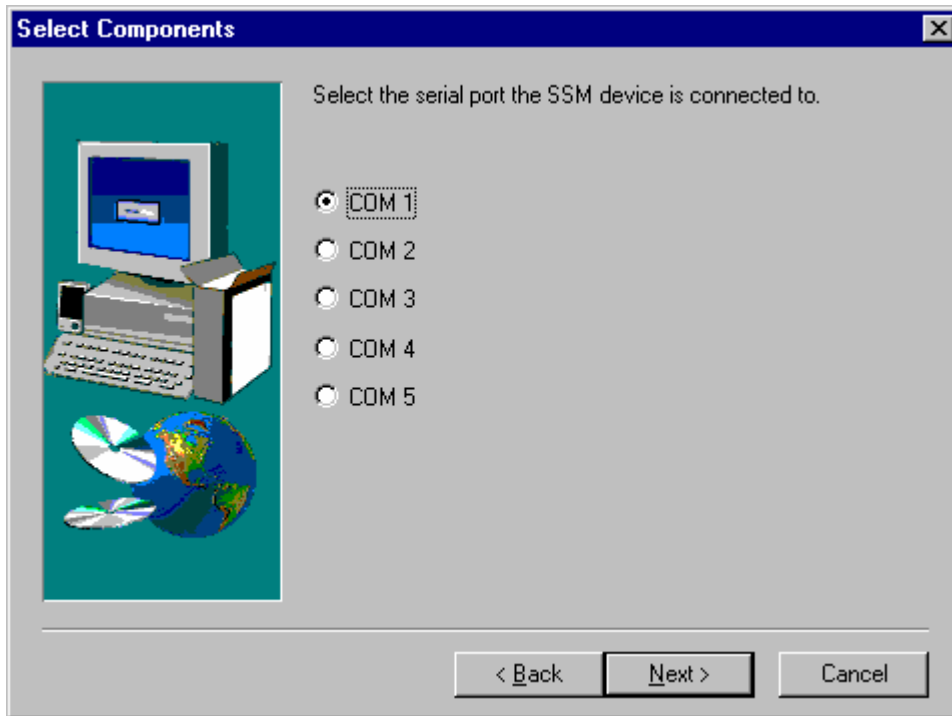


For the most cases 'Standard' is the correct type.

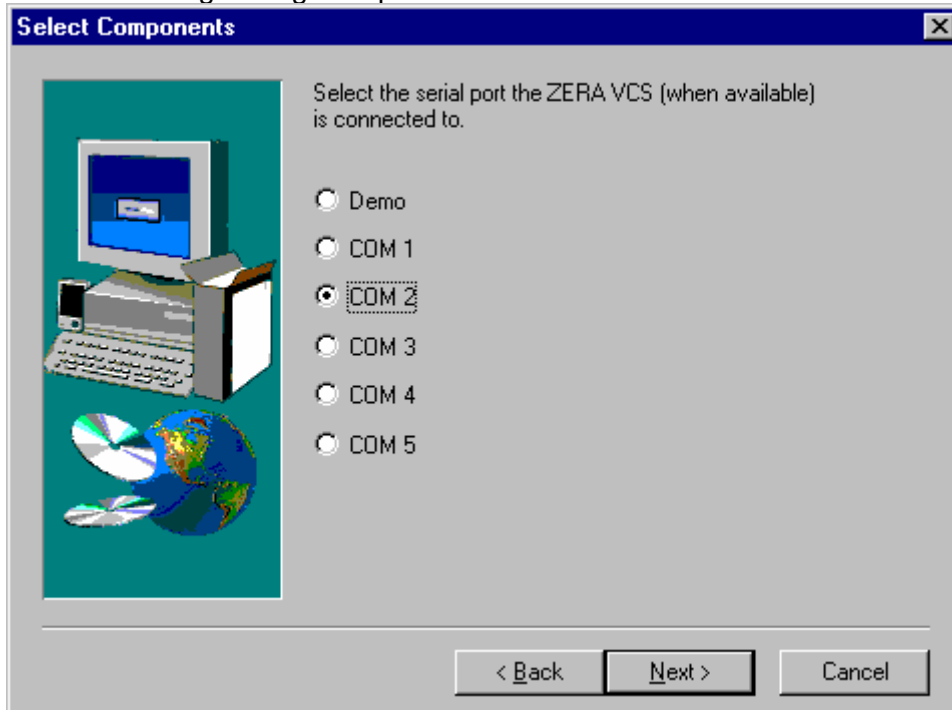
10. The next dialog decides in which folder of the startmenu the program icons are stored:



11. With the next dialog you can choose the COM port on which the comparator is connected:

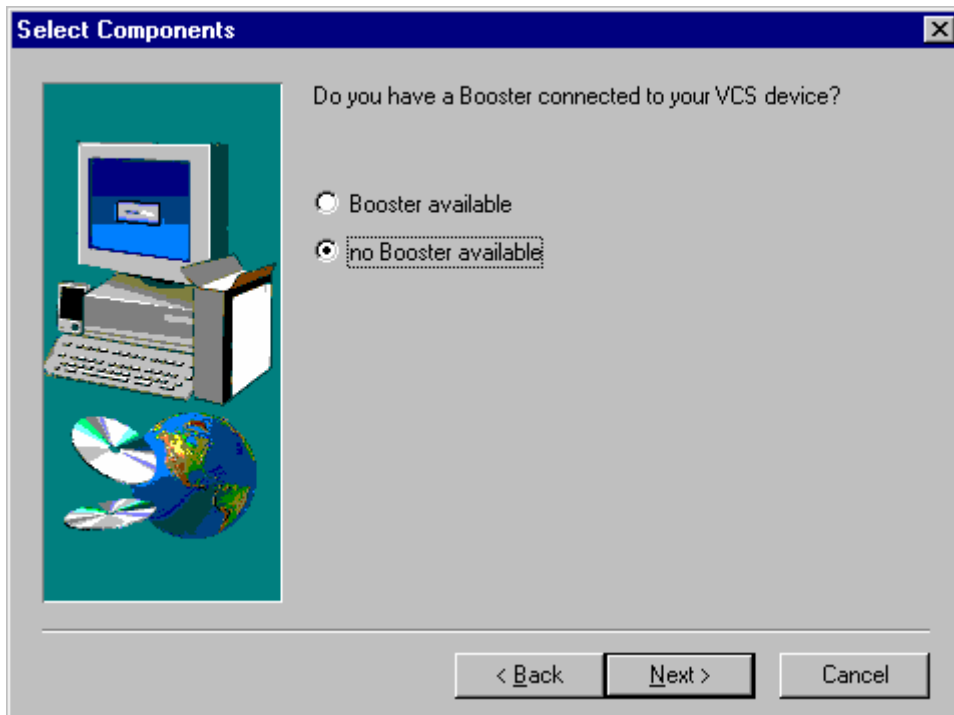


12. In the following dialog the port is selected on which the source is connected:



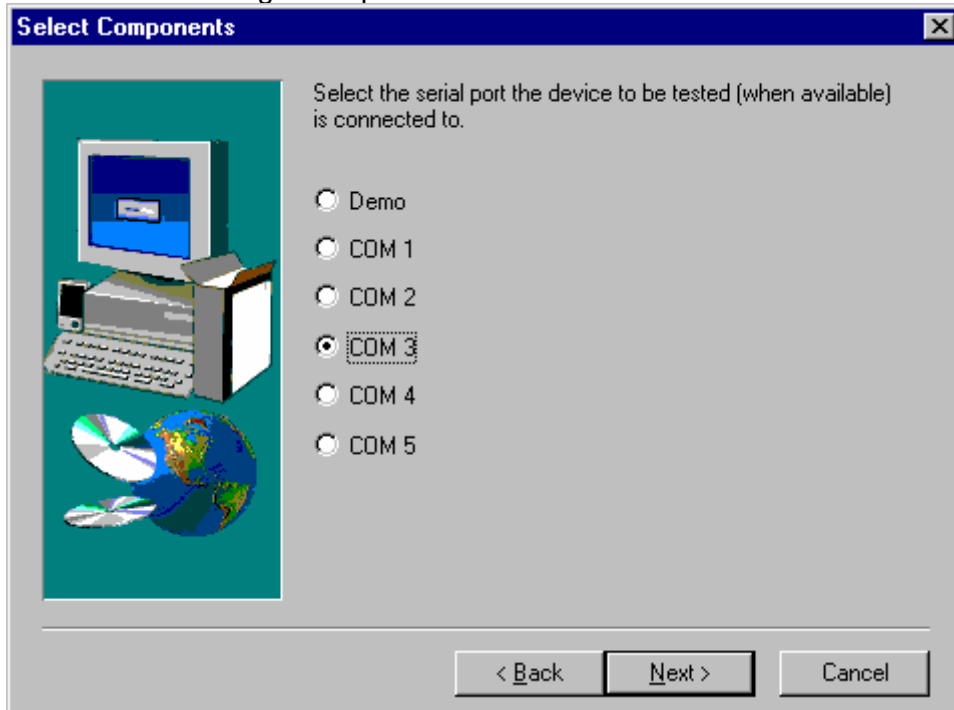
If there is no source available please select 'Demo'.

13. Was a port for the source selected, the following dialog appears:



With this dialog the optional (see VCS specification) booster is activated.

14. In the next dialog the port number for the sub standard meter is set:



If no sub standard is available please select 'Demo'.

15. Now all files are copied on your computer and the system is set up. At last some actual information is given. In some cases the computer has to be restarted after installation. If you are asked to restart please confirm rebooting.

1.3 Program state

The state of all open windows and the local settings within these windows can be stored in a file with *.INI-extension.

The stored state can be recalled by loading it. All saved windows are opened and placed at their old position.


Program states are stored and loaded within the menu setup. Optional the program state can be loaded at application startup automatically.


1.4 Drag & Drop

Drag and Drop means moving of elements.

Set the mousepointer on the object to move. Press the left mousebutton and keep it pressed while moving to the destination object. The appearance of the mousepointer shows if (and how) the object can be dropped:

 no permission for dropping

 Move object (Alt)

 Copy object (Ctrl)

1.5 Menus

1.5.1 Main menu

The main menu of the sub standard control program consists of the following menus:

File
Measurement
Setup
Database
Window
?

Depending on the activated child window one of the following menu entries will be placed between the menu entry File and the menu entry **measurement**:

- Actual values
- Flexible view
- Vectorial view
- Analogue view
- Energy comparison
- Comparison measurement
- Statistic
- Accuracy test
- Test table
- Memory read

If the active window changes, the corresponding menu entry changes as well. Only the current program functions are indicated in the menu.

1.5.2 Commands in menu file

In the menu **File** or the shown symbols of the toolbar the following commands are available:

Open



Opens the file open dialog.

With this you can select files of different types and open them.

Close

Closes the current child window.

If this window is the last of a measurement in progress the measurement will be stopped and the database belonging to it will be closed.

Print



Prints the values of the current window. (Print Dialog)

Print preview




Shows the values in the current window as they will appear when printed. (Print preview)


Print setup Selects a printer and setup printing. (Dialog Print setup)


Exit Ends the SSM 3000 Software.
All databases will be closed and the connected meter is set to LOCAL mode.

1.5.3 Commands in menu measurement

With the menu **measurement** and the symbols of the toolbar the following measurement can be started.

Actual values  Opens the summary view. If the summary view is already opened it is moved to foreground.

Energy comparison  Opens the view for energy comparison. If that view already open it is moved to foreground.

Comparison measurement  Opens the view for comparison measurement. If the comparison measurement already opened the view is moved to foreground.

Data sampling Opens a view for data sampling.

Automatic energy comparison Opens the view for a automatic energy comparison

Automatic comparison measurement Opens the view for the automatic comparison measurement.

DC Accuracy test Opens the view for the DC accuracy test. If the view already open it will be moved to foreground.
While opening the accuracy test the name of the

database (*.ref) has to be set.

Time base accuracy test

Opens the view for the time base accuracy test. Is the view already open it will be moved to foreground.

While opening the accuracy test the name of the database (*.ref) has to be set.

Source window

Opens the view for the source of current and voltage. In this view the source can be parametrized.

1.5.4 Commands in menu setup

The menu **Setup** contains the following commands:

Store desktop Opens the save as dialog. In this the filename can be selected where the window configuration will be saved.

Load desktop Opens the file open dialog. In this a saved window configuration can be selected for restoring the configuration.

Folder Opens the dialog folder administration.

Options Opens the dialog program options.

1.5.5 Commands in menu database

The menu **database** contains the following commands:

Edit SSM database Opens the database for sub standard meter for editing.

Edit meter database Opens the electricity meter database for editing.

Edit test table After selecting a database the test tables will be opened for editing.

Protocol Opens a MS-Access Application with which the test results can be printed.

Protocol for accuracy test Opens a MS-Access Application with which the results of accuracy tests can be printed.

Compress database Opens a file open dialog. After selecting a database file this file will be compressed.

1.5.6 Commands in menu window

The menu **window** contains the following commands:

Toolbar If selected the toolbar is visible.

Status bar If selected the status bar is visible.

RS 232 Toolbar If selected the RS232 toolbar for connection status is visible.

Comparator If selected the comparator window is visible

Source Toolbar If selected the Source-status-window is visible.

SSM Toolbar If selected the SSM-status-window is visible.

Window 1,2,... Moves the selected window to foreground.

1.5.7 Commands in menu ?

The menu ? contains the following entries which give online support for the SSM 3000 application:

Help	Shows the contents of the online help.
Help content	Shows the index of the online help.
About SSM 3000	Shows version info and copyright for the application and their components.

1.5.8 Contextmenu

The contextmenu is reached by pressing the right mouse button or by (Alt+F10). It contains the most important commands for the object on which it is called.

1.6 Folders

1.6.1 General

The databases are stored in a certain directory. The directory must be located on a local hard disk or on a network drive. This directory is called measuring position.

All measuring position directories are located in the directory tree of the hard disk within or below a certain directory, the standard measuring position.

Example:

The relevant measuring position should be called 'Labor'. During the installation of the working standard control program the standard measuring position is positioned as subdirectory USERDATA in the installation directory (\ZERA\SSM 3000). Therefore you have the following directory structure:

Standard measuring position:	\ZERA\SSM 3000\USERDATA
Measuring position:	Labor
Directory of Labor:	\ZERA\SSM 3000\USERDATA\Labor

The active measuring position is indicated in the toolbar of the main menu. All data is stored in this measuring position. Moreover the program state is stored in this measuring position when you leave the program and is read in from here when starting the program.

It is possible to change the measuring position with the menu entry folder in the menu configuration or with the measuring position indication in the toolbar.

1.6.2 Indication of folders

The current selected folder is indicated in the combobox in the toolbar of the main window. When the list appears you will see the following entries:

Select a folder The dialog 'Folder Administration' will be opened. Here you can choose another measuring position.

Standard folder Selection of the standard folder.

..... Further entries may appear which indicate already selected measuring positions.

By selecting one of these entries you can switch over to other measuring positions.

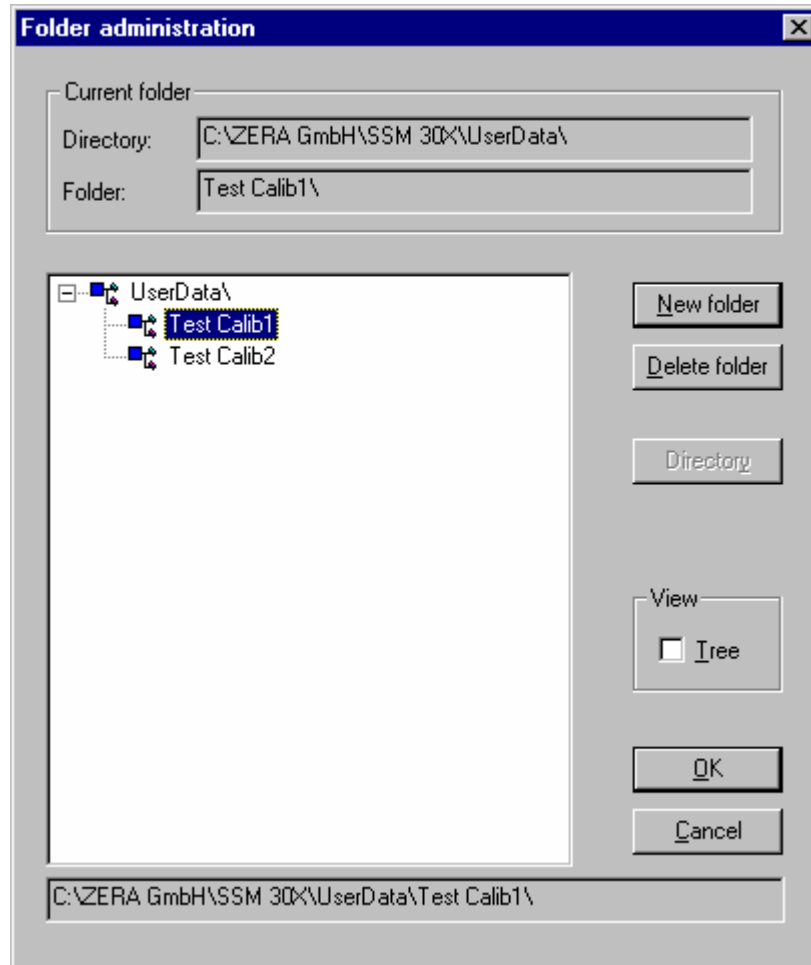
1.6.3 Dialog folder administration

Setting up of folders or the selection of a measuring position is carried out with the dialog 'Folder administration'.

You will find the path to the standard measuring position behind 'Directory' and behind 'Folder' you see the relative path to the measuring position directory is shown. The complete path leading to the directory of the selected measuring position is shown at the bottom of the dialog.

The tree representation shows all available measuring positions. The just selected measuring position is always marked. You can move within the tree representation with the cursor keys or with the mouse and select a new measuring position. Directories which can be selected as measuring positions are marked with the symbol





This view indicates only measuring positions beneath the standard measuring position. The standard measuring position cannot be changed here. If you activate the adjustment tree the indication shows the complete directory structure and you can also change the standard measuring position.

In this dialog the following commands are available:

New Folder A new measuring position is inserted beneath the current marked measuring position. Enter the name of the measuring position in the indicated field.

Delete Folder The just current measuring position is deleted. You always have to confirm this command.

Attention: If this measuring position directory contains still other measuring positions or files you will get an error message. In this case the measuring position will not be deleted.

- Directory** The current marked directory is selected as new standard measuring position.
- Tree** When marking this field the list will show the complete directory tree structure.
- OK** Selection of the marked measuring position; the dialog will be closed.
- Cancel** The dialog window will be closed without changing the measuring position.

2 Windows

2.1 General

The application consists of one main window and several child windows. At both sides of the main window (and certain subwindows) there may be toolbars.

2.2 Main window

All WINDOWS applications contain at least one window in which the user interacts. When the window is closed the application is terminated and removed from memory.

The main window usually contains one or more child windows.

2.3 Child window (MDI)

For certain program functions all user in-/ and output occur in separate windows. These windows can only be moved within the main window.













2.4 Toolbar



The toolbar is shown under the menu of the application. The toolbar enables a quick access to the important tools of the application.

The toolbar is made visible/invisible with the menu **window** and the command **toolbar** (Alt W,T).

The following commands are available in the toolbar:

Symbol	Meaning
	Opens an existing database in a new view. More than one database can be opened at the same time.
	Opens the summary view.
	Opens an empty flexible view
	Opens the Energy comparison.
	Opens the comparison measurement.
	Shows a preview of the current view as it will be printed.
	Prints the contents of the current view.
	Shows the online help for the current window.
	Shows the online help for a control element of SSM 3000 Software. When this button is selected the mousepointer changes to a questionmark. As long as this pointer is active a control element can be selected.
	Aligns all open windows overlapped.
	Aligns all open windows vertical among themselves.
	Aligns all open windows horizontal beside themselves.

2.5 Status bar



The status bar is displayed at the lower edge of the application-window. The status bar can be made visible/invisible by selection of the command **status bar** in the menu **window**.

While moving through the menus a small explanation of the selected command is shown in the left area of the status bar. This feature is also implemented for the buttons of the toolbar. Therefore the mousepointer has to be kept over the button for a short time.

In the right area the following informations of the application state are displayed as described:

Display	Description
I/O	The communication to an external device is active.
NUM	The key NUM is fixed.
RF	The key ROLL is fixed.
REMOTE	A connection to the comparator is established.

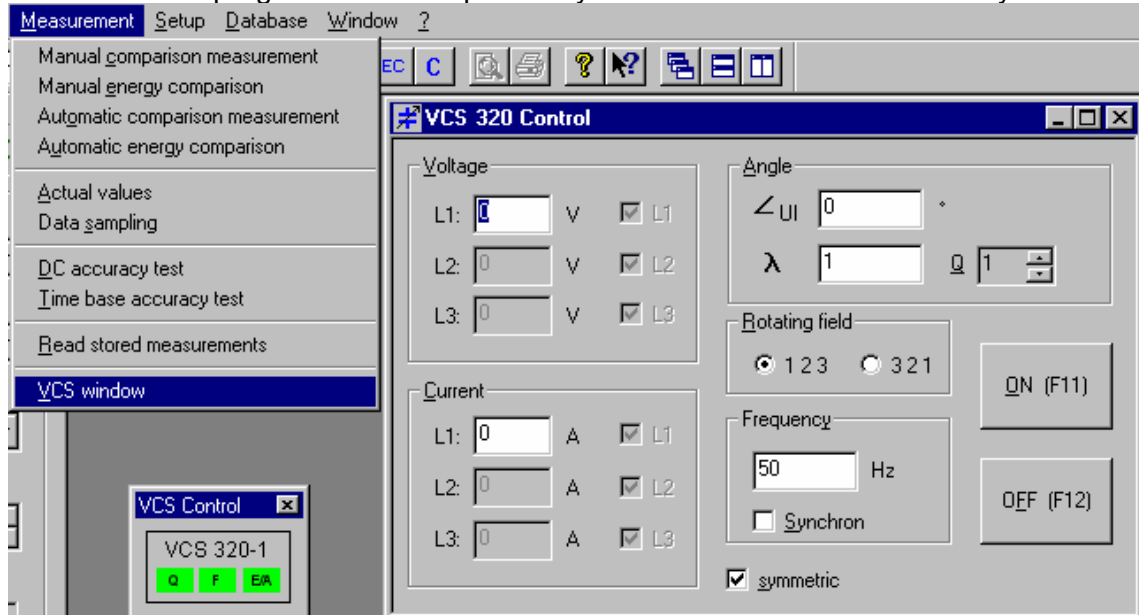
2.6 About window

Shows the copyright and version of the application components.

2.7 Device specific windows

2.7.1 Source-Control

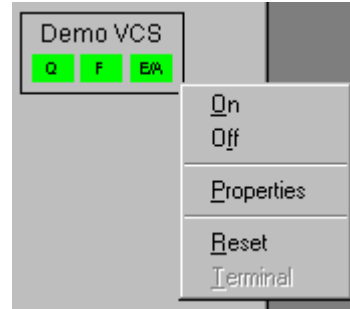
The SSM 3000-program offers the possibility to control source units manually.



After entering the load point parameters select the key **ON** for switching on and **OFF** for switching off.



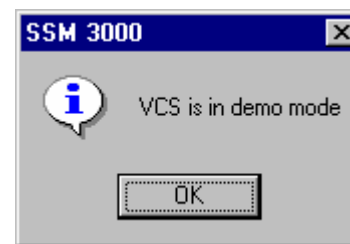
This device-icon can be shifted to the comparator window with a pressed left mouse key.



When the right mouse key is pressed the context menu appears.

