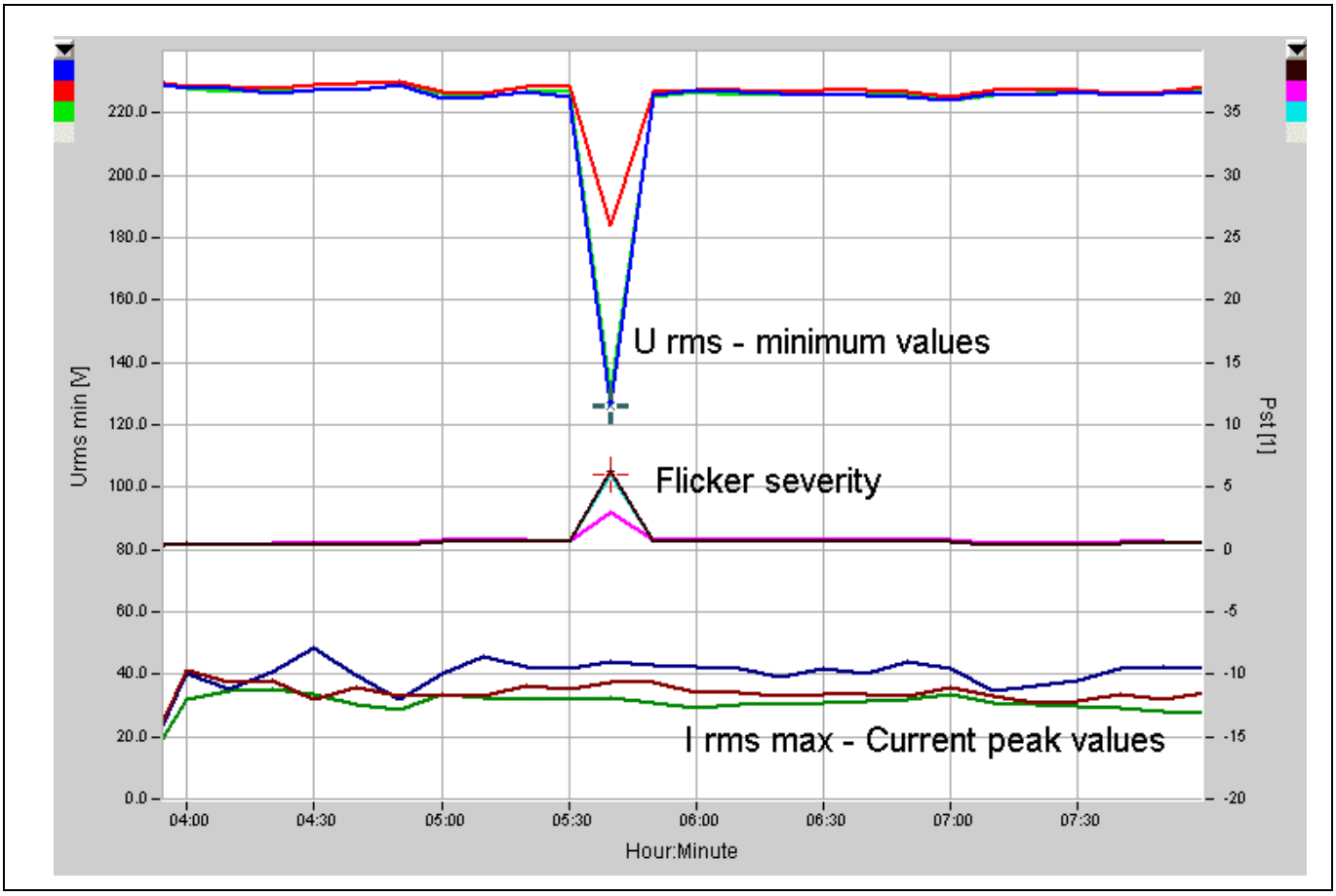
Operating Instructions

Power Quality Application Software Topas

for Versions ≥ V4.0



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1 About this Document

1.1 Document structure

This document consists of several chapters. Within these chapters, shoulder headings in the margin identify sections in the text focusing on the respective topic or procedure. Example:

View details

The text associated with this shoulder heading informs you on how the details of a measured value can be viewed, including introductory notes, safety instructions, hints and tips, instructions on procedures, figures and tables, if any.

1.2 Symbols and signs

The following symbols and signs are used in this document:

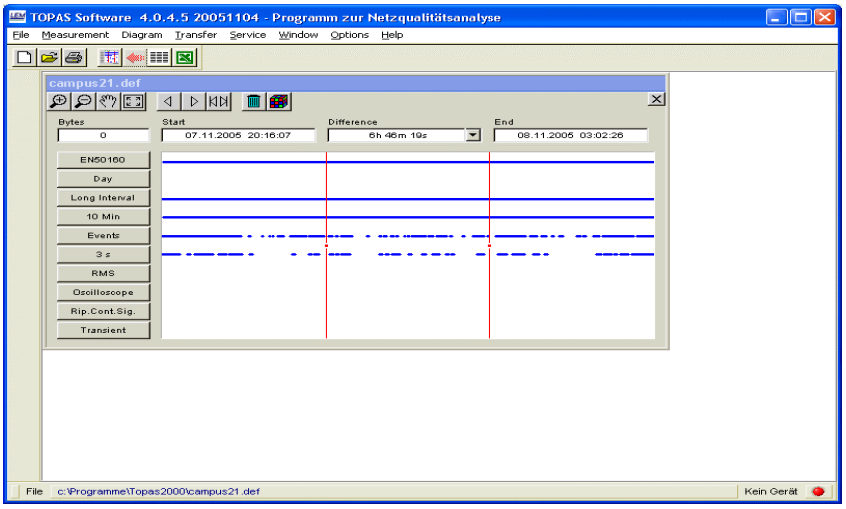
Symbols

Symbol	Description
☑ ...	... identifies a requirement. This requirement must be met before you can proceed with the task described in this section of the text.
▸ ..	... identifies a mandatory action. You are requested to carry out a specified task.
▸ ... – or – ▸ ...	... identifies a mandatory action to which there is an alternative procedure. The alternative procedure is introduced with "– or –" or by a left indent..
	... identifies general information and hints. In the related section of the text, you find important information regarding a certain system feature or procedure.
	... identifies important information. The related information and instructions must always be strictly followed.
	... identifies a warning relating to a risk to life and limb from electric shock. If the instructions are not strictly adhered to, there is an inevitable risk to life and limb..
	... identifies a warning relating to a potential risk or dangerous situation. If the instructions are not adhered to, there is a risk of death, injury or damage to property.

Text formats

Text format	Description
Detail	Names of software and operating elements, lettering on the instrument as well as numbers and text shown on the display are printed in *italics*.

2 Design and functions



The following sections provide a brief overview of the basic functions of the Topas software.

Communication with instrument

Chapter *Menu: Transfer* contains detailed descriptions of the various communication methods between the software and the instrument:

- Serial communication via RS232 interface
- Modem connected to serial RS232 interface
- Ethernet

Configuration of instrument for measurement

Chapter *Menu: File - New* contains detailed descriptions of all necessary settings:

- Adjustment of limit values according to EN 50160
- Hardware settings:
  selection/scaling of measuring sensors
  selection of measuring system (U-U, U-I, ARON, etc.)
- Memory management
- Recording modes (RMS, oscilloscope, transients, etc.)
- Definition of trigger conditions

Basic instrument settings

Chapter *Menu: Service* describes the instrument data that can be tested and/or adjusted:

- Date/time settings
- Baud rate for RS232
- TCP/IP settings for Ethernet
- Firmware update
- User management (authorizations)
- Instrument status

Data transfer from instrument to PC

Chapter *Evaluation* contains all detailed information required for the evaluation of the measured values.

Generation of measurement reports

Chapter *Menu: Options – Export configuration* contains a detailed descriptions of the available options for the configuration and automatic generation of reports. The following reports are produced by the Topas software:

- ASCII reports
- MS Excel® worksheets
- MS Word® reports
- Measurement tables in text format
- BMP images via Windows® clipboard

3 Commissioning and functional test

The procedure described below allows users to familiarize themselves with the functions of the instrument, while testing all basic instrument functions.

Installation

- Install the Topas software, for details see chapter *Software installation,* page 8

Communication

- Establish a connection to the instrument, using one of the available interfaces.
  For details, see chapter *Menu: Transfer*, page 83.

Connect instrument

- Connect the instrument as described in the instrument manual in chapter *Connection*.

Configure

- Configure the instrument.
  For details, see chapter *File -New* , page 21.

Measure

- Establish a connection to the instrument, using one of the available interfaces.
  For details, see chapter *Menu: Transfer*, page 83.

- Activate *Online mode*.
  See chapters *Online mode* page 18 and *Transfer – Online Mode*, page 88.

  You can now test voltages and currents online. If this is possible without problems, all settings are correct and all connections and sensors are working properly.

- Transfer the measured data from the instrument to the PC.
  For detailed instructions, see chapter *Transfer – Download Measurement Data* , page 86.

Evaluate the data according to your requirements. For details, see chapter *The evaluation window* page 52.

4 Software installation

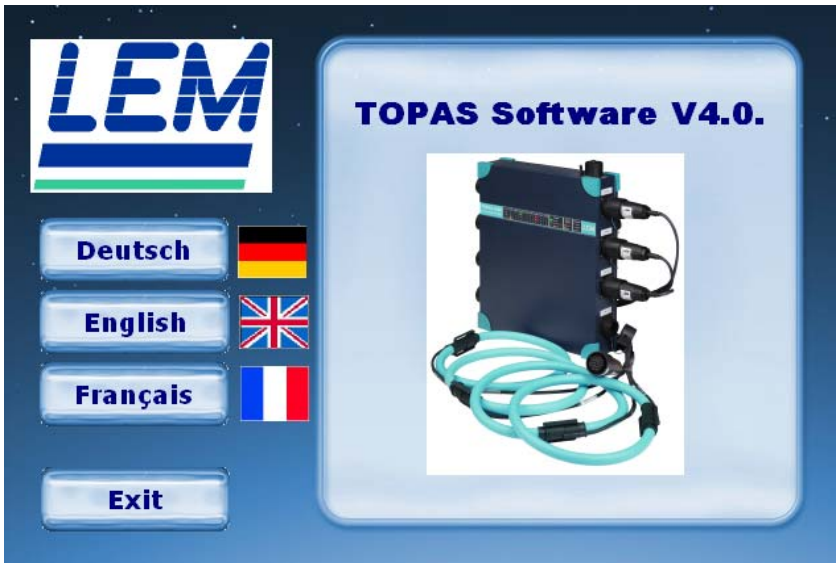
4.1 System requirements

For trouble-free operation of the software, your system must meet the following minimum requirements:

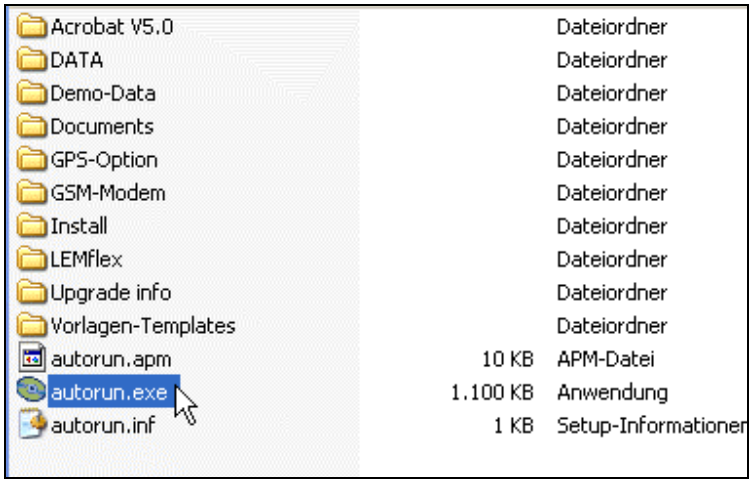
PC	IBM compatible
Processor	Pentium 133 or higher
RAM	64 MB
Hard disk	minimum free space: 20 MB for the Topas software
Operating system	Microsoft Windows® 2000 / XP / NT 4.0
Network	Ethernet IEEE 802.3x 10Base-T
Other drives	CD-ROM

4.2 Installation

- Insert the supplied installation CD in the CD-ROM drive of your PC. If your CD-ROM drive is configured for *Autorun*, the software installation program is started automatically.