If the message 'Source is in demo mode' appears the following reasons may be the reason:

- RS232 connection not ok.
- RS232 parameters are not correct
- Valid is baud rate 9600; data bits 8; stop bits 2; Parity: no;
- Source is not switched on

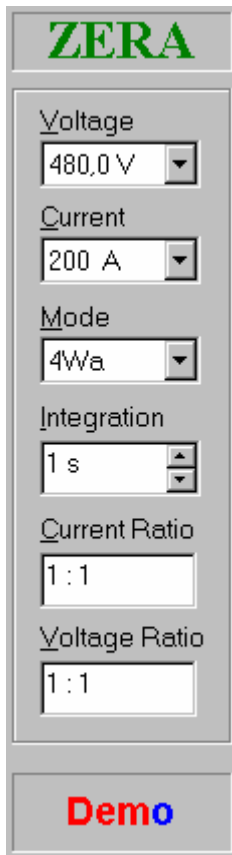


2.7.2 Comparator window

With the use of this window you can setup the comparator device, that is connected to the PC via RS 232 connection. Furthermore the actual state of the comparator is displayed in this window. The state informations are refreshed automatically with the time period given in the global adjustments.

This window can be activated by pressing F10 in case no mouse is available.

In the comparator window the following elements are available:



In the topmost element the type of the connected comparator device is shown. If the connection is not established, the name ZERA is displayed here.

In the mean part of the window the voltage range, current range and the measurement mode being currently selected are displayed.

As soon as you select a new range / mode in the listboxes, that range / mode is selected at the connected comparator device.

In the field integration time you may enter the integration time to be used by the comparator. In order to change the integration time, enter the new value in the editbox (without s) and press the enter key.

In the fields Ratio you may enter a ratio for current and voltage. In order to change this ratios, enter it's new primary value in the editbox and press the enter key. The secondary value of the ratio is always 1.

In the lower element the current state of the comparator device is shown.

The context menu of the comparator window contains further commands concerning the comparator device connected to the PC.

Usually the comparator window is fixed on the left side of the main frame. With the mouse it can be dragged to every position on the desktop. With the menu Window the comparator window can be hidden or shown. In case of error a hidden comparator window will be shown.

2.7.3 Comparator state

The current state of the connected comparator device is symbolized by the following pictures at the bottom of the comparator window:



Demo Mode: The COM 303 software could not build up a connection to the device or it was disconnected.

In demo mode nearly all program functions are available, however, all displayed values are generated by a random

number generator.



Normal Mode: The phase reference is displayed by the symbol. All phase angles are related to this channel (U L1 ... I L3).



Awaiting 1st mark: comparison type measurement has been started and the comparator device is awaiting the starting pulse.



(Energy) comparison measurement in progress



Overflow

At the comparator device a range overflow occurred. Please select another voltage / current range.



Communication error: The RS 232 communication between the comparator device and the PC has been disturbed.

Because the COM 303 software can deal with communication errors, this error is not serious, if it occurs only sporadically.

2.7.4 Further control commands

In the context menu of the comparator window further commands for controlling the comparator device are available:

Nominal frequency	Edits the nominal frequency for the output f2 at the comparator device.
Version	Reads out the firmware version of the comparator and displays it in a window.

- Connect** Builds up a RS 232 connection to the comparator device. After the connection has been established, the comparator cannot be operated manually.

- Disconnect** Disconnect the comparator device from the PC (LOCAL mode). Then the comparator can be operated manually again.

- Terminal** Opens a terminal window that is connected to the sub standard meter. This function is useful for test and service purposes only.

2.7.5 Setup connection

Before the SSM 3000 Software can be used to control ZERA meters a connection has to be established. Usually this connection is made automatically at program startup.

The connection progress contains two steps. The status is shown in the following windows:

```
Connection in progress..
Baud rate 4800 : Ok
Remote command : Error
```

The standard meter is set to REMOTE mode. A manual control in this mode is not available.

When closing the SSM 3000 software the device will be reset to LOCAL mode.

```
Reading the device status...
Comparator type : ZERA DEM
Voltage ranges : Demo
Current ranges : Demo
Measurement modes : Demo
Integration : Demo
Nominal frequency : Demo
Auto range : Demo
```

The options and features of the standard device are read.

The SSM 3000 Software adapts its features automatically. The standard Type is shown in comparator window.

Was the connection to the comparator not opened properly the SSM 3000 Software switches to the demo mode. In this mode nearly all functions are available. The shown

measurement values are created by a random generator. See also 'Error handling hints'.

2.7.6 Comparator nominal frequency

The frequency entered here will be on frequency out of the standard meter when all 6 channels are driven at their maximum range. With the divider the output frequency can be adjusted to very low frequencies.

Remark: The divider takes effect only on the second frequency output for devices with more than one frequency output (e.g RMM 3000). For further information check the device documentation.

2.7.7 Firmware version

In this window information about the firmware of the comparator is shown. The data was read out from the device as the dialog had been opened.

2.7.8 Error handling hints

When the RS 232 connection could not be established, you may check the following:

1. Do you use the correct wiring between the comparator and the PC (Null Modem Cable)?
2. Is the correct RS 232 interface selected at the program options? This interface may not be used by a second application.
3. Try a lower baudrate. The baudrate is selected in the program options.
4. Check the communication parameter for the selected RS 232 interface. The parameters must be set to 8 data bits, 2 stop bits and no parity. The parameters can be viewed via the context menu of the corresponding RS 232 state window.
5. Use the RS 232 monitor of the selected RS 232 interface to observe the data transferred via the interface. In the program options you can determine that the RS 232 monitor is opened automatically at the beginning of the connecting process.
6. Try another RS 232 interface.

3 Measurement

3.1 Actual value measurement

3.1.1 General

The currents and voltages at the measurement input are measured within the ZERA measurement instrument which is equipped with an adjustable integration time. The

integration time can be adjusted in the working standard window and it is also indicated in this window.

All measured variables available in the working standard are continuously read out by the control program and represented in an actual value display. The interval between two updatings of the actual value indication can be adjusted in the dialog Global Adjustments

The measured variables of the actual value measurement can be represented in different displays:

Analogue view

Flexible view

Summary view

Vektorial view

Each representation of these displays has its own window. You can open as many windows as you want at the same time. All windows will indicate the same data sources.

3.1.2 Actual values: Summary view

The summary view indicates almost all measured variables, which can be measured with the working standard.

Upp	Delta voltage between phase L_i and L_{i+1} .
Upn	Star voltage of phase L_i against common potential.
Udc	Direct component of the voltage
I	Current
Idc	Direct component of the current
< U1 Ui	Phase angle of the voltage with regard to the reference voltage in channel L_1
< U1 li	Phase angle of the current with regard to the reference voltage in channel L_1

- < **Ui li** Phase angle between current and voltage of the corresponding phase

- P** Active power for phase Li and total power

- Q** Reactive power for phase Li and total power

- S** Apparent power for phase Li and total power

- λ Power factor ($\lambda=P/S$) for phase Li

- F** Frequency

- DF** Direction of the phase rotation sequence

	L1	L2	L3		
U_{pp}	830.95	831.10	827.43	V	P 13.955 MW
U_{pm}	477.95	481.35	478.00	V	Q -142.4 MVA_r
U_{dc}	0.9942	1.0008	0.9931	V	S 143.35 MVA
I	100.05	99.948	100.44	A	λ 0.0973
I_{dc}	1.0025	1.0011	1.0024	A	f 50.190 Hz
U_L->U	0.0000	120.04	240.10		DF 123
U_L->I	30.000	150.05	249.92		
U -> I	30.000	30.013	29.814		
P	73740	80592	-1480	MW	
Q	-4724	-4744	-4798	MVA_r	
S	47.818	48.120	48.009	MVA	
λ	0.1543	0.1475	-0.030		

The columns L1, L2 and L3 correspond to the three channels of the working standard. On the right side the total variables independent from the channels are indicated or the total variables corresponding to the channels. By clicking on a numerical value with the left mouse key the selected measured variable will no longer be indicated. A second mouse click on the corresponding field and the measured variable will appear again. The type size of the actual value display is adapted automatically to the window size selected by you.

From the actual value display you can fill the other representations of the actual value measurement by using Drag & Drop. By dragging (Drag) e.g. the frequency and then dropping it (Drop) over flexible view the value of the frequency will be indicated in the flexible view.

The summary view exists for the active actual value measurement as well as for an opened snap shot. In case of a snap shot the header shows the current moment in which the represented variables have been measured. Moreover the summary view shows the name of the database and the number of the current data record.



It is only possible to open one summary view for the actual value measurement and for each snap shot.

Operation and parameterization of the actual value display can be effected via its own toolbar or via the menu entry summary view in the main menu. This entry always exists as long as the summary view has the focus.

The context menü of the actual value display will only be indicated if it is opened with a numerical value within the display. Commands indicated in the menu refer to the selected measured variable.

3.1.3 Menu summary view

The following commands are available in the menu entry summary view of the main menu and in the toolbar of the summary view:

Toolbar	Menu command	Meaning
	Store	Stores current database in a snap shot. In case no database has been assigned the dialog 'Open' appears first in order to select a database. This database will then be opened, assigned to the actual value measurement and added there. If a database has already been assigned the database is added there.
	Auto snap shots	Starts the automatic recording of snap shots. After selecting this function a dialog appears in which the time span between two measurements is set.



To bring the actual value display to default size.



Vectorial view

Opens the vectorial view



Flexible view

Opens the flexible view

The mouse pointer changes into a crosshairs for a certain time. During this time several measured variables in the measured value indication which should be represented in the large display can be clicked on with the mouse pointer. All clicked-on measured variables will be indicated in the same large display.



Analogue view

Opens window with analogue view

The mouse pointer changes into a crosshairs for a certain time. During this time several measured variables in the actual value display which should be represented in the analogue display can be clicked on with the mouse pointer. Each mouse click opens a new analogue display.









y(t) diagram

Opens a window with a graphical representation of snap shots

This entry can only be selected in case of a snap shot with more than two entries. The mouse pointer changes into a crosshairs for a certain time. During this time several measured variables in the actual value display which should be represented in the y(t) diagram can be clicked on with the mouse pointer. Each mouse click opens a new y(t) diagram.

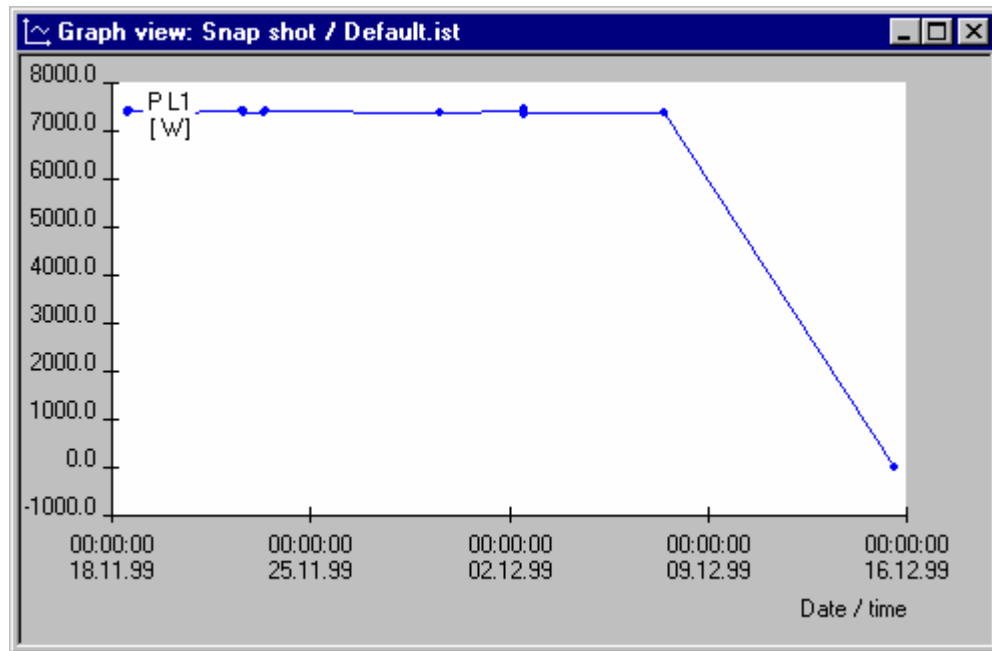
3.1.4 The menu snap shot

In the menus and toolbars of the displays of a snap shot the following commands are additionally available:

Toolbar	Menu command	Meaning
		Opens new database
		Opens a dialog window for selecting a new snap shot. The window shows the new data instead of the old database.
	y(t) diagram	Opens window with y(t) diagram. The mouse pointer changes for a certain time into a crosshairs. During this time you can click with the mouse pointer on a measured variable of the actual value indication which is to be represented in the diagram. A new diagram will be opened for each mouse click.
	First record	Shows the first data record.
	Last record	Shows the last data record.
	Previous record	Shows the previous data record.
	Next record	Shows the next data record.
	Delete record	Deletes the indicated data record.

3.1.5 The y(t) diagram

A y(t) diagram shows graphically certain selected measured variables during the time of the measurement. A y(t) diagram can only be opened for snap shots in which more than two data records are stored. In the header of the display the file name of the corresponding snap shot is indicated. The y(t) diagram is adapted automatically to the window size.



The y-axis shows the measured variable. On the right side next to the y-axis a short description and the unit of the variable is indicated. If one diagram shows several variables only the measured variable added last will be indicated here. The x-axis shows the time of the measurement (date + time). Scaling of the diagram can be carried out automatically or manually.

The context menu of the $y(t)$ diagram and the menu entry graphics contain the following commands:

- Content** Opens the dialog window for determining the measured variables to be shown in the diagram.

- Options** Parameterization of the graphic representation.

- Show captions** Inserts or removes the indication of the legend.

- Enlarge region** If the dynamic scale mode is set you can enlarge the selected region to the full size of the diagram.

- Dynamic Scale** While this mode is selected you can size the frame for enlarging

mode by dragging it with the mouse.

Graph color The color of the painting area of the diagram will be selected.

Background color Selects the color of the bckground of the diagram

With Drag & Drop you can determine the measured variables to be indicated from an actual value indication, a large display or an analogue display.

3.1.6 The dialog value selection

You can determine the content of the flexible view or a $y(t)$ diagram via a separate dialog window. In this window you will find a field for each representable variable which has to be checked if the measured variable shall be indicated in the flexible view or in the $y(t)$ diagram. If you want to cancel the selection of a measured variable the corresponding variable is removed from the display. At the beginning all measured variables already contained in the display are marked.

For a better survey the measured variables are grouped according to their function in the dialog window. Almost all variables are described in the chapter 'Actual values: Summary view'.

Voltage / Current Phase-to-phase voltages, star voltages and currents

Angle Angle sizes between the voltages and between voltage and current

DC values DC voltages and currents

Power Power and power factors for the individual channels

Sum of power / Additional values Total powers, frequency and:
Integration:

Current integration cycle of the measuring instrument. During integration this variable is counted up in an interval of a second. At the end of the integration time counting starts again.

After a change in the measured variable selection you can transfer the new selection directly to the large display by using the Apply-Button. The dialog window remains open for additional corrections.

3.1.7 The dialog graph view options

The dialog window for the parameterization of a $y(t)$ diagram contains 3 different registers in which the adjustment possibilities are arranged thematically.

Representation

Show Caps You can determine here whether the diagram has a legend.

Show axis description You can determine here whether the axes are labeled.

Select Graph Select here a measured variable for which the following adjustments are valid. Only measured variables can be selected which are already indicated in the diagram.

Bar Graph When selected all values are shown as bar graph.

Caption Here you can enter the text for the legend of the selected measured variable.

Color Here you can select via the dialog 'Color' the color for the selected measured variable.

Lines between symbols You can determine here whether the measuring points are to be connected with lines.

X-Axis

- Minimum** Here you can enter the lower limit for scaling the x-axis.
Date indications must be entered as follows:
Year / Month / Day / Hour / Minute / Second
At the end of the line you may also omit details
- Maximum** Here you can enter the upper limit for scaling the x-axis.
Date indication as described above
- Ticks** Here you can enter the number of the scale markings. All scale markings are labeled.
- Auto scale** Here you can enter whether the x-axis is scaled automatically.
- Time/Date values** Here you can enter whether a date will be indicated on the x-axis.
- Mark zero** Here you can determine whether a broken line will be drawn in the diagram at $x=0$ (not with date indications).
- Year, Month, Day** In case of a date indication you can determine here which
Hour, Minute, Second details are to be used for labeling the x-axis.

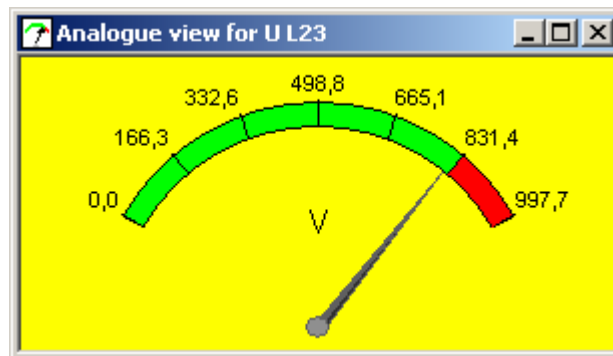
Y-Axis

- Minimum** Here you can enter the lower limit for scaling the y-axis.
- Maximum** Here you can enter the upper limit for scaling the y-axis.
- Ticks** Here you can enter the number of the scale markings. All scale markings are labeled.
- Auto scale** Here you can enter whether the y-axis is scaled automatically.

- Mark zero** Here you can determine whether a broken line will be drawn in the diagram at $x=0$.
- Total** Here you can enter the number of the positions for the number output.
- Precision** Here you can enter the number of the post-decimal positions.

After a change you can transfer the new adjustments directly to the graphics with the button **Apply**. The dialog window remains open for further changes.

3.1.8 Analogue view



The analogue display is a window representing a value in a symbolic pointer instrument. The represented value and the unit are indicated in the header of the analogue display. You can open as many analogue displays as you like. You can take the measured variable to be indicated from the actual value display, from a large display or from another analogue display by using Drag & Drop.

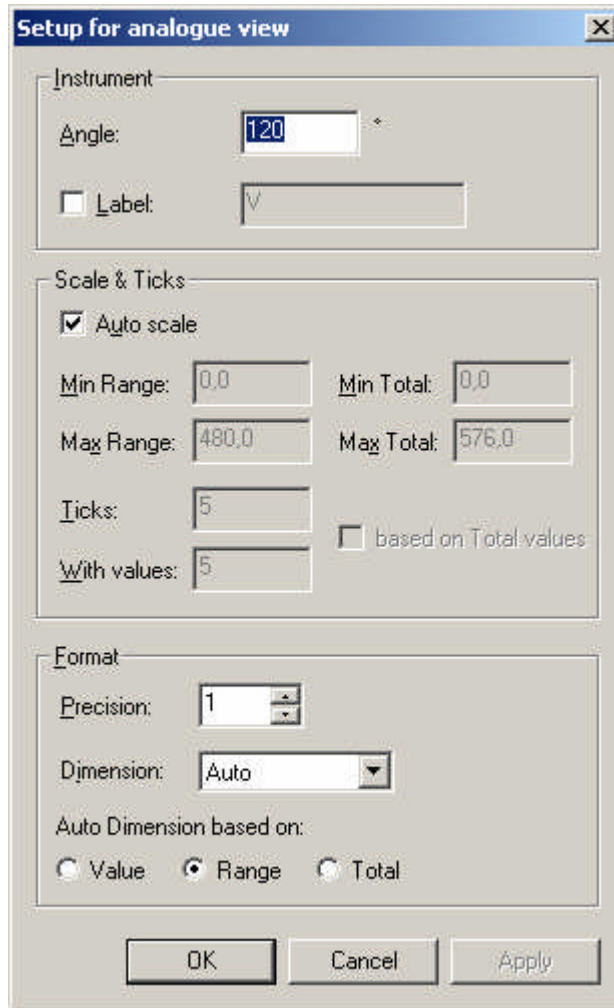
If the window of an analogue display is shown in the foreground, the menu command 'Analogue display' is indicated in the main menu of the control program with the following entries:

- Setup** Opens the dialog 'Setup for analogue view'. You can parameterize the analogue display here.
- Background colour** Opens the dialog 'Color'. You can determine the background color for the analogue display here.
- Left range colour** Opens the dialog 'Colour'. The colour for the display below the allowed range is selected here.

Middle colour	Range	Opens the dialog 'Colour'. The colour for the display inside the allowed range is selected here.
Right range colour		Opens the dialog 'Colour'. The colour for the display beyond the allowed range is selected here.
Summary view		Display of the corresponding summary view
Vektorial view		Display of the corresponding vectorial display
y(t) diagram		Indication of the represented variable in a y(t) diagram This entry can only be selected in case of a snap shot.

The same entries are also available in the context menu of the analogue display. analogue displays are available for actual value measurements in progress as well as for opened snap shots. In case of a snap shot the header shows the current moment during which the represented variable has been measured.

3.1.9 The dialog setup for analogue view



Instrument:

Angle

Enter the angle in degrees which should be the range for the instrument pointer. Whole numbers between 10 and 180 are possible.

Description

Here you can determine whether you want to enter a text for labeling the analogue display.

After activating you can enter the description text in the entry field. If this function is not activated the unit of the represented measured variable is taken automatically as labeling text.

Scale & Ticks:

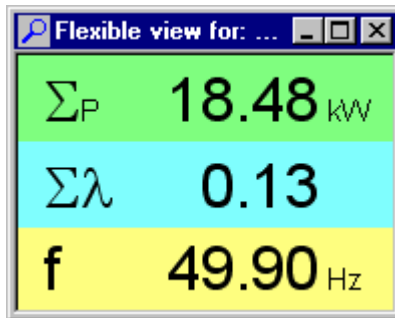
- Auto Scale** You can determine here whether the range limits of the indication instrument should be set automatically.
- Min, Max Range** Enter here the upper and lower limit for the nominal range (by default displayed in green) of the analogue display.
- Min, Max Total** Enter here the upper and lower limit for the extended range (by default displayed in red) of the analogue display.
- Ticks** Here you can enter the number of sections.
- With Values** The number of values is entered here.
- Based on Total values** If checked, the number of ticks / values is divided in the extended range.

Format:

- Precision** Enter here the number of the decimal positions for labelling the analogue display.
- Dimension** Here you can enter the dimension (e.g. kilo, milli, ..) of the measured variable to be represented or you select 'Automatic' for an automatic determination of the dimension.
- Auto Dimension based on** In case 'Automatic' was selected for dimension, the value on which the calculation is based on is selected here.

With the button Apply you can transfer the changes directly to the analogue display. The dialog window remains open for further changes.

3.1.10 Flexible view



The flexible view represents selected measured variables in a separate window. The kind of the representation of individual variables (text color, background color, format of numbers, ...) can be adjusted by you within broad limits. The type size of the flexible view is adapted automatically to the window size selected. You can open as many flexible views at the same time as you want. The header of the large display shows always the first variable of the represented measured variables in order to be able to differentiate between the windows.

You can determine which measured variables are to be represented by using the menu command 'Flexible view' or via the context menu. Moreover you determine there the kind of representation. See also 'Menu commands'

You can fill the flexible view also from another flexible view, from the actual value display or from an analogue display by using Drag & Drop .

You can mark individual measured variables by a click with the left mouse key. The marked values are represented hatched. You can cancel marking of an entry with a second mouse click. By pressing the shift key during the marking clicks you can mark whole ranges of the large display. In this case you only have to click on the first and the last entry of a connected range.

When using marking you can change the representation characteristics of several measured variables at the same time. You only have to open the context menu via one of the marked measured variables.

There are flexible views for a actual value measurement in progress as well as for opened snap shots. In case of a snap shot you will find in the header the current moment during which the represented value has been measured.

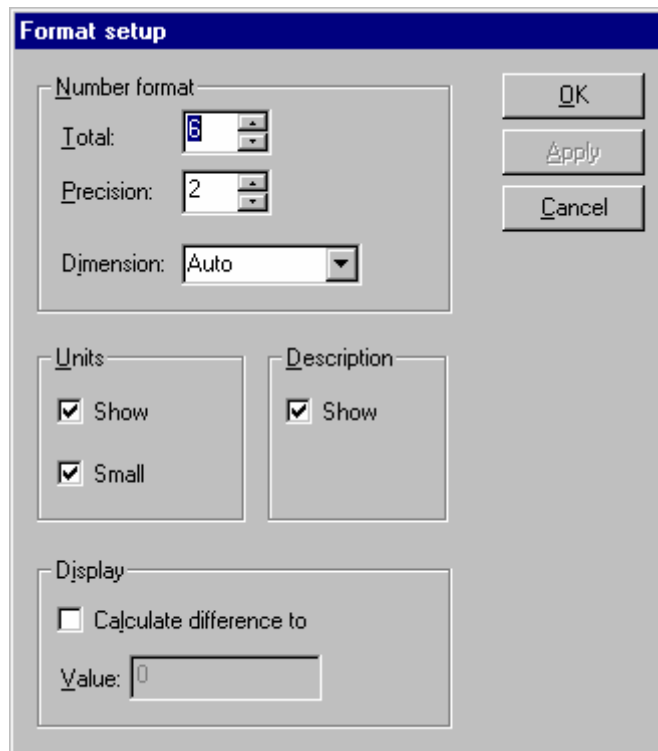
3.1.11 Menu flexible view

The following commands are available in the menu and / or in the context menu of the flexible view:

Content	Selection of the measured variables to be represented
Add	Via a further submenu groups of measured variables can be added.
Format value(s)	Formatting of the number output
Delete value(s)	Deletes the marked entries from the flexible view.
Analogue view	Opens an analogue display and shows the selected measured variables.
y(t) Diagram	Opens a y(t) Diagram and shows the marked measured variable. This entry can only be selected for a snap shot.
Show Columns	To switch on or of column indication Here you can determine whether the representation of the measured variables shows 3 columns (for each of the channels 1..3) or one column. In case of three column representation a tick appears in the menu entry..
Auto size font	Automatic adaptation of the type size It determines whether the type size is adapted automatically to the window size. In case of automatic adaptation a tick appears in the menu entry.

- Font** Opens a dialog window for selecting the character font.
- Text color** Opens the dialog 'Colors' for determining the text color for the marked measured variables.
- Background color** Opens the dialog 'Colors' in order to determine the background color of the marked measured variables.

3.1.12 The Dialog Format setup



In the flexible view you can separately adjust the format of the representation for all measured variables. After a change in the adjustments you can transfer the new number format directly to the display by using the key **Apply**. The dialog window remains open for further adjustments.

Meaning of the entry fields:

Total	Determines how many digit positions the number output has. Sign+pre-decimal position+decimal point+post-decimal positions
Precision	Determines the number of post-decimal positions
Dimension	Determines the dimension of the measured variable Apart from an automatic dimension selection you can choose between the factors 10e-9 up to 10e9.
Units	Determines whether units are to be indicated or whether the indication works with normal or small characters.
Description	Determines whether the description of the measured variable is shown.
Calculate difference to	If checked the value shown is calculated from the difference between the original value and the value below.
Value	This value is the optional offset for the value shown.

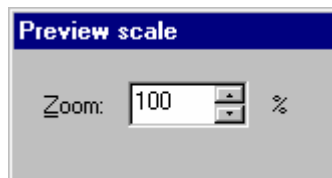
3.1.13 Addition to Flexible view

You can add directly a group of several measured variables to the large display via the following menu entries:

Star Voltage	3 star voltages
Phase-to-phase voltage	3 phase-to-phase voltages
Current	The currents in the 3 channels

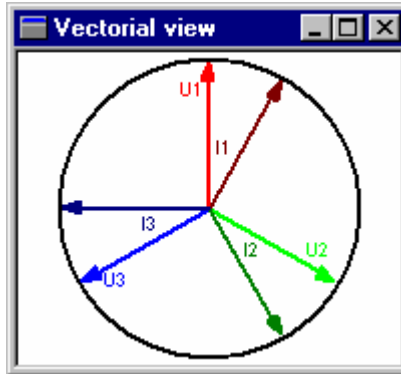
DC U	DC voltages in the voltage channels
DC I	DC voltages in the current channels
Angle U1 --> U	3 angles between U(channel 1) and U(channel x)
Angle U1 --> I	3 angles between U(channel 1) and I(channel x)
Angle U --> I	Angle between U(channel x) and I(channel x)
Active Power	Active power in the 3 channels
Reactive Power	Reactive power in the 3 channels
Apparent Power	Apparent power in the 3 channels
Power Factor	Power factor in the 3 channels
Total Powers	Total of the active, reactive and apparent power as well as the power factor.

3.1.14 Scaling for flexible view



After choosing page preview in the menu file for the flexible view the scaling of the printer output view is set with this dialog.

3.1.15 Vektorial view



This window shows the measured currents and voltages in a vector diagram. The vector display exists for an actual value measurement in progress as well as for an opened snap shot. In case of snap shot the header shows the moment when the indicated variables have been taken.

Only one vector display can be opened for an active actual value measurement and for each snap shot.

If the vector display is shown in the foreground the main menu of the control program indicates the menu command 'Vector Display' with the following entries:

Setup Determination of the color assignment

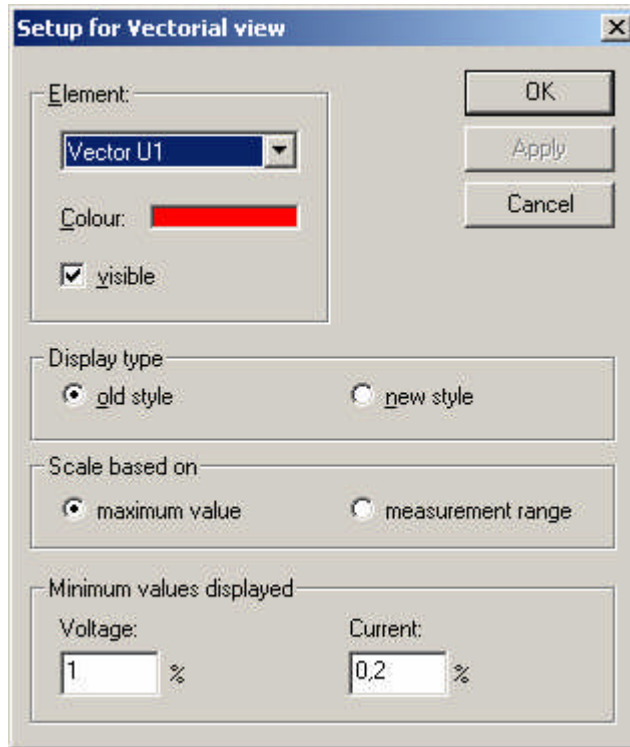
Here the dialog 'Phasor Diagram Adjustments' appears. You can determine the colors for the individual vectors here.

Summary view Opens the summary view.

Flexible view Opens flexible view for the variable selected.

You will find the same entries also in the Contextmenu of the vector display.

3.1.16 The dialog setup for vectorial view



In this dialog the representation of individual vectors in the phasor diagram can be parameterized.

First you have to select one element from the list box whose characteristics have to be changed. After that the screen color for this element can be changed via the entry field Color. The checkbox Visible determines whether the element should be drawn or not. In the box 'Display type' the arrangement of the vectors is set up:

old style

The angles apply to the angle of the voltage U1 and the origin of the angles ist vertical up.

new style

The angles apply to the angle of the current I1 and the origin of the angles ist horizontal right.

The section 'Scale based on' specifies the value which on which the maximum length of the vetors is based on:

maximum Value For all phases the maximum value is calculated. The lengths of the vectors is based on the maximum value.

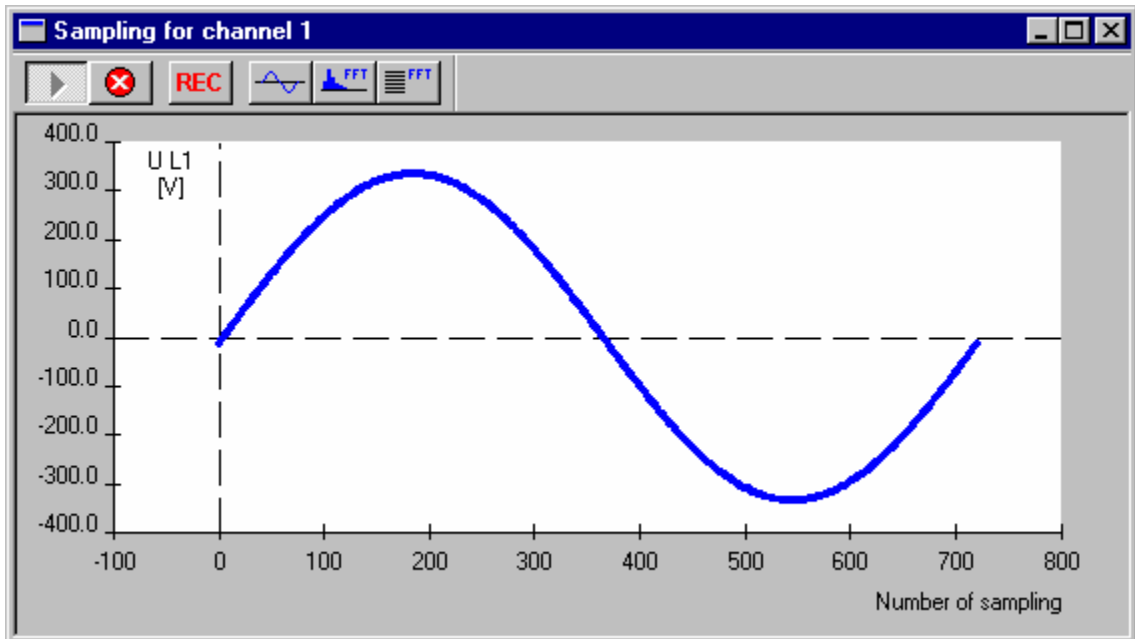
measurement range The maximum length of the vectors are the measurement ranges of the comparator.

To prevent from painting vectors when no values are switched on the limits can be set in the section 'Minimum values displayed'. In case a value is less than the value set, the vector is not painted.

3.1.17 Data sampling

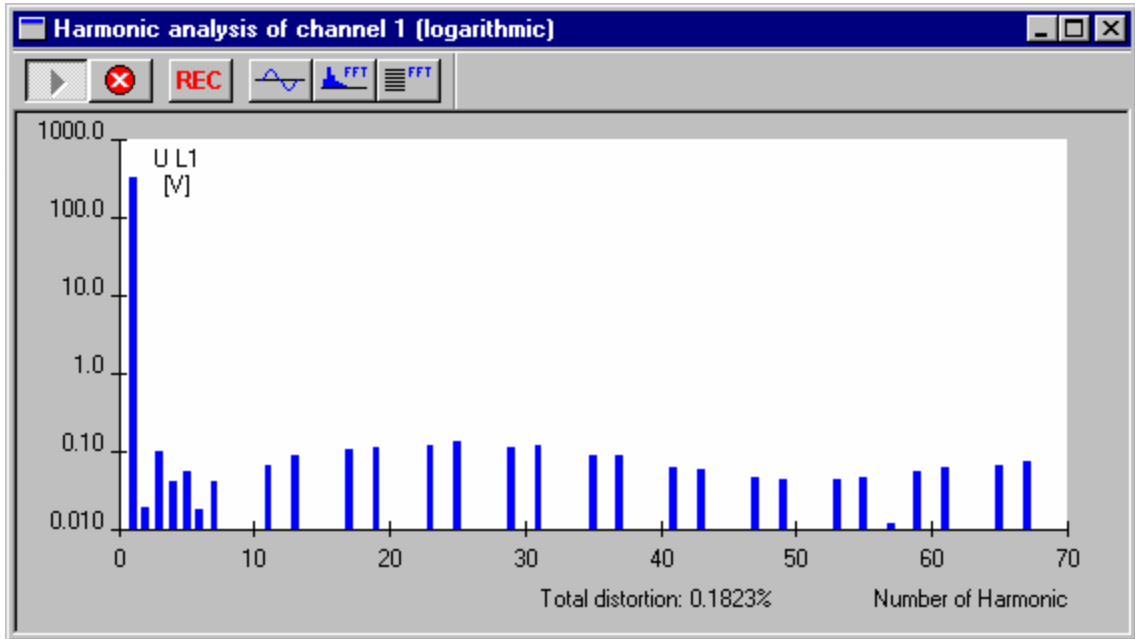
The comparator records the signal form for a preselected measuring channel for the duration of one period. The stored signal can be represented in the time intervall and in the frequency range.

Representation in time



The Signal always contains 720 samples.

Representation in frequency



The discrete calculation of the harmonics is more exact than FFT but needs more performance.

In the lower part of representation in frequency the total distortion of the measured curve is displayed. It is calculated by:

$$\sqrt{\frac{\sum_{i=2}^n U_i^2}{U_1^2}}$$

with U_i : Fouriercoefficient and n : count of coefficients

contain the following

Start



Starts data sampling.

The curve is recorded and displayed in certain time intervals.



During recording the toolbar shows

Stop



Stops data sampling.

Parameters

The dialog 'Setup for Sampling' will be opened.

Logarithmic display



The y-axis of the representation in frequency will be scaled logarithmic.

Show Curve

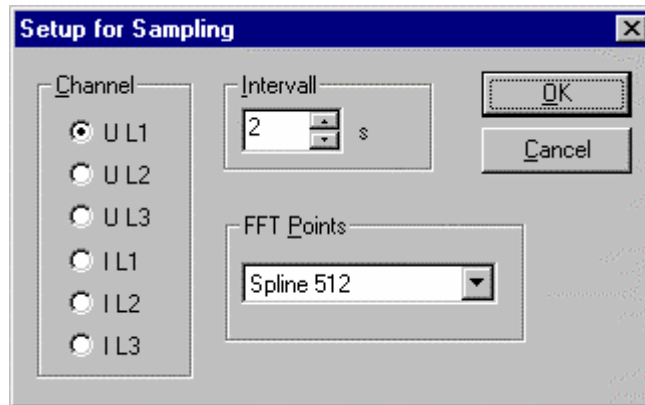


Shows a diagram with the samples in a

representation in time.

Show Analysis	Fourier		Shows a diagram with the samples in a representation in frequency.
Show coefficients	Fourier		Shows the coefficients of the harmonic analysis in a list representation.
Show Measurement			Shows the samples in the time representation.
Show Spline			Shows the spline on which the FFT is based.
Options			Opens the Dialog 'Graph view' for parametering the representation of the diagram.
Show Captions			You can determine here whether the diagram has a caption.
Enlarge region			If the dynamic scale mode is set you can enlarge the selecteted region to the full size of the diagram.
Dynamic mode	scale		While this mode is selected you can size the frame for enlarging by dragging it with the mouse.
Graph color			The color of the painting area of the diagram will be selected.
Background color			Selects the color of the background of the diagram.

3.1.18 The dialog setup for sampling



In this Dialog the settings for data sampling and harmonic analysis are made.

With **Channel** the source of the data is selected, which will be recorded and displayed.

In the field **Intervall** you can set the time between two recordings. This value should not be smaller than 2 second because recording of the 720 samples needs a certain amount of time.

With **FFT Points** you can select how the harmonic analysis will be calculated. The following methods can be chosen:

No Spline A discrete Fourier transformation with 720 samples will be calculated. The upper limit in spectrum is the 310th harmonic wave.

Spline 512 The recorded 720 samples are interpolated by a cubic spline. With this 512 new samples are calculated. These are transformed by FFT. The upper limit in spectrum is the 256th harmonic wave.

Spline 1024 The recorded 720 samples are interpolated by a cubic spline. With this 1024 new samples are calculated. These are transformed by FFT. The upper limit in spectrum is the 512th harmonic wave.

3.2 Comparison type measurements

3.2.1 General

With this term the following measurements are described:

- Energy comparison
- Comparison measurement
- Accuracy test for time/frequence

All of them is in common that the meter „compares“ external (e.g with power-proportional pulse count) impulses with internal pulses.

3.2.2 Energy comparison

This measurement compares the power proportional impulses from a test meter with internal generated impulses. The duration of the measurement is fixed by a definit time.

3.2.3 Comparison measurement

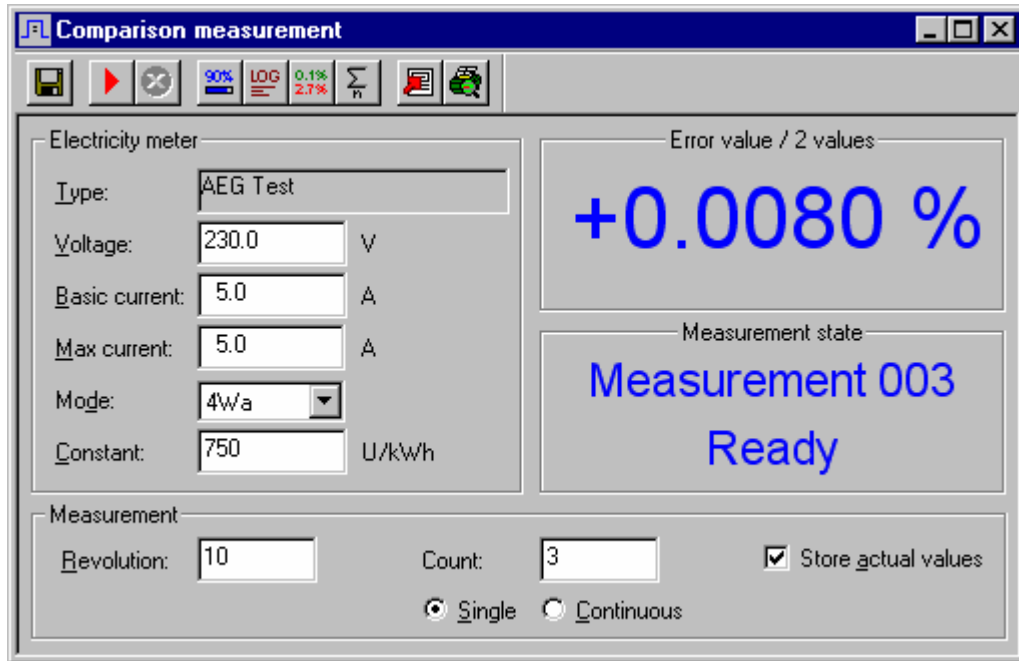
This measurement compares the power proportional impulses from a test meter with internal generated impulses. The duration of the measurement is fixed the count of impulses the comparator required to terminate the measurement.

3.2.4 Manual comparison measurement

3.2.4.1 How to do a manual comparison measurement



This operating mode serves for testing reference meters with rotor discs or LED indication. In this case the ZERA scanning head is connected to the socket „SC“ of the working standard.


The accuracy test is carried out by the working standard. The control program offers the following operator interface for controlling the measurement:



On the right side of the window the measurement result and the state of the measurement will be indicated. On the left side you will find the indication of the electricity meter and the testpoint values for the measurement which can be processed:

You can open a list with the available meter types via menu line 'Accuracy Test' / 'Selection List' of meter types.

You can start the comparison measurement with the button . You can stop the accuracy test with the button .

With the button  the results of the measurement will be stored in the selected result database. If the option 'store actual values' is selected the actual values are added to the results. By this protocols with vectorial display are enabled.

You will find additional commands for controlling the accuracy test in the menu comparison measurement or in the context menu of the window.

3.2.4.2 Comparison measurement: Measurement

The sequence of the comparison measurement is determined in 'measurement'. The following adjustments have to be made:

Revolutions Number of the rotor mark revolutions (pulses of the scanning head) for a single measurement

- Single** If marked the specified number of single measurements will be carried out. After that the measurement will be stopped automatically.
- In case several single measurements are carried out the result indication will show the average value of these measurements.
- Continuous** If marked the accuracy test will be carried out continuously. As soon as a single measurement is finished it will be started again.
- In case the entered number n of single measurements is > 1 , the result indication shows the sliding average of the last n single measurements.

As soon as more than one single measurement has been carried out the statistical distribution of single results will be indicated by pressing the button 'Statistics'.

3.2.4.3 Electricity meter

In this area the data of the meter to be tested is indicated. Normally the type-specific data is taken from the meter database.

The type 'Unknown' is available for fast tests. After selection of this type all other parameters are freely editable.

The following data has to be entered for a meter to be tested:

- Type** Short description of the meter.
- The name is taken from the database or is 'Unknown' for the user type.
- Voltage** Nominal voltage of the meter (in V).
- This field can only be processed for the user type.
- Basic Current** Basic current of the meter (in A).

Max. Current Maximum permissible current of the meter (in A).

Mode Measurement mode which should be used for the accuracy test

If all type data is taken from the database the kind of measurement is already specified.

In case of user type (Unknown) the listbox contains all kinds of measurements of the connected working standard.

Constant Meter constant of the meter (in Imp/kWh).

3.2.5 Manual energy comparison

3.2.5.1 How to do a manual energy comparison

This operation mode serves for checking working standards with power proportional pulse output. This output has to be connected to the socket 'fin' of the measuring meter.

The energy comparison measurement is carried out by the working standard. The control program offers the following operator interface for controlling the measurement:

Energy comparison

90% LOG 0.1% 2.7%

Sub standard meter

Type: TPZ 303

U range: 240 V

I range: 5 A

Mode: 4W/a

Frequency: 60000 Imp/s

Constant: 60000000 Imp/kWh

Error value / 5 values

-0.0072 %



Measurement state


Measurement

Time: 8 s Measurements: 5 Store actual values

Single Continuous

On the right side of the window the result and the state of the measurement will be indicated. On the left side you will find the sub standard meter indication of the setpoint values for the measurement which can be processed.

The energy comparison measurement is started with the button . It is stopped with the button .

With the button  the results of the measurement will be stored in the selected result database. If the option 'store actual values' is selected the actual values are added to the results. By this protocols with vectorial display are enabled.

You will find additional commands for controlling the energy comparison measurement in the menu energy comparison or in the context menu of the window.

3.2.5.2 Energy comparison: Measurement

The sequence of the energy comparison measurement is determined under 'measurement'. The following adjustments are necessary:

Duration Determines the duration (in seconds) of an individual measurement.

Single If marked the given number of single measurements is carried out. After that measurement is stopped automatically.

In case several single measurements are carried out the result display indicates the average value of these measurements.

Continuous If marked the energy comparison measurement is carried out continuously. As soon as a single measurement has been finished it will be started a new.

In case the given number n of single measurements is > 1 the result display indicates the floating-point average value from the last n single measurements.

As soon as more than one single measurement has been carried out the statistical distribution of single results are indicated when using the button 'Statistics'.

3.2.5.3 Sub standard meter

In this section you will find the data of the working standard to be tested. Normally this data is taken from the working standard database.

The type 'Unknown' is set for a fast check. After that all other parameters can be edited freely. Under 'kind of measurement' all available kinds of measurement of the presently connected device can be selected.

The following data must be entered for a working standard to be tested:

Type	Short description of the working standard. The name is taken from the database or is 'Unknown' for the user type.
U range	You can select the voltage range here. If the type data has been taken from the database the listbox contains all available voltage ranges. With the user type 'Unknown' please enter the voltage range as floating-point number.
I range	Here you can select the current range. If the type data has been taken from the database the listbox contains all available current ranges. With the user type 'Unknown' please enter the current range as floating-point number.
Mode	Here you can select the kind of measurement. If the type data has been taken from the database the listbox contains all available kinds of measurement. With the user type 'Unknown' the listbox contains all available kinds of measurement of the connected working standard.
Frequency	Working standard nominal frequency in Hz.