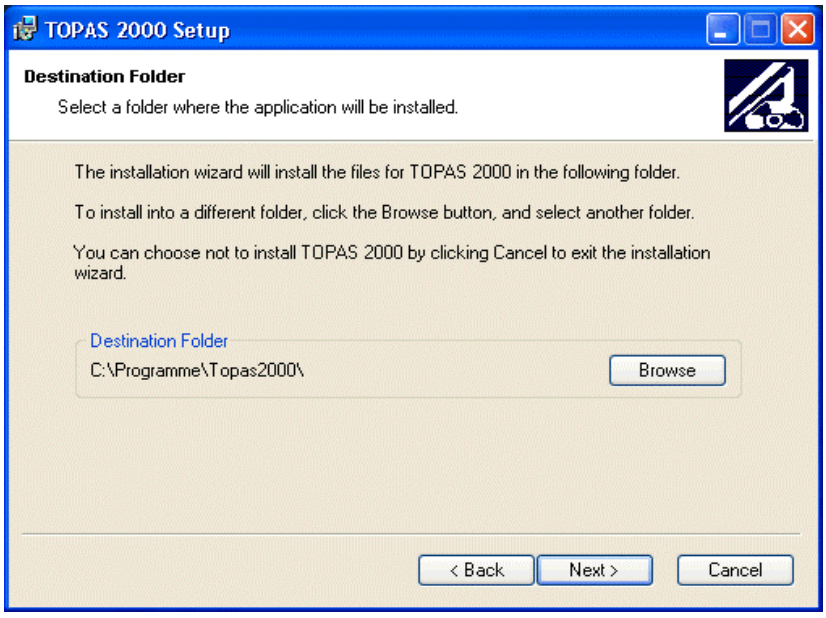


- If the CD-ROM drive is not configured for *Autorun*, start the installation program by double-clicking *autorun.exe* in the MS Explorer® window:



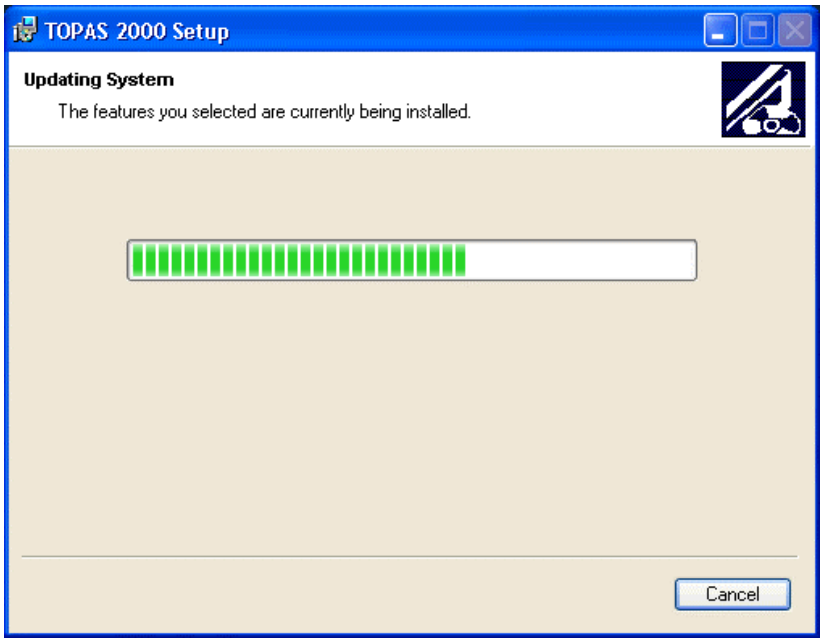
Selection of language

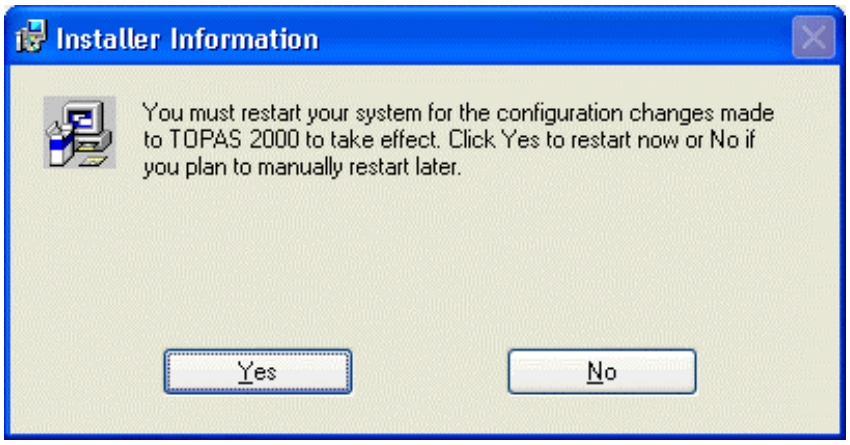
- Click the *INSTALL* button
  The installation procedure is performed automatically.



- If you wish to install the software in a different directory than the suggested one, click the *Browse* button. Select an existing directory or enter a new name.
- Click *Next* to complete the installation.

The bar informs you on the progress of the installation procedure.





- It is recommended to restart the PC system to complete the installation procedure by clicking *Yes*.

Important
If there is a former version installed on the PC this version will be removed automatically. Please rerun the installation procedure again to install the actual version.

4.3 Ethernet communication

For Topas 1000 only

- Check whether the NetBEUI protocol is installed on your PC. If this is the case, and if the PC and the instrument are located in the same network segment, there is no need for a special entry in the *lmhosts* file.

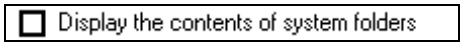
Communication across entire network

From Windows® 2000 and upwards, you must register the instrument in the *lmhosts* file and adjust the TCP/IP settings of the instrument.

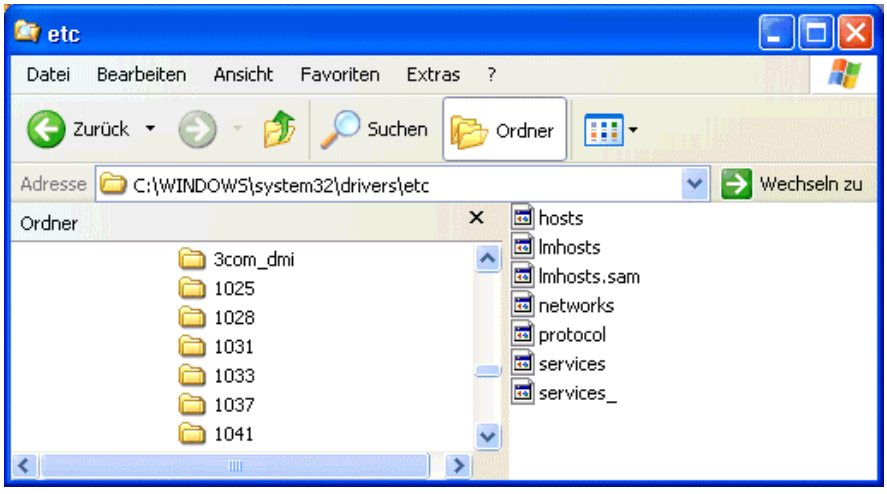
To do this, you need the following details (available from your system administrator):

Name	Description
IP address	Unique static address of the instrument e.g. *192.168.140.69*
Subnet mask	Code defining the class of network into which the instrument is to be integrated.
Gateway	Code defining the network address of network into which the instrument is to be integrated.
Instrument name	Instrument serial number, e.g. *PQA74485*
lmhosts	The *lmhosts* file is located in the *Windows\System32\drivers\etc* directory on your PC.

Note
In order to enable you to edit this file, adjust the MS Explorer® settings in the *Tools-Folder Options-View* as follows:



Subsequently, you can edit the files as required:



The *lmhosts* file is required for correct communication between the software on your PC and the instrument, as it allocates the IP address of an instrument to its PQA name.
The *hosts* file contains the equivalent information for the *PING* command.

- If there is no *lmhosts* file in the above folder, copy the sample file called *lmhosts.sam* and delete the extension *.sam.*

- Enter the following data:

#TCP/IP	**Instrument**	**Comment**
192.168.140.69	*"pqa74485*	*"#TOPAS*

Important
The following rule applies to the *lmhosts* file:
There must be 16 characters between the quotation marks (")! Add spaces, where necessary!
Example for a correct entry:

192.168.140.69 "pqa74485 " #TOPAS

The following rules apply to the *hosts* file:
Do not use quotation marks (")!
Example of correct entry:

192.168.140.69 pqa74485 #TOPAS

- Save and close the *lmhosts* file.

4.3.1 TCP/IP settings at the instrument

- Establish a direct connection between the instrument and the PC (via serial interface or Ethernet).
- Enter the necessary data (see chapter *Menu: Service – TCP/IP Settings*).

Important
All instruments are factory-configured with the same IP address. If you wish to commission several newly delivered instruments in your network, you must first change the default IP address to a unique address for each instrument. Identical IP addresses in a network are not permitted, as certain instruments might not be accessible, even when the *NETBEUI* protocol is used!

4.3.2 Testing of communication

Check IP address

- On your PC, select *Start – Run* and enter the following command:

  Ping *192.168.140.69*
  Reply: *192.168.140.69*: Bytes =32. time <xx ms TTL=30
  The instrument has been detected!
  Reply: Timeout of request
  The instrument has not been detected!

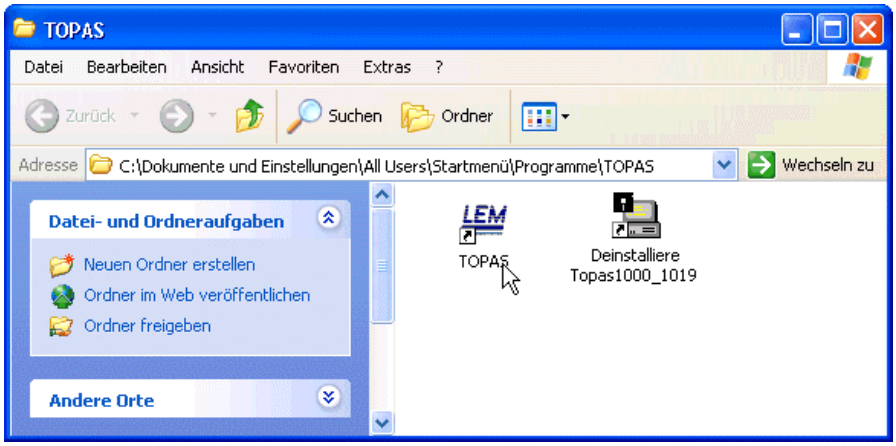
Check instrument identification

- On your PC, select *Start – Run* and enter the following command:

  Ping *pqa74485 OK*
  Reply: 1*92.168.140*.6: Bytes =32 time <xx ms TTL=30
  The instrument has been detected!
  Reply: Timeout of request
  The instrument has not been detected!

4.4 Communication with the instrument

- Call up the operating and evaluation software by clicking the *Topas* icon

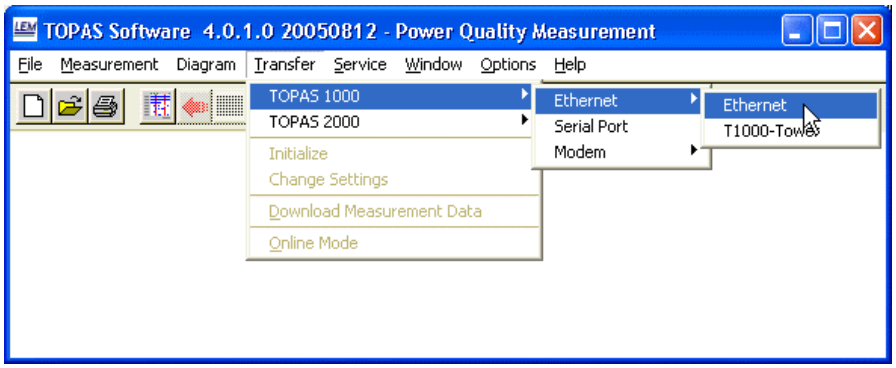


- . . . . or by going to *Start - Programs*.