You can make an entry only if the field constant is empty or contains 0.

Or

Constant Meter constant of the working standard in Imp/kWh.

You can make an entry only if the field WS frequency is empty or contains 0.

3.2.6 Automatic comparison measurement

3.2.6.1 Preparation of the automatic comparison measurement


When carrying out the automatic accuracy test for the first time or measuring a meter type which is not available following preparations are necessary:



Creation or adaptation of the test table

The automatic accuracy test requires a test table which determines the measured variables with amount and angle as well as test parameters and error range:

menu line *Database* → Selection Edit *test table*.

Creation or Adaptation of the meter type table

When calling the function menu line *Database* → selection Edit meter database the request for a password will appear. In case the user has entered no password and will also in future use no one the entry field remains empty. The security request is terminated with the key .

The key  extends the meter database, the key  deletes marked entries from the database. The parameters must be entered in the table for the meter type to be tested. The parameters nominal voltage, basic current and kind of measurement together with the test table determine the load point.

Adjustment or alignment of the Scanning Head and checking the Measuring setup

You can apply the measured variable with the help of the Source Control. Adjust the scanning head and if necessary call the menu actual value in order to compare the applied measured variables with the indicated ones with reference to amplitude and phase angle.

3.2.6.2 Automatic comparison measurement

The automatic accuracy test serves for testing electrical consumption meters with rotor marks or LED display. The test table is executed automatically. The measuring set-up is identical with the one from the manual accuracy test.

The automatic comparison measurement is called by: menu line *Measurement* → *Automatic comparison measurement*

The steps to be taken before automatic comparison measurement are described in Preparation of the automatic comparison measurement

Selection of the test and meter table by clicking on the corresponding entry field or via the selection list of the menu line. The selected test table can be indicated in a window.

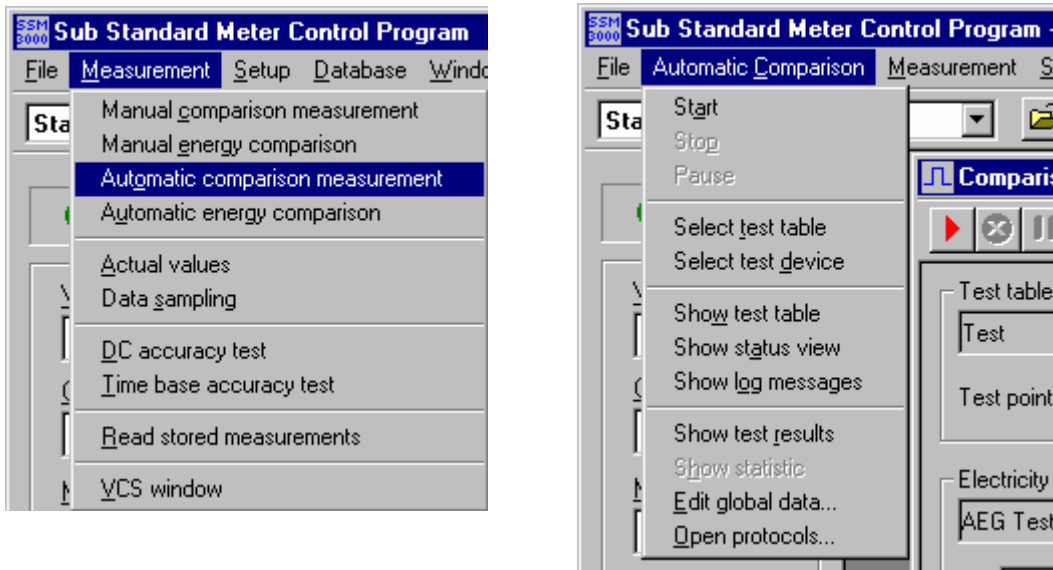
The screenshot displays the ZERA software interface for automatic comparison measurement. It consists of several windows:


- Comparison measurement (Main Window):**
 - Test table: Comparison Test
 - Test point: 3 until 5
 - Electricity meter: AEG Test
 - U: 230.0 V, IB: 5.0 A, Mode: 4LW
 - Measurement: 2 out of 2, Pulses: 5
 - State: Setup VCS
- Test tabl: Comparison measurement:**
 - Comparison Test
 - Nr 1: U = 100.0% I = 100.0%, Lf = 1.00/1 f = sync., Error interval: -0.10% - 0.10%, 2 measurement(s) with 5 pulses
 - Nr 2: U = 105.0% I = 105.0%, Lf = 1.00/1 f = sync., Error interval: -0.10% - 0.10%, 2 measurement(s) with 5 pulses
 - Nr 3: U = 100.0% I = 50.0%, Lf = 1.00/1 f = sync., Error interval: -0.10% - 0.10%, 2 measurement(s) with 5 pulses
 - Nr 4: U = 100.0% I = 100.0%, Lf = 1.00/1 f = sync.
- Log messages: Comparison measurement:**

Time	Log message
10:09:43	Single measurement started
10:10:02	Single measurement finished
10:10:03	Test point 2
10:10:06	Single measurement started
10:10:15	Single measurement finished
10:10:16	Test point 3
- Status view: Comparison measurement:**
 - Last error: +0.0020 %
 - Mean value: -0.0069 %
 - Count: 2
 - Remaining energy: 0.0 Wh
 - Ready: 0% (Progress bar)
- ERG Test result: Comparison measurement:**

Date and time	Mean value	Standard deviati...	Result
27/11/00 10:10:03	-0.0024	0.01266	Ok
27/11/00 10:10:16	-0.0069	0.00890	Ok

By selecting the field *Select test points* and entering values in the fields which are now editable a sub part of the test can be executed.



As soon as the measurement starts (click on ), the window *Log messages: comparison measurement* appears. The log messages display describes the progress of the measurement and in case of faults it indicates the corresponding error message. Indication of the test result and the statistics for the test points which have already been executed is possible also during the test in progress: menu line *Automatic comparison* → Selection *Show test result* and *Show Statistics*.

→ menu Automatic comparison

The test result is stored in a database result file *.ERG.

The test result and the statistics for the test points which have already been executed can be indicated during the test: menu line *Automatic comparison* → *Show test results/ Show statistics*.

3.2.7 Automatic energy comparison

3.2.7.1 Preparation of the automatic energy comparison measurement

When carrying out the automatic energy comparison measurement for the first time or measuring a working standard which is not available in the database with maybe new load points the following preparations are necessary:

Creation or adaptation of the test table

The automatic energy comparison requires a test table which determines the measured variable with amount and angle as well as test parameters and error range.

Expansion of the working standard type table

The working standard type table has already been prepared for some of the ZERA devices. Device types which are not available in the database must be added. In this case the device characteristics for REMOTE operation are to be considered. (see also in the device documentation: Interface description).

3.2.7.2 Automatic Energy comparison

The automatic energy comparison measurement serves for testing energy measuring devices with power proportional frequency output (e.g. working standard TPZ 303/306/308 among other things). In this case a load point table (test table) is executed automatically. The measuring set-up is identical with the one of the manual energy comparison measurement.

The frequency output f_{out} of the device to be tested is connected to the socket f_{in} of the reference device (for further details we refer also to the manual of the measuring device, headword *Frequency input / output* resp. *Pulse input / output*).

With the energy comparison measurement the reference device proportiones an energy amount which can be specified, measures the power proportional pulses during the time of the dosage and carries out an evaluation of these pulses.

The dosage energy E_{Dosage} is calculated as follows:

$$E_{Dos} = 3 \cdot U_{Range} \cdot I_{Range} \cdot T_{Measure}$$

with

U_{Range} ... Voltage measuring range of the reference device

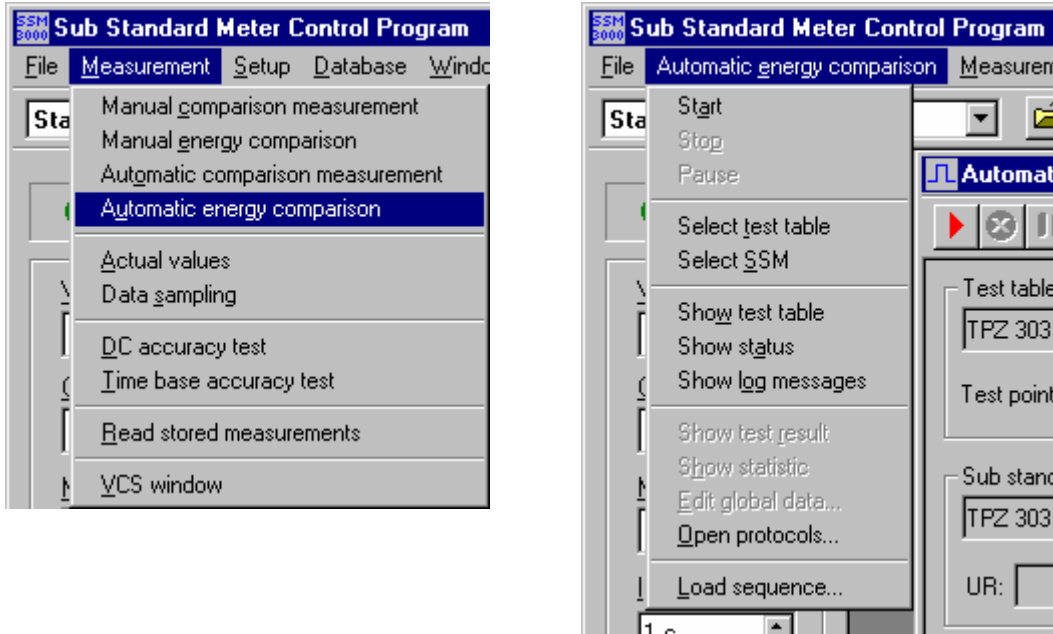
I_{Range} ... Current measuring range of the reference device

$T_{Measure}$... min. measuring time → Parameter in the test table.

Remark: In case the test setting exceed or fall below the nominal range U_{Range} or I_{Range} the actual integration period is shorter or longer than the time entered in the test table

Tintegration period.

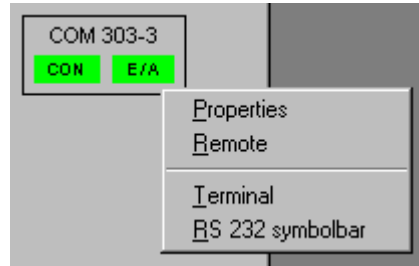
The automatic energy comparison measurement is called by: menu line *Measurement* → *Automatic Energy comparison*.




The test and device tables can be selected by a mouse click on the corresponding entry field or via the selection list in the menu line. The selected test table can be indicated in a window. By selecting the field *Select test points* and entering values in the fields which are now editable a sub part of the test can be executed.



After the selection of the working standard type table the device icon appears which can be relocated with the pressed left mouse key to the comparator window.



When using the right mouse key a context menu appears.

As soon as the measurement starts (click on ) , the window *Sequence-of-event display: Automatic Energy comparison* appears. The sequence-of-event display describes the progress of the measurement and in case of faults it indicates the corresponding error message.

Indication of the results for the test points which have been already executed is possible also during the test: menu line *Automatic test* → Selection *Indicate test result*.

→ menu Automatic test

→ Communication problems with reference or device to be tested

The test result is stored in a result database *.ERG.

Indication of the results for the test points which have been already executed is possible also during the test: menu line *Automatical table* → Selection *Indicate test*

The screenshot displays the ZERA software interface with several windows:

- Automatic energy comparison:** Shows test table 'TPZ 303 Calibration', test points 3 to 164, sub-standard meter 'TPZ 303', and measurement parameters (UR: 60V, IR: 500mA, Mode: 4W/a). The status shows 'Test: 24%'.
- Test tabl: Automatic energy comparison:** Lists three test points (Nr 1, Nr 2, Nr 3) with their respective parameters and error intervals.
- Log messages: Automatic energy comparis...:** A log table showing the sequence of events:

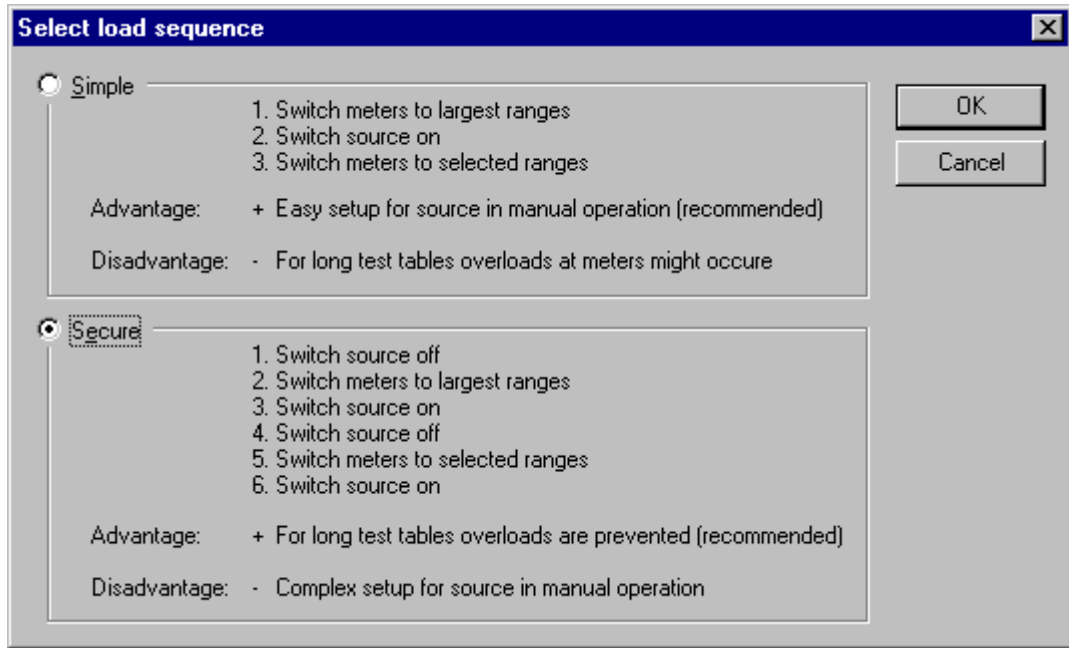
Time	Log message
09:59:15	Single measurement finished
09:59:17	Test point 2
09:59:34	Single measurement started
10:03:06	Single measurement finished
10:03:07	Test point 3
10:03:25	Single measurement started
- ERG Test result: Automatic energy comparison:** A table showing the final test results:

Date and time	Mean value	Standard deviation	Result
27/11/00 09:59:16	-0.0013	0.01312	Ok
27/11/00 10:03:07	-0.0043	0.01192	Ok
- Status view: Automatic energy comparison:** Shows energy and pulse statistics:

Last error:	-0.0141 %
Mean value:	-0.0141 %
Count:	1
Remaining energy:	433.3 mWh
Remaining pulses:	1.0 MImp
Energy:	133.3 mWh
Pulses:	320.0 klmp

result.

3.2.7.3 Selection of the load sequence



This dialog selects the sequence for switching the devices during change of test point for automatic energy comparison measurement. The following options are available:

Simple After selection of this option the devices are switched as follows:

1. Switch meters to largest ranges
2. Switch source on
3. Switch meters to selected ranges

This version can be used for manual setup of the source, short test programs or sources with ramp switching.

Secure This selection results in the following sequence:





1. Switch source off
2. Switch meters to largest ranges
3. Switch source on
4. Switch source off
5. Switch meters to selected ranges
6. Switch source on







This sequence offers more security regarding to overflows, which are caused by spikes when modifying the loads at the source directly and modification of the meter ranges with source switched on (change of burden).

3.2.8 Displays / Settings for comparison type measurements

3.2.8.1 The menus / toolbars for comparison type measurement

The following commands are available in the menu energy comparison and in comparison measurement as well as in the corresponding context menus:

Start		Start of measurement
Pause (only automatic tests)		Interruption of the test without switching off the load. The test sequence can be continued.
Stop		Stop of measurement
Show statistic		Indicates the distribution of the errors measured last.
Delete statistic (only manual tests)		Deletes an existing distribution of the error values.
Print statistic (only manual tests)		Prints the distribution of the error values measured last.
List SSM / meter types		Shows a list with all available types of (sub standard) meters. With drag & drop a meter can be selected for the test.
Select SSM / meter type		Shows a list with all working standards. Here you can select a type whose data is transferred to the energy comparison measurement.
Select test table (only automatic tests)		Opens the list of the available test table databases. After selection of the database a

Show test table		table within this database can be selected. Opens a window with the test table in use. The current testpoint is selected automatically.
Reset type data (only manual tests)		Deletes the current type data. After that you can enter any data for the type-specific parameters.
Store (only manual tests)		Stores current error value in a comparison measurement database. In case no database has been assigned yet the dialog 'Open' appears in order to select a database. This database will be opened then and the error value is stored there. If a database has already been assigned the error value is stored there.
Format		Opens the dialog 'Determine Number Format'. Here you can determine the display of error values.
Show measurement state		Indicates the state of the measurement in a new window.
Show log data		Opens a window which displays the log information of the current measurement.
Show test result		Opens a window with the results of the current measurement.
Edit global data		Opens a window for editing the global data of the

protocols.

Open protocol



Opens the SSM 3000 protocols and selects the results for the actual measurement.

3.2.8.2 Result Indication of comparison measurement

The field Error value shows the measurement result of the energy comparison or the comparison measurement. As long as a single measurement is carried out, the result of the corresponding last single measurement will be indicated here. If the test has been finished the average value of the last n single measurements will be indicated. The number n has been entered under 'measurement'. The number format for the error indication can be adjusted by using the menu command number format.

As soon as valid measurement results are available these can be stored in a database by pressing the button 'Store'. In this database the results are stored together with the current state of the working standard (ranges, mode, etc.) and the state of the meter. The database has always the extension *.erg.

The current state of a single measurement is indicated in the field 'Measurement State'. The abbreviations shown below have the following meaning:

Start / Stop A single measurement of the working standard has just been started or finished.

Measurement The working standard is waiting for the first meter pulse.
xx This message is only available in case of an accuracy test.

1. mark?

Measurement The xx.measurement has been started.
xx
started

Measurement The test was finished after xx single measurements.
xx

Ready

3.2.8.3 Statistic data

This graph shows the distribution of error values measured up to now for the energy comparison or comparison measurement.

For this purpose the value range between the smallest and the largest measured error value is divided into k intervals of the same size. After that it is counted for each of these intervals how many error values belong to this interval. This number is indicated on the y-axis of the graph.

The number of the intervals k and further adjustments can be changed via the menu statistics.

Beneath the distribution the following variables are indicated:

—	
x	Average value considering all error values
σ	Standard deviation of the error values
Min	Smallest measured error value
Max	Largest measured error value
N	Number of the considered error values

3.2.8.4 The dialog statistic view options

In this dialog you can make the following adjustments for the graphic indication of the error value distribution:

Number of Intervals Here you can enter the number k of the intervals for “Counting“ the error values. The value range between the smallest and the largest measured error value is divided into k intervals of the same size. If the corresponding field has been marked selection of the intervals is carried out automatically.

Max Value Enter here the maximum value for scaling the y-axis. If the corresponding field has been marked the maximum value is determined automatically.

Lower Limit Here you can enter the smallest error value for scaling the x-axis.

If the corresponding field has been marked the lower limit is determined automatically.

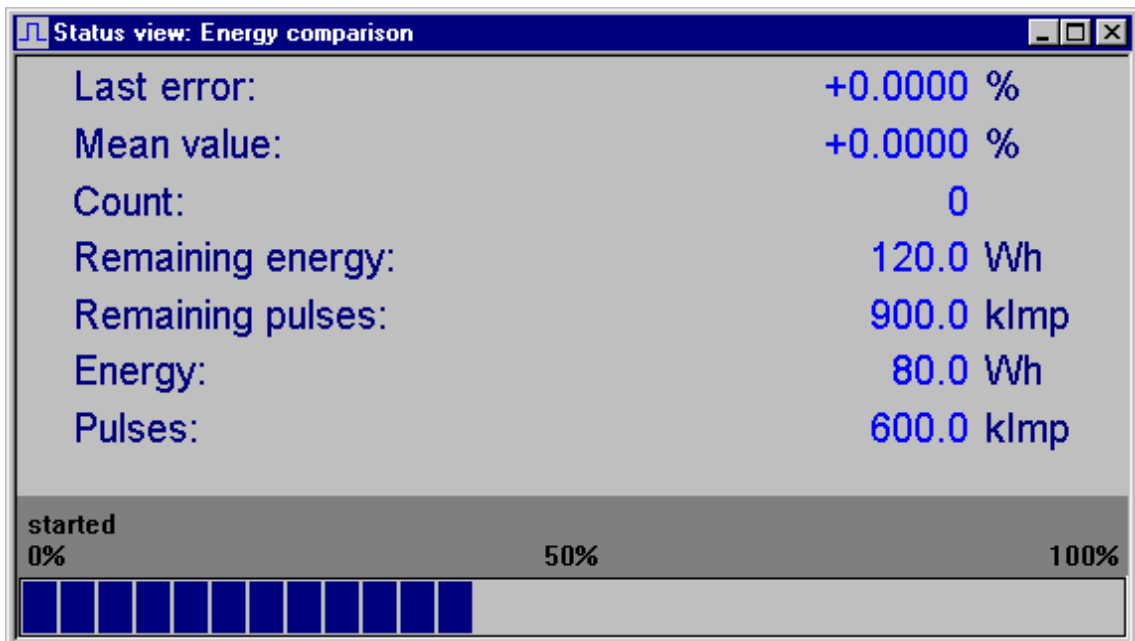
Upper Limit Enter here the largest error value for scaling the x-axis. If the corresponding field has been marked the upper limit is determined automatically.

Standard deviation Here you can enter whether the standard deviation of the error values should be visualized in the graph with a colored bar.

Mean Value Here you can enter whether the average value of the error values should be visualized by a line in the graph.

Single value Here you can enter whether the individual error values considered in the distribution should be represented by small strokes beneath the x-axis.

3.2.8.5 Status view for measurement



This window shows the state of an energy comparison or a comparison measurement

which is continually updated. The header shows the test to which the status indication refers.

The values indicated in this window can be selected freely from a set of possible values. All permissible values are indicated in the Context menu of the window. By selecting an entry of this menu the indication of the corresponding entry is switched on or off. An already indicated entry can also be deleted with a double click on this entry.

At the lower part of the window the progress of the current test is visualized by a progress bar. Above this bar the state of the test is indicated.

The following single values can be indicated in the status view:

Last Error	Error Value
	During a test the test result of the single test carried out last is indicated here.
	After the test has been finished the average value of the last n single measurements will be indicated. The number n is determined in measurements.
Energy	Measured energy
	The currently incoming energy for a test in progress is indicated here.
Remaining Energy	Energy remaining until the end of the current single test.
Pulses	Counted pulses
	The number of the just incoming pulses for a test is indicated here.
Remaining Pulses	Number of pulses which still must run in before the end of test.
Number	Number of the single measurements which has already been

carried out

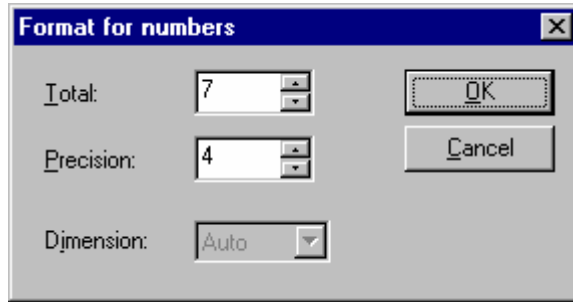
Remark:

Only in case of the energy comparison measurement the values for energy / remaining energy and pulses / remaining pulses are delivered by the connected working standard. With an accuracy test the values are calculated by the PC on the basis of the passed time. Therefore it may be possible, in this case, that the indicated values are not identical with the real measured values. But the error value indicated at the end of a test has always been measured by the working standard!

The context menu of the window resp. the menu of the comparison measurement contains further commands:

- | | |
|-------------------------|--|
| Format numbers | Opens the dialog format for numbers for determining the format.
In this dialog the format of the clicked on entry can be worked on. |
| Content | Opens the dialog for selecting the displayed variables |
| Progress Bar | Switches on or off the indication of the progress bar at the lower part of the window. |
| Show statistic | Indicates the distribution of the error values measured last. |
| Delete statistic | Deletes an existing distribution of the error values. |
| Print Statistik | Prints the distribution of the error values measured last. |

3.2.8.6 The dialog format for numbers



This dialog sets the display format of error values.

Total Enter here the number of the digit positions for labeling the analogue display (pre-decimal positions + decimal point + decimal positions).

Precision Enter here the number of the decimal positions for labeling the analogue display.

Dimension Here you can enter the dimension (e.g. kilo, milli, ..) of the measured variable to be represented or you select 'Automatic' for an automatic determination of the dimension.

Total sets the number of digit positions for the display of numbers (pre-decimal positions + decimal point + decimal positions).

At 'Precision' enter the number of decimal positions.

The value 'Dimension' sets the dimension (e.g. kilo, milli, ..) of the measured variable to be represented. Select 'Auto' for an automatic determination of the dimension.

3.3 Accuracy tables

3.3.1 General

The comparator contains separate accuracy tests for calibrating its meter with external normals in regular time periods. The results of an accuracy test is stored in databases with *.ref extension.

3.3.2 DC accuracy test

This function serves for testing the 6 measuring channels with a highly accurate DC voltage source. The DC source has to be connected to the input Uref.

ATTENTION: Disconnect all voltages and currents from the inputs!

The DC reference measurement is controlled by the menu Reference measurement, by the context menu or by the toolbar.



No	Date / time	U [V]	n	DC1 ppm	DC2 ppm	DC3 ppm	DC4 ppm	DC5 ppm	DC6 ppm
1	27/11/00 10:23:36	1.000000	5	-412.2	247.1	551.9	488.6	31.1	-1369.8
2	27/11/00 10:23:46	1.000000	5	659.0	-573.8	-2410.7	-1604.0	1015.8	252.0
3	27/11/00 10:23:57	1.000000	5	-1029.2	-1443.0	202.4	-2075.2	172.4	-1984.0


Before starting the measurement the following settings have to be entered in the input fields of the toolbar:

In the field 'U' the voltage of the reference voltage source has to be entered.

In the field 'N' you have to enter the number of the measurements which are to be the basis for the average value.

If the comparator has more than one DC-input (e.g. COM 303-3, COM3000...) the range can be set by the field "UR".

After the start of the measurement (key ) the currently measured DC voltages are indicated for all 6 channels in the upper part of the window. With the key  the currently measured values are transferred to the table together with the current settings.

By activating the key  the values are stored automatically when the count ("n") of measurements has raised to the value set in the field "N".


The columns of the table have the following meaning:

No Current number of the measurement.

Date/Time	Time (date and time) of the measurement
U	Voltage of the reference voltage source
N	Size of the Moving-Window filter
DC 1 – DC 3	Error of the voltage channels (in ppm).
DC 4 – DC 6	Error of the current channels (in ppm).

The error values stored in the table are calculated on the basis of the entered setpoint values in [ppm]. If the data filter is switched on the table shows only the measured values which have been calculated at the just active setpoint values for U and n.

All test results indicated in the table are automatically transferred to a database. In such a reference measurement database any amount of results can be stored one after the other. Databases containing reference measurements have always the data extension < *.REF >.

A stored reference measurement can be opened via  in the toolbar of the main window. For this purpose you must select the open dialog under file type "Reference measurement (*.ref)". The header of the application shows the file name of the opened database.

3.3.3 Time base accuracy test

This kind of measurement serves for testing the internally used quartz oscillator. Two kinds of tests are possible:

Measurement of the nominal frequency of the working standard:

For this purpose you must connect a frequency meter at the output "fout" of the working standard.

Comparison of the nominal frequency of the working standard








For this purpose you must connect a highly precise external pulse source, e.g. a DCF 77-normal frequency receiver or a highly precise frequency generator to the input "fin" of the working standard.




The measurements are controlled via the menu Reference measurement, via the context menu or via the toolbar.

The test results can be stored together with the time of the measurement in a database. In such a reference measurement database any number of results can be stored one after the other. Databases containing reference measurements have always the data extension < *.REF >.

3.3.4 The menu accuracy test

The menu **Reference measurement** and the toolbars of the **DC Reference measurement / Time Reference measurement** contain the following commands:

Start		Start of the reference measurement
Stop		Stop
Frequency		Output of the working standard nominal frequency.
Add record		Stores measured error values in the table
Delete record		Deletes marked data record from the table
Auto Storage		By activating the values are stored automatically when the count ("n") of measurements has raised to the value set in the field "N".
Data filter		Switches on or off the data filter In case of switched on data filter only the measurement values are indicated in the table which are calculated at the setpoint values indicated in the toolbar of the window.
Format		To determine the number format for the measured values

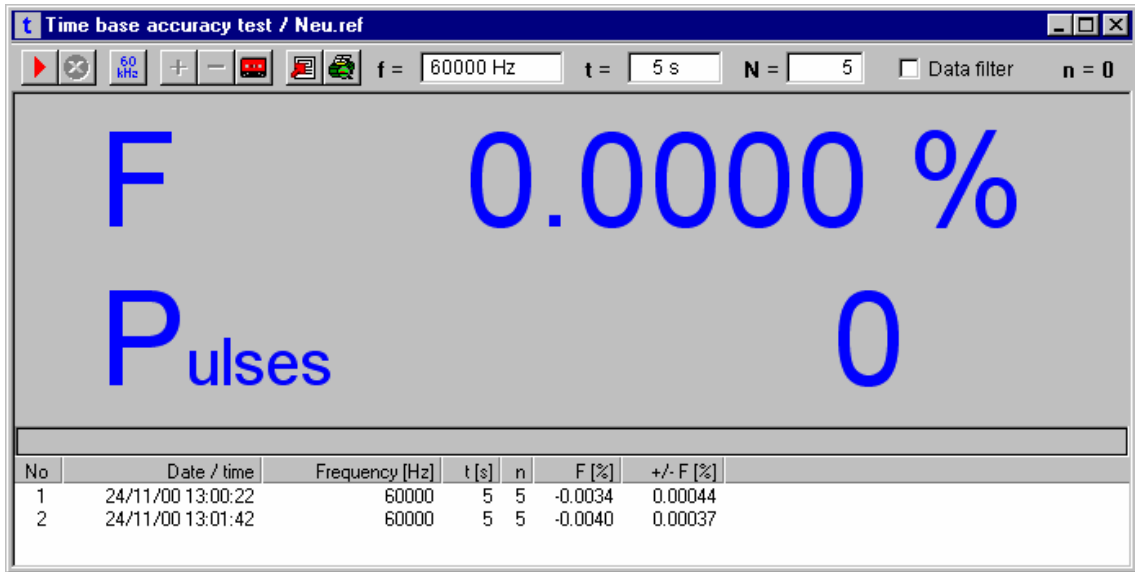
Graph		To show the measured values stored in a table in a graphics display.
Text color		To determine text color for the measured values.
Background color		To determine background color for the measured values
Font		To determine type font for the measured values.
Global data record		Opens a window for editing the global data of the protocols.
Protocol		Opens the SSM 3000 protocols and selects the results for the actual measurement.
Excel Export		By selecting this function the results can be stored in a MS-Excel file

3.3.5 Measurement of the nominal frequency

The internally generated quartz frequency usually has 60 kHz. You can adjust this frequency via the context menu of the working standard window. This frequency can be measured at the output "fout".

For starting the frequency please use the icon "60 kHz". After that the special kind of measurement MQREF will be selected and the nominal frequency will be output.

3.3.6 Comparison of the nominal frequency






Before starting the measurement you have to enter the following setpoint values in the input fields of the toolbar:

Please enter the frequency of the highly precise external pulse source in the field “f”.

Please enter the time for the measurement in field “t”.

Please enter the number of the measurements value in the field “N”. This value will be the basis for the average value in the result.

After starting the measurement (key ) the currently measured error value and the received pulses are constantly indicated in the upper part of the window. With the  key the current measurement values are transferred to the table together with the just valid setpoint values.

By activating the key  the values are stored automatically when the count (“n”) of measurements has raised to the value set in the field “N”.

The columns of the table have the following meaning:

No Current number of the measurement.

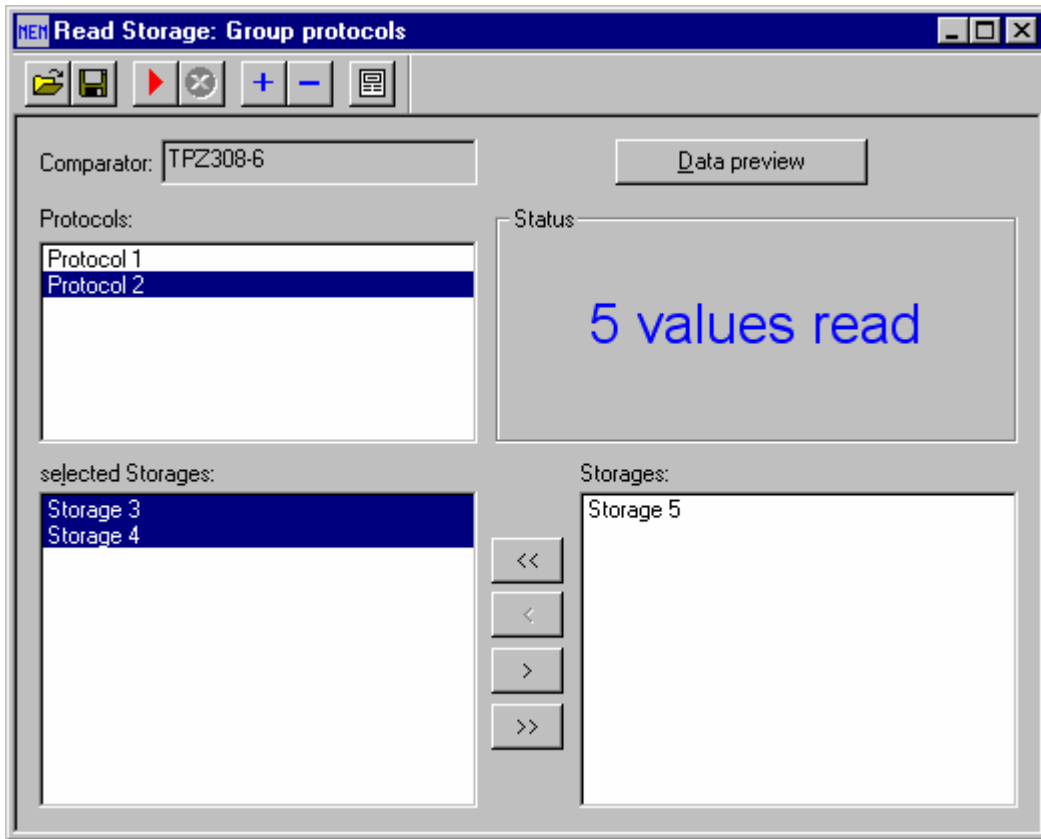
Date/Time Time (date and time) of the measurement

Frequency Frequency of the frequency generator

T	Measuring time in seconds
N	Size of the Moving-Window filter.
F	Error value in %.
+/- F	Standard deviation of the error value (in %).

If the data filter is active only the measurement values are indicated in the table which have been calculated at the just active setpoint values for f, t, and n.


3.4 Reading of stored measurements












After selecting the menu 'Measurement/Read stored measurements' the following window appears.

It serves for the controlling and organization of stored measured values of the devices TPZ 306 and TPZ 308. The main function of this dialog is to group the unstructured memory contents into protocols.

In the upper area of the window there is a display which indicates which device was the source of the current data. Among this the selection of the protocols and a status indication for the last action are displayed. Within the lower area those storages are displayed which belong to the current protocol and a pool of those which are not assigned yet. For taking control the following buttons or menus serve:

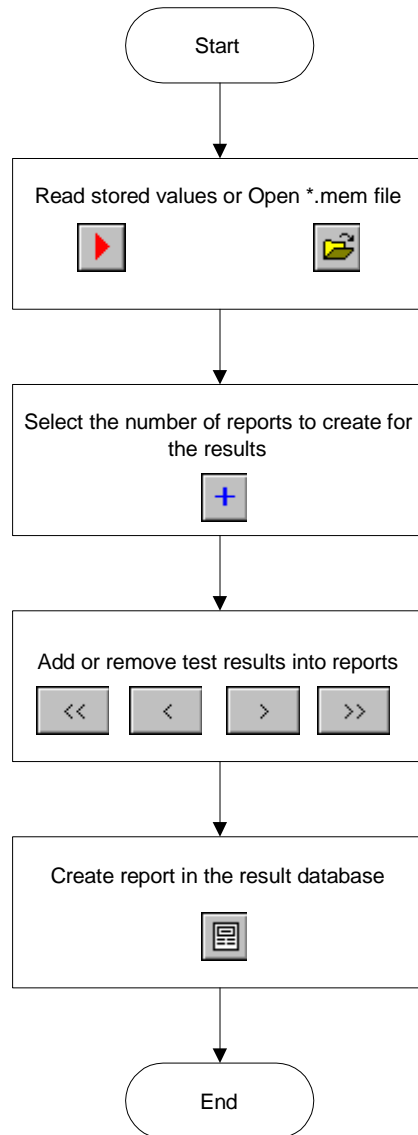
Button	Menu	Description
	Read data	Hereby the reading of the device memory is started. During the reading the progress within the status area of the window is displayed. After termination the number of read (= occupied) memory is displayed here. The list of 'Storages' is filled with the occupied memory positions.

	Abort reading	A running read process can be aborted by selecting this option. In the status area the abortion is displayed.
	Preview	A view with the table of data read out is opened. This representation is very helpful for grouping the protocols.
	Add protocol	This option adds a new empty protocol at the end of the list of protocols.
	Delete protocol	The current selected protocol will be deleted by this command. All storage positions which were already selected for this protocol are added in the field 'Storages'.
	Create protocols	By running this command at first a dialog for selecting a result database appears. Then the global data for each protocol can be set. If this process will not be canceled the protocols are written to the database.
		All storage positions which are not selected yet will be added in the current protocol.
		The selected storage positions which are not yet assigned to protocols will be added to the current selected protocol.
		The already assigned storages of the current protocol which are selected will be removed from the current protocol and can be assigned to other protocols.
		All already assigned storages of the current protocol will be removed from the current protocol and can be assigned to other protocols.
	Save data	The contents of the window and the data of the storages will be stored in a file with the extension *.MEM.



Open data Stored contents and data can be restored from a file.

For creating a report from the measurements the following flow chart is suggested:



4 Databases

4.1 General

The SSM 3000 application manages the contained data with several databases. All these databases are created with Microsoft ACCESS version 7.0.

The application handles the following database types:

Test database	<p>These databases manages the test tables for energy comparison and comparison measurement.</p> <p>The test databases are stored in the folder for the user data. There can be more than one test database.</p> <p>Filename: < Filename >.PTB</p>
SSM database	<p>This database manages the type specific data for the sub standard meters. This data is used at energy comparison</p> <p>Filename: PZTYPEN.MDB</p>
Meter database	<p>This database manages the type specific data for meters. This data is used at comparison measurement</p> <p>Filename: ZTYPEN.MDB</p>
Snapshots	<p>These databases contains the results of a snap shot.</p> <p>Extension: *.IST</p>
Measurement results/ Stored measurements	<p>These databases contain the results of energy comparison, comparison measurement and reading of stored measurements.</p> <p>Extension: *.ERG</p>
Accuracy test results	<p>These databases contains the results of DC-/ and time accuracy tests</p> <p>Extension: *.REF</p>

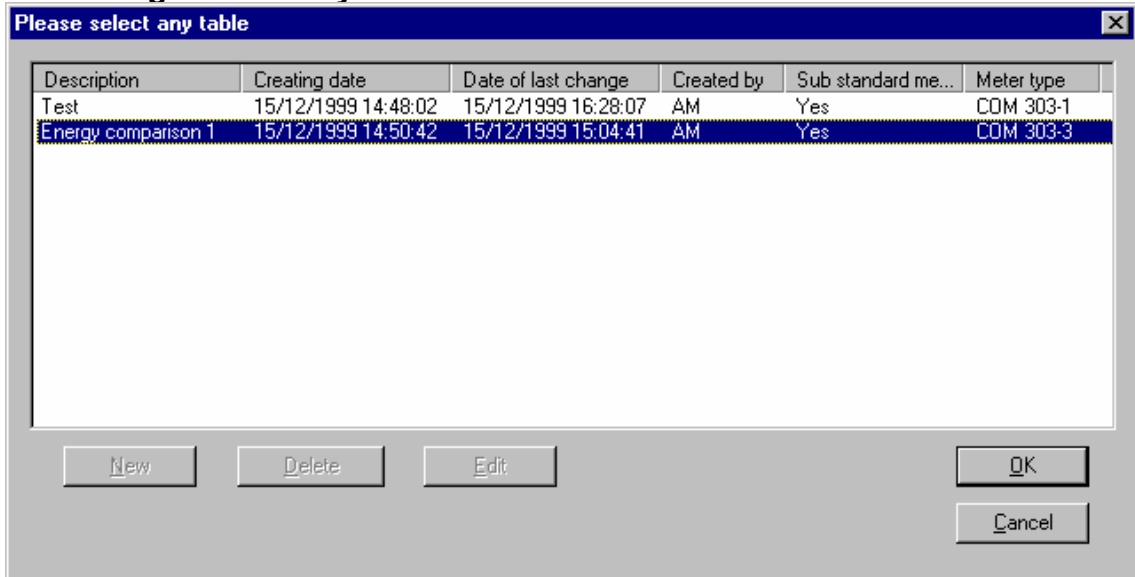
There can be more than one test-, snap shot- and result databases.

(→ Directory *UserData*).

All other databases only exist once

(→ Directory *Database*).

4.2 Dialog select entry



In this window a list of all electricity meters, that are stored in the sub standard meter database or in the electricity meter database are displayed. For clearness only the short name and the description of the type record is shown.

You have to select an entry from this list, either by a double click on a list entry or by selecting a list entry with the cursor keys followed by pressing the OK button. The data of the selected type are entered into the Energy comparison measurement or into the comparison measurement.

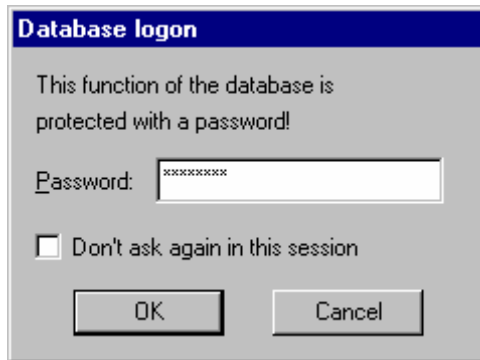
4.3 Entering global data

With this dialog the global data of the test protocol is set. This data appears on the first page of the protocol. In the field 'Description' a free text for the specification of the test can be set.

Description	Calibration of TPZ 303 at COM 303-3 1. Measurement ranged 10% max overloaded 2. ...
Test type	Automatic energy compare
Performed by	Andi
SSM type	COM 303-3
SSM id	34986324m-1489
Test device type	TPZ 303
Test device id	23489-234986

This text can be 255 (for result databases created with version before 2.10 only 120) characters long.

4.4 Dialog database logon

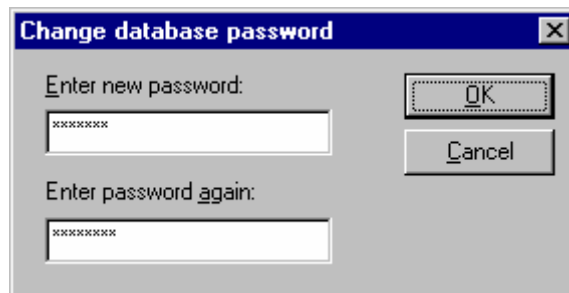


The access to the database functions of the COM 303 software is controlled by a password. In this dialog a valid password has to be entered in order to open the database functions.

After the COM 303 software has been installed, no password is necessary for accessing the database functions. Then you just have to leave the dialog by pressing the OK button without entering a valid password. If you want this dialog only once per session select the option 'Don't ask again in this session'.

After a password has been set in the dialog change database password, however, entering a valid password will be necessary each time you call the database functions.


4.5 Dialog change database password



In this dialog the password has to be entered, by which access to the database functions is restricted. For safety reasons, you have to enter a new password twice. The entered characters will be not displayed on the screen. The password protection can be deactivated by leaving both the editboxes empty. This dialog is activated by selecting the entry "Password" in the menu that belongs to the database window.

4.6 Snap shot

In a snap shot the database of the actual value measurement is frozen at a certain moment. The frozen measurement data is stored together with the time of the measurement and the state of the measuring instrument at that time (measuring range, kind of measurement, ...) in a database. In such a snap shot database any number of snap shots can be stored one after the other. Databases with snap shots always have the file extension < *.IST >.

A stored snap shot can be opened via  in the toolbar of the main window. For this purpose you have to select in the open dialog under data type 'snap shot (*.ist)'. The header of the application shows the file name of the opened database.

Similar to the actual value measurement different representation possibilities are available which are indicated in separate windows:

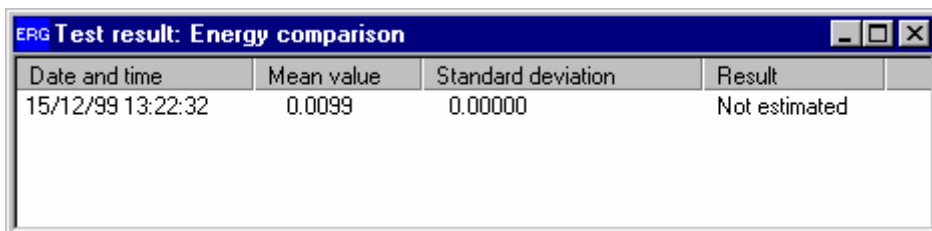
- Summary view
- Analogue view
- Flexible view
- Vektorial view
- y(t) Diagram

Only the y(t) diagram shows the measured variables in relation to the integration period. The other representation types show the data in relation to a fixed time. In this case the date and the time of the measurement are indicated in the header.

Moreover the indication windows of a snap shot unlike the indication of the actual value measurement contain their own toolbars and additional menu entries for leaving through the different data records in a snap shot database.

4.7 Measurement database

Single results of an energy comparison measurement or a comparison measurement can be stored in a database. The content of this database will be indicated in the window comparison measurement. In the header of this window the path name of the just opened database will always be indicated.



Date and time	Mean value	Standard deviation	Result
15/12/99 13:22:32	0.0099	0.00000	Not estimated

The database contains a data record for each stored measurement result. The table in this window contains a line for each of these data records. The columns of the table have the following meaning:




Date and time	Shows the moment (date and time) at which the measurement was carried out
Mean value	Shows the average error value of the last measurement (in %)
Standard deviation	Shows the standard deviation of the error value (in %).
Result	Here the results of the measurement are shown.

4.8 Meter databases

4.8.1 Edit type data

Editing records of SSM database or of electricity meter database is performed in similar windows described in the following.