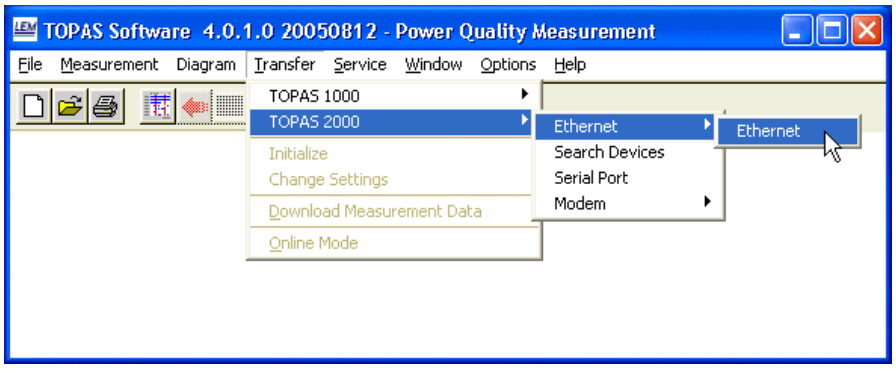
The PC can communicate with the instrument via Ethernet, direct connection to the serial port or a modem connected to the serial interface.

- Call up menu *Transfer/Select Device*:

Topas 1000:



Topas 2000:

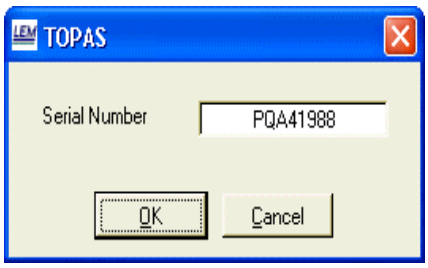


- Select one of the interfaces described below.

4.4.1 Ethernet connection to Topas 1000

The instrument is identified by its five-digit serial number *xxxxx*. printed onto the type plate of the instrument.

- This code is combined with the letters PQA to *PQAxxxxx*:

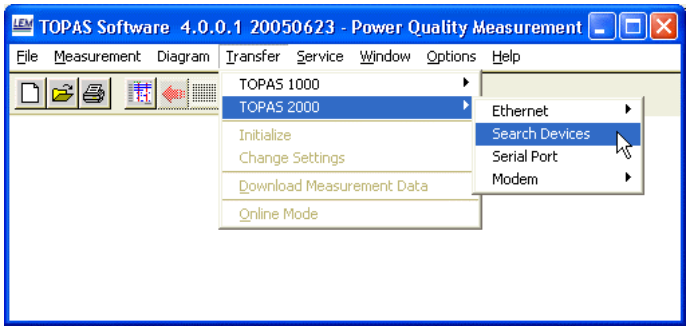


Example for a valid serial number: PQA41988.

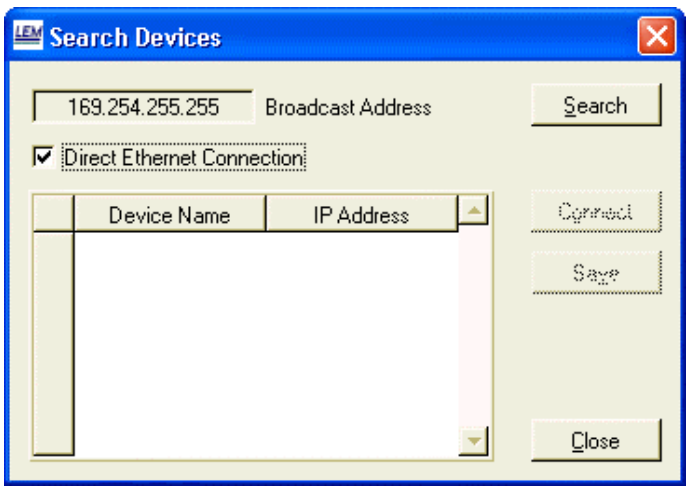
Ethernet is the default communication interface between the instrument and the evaluation PC.

4.4.2 Ethernet LAN connection to Topas 2000

The instrument is identified by its IP address. This can be a fixed one associated manually by the user /administrator or can be dynamically assigned by a DHCP server.
This IP-address can be found out easily if the instrument is connected to the same branch of the Ethernet network using the *Search Devices* function:

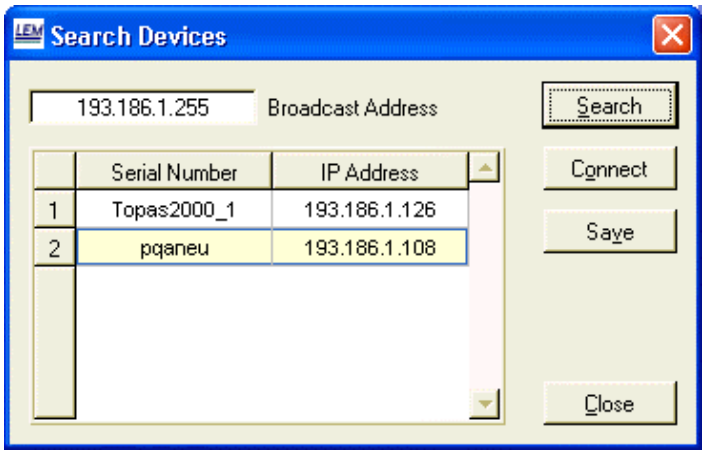


There is an option to enter a *Broadcast Address*, this will limit the search function to the actual network branch:



This function will broadcast a search command and all active Topas 2000 in this network branch will respond:

Important
For peer to peer connections between Topas 2000 and the PC mark *Direct Ethernet Connection*. This option limits the broadcast address range to the IP address class the Topas 2000 will be assigned to in case that there is no DHCP server responding.

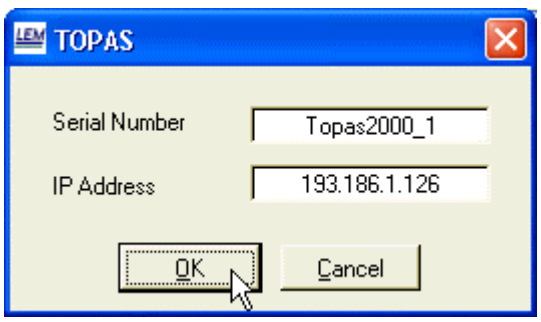


- Click on *Search* to initiate the network search procedure. After some seconds of waiting for the time out we can see from this dialogue the *Serial Number* of the responding instruments and their actual *IP address*.

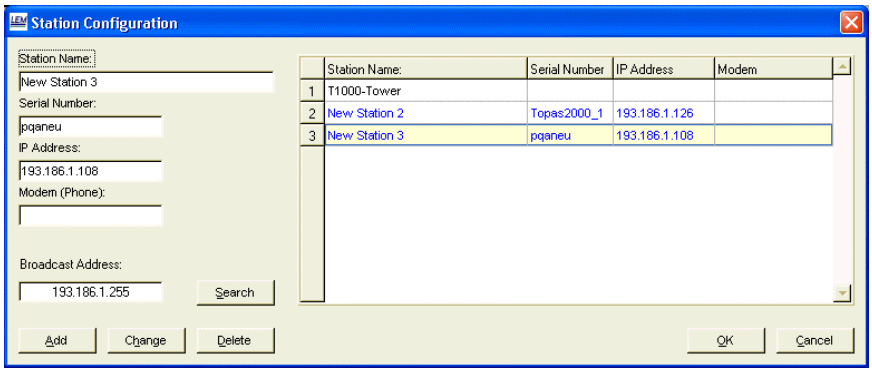
Important
This IP address can be different from time to time because the Topas 2000 will get this IP address from the DHCP server in the network during power-up procedure if DHCP is enabled.

Important
If an Ethernet connection is not possible, establish a serial connection to the Topas 2000 via the RS232 interface and use the menu *Service TCP/IP settings* to find out the assigned IP address.

Mark the required instrument with the mouse and click the *Connect* button to directly connect the Topas 2000. The next panel shows details:

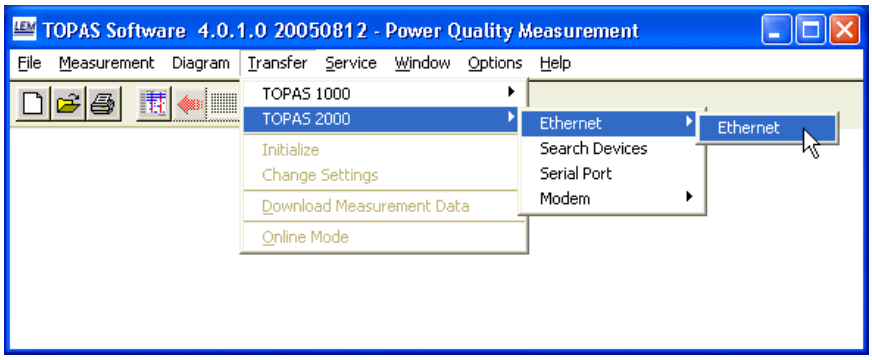


With the button *Save* a dialogue is opened to easily maintain the station list:

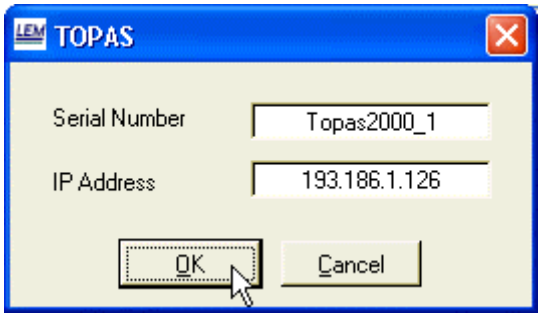


A newly found instrument can be added to the list of stations by entering a specific name. Also a telephone number can be assigned in case the instrument is connected via modem. Later on this name can be used to refer to this instrument.

- Now as the IP address is known and we can connect to the Topas 2000 also from the Transfer menu:



- Enter the actual IP address and press *OK*:



Example for a valid IP address: *193.186.1.126*.

Ethernet is the default communication interface between the instrument and the evaluation PC.

4.4.3 Peer to peer connection PC to Topas 2000

We recommend the following procedure:

- Configure the Topas 2000 for DHCP
- Configure your PC for DHCP functionality (d.h. ein eventuell vorhandener DHCP Server weist dem PC ein IP Adresse zu).
- Power up the Topas 2000

- Connect the PC to the Topas 2000 via the provided cross link cable (with red plugs). Nach einiger Zeit wählt sich der PC automatisch eine freie IP-Adresse über die APIPA Funktion im Bereich 169.254... aus.
- Run the Topas software and use *Transfer – Topas 2000 – Search devices*, mark the option *Direct Ethernet Connection*. Now Topas 2000 and the PC will have an IP-address in the same class and can connect.

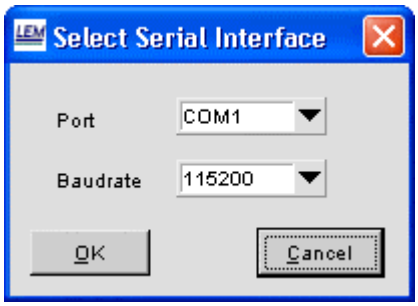
Important
This is just a short description, for details, esp. how to configure the Topas 2000 via the serial port see a comprehensive document *Peer to peer connection* located on the CD-ROM shipped with the Topas 2000 instrument.

Important
We strongly recommend to power off and power on again the Topas 2000 if it is connected to another PC or to another network. This ensures that the Topas 2000 is assigned a new IP-address again via the DHCP function.

4.4.4 Direct connection to the serial port (Topas 1000)

- Select the serial port (*COM port*) and the *Baud rate*. The serial port should only be used, if communication via Ethernet is not possible.

The default serial port is *COM1*, at a Baud rate of *57.600*.



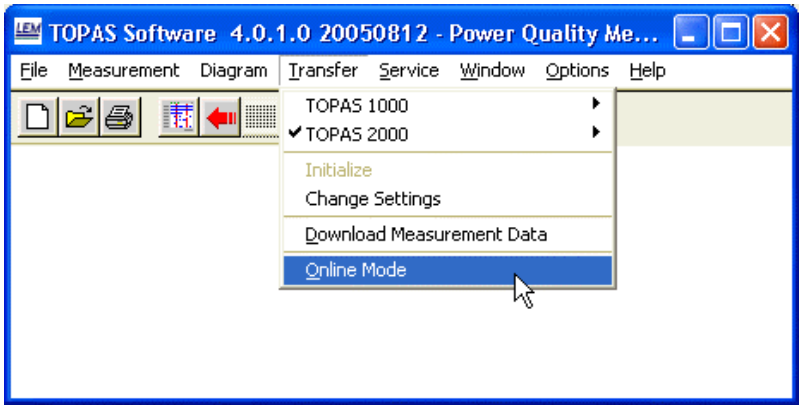
For detailed instructions, please refer to chapter *Menus: Transfer and Service*.