To these windows the menus SSM database or meter database are assigned. In these menus and in the toolbars of the view, following commands are available:

Command	Symbol	Meaning
New record		Creates a new (empty) record in the database.
Delete record		Deletes the current selected record in the database.
Dialog view		Opens a dialog view and displays the current record in the dialog.
Tree view		Opens a tree view and marks the current record in the tree.
List view		Opens a list view and marks the current record in the list.
Voltage ranges		Opens the dialog edit ranges.

In this dialog you can define voltage ranges for the selected meter and edit all the data that are specific to voltage ranges.

Current ranges



Opens the dialog edit ranges.

In this dialog you can define current ranges for the selected meter and edit all the data that are specific to current ranges.

Measurement modes



Opens the dialog edit measurement modes.

In this dialog you can edit all the data that are specific to measurement modes.

Password

Opens the dialog Change database password.



Jumps to the first record.



Jumps to the last record.



Jumps to the previous record.



Jumps to the next record.

4.8.2 Databases for sub standard meters

4.8.2.1 Sub standard meter database

The sub standard meter (SSM) database contains all the type specific data for any SSM to be tested. In this database one record exists for each sub standard meter. These records can be used in the Energy comparison measurement in order to setup the measurement for testing the selected electricity meter.

For many of the ZERA high precision measurement devices in the SSM database type records already exist. For a list of sub standard meters you can use the command List SSM types in the menu Energy comparison.

By the command Edit SSM database in the menu Database you can edit the content of the SSM database.

For each SSM type in the database exist a record with the following structure:

Type data:

Meter name	Unique short name of the SSM type
Description	Description of the SSM.
Frequency	Nominal frequency at the power proportional frequency output [Hz]
Or	
Meter constant	Meter constant of the SSM [1/kWh]

For each voltage range of the SSM:

Description	Name of the voltage range
Full scale value	Voltage at which the range shows full scale [V]
Factor	Factor for calculating the power proportional frequency if this voltage range is selected.

For each current range of the SSM:

Description	Name of the current range
Full scale value	Current at which the range shows full scale [A]
Factor	Factor for calculating the power proportional frequency if this current range is selected.

For each measurement mode of the SSM:

Name	Unique short name of the measurement mode
Description	Description of the measurement mode
Factor	Factor for calculating the power proportional frequency if this measurement mode is selected.

The actual meter constant is calculated by multiplying the meter constant entered in the type data with the additional factor of the actual voltage range and with the factor of the actual current range and with the factor of the actual measurement mode.

The actual nominal frequency is calculated by multiplying the nominal frequency entered in the type data with the additional factor of the actual voltage range and with the factor of the actual current range and with the factor of the actual measurement mode.

By default these additional factors are initialised with 1.0. Therefore all ranges and modes are equal.

4.8.2.2 Dialog enter new SSM type

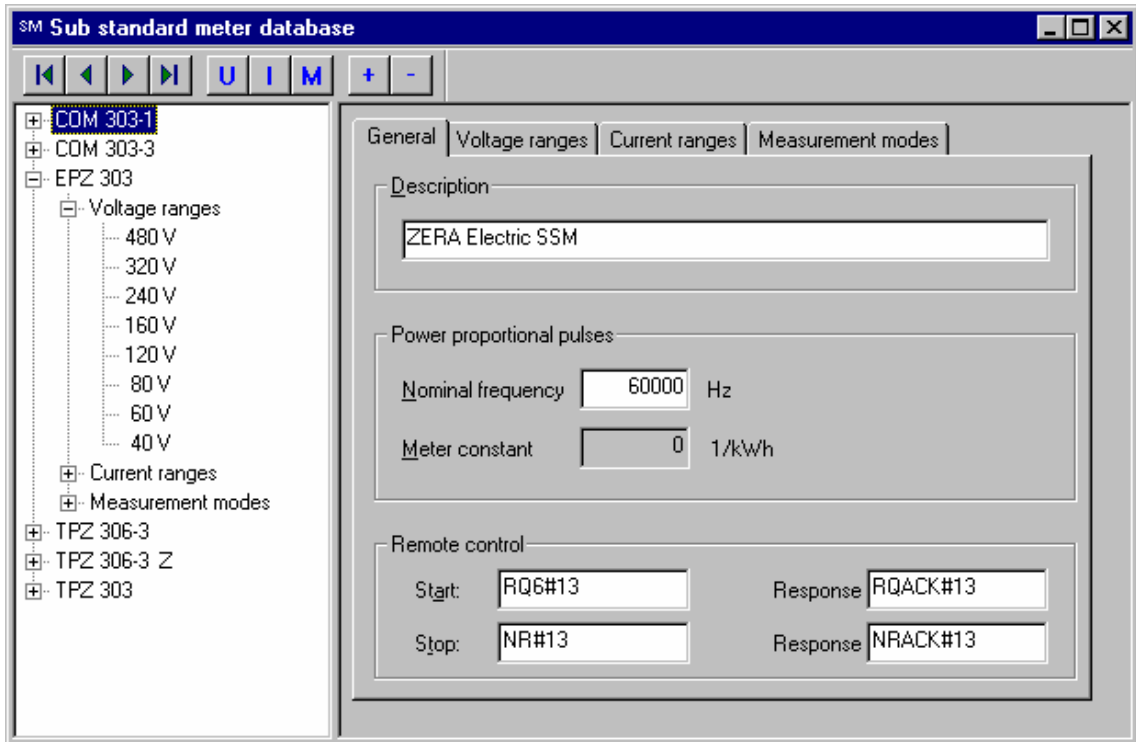
The dialog box titled "Enter new SSM type" contains the following fields and controls:

- Meter name:
- Description:
- Frequency output:
 - Frequency: Hz
 - or meter constant: 1/kWh
- Remote control:
 - Start: Acknowledge:
 - Stop: Acknowledge:
- Buttons:

To insert a new record into the sub standard meter database this dialog window will be opened. Here you have to enter the type data for the new SSM. At the beginning to the new electricity meter no voltage or current ranges and no measurement modes are assigned.

By pressing the cancel button the insertion process is aborted and the new record will be deleted.

4.8.2.3 The view SSM database



In this view all sub standard meter types stored in the SSM database are listed. The main entry of each type record shows the short name and the description of the sub standard meter.

Underneath each main entry the sub entries voltage ranges, current ranges and measurement modes exist, where all the voltage and current ranges and all the measurement modes of the SSM are listed.

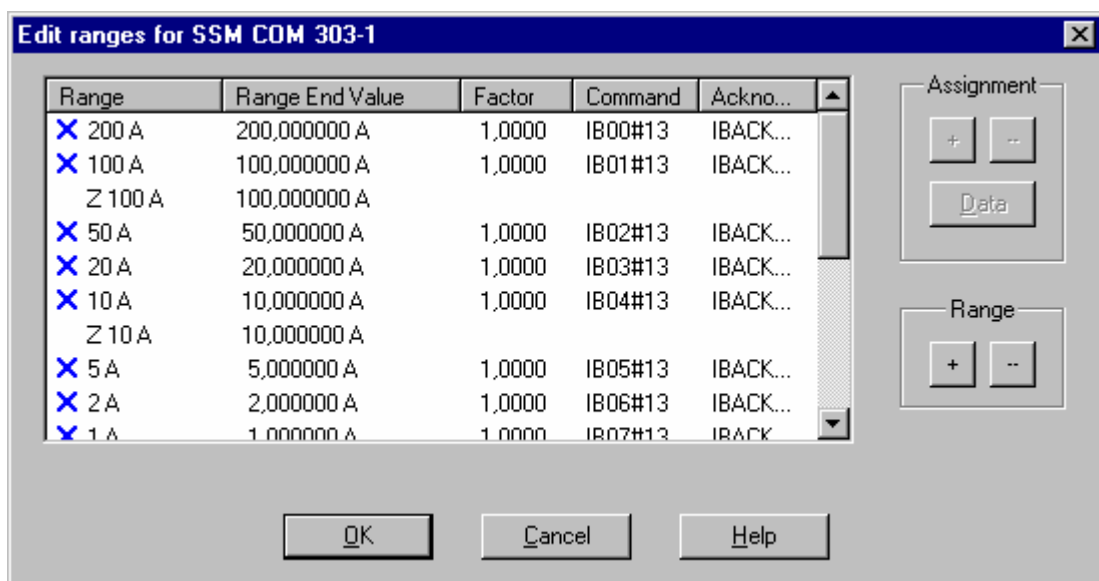
By Drag & Drop method a single voltage or current range as well as a single measurement mode can be copied from one type record to another record. Similar all ranges or modes of one type can be copied by simply dragging the sub-entry voltage ranges, current ranges, measurement modes and drop it over a second type entry. By a double click on a single voltage range, current range or measurement mode, a dialog window will be opened. Here you can edit all data that are specific to the ranges or modes. Additionally these dialogs can be opened by pressing the INS key while one of the sub-entries is selected. A selected voltage, current range or measurement mode can be deleted by the DEL key.

When a main entry is selected, pressing the INS key will insert a new (empty) type record and pressing the DEL key will remove the selected record from the database.

The tree view is useful for editing the voltage / current ranges or the measurement modes for a selected sub standard meter record. By a double click on one of the main entries, you can open the dialog view of the selected record. Here you can edit the type data of the selected meter type.

The setup of the energy comparison measurement for testing one of the listed electricity meters can be easily done using the Drag & Drop method.

4.8.2.4 Dialog edit ranges



In this dialog the voltage and current ranges assigned to a certain sub standard meter type can be edited. The short name of the SSM is displayed in the title bar of the window.

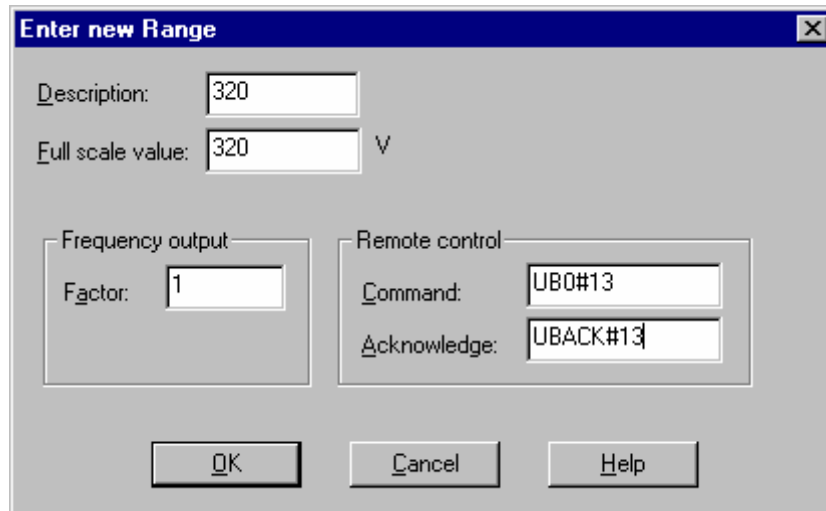
In the view a list of all known ranges are given. Whenever a entry is marked with ✕, this range is assigned to the electricity meter. By a double click you can toggle the assignment of a certain range. The same can be done using the buttons + or - in the box named assignment: The button + creates an assignment for a range that is marked in the list, the button - cancels an already existing assignment of a marked range.

By the button 'Data' you can edit those data, that are specific for a certain voltage or current range (e.g. factor for meter constant).

The buttons within the box named range can be used for editing the list of known voltage or current ranges. By the button + a new range is created, whereas by the button - an already existing range is deleted. However, only those range can be

deleted, that are not assigned to any type record. A message will be displayed, if you try to delete such a range.

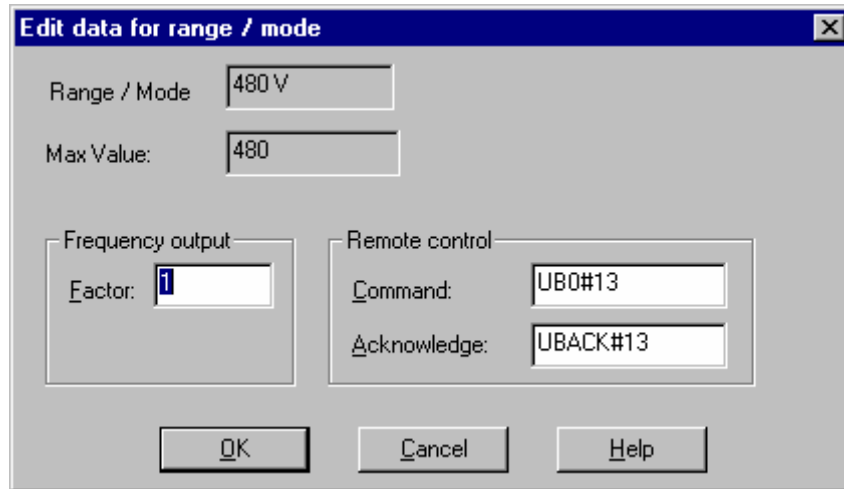
4.8.2.5 Dialog enter new voltage / current range



In this dialog the data, that is specific for a new voltage or current range is entered. For each voltage or current range the following data is stored in the sub standard meter database:

Data entry	Meaning
Description	Description of the range.
Full scale value	Voltage or current at which the range shows full scale.
Factor	Factor for calculating the power proportional frequency if this range is selected.
Command	Command to be send to the electricity meter for switching on this range.
Acknowledge	Sequence to notify the reception of the command.

4.8.2.6 Dialog edit data for range / mode

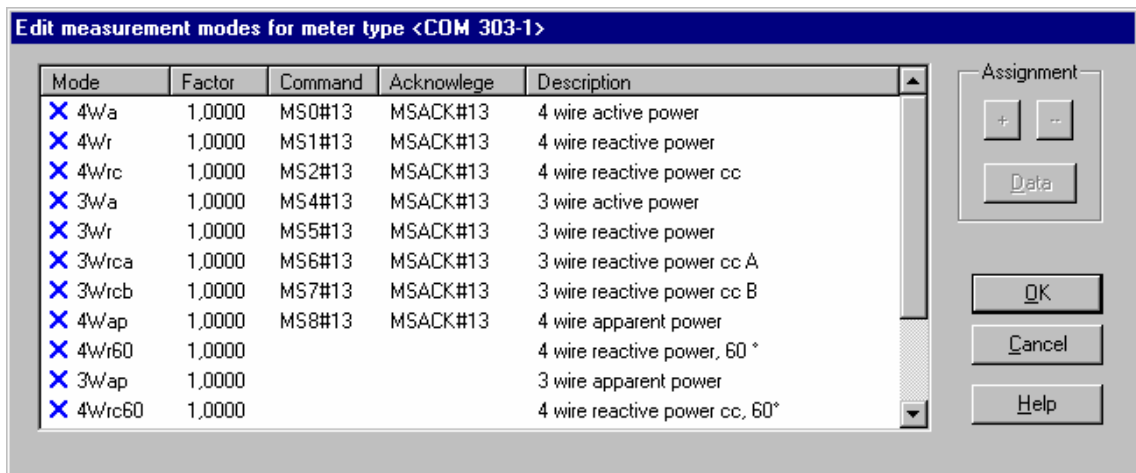


In this dialog those data, that are specific for the range or measurement mode described in the editbox Range / Mode can be edited.

The following data is stored in the sub standard meter database:

Data entry	Meaning
Description	Short name of the range / mode.
Factor	Factor for calculating the power proportional frequency if this range / mode is selected.
Start	Command to be send to the electricity meter for switching on this range / mode.
Stop	Command to send to the electricity meter for switching off this range / mode.

4.8.2.7 Dialog edit measurement modes



In this dialog the measurement modes assigned to a certain sub standard meter type can be edited. The short name of the SSM is displayed in the title bar of the window. In the view a list of all known measurement modes are given.

Whenever a entry is marked with , this mode is assigned to the electricity meter. By a double click you can toggle the assignment of a certain mode. The same can be done using the buttons + or - in the box named assignment: The button + creates an assignment for a measurement mode that is marked in the list, the button - cancels an already existing assignment of a marked mode.

By the button 'Data' you can edit those data, that are specific for a certain measurement mode (i.e. factor for meter constant).

The list of known measurement mode cannot be edited by the user.

4.8.3 Databases for electricity meters

4.8.3.1 Electricity meter database

The electricity meter database contains all the type specific data for any electricity meter to be tested. In this database one record exists for each electricity meter. These records can be used in the comparison measurement in order to setup the measurement for testing the selected electricity meter.

For a list of electricity meters you can use the command 'List meter types' in the menu comparison measurement.

By the command edit meter database in the menu database you can edit the content of the electricity meter database.

For each electricity meter type in the database exist a record with the following structure:

Type name	Unique short name of the electricity meter type
Description	Description of the electricity meter
Voltage	Voltage of the meter [V]
Basic current	Basic current of the meter [A]
Max current	Maximum current of the meter [A]
Mode	Measurement of the meter
Frequency	Operation frequency of the meter [Hz]
Ratio Up / Us	Voltage ratio for a transducer meter
Ratio Ip / Is	Current ratio for a transducer meter
Meter constant	Meter constant of the electricity meter [1/kWh]

4.8.3.2 Dialog enter new meter type

After a new record has been inserted into the electricity meter database, this dialog window will be opened. Here you have to enter the type data for the new meter.

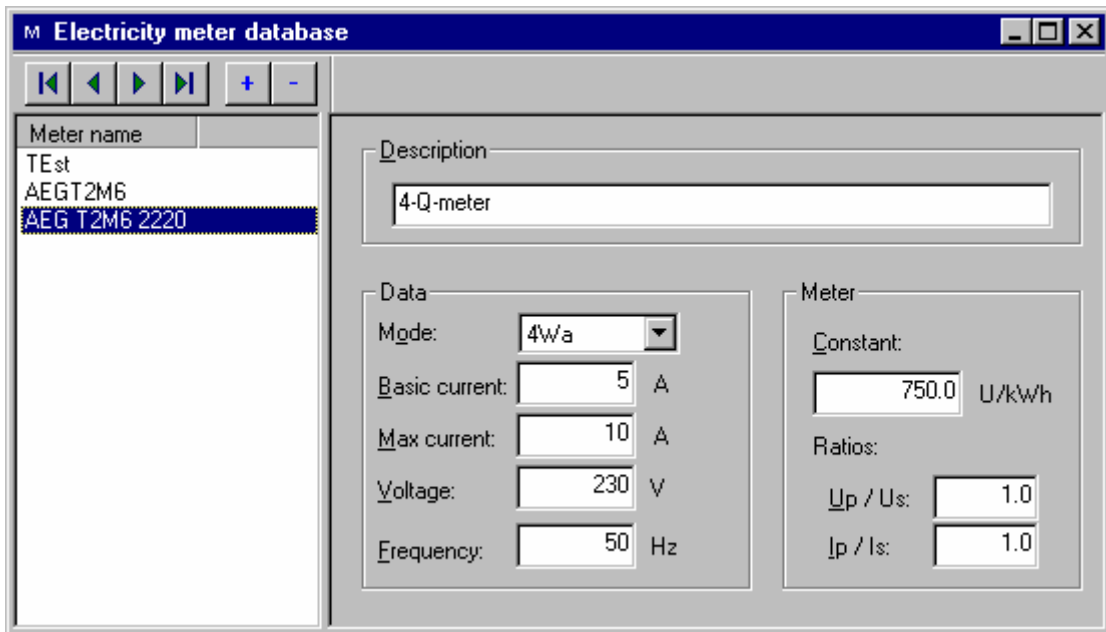
In the voltage editbox you can use the character **W** in order to enter a voltage that should be divided by $\sqrt{3}$ (i.e. 230W for $230 / \sqrt{3}$).

In the mode editbox the measurement mode must be entered using the short names that are shown in the comparator window.

The voltage- and current-ratios have to entered either as decimal number (i.e. 0.10) or as fraction (i.e. 10/1). In the last case the nominator describes the primary voltage.

By pressing the cancel button the insertion process is aborted and the new record will be deleted.

4.8.3.3 The view electricity meter database



On the left of this view a list with all of the stored electricity meter types is displayed. The data of a single record marked in this list is displayed in the right dialog view and can be edited.

In the voltage editbox you can use the character **W** in order to enter a voltage that should be divided by $\sqrt{3}$ (i.e. 230W for $230 / \sqrt{3}$).

In the mode editbox the measurement mode must be entered using the short names that are shown in the comparator window.

The voltage- and current-ratios have to be entered either as decimal number (e.g. 0.10) or as fraction (i.e. 10/1). In the last case the nominator describes the primary voltage.

4.9 Test tables

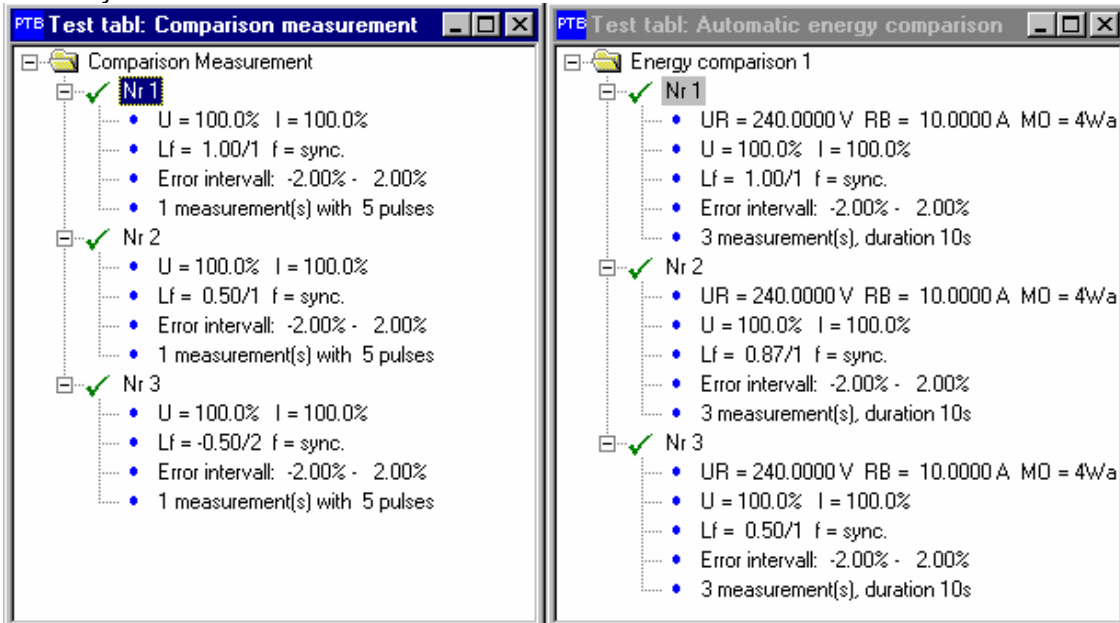
4.9.1 General

The prerequisite for carrying out an automatic comparison is the existence of a suitable test table. This is necessary for the automatic comparison measurement as well as for the automatic energy comparison measurement.

After calling the automatic comparison measurement or the automatic energy comparison measurement the test and meter table must be selected by clicking on the corresponding entry field or via the selection list of the menu line. The selected test table can be indicated in a window.

For processing the test tables call the menu line *Database* → *Selection Test table*. A selection window appears which indicates all existing databases in which test tables are stored: *<Databasename.ptb>* .

With the first call no database with test table exists so that no entry can be found in the database selection window. The test table database is stored in the measuring position directory.



The file name for the test table database can be freely selected. The setpoint entry is: *Default.ptb*

In the field file name *<Databasename.ptb>* the database to be opened is entered. By marking a test table - also a newly created - and confirmation with the test table editor opens.

See also:

Create test table database

Create new test table
Delete test tables
Test table editor

4.9.2 Create/Delete test table database

Create a new test database

Menu *Database* → Command *Edit test table* → In the file open dialog enter the name of the new database: <Filename.ptb> → Open → Query: ...*Build* ... → Confirm *Yes*

The new database will be stored in the actual selected folder. After confirmation of the security check a window appears in which a test table can be selected.

→ Create new test table




Delete a test database

Menu *Database* → Command *Edit test table* → In the file open dialog select the database to be deleted → press keyboard- *Del*.



4.9.3 Create new test table

Test tables are created within a test database. This is done in two steps:



1. In the dialog for selection of a test table press the button new . A dialog for input of the global data for this table appears. This data appears later when selecting a test table.


Note:

It is important to decide if the test table will be used for a comparison measurement


 

or

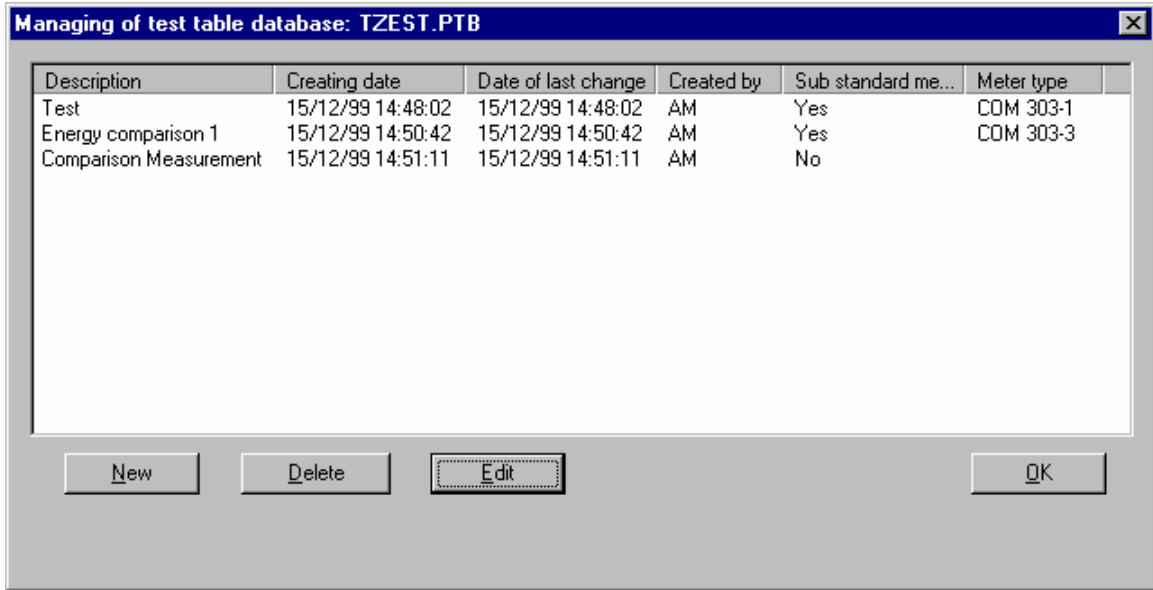
for energy comparison  

2. The new table appears in the selection dialog. By selecting it and confirmation with button  the test table editor starts. With this the parameters for the test sequence can be set.

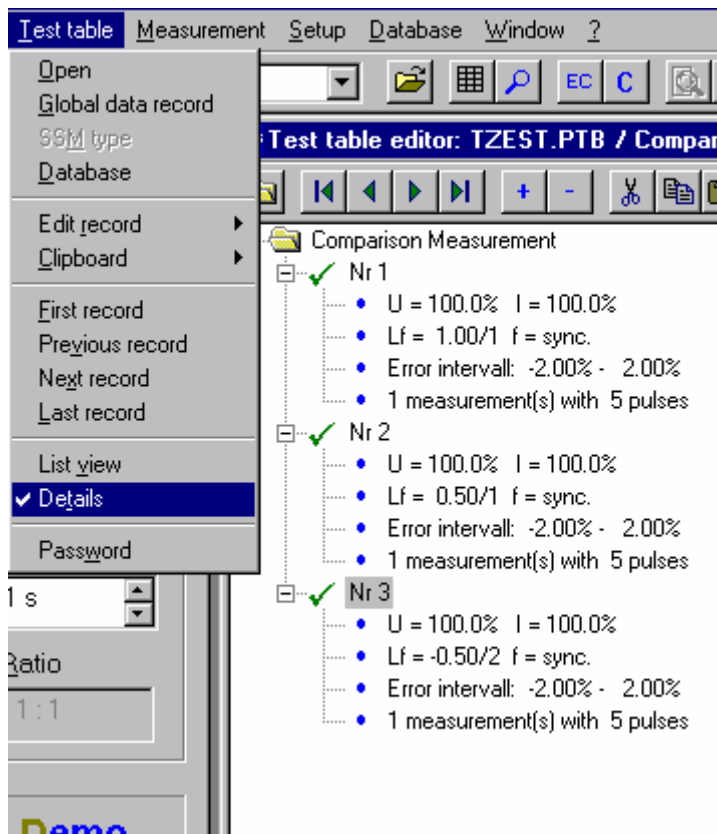
4.9.4 Delete test table

A deletion of a test table is made in in the selection dialog for test tables. To avoid an unwanted deletion the button  is only active when the test table editor is open. Select menu test table / database to open the selection window with the delete button.

Important: For the deletion there is no safety confirmation.



4.9.5 Test table editor



With the test table editor the parameter for the steps of an automatic test sequence is set. The commands of the editor can be activated by the menu **Test table** or with the buttons in the editor.

All commands are described in the following table:



Open  Opens the selection dialog with a

list of available tables.

Global data record

Opens the dialog for entering the global data of the test table.

Database

Opens the selection dialog with a list of available tables. The buttons  and  are active.

Edit record

New Record



Inserts a load point without parameters to the table.

Delete Record



Deletes a load point from the table.

Delete detail record

Deletes detail data from the load point.

Store



Saves current changes.

Restore



Undos last input

Clipboard

Copy



Copies a load point.

Cut



Cuts a load point

Paste



Inserts a load point from clipboard.




Replace

Overwrites the selected load point with data from clipboard.

First record



Selects the first load point.

Previous record		Selects the previous load point.
Next record		Selects the next load point.
Last record		Selects the last load point.
List view		Opens the test table in a list view.
Details		Shows the parameters of all load points in a tree view.
Password		Changes the password

Every testpoint contains several quantities. For this the test table editor consists of four or five tabs wher the quantities can be set;

TP: Values	Here the relative voltages and currents of the testpoint are entered. The relative sizes refer to the measuring ranges of the meter under test. For asymmetrical combinations the appropriate option must be selected.
LP: Angle	Here the angle, frequency and phase sequence of the rotary field are set. The angle can be set either directly or by specification of the power factor and the quadrant.
Error interval	The values set in this tab enable to rate the results of the measurement. A testpoint is rated as good if the error value is between the error limits and if all single measurements spread less than the maximum deviation.
Test	Here the number of repititions, the duration (energy compare) or revolutions/impulses (comparison measurement) and the delay between settting up the load and starting of the test are entered. Please note that the time the measuring really takes depends on the load of the measuring ranges of the comparator.

Also take care of the option 'Store single values'. Only if this option is selected the single values can be shown in the protocol.

Test object (only for energy comparison) Here the measurement mode and the ranges for voltage and current are set.

5 Printing


5.1 Measurements

5.1.1 The command print

This command is used to print the measured values of the topmost window. Is the current topmost a snap shot all measured values of the database are printed.

After selecting this command the dialog for printing will appear. With this dialog the printing options like page area, count of copies and destination printer can be chosen.

Abbreviations

Toolbar: 

Keyboard: STRG+P

5.1.2 The dialog printing

The following options setup how a document will be printed:

Printer

Here the active printer and its connection is shown. By choosing setup these settings can be changed.

Setup

By choosing this option the dialog for printer setup appears in which the setting for the printer can be made.

Printing area

The pages which shall be printed are selected here:

All Prints the whole document

Marked Prints the marked text

Pages Prints the chosen pages

Copies

With this option is chosen how many copies of the selected print area are printed.

Sort Copies

Prints the copies so that the pages of one document appear after another instead of printing each page as often as chosen in the setting copies.

Quality

This option sets the quality for printing. Usually printing is faster for lower qualities.

5.1.3 The dialog printing progress

While the SSM 3000 Software sends data for output to the printer this dialog appears. The actual page number gives information of the progress.

Press 'Cancel' to abort printing.

5.1.4 Page preview

With this command the output of the current window will be shown as it will appear printed.

After selecting this command the main window will be replaced by a page view in which one or two pages are represented in their printing format. How many pages are displayed in this view is set in the toolbar. If more than one dataset belongs to the selected window (e.g. snap shot) you can move through the datasets.

Abbreviations

Toolbar: 

5.1.5 Toolbar for page preview

In the toolbar of the page preview the following options can be set:

Print

With this command the dialog printing will be opened. With this the printing job can be started.

Next page

Shows the preview for the next page.

Previous page

Shows the preview for the previous page.

One/Two pages

With this option it is determined whether one or two pages will be previewed at the same time.

Enlarge

With this option the page is enlarged for a more detailed representation.

Shrink

Shows a smaller page representation for a better overview.

Close

Closes the preview and goes back to the view from which the preview was opened.

5.1.6 The command printer setup

With this command the printer and the connection can be adjusted. After selecting this command the dialog printer setup appears.

5.1.7 The dialog printer setup

With the following options you can setup the printer and its connections.

Printer

Here you can choose the printer to be used. For installation of new printers please look at the Control Panel.

Format

Select portrait or landscape format

Paper/Size

Choose the size of the paper on which the document will be printed.

Paper/Supply

Some printers have several slots for different types of paper supply. Select the slot here.

Options

This command opens a printer-specific dialog in which more options for the selected printer can be set.

Network...

Here you can assign a network volume to a specific drive letter.

5.2 Comparison measurement protocols

5.2.1 General

The test results of the *SSM 3000 software* are stored in a result database <Databasename.ERG>. The result database itself contains a couple of test results and is stored in the userdata folder. The name and the directory have to be set before testing.

The protocol application makes no difference between results of energy comparison and comparison measurement. The protocol module is an application based on *MS ACCESS V7.0* which handles all result files. It generates protocols and creates graphical representations of the results. The following functions for evaluation / printing are available:

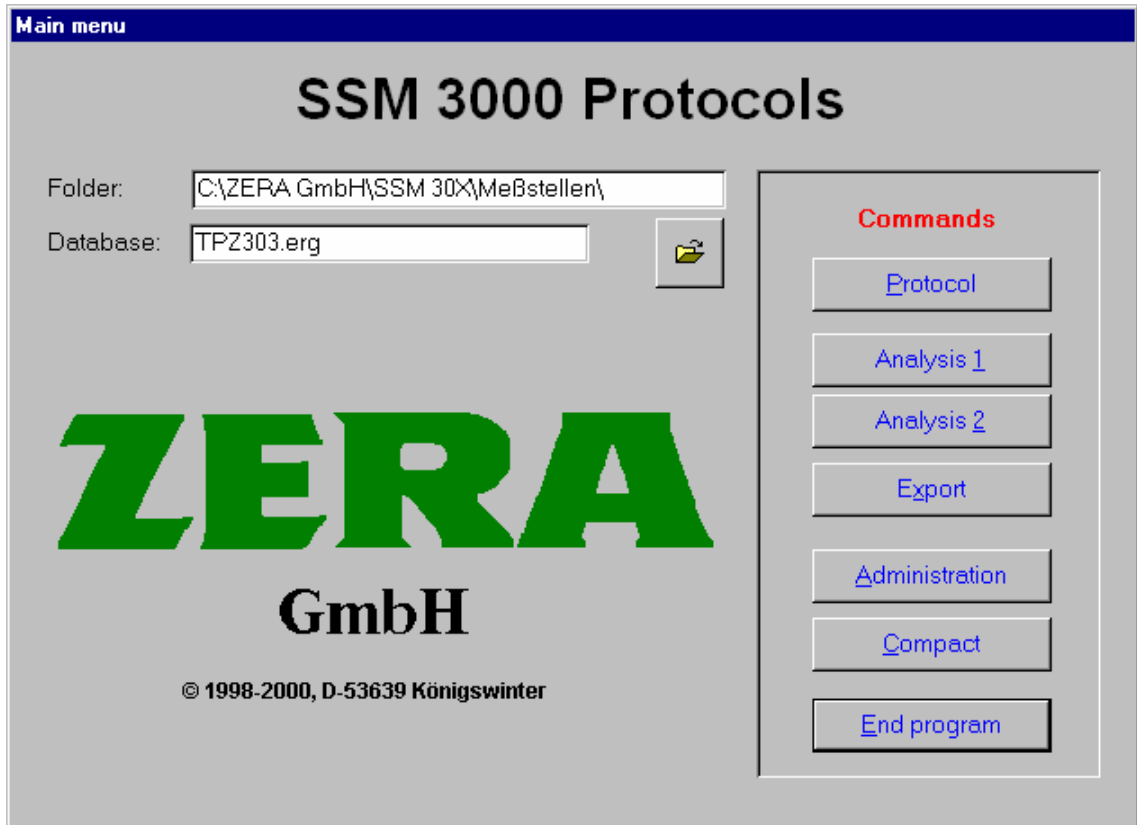
Protocol

Analysis 1

Analysis 2

The application *SSM 3000 Protocols* can be started from the *SSM 3000 Software* or directly from Windows startmenu. The call from startmenu needs lower performance for the client PC.

5.2.2 Main menu

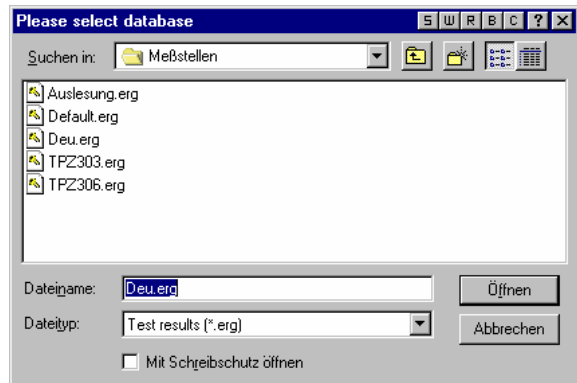


The result-database <filename.ERG> is selected by mouseclick on the button



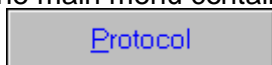
The file open dialog shows the available result-databases for the opened folder.

A database is selected by mouseclick and the button **Öffnen**.



The result-databases contain a couple of test results which can be analysed with the commands of the protocol module. The selection lists display all results of the selected database.

The main menu contains the following commands:



Creates a protocol with editable headlines.

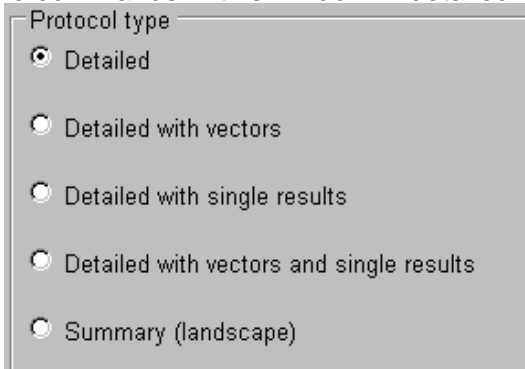
A list is filled with all results from the database.

Analysis 1	Graphical analysis for one test which is selected from all results in the database.
Analysis 2	Graphical Analysis for a timespan. By setting start- and endtimes and dates the timespan is selected for analysis.
Export	This command opens the window for exporting protocols to MS Excel.
Administration	Deletes results from the current selected database.
Compact	Frees memory of previous deleted datasets. For databases where no dataset has been deleted yet this command has no effect.
End program	Ends the protocol module.

5.2.3 Command protocol

This command generates a protocol from the selected dataset. By pressing the button in main menu a window with a list of all datasets and the commands **Preview protocol**, **Edit protocol headlines** and **Print protocol** is opened. On the left of a selected line an arrow appears.

The commands in this window in detailed:



Sets the page format for the protocol. Protocol type *Detailed (with vectors)* and *Detailed with (vectors and) single results* is created in portrait format. The single results are only available if selected for the test in SSM 3000 Software. See Test table editor: *Store single values*
The options with vectors are only available for manual comparison measurement, manual energy

comparison and memory read.

Protocol *Summary (landscape)* contains information of the test point.



Preview of the protocol on screen.



Edit protocol headlines



Print protocol



Edit the look of the vectorial representation



Exit the *Protocol module*

Additional this dialog contains a field *Select results*. By checking this field and entering values in the fields *Start* and *End* a sub part of the protocol can be previewed or printed.

The protocol contains the following elements:

Test using ZERA SSM 3000 Software		
Zera Electric GmbH Hauptstraße 392 53639 Königswinter	Protocol	Printed at: 02/02/00 Page no: 1 Pages: 4

Protocol-headlines :

For editing press Protocol and



Global data

Device term: TPZ 303
Serial number:
Test mode: Energy compare
Performed by:
Description: Automatische Prüfung

Sub standard meter: COM 303-3
Serial number:
Test state: Started
Started at: 20. Jan. 00 21:38:40
Finished at:

Global data:

The source of this data are the inputs made in the SSM 3000 software before the test starts.

Measurement results

No	Date	Time	Mean value	Std. dev.	Error [%]	Error mark
1	20/01/00	21:45:13	0.0138	0.00007		Ok
					0.0139	
					0.0136	
					0.0138	
					0.0138	
					0.0137	
					0.0139	
					0.0138	
					0.0138	
					0.0138	

Measurement results:

The results of the tests with the number of the test point, the average value of the error, the standard deviation, the single values and a mark of the error are displayed.

Note: The base for the mark of the error is the error interval in the test table.

In case of manual testing no valuation is made since no information of the error interval is given.

Test points

No	Voltage			Current			Pf	Q	f [Hz]	PS		
	UR [V]	L1 [%]	L2 [%]	L3 [%]	IR [A]	L1 [%]					L2 [%]	L3 [%]
1	60.000	105.85	105.85	105.85	0.500	100	100	100	0.5	1	50	M
2	60.000	105.85	105.85	105.85	0.200	100	100	100	0.5	1	50	M

Test points:

In the protocol type *Summary (landscape)* the results and the test points are displayed in the same table. In the other protocol types the test points are displayed in an own area.

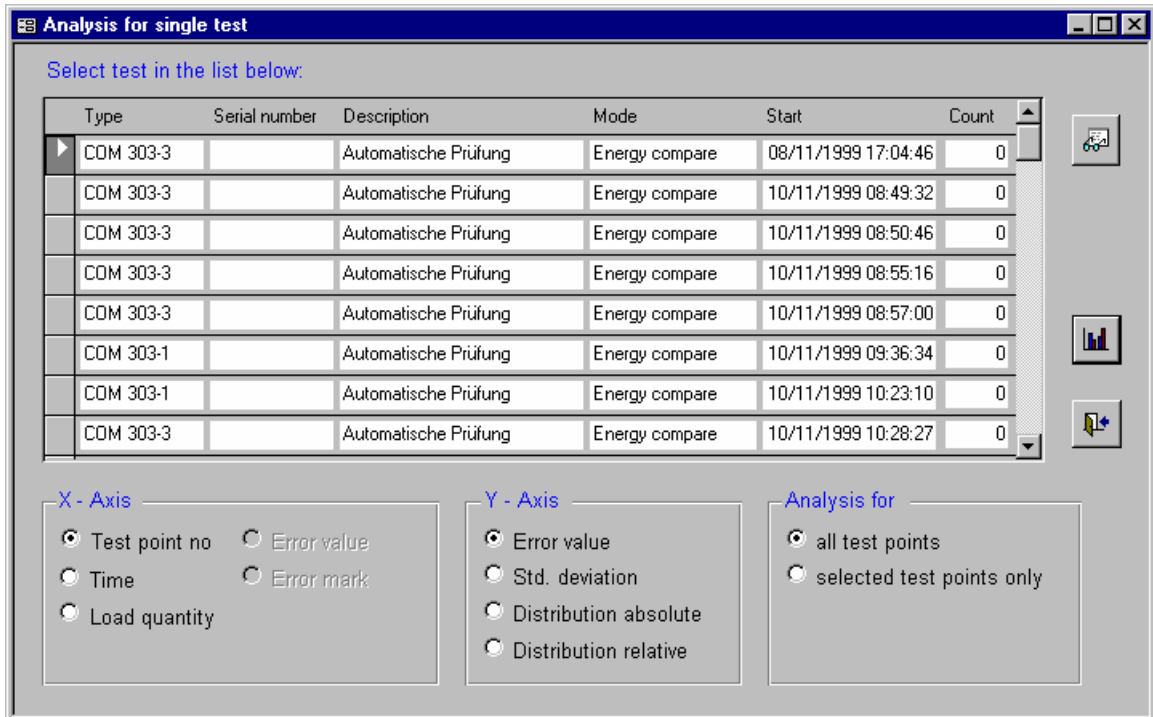
Additional parameters

No	Measurement			Error interval [%]			Test device	
	Count	Time [s]	Pause [s]	Min	Max	Dev.	C [1/kWh]	Mode
1	10	17	20	-0.1000	0.1000	0.1000	2.4E+10	4LW
2	10	17	20	-0.1000	0.1000	0.1000	1.2E+10	4LW

Additional parameters:

In this part the parameters of the test and the error interval are displayed. The error interval can only be set for automatic tests.

5.2.5 Command analysis 1



This command allows an analysis of a test. The list contains all tests which the selected database contains. A test is selected with mouseclick on the row of the list. On the left of the selected row appears an arrow.

Every test can contain a couple of test points which themselves can contain one or more single values. This can be seen when opening the test table editor of the SSM 3000 Software. In this the enumerated test points are displayed in a tree view. For each test point the count of measurements can be set to single value storage.

The average value and the standard deviation are calculated from the single values for each test point.

In contrast to the analysis of one test there is an analysis in time is available → Analysis 2 .

The commands for the analysis of a single test:



Shows a list of all test points for the selected test.



Creates a graphical display where the meaning of x-axis and y-axis depend on the settings described below.



Exit analysis 1.

The selected test can be analysed by the following criteria (y-axis):

Error value The error value is the average from all single values of the selected test point. The error value can be displayed dependent on test points, time or load quantity.

Standard deviation The standard deviation is calculated from all single values of the selected test point. The standard deviation can be displayed dependent on test points, time or load quantity.

Distribution absolute This option displays the distribution dependent on the error value. The count value is related to the whole set of test points. All error values are calculated with all single values of the test point.

Distribution relative Representation of the relative appearance frequency depending on the error value. Each test point generates an error value, which is calculated as average value from the single error values of a test point.