5 Online mode

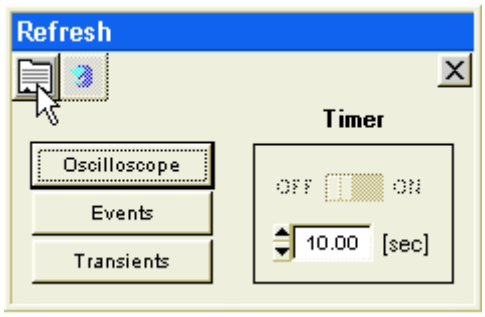
The *Online* mode is used for the initial functional check of the instrument and allows users to test the measuring configuration and assess the received signals. If necessary, the range of measurement and the trigger settings might have to be adjusted in the *Settings* dialogue. In *Online* mode, you can at any time call up partial results without interfering with the current measurement.

Preparation

- Connect the voltage and current sensors to the instrument and then to the network to be measured. For detailed instructions, please refer to the operating instructions, chapter *Connection*.
- Establish a connection between the PC and the instrument (via Ethernet, RS232 interface or modem).
- Activate the *Online* mode by selecting *Transfer – Online Mode*.



The *Refresh* window is displayed:



- Click *Hardware Settings* to open the *Online* mode configuration dialogue for the instrument.

The following evaluation buttons are available in *Online* mode

Settings	Description
	Wave shapes
	Voltage, current and power spectrum
	Spektren von Leistungen
	Vector diagrams for voltage, current
	Vector diagrams for apparent power
	Measurement tables

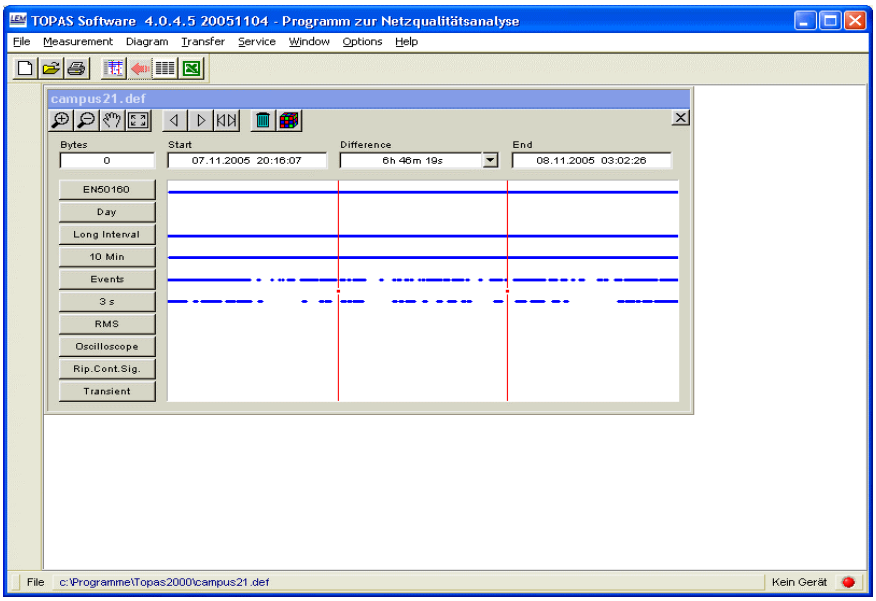
etc.

For detailed descriptions of the output options, please refer to chapter *Transfer-Online-Mode*, page 88 ff.

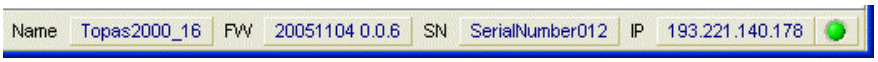
6 Operation of the software

6.1 The program window

After start-up of the software, and opening of a measurement data file, the following main window is displayed:



In the window title we can see version and creation date of the software and the name of the actual measurement data file.
In the bottom of the program window there is a status line showing the following information:



Name	Description
Name	Designation of the Topas 2000
FW	firmware version
SN	serial number of the Topas 2000
IP	IP-address of the Topas 2000
Red indicator	no connection to a Topas 2000
Yellow	Searching for Topas 2000 in the network
Green indicator	connection to Topas 2000 is active

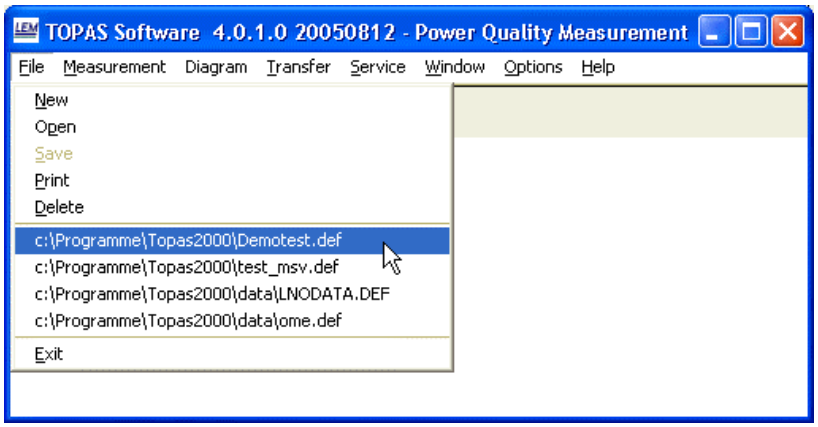
6.2 Main toolbar

Button	Function
	▸ Select *File/New* to create a new definition file.
	▸ Select *File/Open* to open an existing definition or measurement data file.
	▸ Select this function to print the current screen contents on the system printer.
	▸ Click this button to open the evaluation window after the transfer of the measurement data.

	▸ If a connection is established between the instrument and the PC, click this button to open the target directory for the file selection/input for the transfer of measurements.
	ASCII report generator – data in text format
	EXCEL report generator: automatic generation of measurement reports based on the export configuration.

6.3 Menu: *File*

The last used files are directly accessible via this pull-down menu



6.3.1 *File - New*

- Select *File/New* or click in the toolbar to create a new definition file (*.def*). The window contains all information required for the configuration of a measuring procedure. The default values correspond to the requirements laid down in EN 50160.

– or –

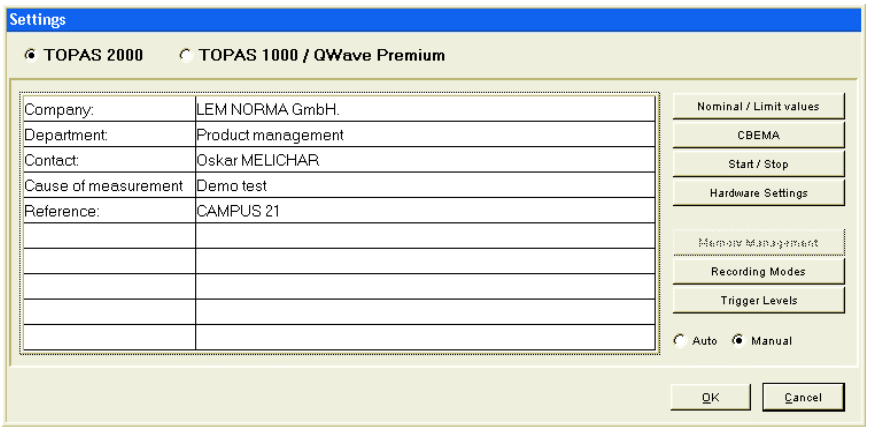
- Select *File – Open* to open an existing file or a template (**.vdf*) where you can adjust the parameters to suit your specific measuring job.

- Save the amended file under a new name.

Important
Do not modify definition files assigned to measurements, as this might corrupt the stored data. Saved data can only be loaded and analyzed together with the associated parameter file.

You also have the option to enter a comment regarding the measurement. Enter a description of the measuring job by entering the details as suggested. Alternatively, you can delete or edit the existing text. You also have the option to amend a number of parameters that determine the measuring procedure and the evaluation.

Important
We have to distinguish between settings for Topas 1000 and Topas 2000. There are several instrument specific differences in the settings especially for recording modes, hardware and trigger settings.

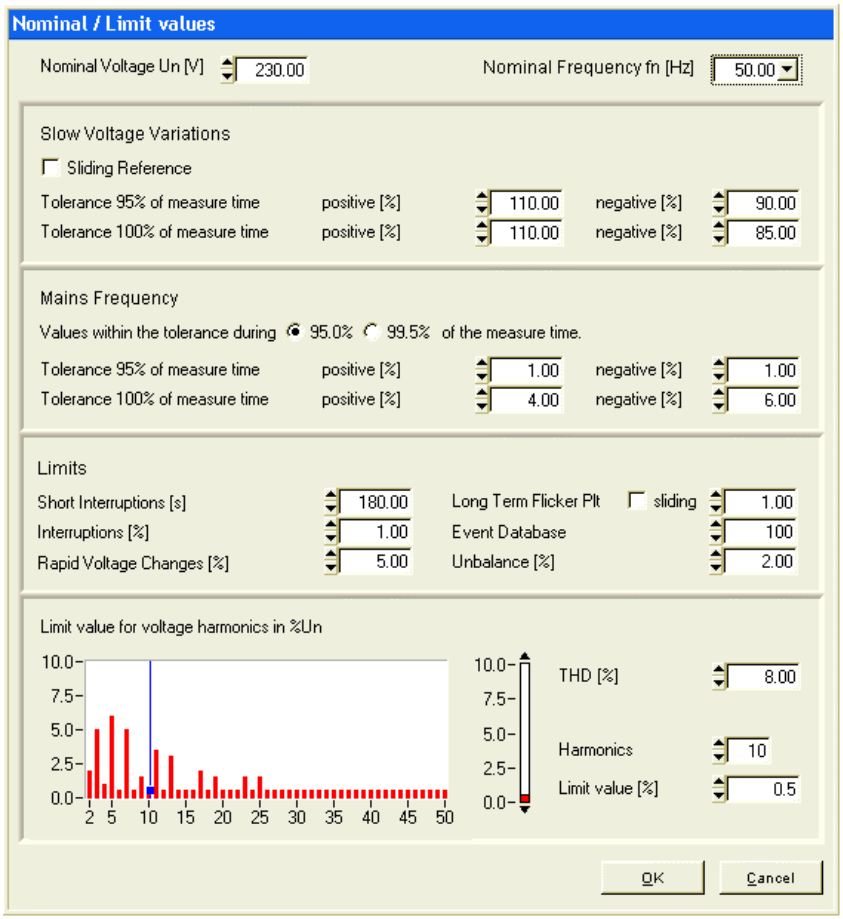


Note
For the initial test measurements, we recommend applying the rated voltage and the default hardware settings of the sensors. We recommend setting the trigger settings to *Automatic* and to apply the default values for all other settings. Based on the initial results, you can then modify the trigger settings to optimize them.

- To enter text, double-click the *respective* field.

Nominal- and limit values

In this window, you have the option to change the nominal and limit values (default values correspond to EN 50160 requirements). Such amendments might be necessary in connection with changes made to the standard or the application of more stringent requirements.



Important
All limit values can be changed!
EN 50160 evaluations are only possible, if this option is activated by means of the appropriate permission code.

Nominal voltage Un

The voltage a system is designated and identified and to which certain characteristics are referred to. In case of special agreements this is the declared voltage Uc. If in the hardware settings dialogue the checkbox *Event, Flicker, Harmonics of U12…* is activated (this is automatically done in ARON2 method, and in VoltagePP/VoltagePP configration) we have to enter the phase-phase voltage for Un (i.e. 400 V in the low voltage system). In this case event detection, Flicker and harmonics are based on the phase-phase voltages. If required a sliding reference according to IEC 61000-4-30 can be applied.

Nominal frequency fn

- Enter the power frequency here.

Slow voltage variations

Slow voltage variations are often caused by load variations in the distribution network. Enter the limit values for 95 % and for 100 % of the measurement time.

Sliding reference

If this option is marked a sliding reference for detection of voltage dips and swells is applied according to IEC 61000-4-30 items 3.26 and 5.4.4

Mains frequency

Enter the limit values for 95 % and for 100 % of the measurement time.