The following units can be references (x-axis)

Test point no Beam diagram depending on the test point number

Time Diagram depending on time displayed as points, lines or curves

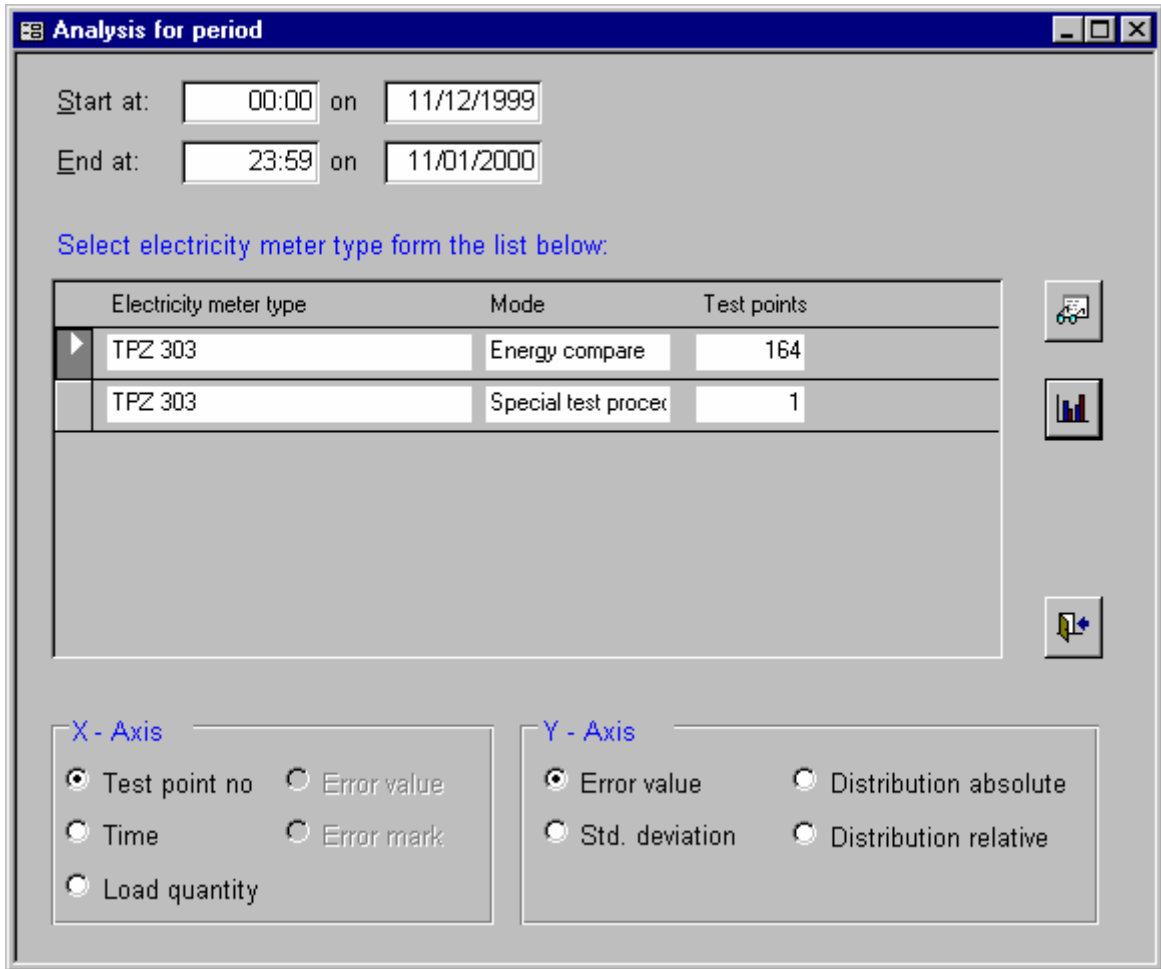
Load quantity Diagram depending on a selected load quantity as: voltage, current, power factor or frequency

The evaluation can be made by considering all test points or by a selectable count of points:

Consideration of all test points The entire data record of the selected test is considered for the analysis.

Selected test points only With the help of a selection window the data record is filtered for certain test points.

5.2.6 Command analysis 2



This function enables the evaluation for a certain time span. Before the tests can be evaluated the time span with date and time are to be defined.

Above the selection list for the tests stored in the database is the input area for the valid evaluation time span. Dependent on the entries date and time the list of the tests is filtered.

The test type and the number of testpoints are specified in the list. The selection of the desired test is made by mouse click on the desired line of the list. An arrow appears at start of line.

From the single measurements of a testpoint the average value and the variance are calculated for each testpoint and output graphically.

In contrast to the analysis for a certain period the analysis for one test can be done by analysis 1 .



Shows the list of test points for a certain time span.



Creates the graphic representation. The definition of the x-axis and the y-axis are to be considered.



Exit the Analysis 2 function.

The selected test can be analysed graphically according to the following criteria (y-axis):

Error value The error value is the average value from the single values, which were determined for a testpoint. In the diagram the error value is representable in dependency of the testpoints, the time or a selectable load quantity.

Standard deviation The standard deviation is calculated from the single values of a testpoint. The graph shows the standard deviation dependent on the testpoints, the time or a selectable load quantity.

Distribution absolute Representation for the frequency of appearance dependent on the error value. Each testpoint generates an error value, which is calculated as average value from the single error values of a testpoint.

Distribution relative Representation for the relative frequency of appearance dependent on the error value. The frequency is related to the entire result. Each testpoint generates an error value, which is calculated as average value from the single error values of a testpoint.

The following units can be references (x-axis):

Test point no Beam diagram depending on the test point number

Time Diagram depending on time displayed as points, lines or curves

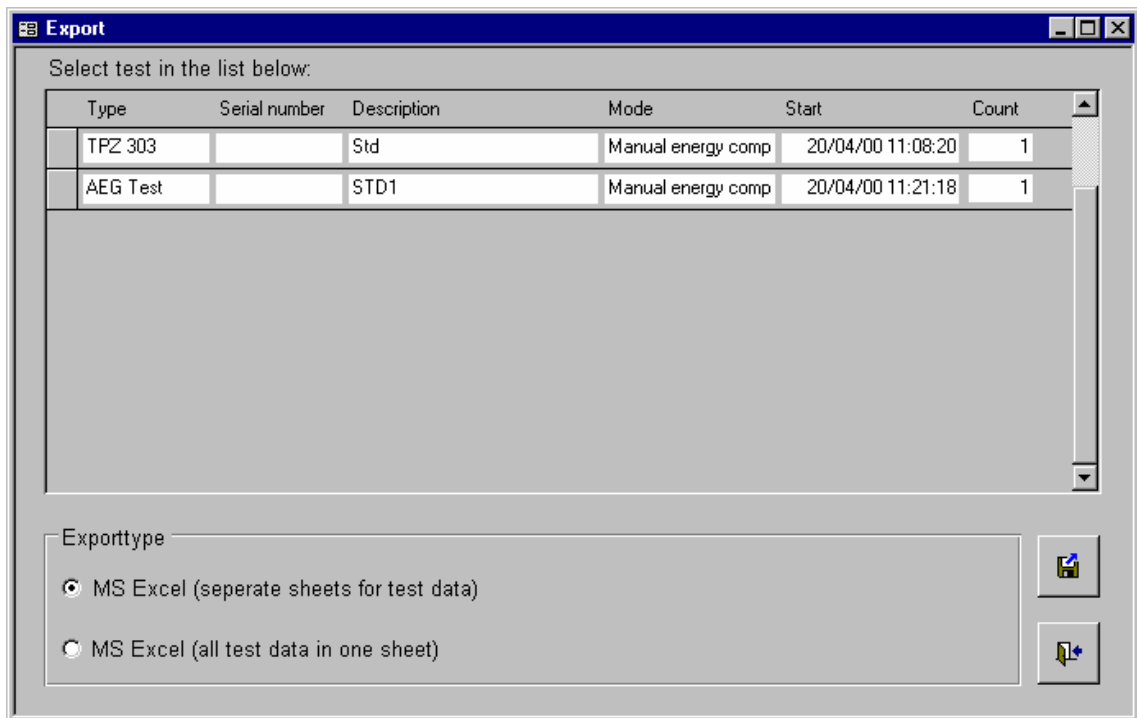
Load quantity Diagram depending on a selected load quantity as: voltage, current, power factor or frequency

The evaluation can be made by considering all test points or by a selectable count of points:

Consideration of all test points The entire data record of the selected test is considered for the analysis.

Selected test points only With the help of a selection window the data record is filtered for certain test points.

5.2.7 Command export



With this command protocols can be exported to MS-Excel. First you have to select a protocol in the list. Then is selected whether all result data (the global data is always stored in an own sheet) will be stored in one or more sheets. When seperate sheets for result data is selected data is grouped in the same manner as for detailed protocol type. By pressing the button with the disk symbol and selecting a destination file name the output is started. The time the export takes depends on the number of testpoints of the selected protocol so that export for longer protocols may last a while.

5.2.8 Command administration

The database contains following measurements:

Description	Test mode	State	Strted	Finished	Count
Automatische Prüfung	Energy compare	Aborted	08/11/1999 17:04:	08/11/1999 17:04:	0
Automatische Prüfung	Energy compare	Aborted	10/11/1999 08:49:	10/11/1999 08:49:	0
Automatische Prüfung	Energy compare	Aborted	10/11/1999 08:50:	10/11/1999 08:52:	0
Automatische Prüfung	Energy compare	Aborted	10/11/1999 08:55:	10/11/1999 08:55:	0
Automatische Prüfung	Energy compare	Aborted	10/11/1999 08:57:	10/11/1999 09:30:	0
Automatische Prüfung	Energy compare	Aborted	10/11/1999 09:36:	10/11/1999 09:37:	0
Automatische Prüfung	Energy compare	Unknown	10/11/1999 10:23:		0
Automatische Prüfung	Energy compare	Aborted	10/11/1999 10:28:	10/11/1999 10:28:	0
Automatische Prüfung	Energy compare	Aborted	10/11/1999 10:30:	10/11/1999 10:30:	0
Automatische Prüfung	Compare measurem	Aborted	10/11/1999 10:31:	10/11/1999 10:31:	0
Automatische Prüfung	Energy compare	Aborted	12/11/1999 11:03:	12/11/1999 11:03:	0
Automatic test	Energy compare	Aborted	24/11/1999 14:34:	24/11/1999 14:35:	0
Automatische Prüfung	Energy compare	Aborted	25/11/1999 17:43:	25/11/1999 17:43:	0
Manual test	Special test proced	Aborted	26/11/1999 09:17:	26/11/1999 09:19:	1
Manual test with Com 303 Derr	Special test proced	Aborted	26/11/1999 10:02:	26/11/1999 10:04:	1
Automatic test	Energy compare	Succeeded	29/11/1999 14:19:	29/11/1999 14:20:	0
Automatic test	Energy compare	Succeeded	29/11/1999 14:20:	29/11/1999 14:20:	0
Automatic test	Energy compare	Succeeded	29/11/1999 14:21:	29/11/1999 14:21:	0

Select those measurements not needed any more.

This function shows an overview of all stored test results in the current database.

Results which shall be deleted can be selected by mouseclick on the concerning line.

Please notice that deleted data areas can not be used by new datasets. By deleting test results the database will be fragmented.

With the command 'Compact' the database can be defragmented so the memory density and the performance will be optimized.

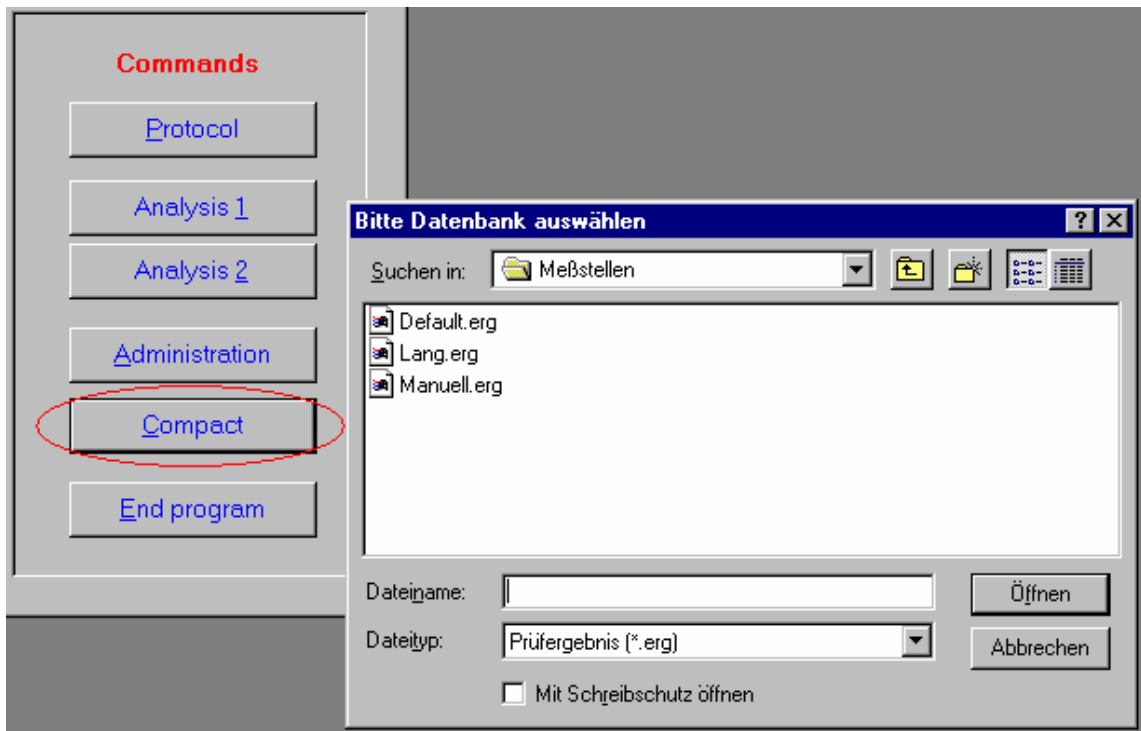


The records selected in the list will be deleted after a security check.



This command causes the administration to be exited.

5.2.9 Command compress



This function defragments a selected database. With this the the memory density and the performance of the database will be optimized.

Compressing only effects on databases with deleted datasets.

→ Administration

6 Settings and connections

6.1 The dialog global adjustments

Parameterization of the working standard control program is carried out with the dialog 'Global Adjustments'. The adjustment possibilities are grouped together in 5 different function groups:

Comparator

With the following entries you can determine the settings for the connected ZERA reference meter:

Port	Enter the RS 232 interface for the measuring device here.
Baud	Enter the baud rate for the communication with the measuring device here. Default for ZERA devices: 19200
Auto connection	Enter whether the communication connection to the measuring instrument is to be established automatically when starting the program. Default: On
RS 232 trace	By selecting this option the communication to the comparator will be recorded in a separate window. You should activate this adjustment only in case of communication problems.
Only 4800 Baud connect	To support the new reference meters EPZ 3001 and EPZ 3005 the SSM 3000 tries to connect with 9600 Baud before connecting with 4800 Baud for all other devices. If the connection to devices with 4800 Baud fails, the 9600 Baud connection can be disabled here.

Polling time Enter here the time interval (in seconds) for checking the status of the measuring instrument.

Default: **5s**

Maximum overload for automatic test For the automatic (energy) comparison measurement selects the ranges for the voltage- and current range. The value in this option defines how much these areas are overloaded. If for example the value 10 is set, the SSM 3000 software selects the next upper ranges for loads larger than 110%.

Program

With the following adjustments you determine the general program behaviour:

Actual values Enter here the time interval for interrogating the measuring values in case of an actual value measurement

Default: **3s**

Comparison measurement Enter here the time interval for interrogating the status of a test in case of a comparison measurement.

Default: **3s**

Accuracy test Enter here the time interval for reading in the measured values in case of the accuracy test

Default: **6s**

Load from Enter here the name of the program status file (*.ini), which is to be loaded automatically when starting the program. The program status must be stored in the selected directory of the measuring positions.

Auto save on exit Enter here whether the present program status should be stored automatically at the end of the program.

Open new frames not as child-windows When selected all new windows will be displayed not as child windows. These windows can be moved on every position of the desktop.

Standard deviation Here the formula for standard deviation is set:

Based on the **Entire population**:

Standarddeviation =

Based on a **Sample**:
$$\sqrt{\frac{n \sum x^2 - (\sum x)^2}{n^2}}$$

Standarddeviation =
$$\sqrt{\frac{n \sum x^2 - (\sum x)^2}{n(n-1)}}$$


Note: Changing this setting does not affect already stored results!

Database setup

In the following adjustments you choose the paths to the databases:

Database for sub standard meters Enter the path to the working standard satabase here.
Default: **PZTYPEN.MDB**

Database for electricity meters Enter here the path to the meter database.
Default: **ZTYPEN.MDB**

You can enter the paths directly into the entry fields. By using the symbol  you reach also the 'Open Dialog' in order to select databases from a list indicating all existing data files. For this purpose you have to select data type „**Access Database (*.mdb)**“.

Additional Devices

In this window the communication settings for the current/voltage supply (VCS/FG) and the meters under test can be made:

RS 232 Determines the RS 232 interface for the device. For meters under test without RS232 interface and devices which set up the ranges automatically the entry 'Demo' has to be selected.

Baudrate / Baudrate 1 Determines the Baudrate used at the beginning of the connection process.

Default values for ZERA devices:

VCS 320: **9600**

TPZ 303: **9600**

EPZ 3001: **9600**

EPZ 3005: **9600**

MT 3000: **9600**

All others: **4800**

Baudrate 2 Determines the Baudrate used after the connection is established. This option is only available for meters.

Default values for ZERA devices:

TPZ 303: **9600**

EPZ 3001: **9600**

EPZ 3005: **9600**

MT 3000: **9600**

All others: **19200**

Booster By selecting this option the automatic booster operation is

activated. Every time current changes value from below to above threshold or vice versa the operator is advised to switch booster on or off.

Do not show setup window in demo mode For meters under test in 'Demo'-mode, this option can be set to prevent the range/measurement mode window in automatic energy comparison. This is necessary if the meter under test is controlled by another device (e.g. **the reference meter in a MTS rack is controlled by FG-device**).

Error recovery

In these adjustments the behavior in case of errors is determined. The following parameters can be set separately for the automatic comparison measurement and the automatic energy comparison:

Start This is the time interval in seconds, which is waited maximum after the beginning of a single measurement, in order to detect start impulse.

Default comparison measurement: **30**

Default energy compare: **3**

Measurement This is the maximum duration of the measurement in seconds. For this the period between start and termination of the measurement is evaluated.

Default comparison measurement: **300**

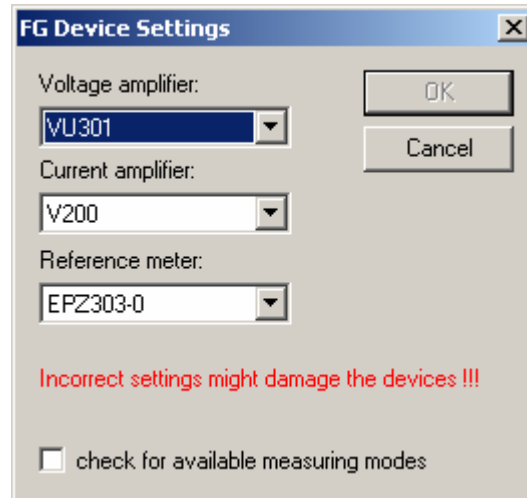
Default energy compare: **30**

For all automatic test the following parameter is relevant:

Max. testpoint starts If an uncritical error occurs while changing the test point or during the measurement the testpoint is repeated. With this parameter the maximum count of testpoint starts is set.

Default: **3**

6.2 Setting for FG111 / FG301



In this dialog the parameters for the devices connected to the FG (source of MTS) are set. There are selections for voltage-/ current-amplifiers and the standard meter. The names of the devices are printed on the amplifiers / standard meters. By selecting the option 'check for available measuring modes' the SSM Software tests for all available measuring modes on communication setup to FG. By this it is ensured that only available measuring modes can be selected. Note that the time for communication setup increases by selecting this option.

Important: Make sure that the correct selections are set. Otherwise the rack or the devices under test might be damaged during operation.

6.3 RS 232 parameter

The parameters for a RS 232 interface are ordered in 3 different groups:

Port settings

Baudrate Selects the baudrate
Default for ZERA devices: **19200**
(TPZ 303 and VCS320: 9600 Baud)

Data bits Selects the number of data bits
Default for ZERA devices: 8

Stop bits Selects the number of stop bits
Default for ZERA devices: 2

Parity Selects the function of parity bit
Default for ZERA devices: none

Check parity Determines whether the parity bit is checked or not
Default for ZERA devices: not checked

Flow control

CTS / DSR Determines the handshake line being used for transmitter function.
Default for ZERA devices: without handshake

RTS Line Determines the use of the RTS line by the receive function.
Default for ZERA devices: on

DTR Line Determines the use of the DTR line by the receive function.
Default for ZERA devices: on

Timeout settings

Send Timeout for transmitter function
For sending n characters the time Tg is allowed:

$$T_g = T_1 * n + T_2$$

T1 is the time entered at Character

Default: 10 ms.

T2 is the time entered at Offset

Default: 1000 ms.

Receive Timeout for receive function

For receiving n characters the time T_g is allowed:

$$T_g = T_1 * n + T_2$$

T_1 is the time entered at character

Default: 10 ms.

T_2 is the time entered at offset

Default: 1000 ms.

The time entered at distance determines the maximum delay between two successive characters

Default: 500 ms.

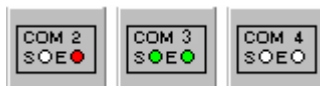
6.4 RS 232 context menu

In the context menu of the RS 232 windows the following commands are available:

Command	Meaning
Settings COM x	Edits settings for the specified RS 232 port.
Error message	Displays the last error message for the RS 232 port.
Show dialog	Opens a window in which the data over the RS 232 interface is monitored.
Reset	Resets the RS 232 interface.




6.5 Displaying RS 232 state

A small status window is displayed for each of the RS 232 interfaces in use. In these windows not only the interface state is shown, but also their context menus contains all the commands, necessary to control the RS 232 communication. All RS 232 state windows appear in a special symbol bar.



Usually this RS 232 symbol bar is invisible. The command RS 232 toolbar in the menu window however, switches the symbol bar on.

In each window, besides the number of the interface port, the state of transmission and receive function are symbolized by colors:

-  Function is in idle state.
-  Function is busy (green).
-  Last transaction has been failed (red).

By a double click in the RS 232 window, any error can be confirmed. More functions are available via contextmenu of the RS 232 window.

6.6 RS 232 terminal window

The terminal window provides you with a RS 232 terminal assigned to a certain RS 232 interface.

All characters you typed in at the keyboard are transmitted over the RS 232 interface after you have pressed the enter key. Then the response is read and will be displayed in the window.

If you press the enter key without any text, only the receive function is activated. All characters being received until a timeout occurred will be displayed in the terminal window.

6.7 RS 232 monitor

In this window all communication data of the assigned RS 232 interface is displayed:

Data send by the PC is colored red.

Data received by the PC is colored blue.

For the evaluation of communication problems the monitor function is very helpful.

The monitored data is stored in a ring buffer. Therefore the RS 232 communication can be observed over a certain time period.

In the menu following commands are available:

- Monitor** Switches the monitor function on or off.
- Delete buffer** Deletes the content of the ring buffer.
- Stop on error** Switches the auto stop function on or off.
When item is marked the monitor function will stop whenever an error occurs.

6.8 RS 232 errors

Following errors may be displayed in this dialog:

Timeout control	Within the timeout interval a communication process did not succeed successfully.												
Transmission error xx	<p>A transmission error occurred.</p> <p>Following errors are possible:</p> <table><tr><td>0x0001</td><td>Receive queue overflow</td></tr><tr><td>0x0002</td><td>Receive overrun error</td></tr><tr><td>0x0004</td><td>Receive Parity error</td></tr><tr><td>0x0008</td><td>Receive framing error</td></tr><tr><td>0x0010</td><td>Break detected</td></tr><tr><td>0x0100</td><td>TX queue is full</td></tr></table> <p>Several errors may occur at the same time!</p>	0x0001	Receive queue overflow	0x0002	Receive overrun error	0x0004	Receive Parity error	0x0008	Receive framing error	0x0010	Break detected	0x0100	TX queue is full
0x0001	Receive queue overflow												
0x0002	Receive overrun error												
0x0004	Receive Parity error												
0x0008	Receive framing error												
0x0010	Break detected												
0x0100	TX queue is full												
Internal error xx	<p>An internal error occurred.</p> <p>Please contact ZERA service with this number.</p>												
Thread did not stopp	Internal error, but without any importance.												