Please, note that in unsynchronized “island” networks the class for frequency variations is different: 95 % instead of 99.5 % of the measurement period for interconnected systems. A selection is provided.

Limits Declare several limit values for evaluations here:

Short interruptions — This time interval in seconds is the border between short interruptions (normally <3 min) and long-term interruptions.

Interruptions — This threshold distinguishes between interruptions (voltage dips below 1 % of Un typically) and voltage dips (normally between 1 % and 90 % of Un).

Rapid voltage changes — These are rapid changes of the rms value between consecutive voltage levels. Enter the limit value for detection of *rapid voltage change* events.

Long-term Flicker Plt — Voltage fluctuations cause changes in luminance of lighting systems which can create a visual phenomenon which is called Flicker. The limit value for the long-term Flicker Plt is defined in the standard EN50160, but there is no limit for the short-term Flicker Pst.
If required a sliding averaging algorithm can be applied. The norm requires building up of 2 hour values form the short term Flicker Pst. This setting is applied also for the level-time diagrams.
Please, note that the results for the different averaging methods can be different!

Events: — The maximum permissible number of voltage events (dips, swells, interruptions) is defined here. The standard EN50160 does not specify a limit.

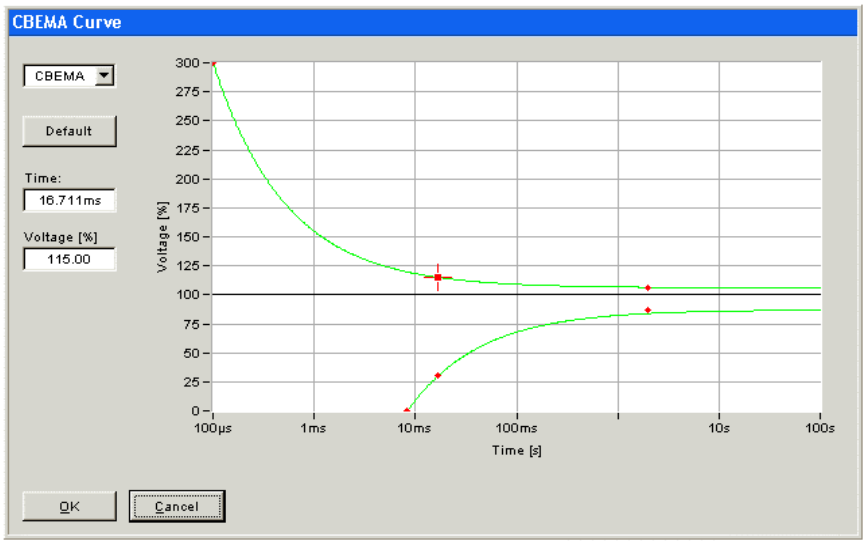
Unbalance: — Unbalance occurs if the r.m.s. values of the phase –neutral voltages and the phase angle between them are not equal.
This is the limit for 95 % of the 10 min values during the measurement period.

Limit value for voltage harmonics — Harmonics are components of the supply voltage with integer multiple (i.e. order) of the fundamental of the supply voltage. For each harmonic with orders between 2 and 50 a limit value can be assigned, also for the THD (total harmonic distortion).
This is a limit for 95 % of the 10 min r.m.s. values for each harmonic during the measurement campaign.

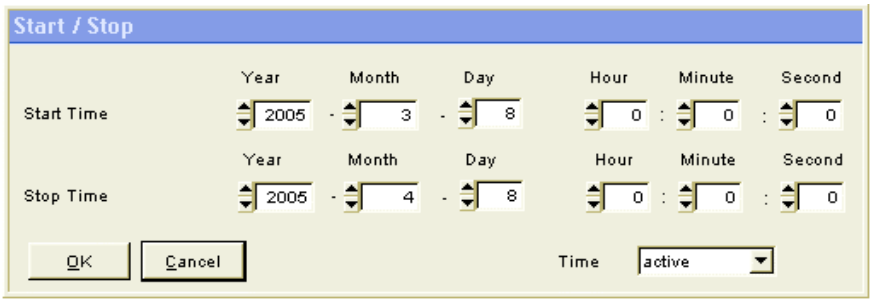
- Click *OK* to save the changes.

CBEMA window In the CBEMA window, users can view and modify the permissible tolerances for the evaluation of events according to CBEMA or ANSI. The limit value graphs have been calculated by CBEMA (Computer and Business Equipment Manufacturers Association) and define the effect of voltage events on equipment, depending on the voltage and the duration. This feature allows for the easy evaluation of malfunctions that are to be expected.
The limit curves can be adapted by moving the red markers with the left mouse button. The color and the width of the curves cannot be changed.

- To restore the default settings, click the *Default* button.



Start/stop time



In this window, you can enter the start and stop time for a measurement campaign.

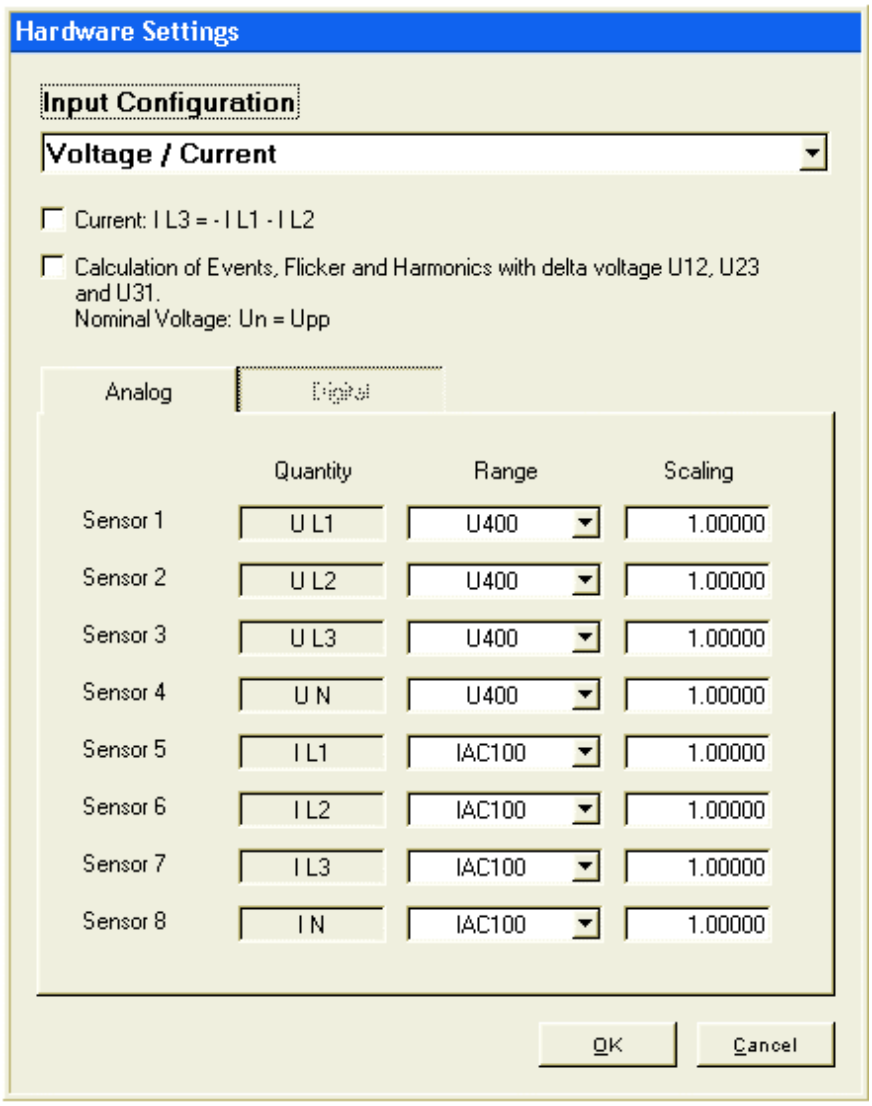
The recording of the measurements that are averaged over have given periods, e.g. 10 minutes, *Long interval* or recording as per EN 50160, is started at the start time. In the above example, the averaged measurements are available after the respective period has lapsed.

Note
If the definition file is opened, *Time is set to inactive* to ensure that the instrument with preset values starts accordingly. If you wish to work with defined *start* or *stop times*, set the *Time* to *active* before initializing the instrument!

- Click *OK* to save the changes.

Hardware settings

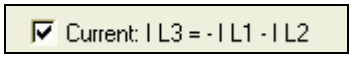
- Select the *measurement system*, the *sensor type* and their *ranges* and *scaling factors* (if required) for each channel.



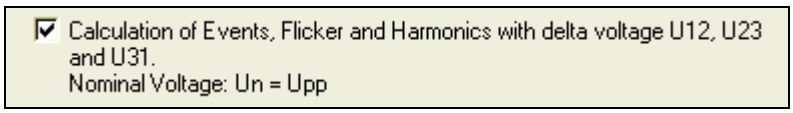
Select the measurement system – input configuration

Configuration Voltage/Current

This is the most commonly used configuration.
Connect max. 4 voltage and/or current sensors to the system under test, single-phase measurements (channel 4, 8: U+I only) are also provided. The standard 3-wattmeter method is applied, and neutral conductor voltage/current can be measured.

If the 

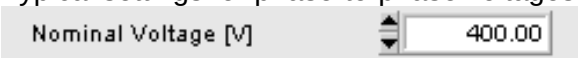
box is checked, current *IL3* is calculated rather than measured. This enables you to carry out measurements based on the 3-wattmeter method with all its advantages, rather than with the two-wattmeter method/Aron circuit in three-wire networks. This method should be used if (*I1+I2+I3=0*). See also connection diagrams in the hardware manual of the instrument.



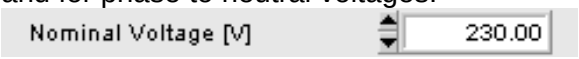
If this box is checked, the results for *events, Flicker* and *harmonics* as well as all trigger conditions for *events* and *harmonics* are determined based on the phase-to-phase voltages.

Important
If phase-to-phase voltages have been selected, the nominal voltage must also be entered as a phase-to-phase voltage in the dialogue *Nominal /Limit* values.

Typical settings for phase-to-phase voltages:



and for phase to neutral voltages:



Active/reactive *power*, *COS phi* of the harmonics

If *phase-to-phase voltages* are selected, the star voltages are calculated from the phase-to-phase voltages, and phase and total power values are determined accurately.

EN 50160 report

If *phase-to-phase voltages* are selected, the voltage events (over-voltage, under-voltage, short and long interruption) as well as the values for Flicker, harmonics, asymmetry and rapid voltage changes are calculated on the basis of the phase-to-phase 10 ms r.m.s. voltage values.

Configuration Voltage/Voltage

The phase voltages (phase-neutral conductor) of two three-phase systems are measured. In all analyses, the icon for current is replaced by that for voltage. The units of all channels is V.

Phase-to-phase r.m.s. voltage values are calculated on the basis of the phase voltages UL1, UL2, UL3. There is thus no need for delta configuration. All voltage channels can be laid from phase to earth.

An index in the parameter name indicates the system to which the voltage value belongs:

Voltages of system 1 *(CH1-CH4)*
- U L1 (1)
- U L2 (1)
- -U L3 (1)
- U N (1)

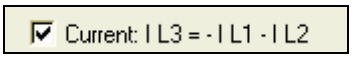
Voltages of system 2 *(CH5-CH8)*
- U L1 (2)
- U L2 (2)
- U L3 (2)
- U N (2)

Configuration VoltagePP / VoltagePP

Similar to voltage/voltage configuration, but with delta configuration connection (phase-phase).

Configuration 2-wattmeter method - *ARON2*

Conventional 2-wattmeter method with connection of the current sensors to conductors *L1* and *L3*. The phase-to-phase voltages are calculated from the phase voltages and form the basis for all phase power values and the total power. All power parameters are thus determined accurately.

If the box 

is checked, the omitted current *IL3* is calculated. Alternatively, use 3 current sensors.

Note
The system offers a range of different operating modes so that the measuring procedure can be adjusted to the actual measuring task. For more information, please also refer to the connection diagrams in the hardware manual of the instrument.

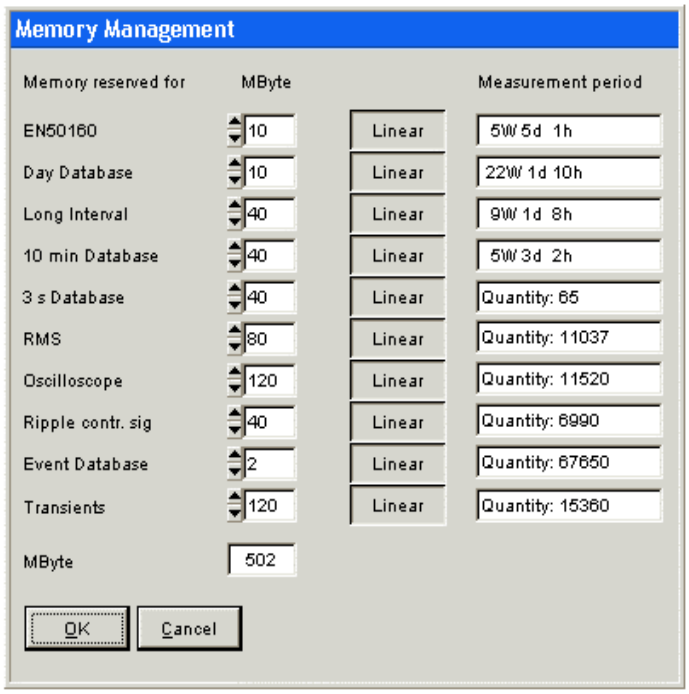
Select sensor

Next select the appropriate sensor out of the pull down list and additionally the scaling factor if required.

The *scale* factor is calculated from the primary quantity /secondary quantity, e.g. 10.000V / 100V = 100.

- Click *OK* to save the changes.

Memory management Topas 1000



In this window, you can determine the maximum memory for the various data (virtual measuring instruments) . This prevents that huge volumes of data are generated, which might lead to the loss of memory for other important data. The method of memory management can be set to *linear* or *circular.*

With *linear* management, the assigned memory space is filled until no new data can be stored anymore. With *circular* memory management, if the assigned memory space is full, the oldest data blocks are overwritten with the new data. The MBytes field shows the total of the assigned memory capacity.

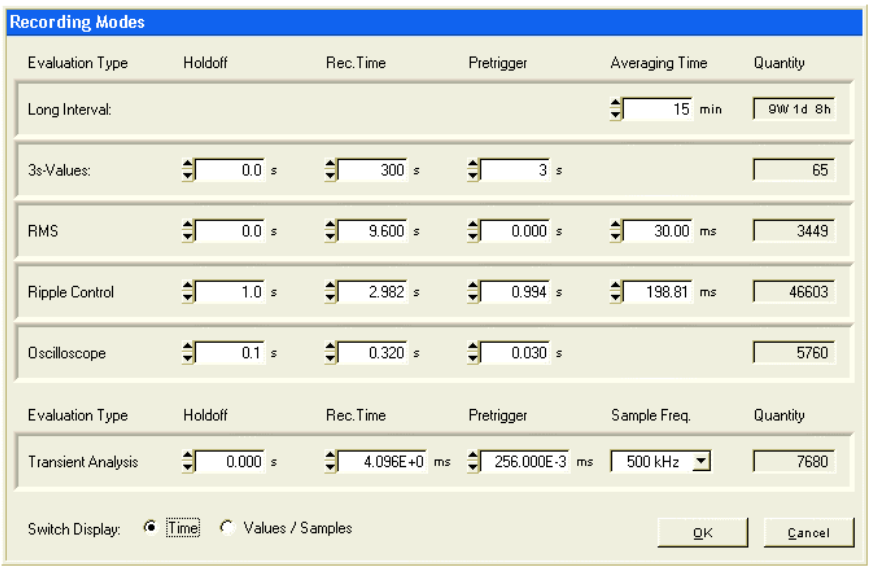
Important
Please ensure that this value is smaller than the actual built-in memory capacity of the instrument. The memory allocation is not tested, as the system can be configured without the instrument being connected, so that the actual available memory capacity cannot be determined.

- Click *OK* to save the changes.

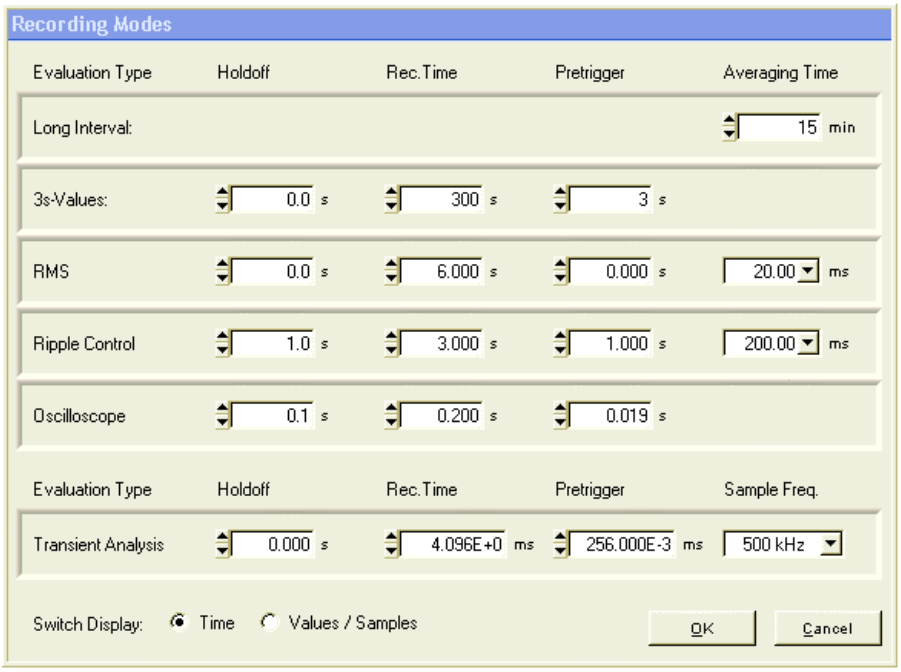
Memory management Topas 2000

Not yet implemented.

Recording modes Topas 1000



Topas 2000



In this window, you can define the recording times, pre-triggers, and hold-off times to the next recording for the virtual measuring instruments.

Hold-off

This value indicates the period from the end of a recording to the next trigger ready state. This hold-off time has to be at least as long as the pre-trigger time.

Recording time

This value indicates the duration of the recording from the trigger time.

Pre-trigger

To define the duration of the recording prior the trigger event, enter a positive time value. Negative values lead to delayed recording after the trigger time (post-trigger).

Averaging time

Define here the averaging interval for the *Long interval*, r.m.s. values (10 ms, 20 ms, 200 ms, 3.000 ms = 3 s) and ripple control signals (200 ms or 3.000 ms = 3 s).

Topas 1000: Quantity

This value indicates the number of recordings per evaluation type, based on the reserved memory, averaging time, or recording time per event.

Sample frequency

For transient recordings, enter here the sampling rate. The standard transient option supports for sampling frequencies between 100 and 500 kHz, the extended option, sample frequencies between 100 kHz and 10 MHz.
After setup we can switched the presentation in the bottom of the panel from seconds to samples/measurement values to check the number of values that will be recorded.

Important
The transient option is only available if it is built into the instrument. No error message is issued, if an invalid sampling frequency is selected.

Note
At the end of a trigger recording, there might be a delay of up to 0.6 seconds to the next trigger response. For gapless recordings, a suitable large number of recorded values or intervals must be selected. Trigger events at short intervals within a period of a second are aggregated to a single event.
The term *oscilloscope* refers to the sampled values.

Basically there is no difference in the settings between Topas 1000 and Topas 2000. For Topas 2000 we can enter values only which are supported by the aggregations in the instrument's firmware: e.g. for r.m.s. values 10, 20, 200, 3.000 ms can be selected or 200 ms, 3.000 ms for ripple control signals.

- Click *OK* to save the changes.

Trigger settings

Values for EN 50160 statistics, 1-day values, Long interval, 10 minutes and events are always recorded, irrespective of the trigger settings. The other functions are recorded only, if the trigger activated in the settings is tripped.

Note
For initial test measurements, we recommend using trigger setting *Automatic*. Based on the initial results, you can then modify the trigger settings to optimize them.

Note
For practical use: If you wish to continuously record r.m.s. values with an averaging time of 20 ms, we recommend the following approach:

- Set the *holdoff* and the *pretrigger* times to the same value of 4 seconds, and choose a recording time of 10 s.

- Activate the *time trigger* with a repeat rate of 10 s. Alternatively, select an *oscilloscope trigger*, which is tripped at each network period. Do not combine an oscilloscope trigger with a time trigger, as this would lead to gaps in the recording.

Automatic selection of trigger levels – Topas 1000

With automatic trigger level selection, the instrument records the most important events within the intervals, which are set to between 5 and 35 minutes, depending on the measuring time. A measuring time of 5 minutes is set for one day; a measuring time of 35 minutes is set for a period of one week and longer. If no measuring time is activated, the default interval of 35 minutes is applied. The following events are recorded in an events list:

Data type		Parameter
rms value	Holdoff	10 s
	Recording time	10 s with 20 ms averaging
	Pretrigger	1 s
Oscilloscope	Holdoff	10 s
	Recording time	320 ms
	Pretrigger	40 ms
Transients	Holdoff	10 s
	Recording time	2.048 ms, sampling frequency 500 kHz
	Pretrigger	0.256 ms
3-sec values	Holdoff	10 s
	Recording time	75 s
	Pretrigger	15 s

All settings are applied automatically by the instrument. After it is switched on, the parameters for the trigger settings are determined during the first interval. Subsequently, the parameters are increased at each trigger event to the level at which the trigger has responded. (If the number of trigger events decreases, the trigger levels of the previous interval are reactivated. The trigger levels of channels U L 1 to U N are individually controlled. The following table shows all active trigger types.

Trigger	Type	Channels
rms value	Lower limit	UL1, UL2, UL3, U N
	Upper limit	UL1, UL2, UL3, U N
	Volt. change	UL1, UL2, UL3, U N
Oscilloscope	Level	UL1, UL2, UL3, U N
	Exceeding of max. value	UL1, UL2, UL3, U N
	Wave shape changes	UL1, UL2, UL3, U N
Transients	Transient level	UL1, UL2, UL3, U N
Harmonics	THD (%)	UL1, UL2, UL3, U N

The automatic trigger is adjusted in such a way that approx. 7 MB of measured data is recorded per day.

Important
Before using the automatic trigger all manual triggers should be de-activated.

Manual adjustment of trigger levels

Note
In general for all trigger settings:
Procedure:

- Select the optimal trigger type for your application:
  - V-I-P trigger (r.m.s. trigger, average values)
  - Oscilloscope
  - Transient analysis
  - Ripple control signal analysis
  - Harmonics
  - Time
- Select the kind of the trigger e.g. for Oscilloscope:
  - Level, Sine, Max, Phase, Wave
- Define the recordings which shall be done in case of a trigger event:
  - RMS and/or
  - Oscilloscope (samples) and/or
  - Transients and/or
  - 3 s values and or
  - ripple control signals

according to the trigger type.
The recordings are done as defined in the dialogue *Settings Recording Modes* then.

- Select the parameter for the trigger, e.g. V, I, P.
- Click with the right mouse button into the field for the phase you want to trigger (L1-A, L2-B, L3-C, N). A further right click disables this trigger.
- Click *Reset* to disable all triggers in this panel.
- Click *OK* to save the settings.

Buttons like Min, Max, Dif can be used to check the appropriate settings.

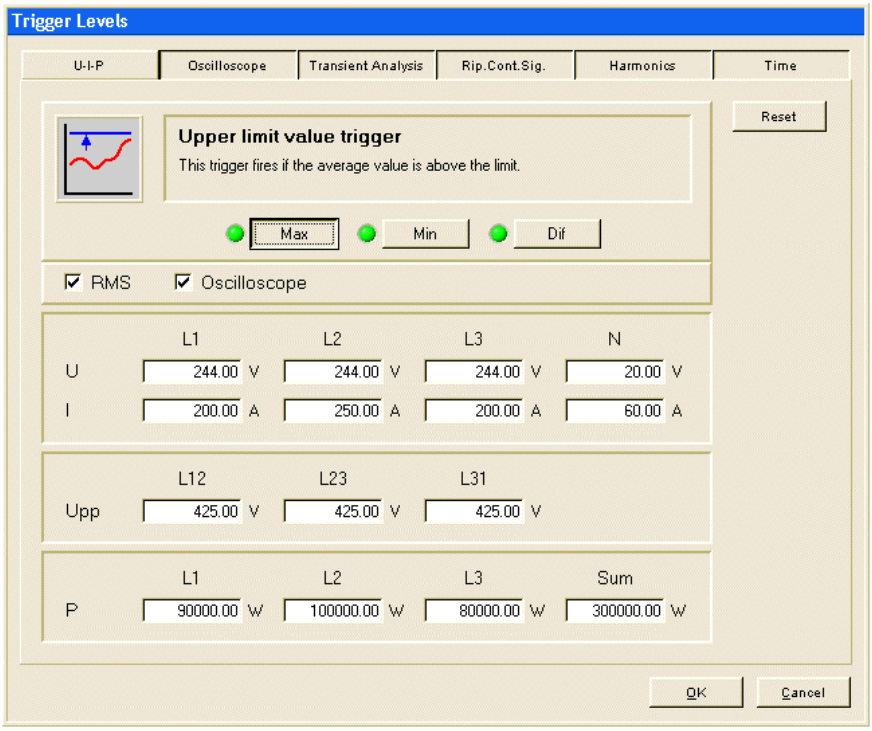
The red indicator means: there is no threshold defined for this trigger.

The green indicator means: there is a threshold defined for this trigger.

An event might meet more than one trigger condition. We recommend selecting only those triggers that correspond best to the event to be recorded, rather than activating too many triggers.

U-I-P trigger

Level monitoring-Maximum



This trigger can be applied to phase voltages (U), currents (I), phase-phase voltages (Upp), and active power (P) values.
We have to enter the r.m.s. values of voltages and currents or the average values for power we want to monitor.
The trigger fires if the measurement values are above the limit value and records on request *r.m.s.* and/or *Oscilloscope* values.
The recordings are done as defined in the dialogue *Settings Recording Modes*.

Important
To record *r.m.s.* values and/or *Oscilloscope* (sample) values, check the respective boxes:

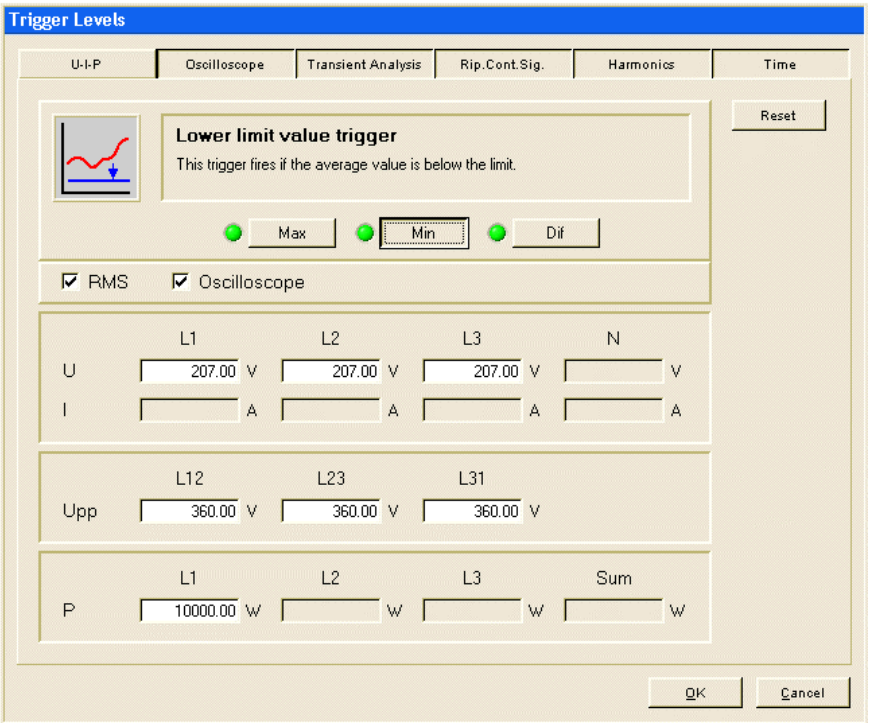
In the above example the trigger record *r.m.s.* values and *Oscilloscope* values if any of the phase voltages is higher than 244 V, or if one of the phase-phase voltages is above 425 V or one of the currents or one of the power values is above the limit.

Typical applications

Detection of peak values of voltages, currents and/or power values, turning off of heavy loads if the power reaches some peak values to avoid peak tariffs.

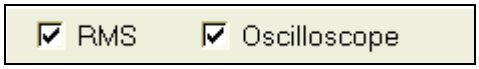
U-I-P trigger

Level monitoring-Minimum



This trigger can be applied to phase voltages (U), currents (I), phase-phase voltages (Upp), and active power (P) values.
We have to enter the r.m.s. values of voltages and currents or the average values for power we want to monitor.
The trigger fires if the measurement values are below the limit value and records on request *r.m.s.* and/or *Oscilloscope* values.
The recordings are done as defined in the dialogue *Settings Recording Modes*.

Important
To record *r.m.s.* values and/or *Oscilloscope* (sample) values, check the respective boxes:



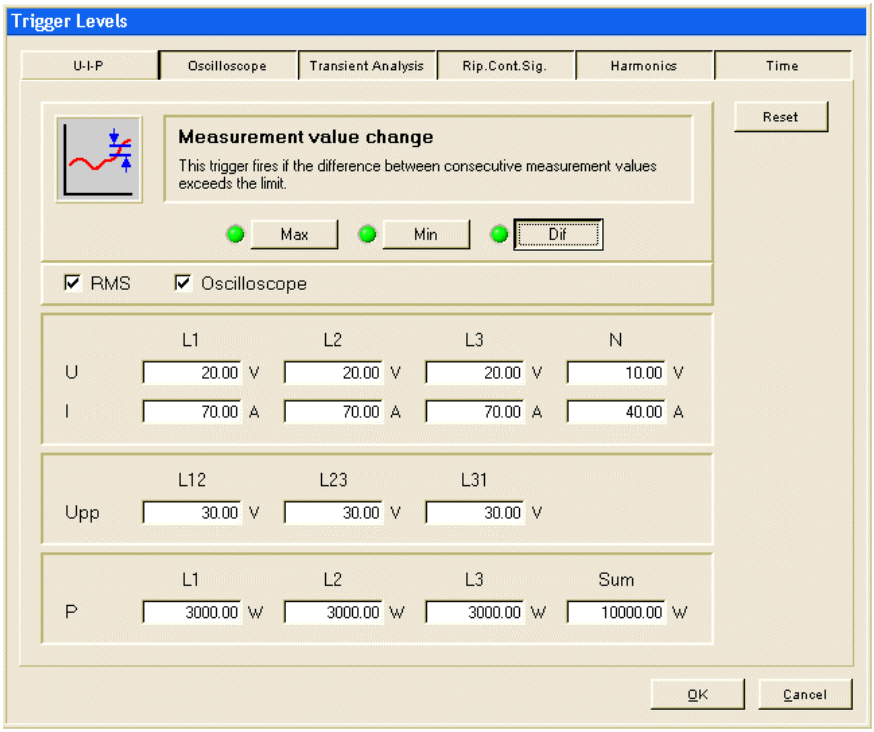
In the above example, the recordings of *r.m.s.* and *Oscilloscope* (sample) values are started, if one of the phase voltages drops below 207 V or if one of the phase-phase voltages exceeds 360 V, or if the active power on phase L1 drops below 10 kW.

Typical applications

Detection of voltage dips.
The concurrent recording of voltage and current values provides data to estimate whether load variations in the installation caused the voltage dips or if the voltage drops were delivered from other branches of the distribution network.

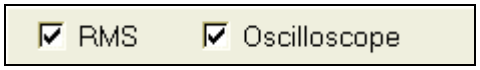
U-I-P trigger

Level monitoring-Difference



This trigger can be applied to phase voltages (U), currents (I), phase-phase voltages (Upp), and active power (P) values.
We have to enter the r.m.s. values of voltages and currents or the average values for power we want to monitor.
The trigger starts the recordings of *r.m.s* values and/or *Oscilloscope* values on request if small, fast measurement value changes occur. The trigger does not react to slow, even large value changes. Disturbances produce rapid voltage changes between consecutive measurement intervals.
The recordings are done as defined in the dialogue *Settings Recording Modes*.

Important
To record *r.m.s.* values and/or *Oscilloscope* (sample) values, check the respective boxes:



In the above example the rigger will record *r.m.s.* values and *Oscilloscope* (sample) value if:
- one of the phase voltages changes for more than 20 V or
- if the Neutral-voltage changes more than 10 V or
- one of the phase currents changes for more than 70 A or
- if the N-wire current changes for more than 40 A or
- one of the phase-phase voltages changes for more than 30 V or
- if one of the phase power values changes for more than 3 kW or
- if the total power changes for more than 10 kW.

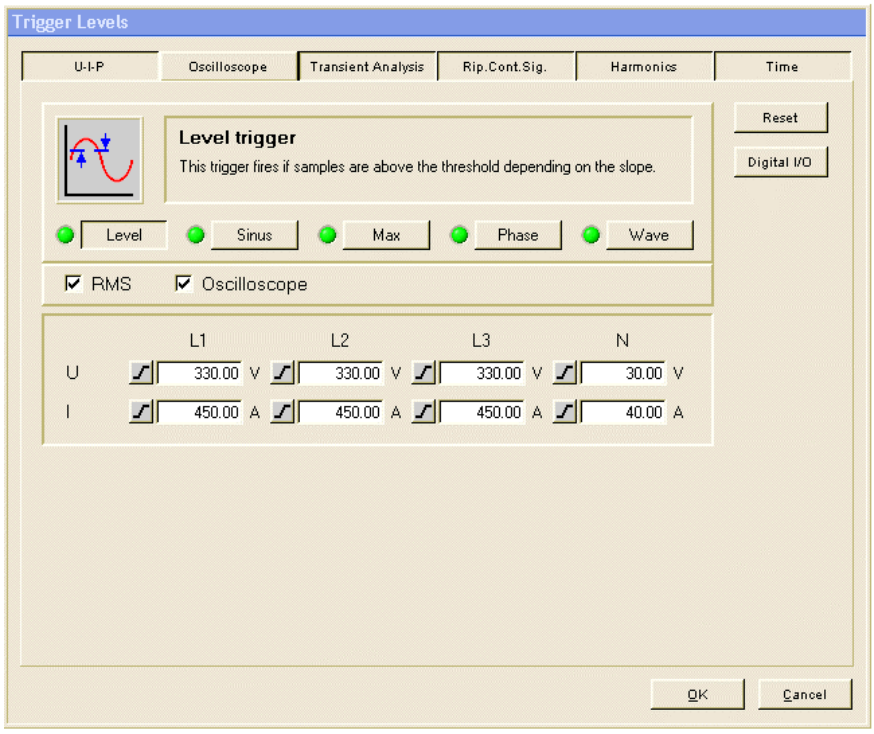
Typical applications

Detect any changes in the distribution system. It is possible to establish complex trigger settings, thus the Topas 2000 will always record relevant data for trouble shooting, for localization of the sources of the disturbances:

- are there voltage dips, voltage swells?
- were there large loads switched on, did they produce voltage dips which had an impact to the distribution network?
- Is the mains impedance low enough on the point of common coupling?
- Monitoring of external signals coming from protection relays, industrial control systems etc.
- Trigger on status changes of specific external signals

Trigger - Oscilloscope

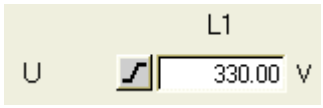
Level



This trigger can be applied to phase and Neutral voltages (U), and phase and Neutral currents (I).
We have to enter the sample values of voltages and currents we want to monitor.
The trigger starts the recordings of *r.m.s* values and/or *Oscilloscope* (sample) values on request if the sample values are above or below the preset limit value.
The recordings are done as defined in the dialogue *Settings Recording Modes*.
Positive (rising) or negative (falling) slope is determined by the symbol left to the numerical input field. The trigger is sensitive to slopes but not to levels.

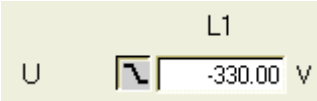
Example

Trigger for positive slope on positive voltage on *L1*:



Example

Trigger for negative slope on negative voltage on *L1*:



Important
To record *r.m.s.* values and/or *Oscilloscope* (sample) values, check the respective boxes:

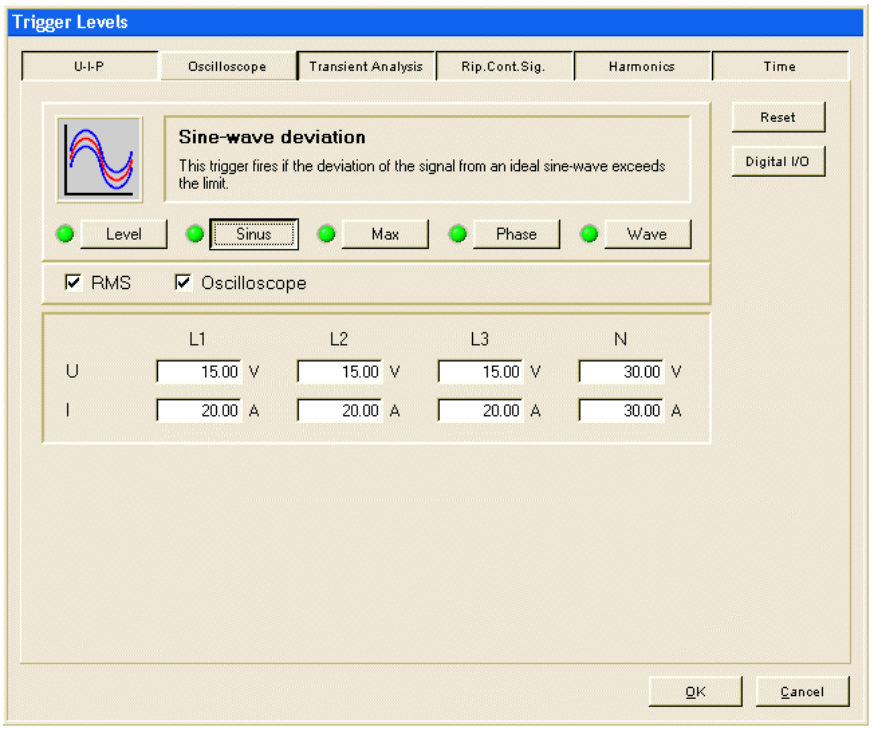
In the above example the trigger starts recordings of *r.m.s.* and/or *Oscilloscope* (sample) values if the sample values of the phase voltages are above 330 V or if the Neutral voltage is above 30 V, or if the samples of the phase currents are above 450 A or if the Neutral current is above 40 A and changes with positive/negative slope respectively.
The recordings are done as defined in the dialogue *Settings Recording Modes*.

Typical applications

Precise investigations of short term voltage and current peak values or voltage sags. It is important to define appropriate pre-trigger time periods in the *Settings Recording modes*. Thus the history before the event and the whole event can be analyzed in detail.

Trigger - Oscilloscope

Sine



This trigger can be applied to phase and Neutral voltages (U), and phase and Neutral currents (I).
This trigger is sensitive for deviations from the ideal sine wave. Based on zero crossings and amplitudes of the last cycle an ideal sine wave is calculated. If the deviation of the samples of the actual mains cycle from this ideal sine eave is higher than the limit value a recording of *r.m.s* values or *Oscilloscope* (sample) values is started.

The recordings are done as defined in the dialogue *Settings Recording Modes*.

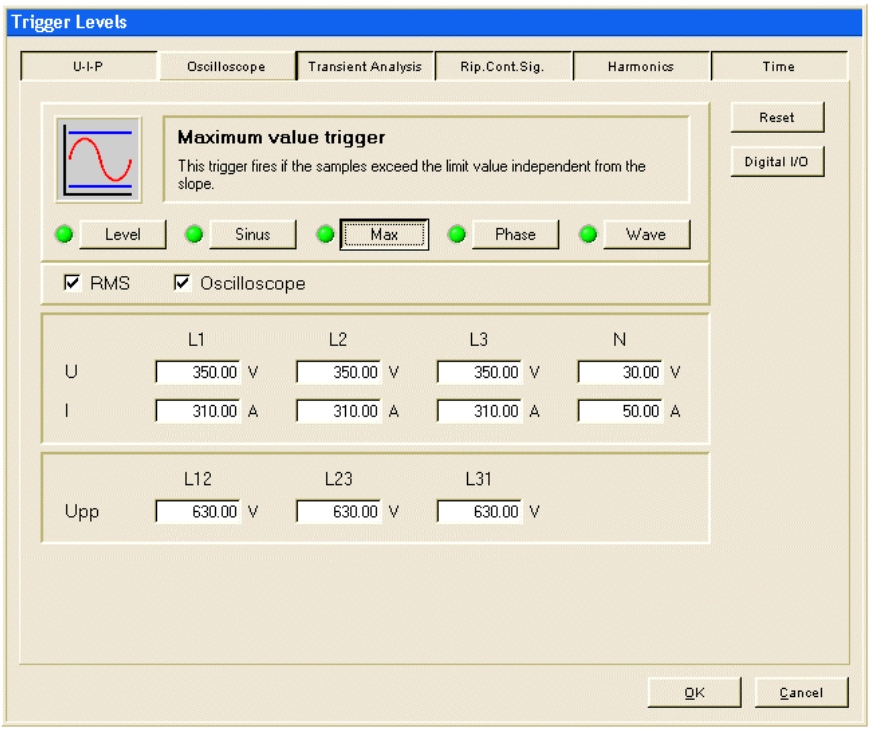
Important
To record *r.m.s.* values and/or *Oscilloscope* (sample) values, check the respective boxes:

If for example the limit is 20 V, a recording will be performed if the deviation of the waveform from the ideal sine wave is more than ±10 V.

Typical applications

- Detection of commutation of distortions
- Sudden distortions of the waveform

Oscilloscope trigger – Maximum



This trigger can be applied to phase voltages and Neutral voltage (U), phase currents and Neutral current (I), and phase-phase voltages (Upp).

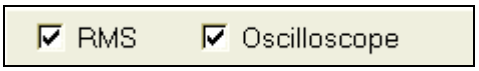
This trigger monitors the maximum values independent of the polarity. We have to enter the sample values of voltages and currents we want to monitor.

The recording is initiated if the sample values of the positive or the negative half cycle are above the limit value.

Example

If the limit value is set to 350 V a triggered recording is started if samples are above +350 V or if samples are below -350 V. The recordings are done as defined in the dialogue *Settings Recording Modes*.

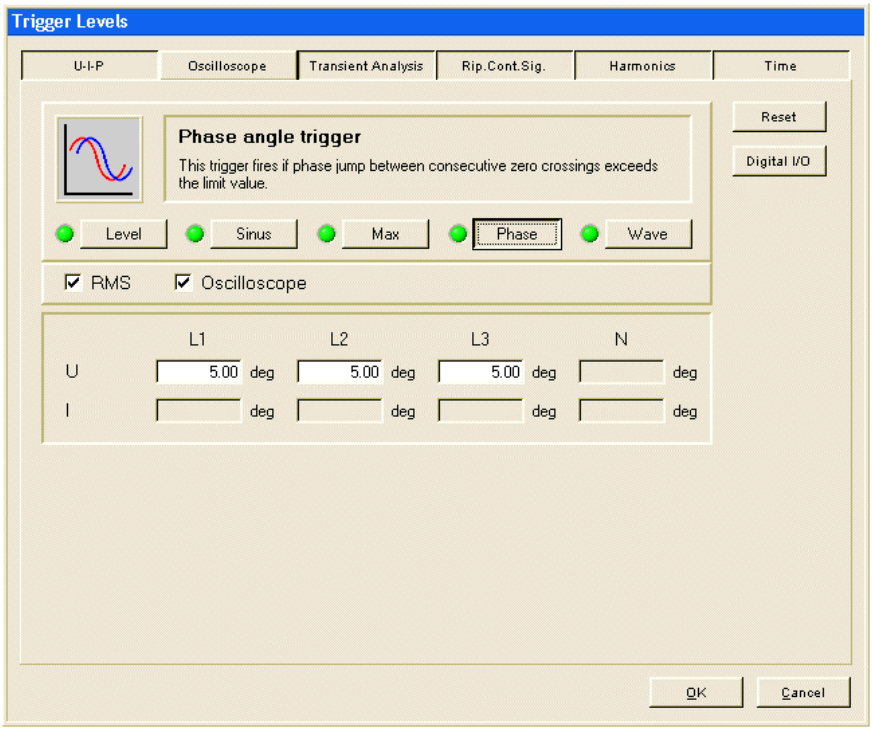
Important
To record *r.m.s.* values and/or *Oscilloscope* (sample) values, check the respective boxes:



Typical applications

Precise investigations of short term voltage and current peak values.

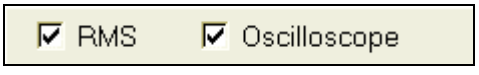
Oscilloscope trigger – Phase



This trigger can be applied to voltages (U) and currents (I) of the phases and of Neutral.
The trigger responds to phase jumps between consecutive cycles. The zero crossings of adjacent periods are evaluated. If the limit is set to 0.5° the trigger will start recordings *of r.m.s.* and/or *Oscilloscope* (sample) values if phase jumps are above this value on request.

The recordings are done as defined in the dialogue *Settings Recording Modes*.

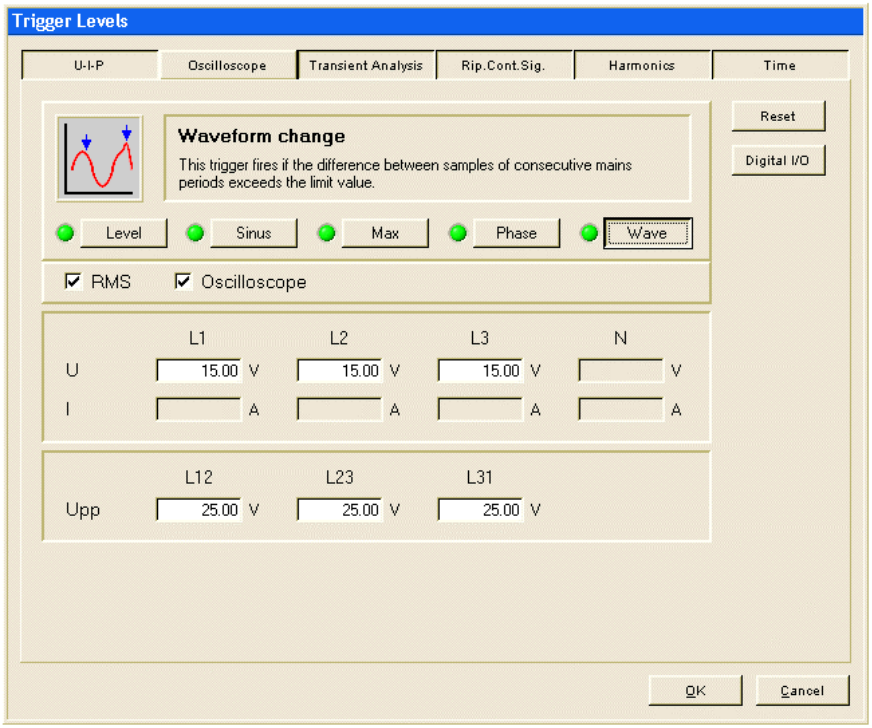
Important
To record *r.m.s.* values and/or *Oscilloscope* (sample) values, check the respective boxes:



Typical applications

Detection of over currents or short circuits in neighboring or host networks.

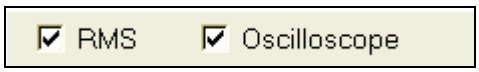
Oscilloscope trigger – Wave



This trigger can be applied to voltages (U) and currents (I) of the phases and of Neutral and phase-phase voltages (Upp).

This trigger monitors the differences in the waveforms of consecutive mains cycles. The samples of the last cycle are compared with the samples of the actual cycle.
The trigger starts the recordings of *r.m.s* values and/or *Oscilloscope* values on request if small, fast measurement value changes occur. The trigger does not react to slow, even large value changes. Disturbances produce rapid voltage changes between consecutive measurement intervals and will be recorded this way.
If the limit is set to 15 V the trigger will respond if the difference between two sample values with a time offset of one cycle is more than 15 V.The recordings are done as defined in the dialogue *Settings Recording Modes*.

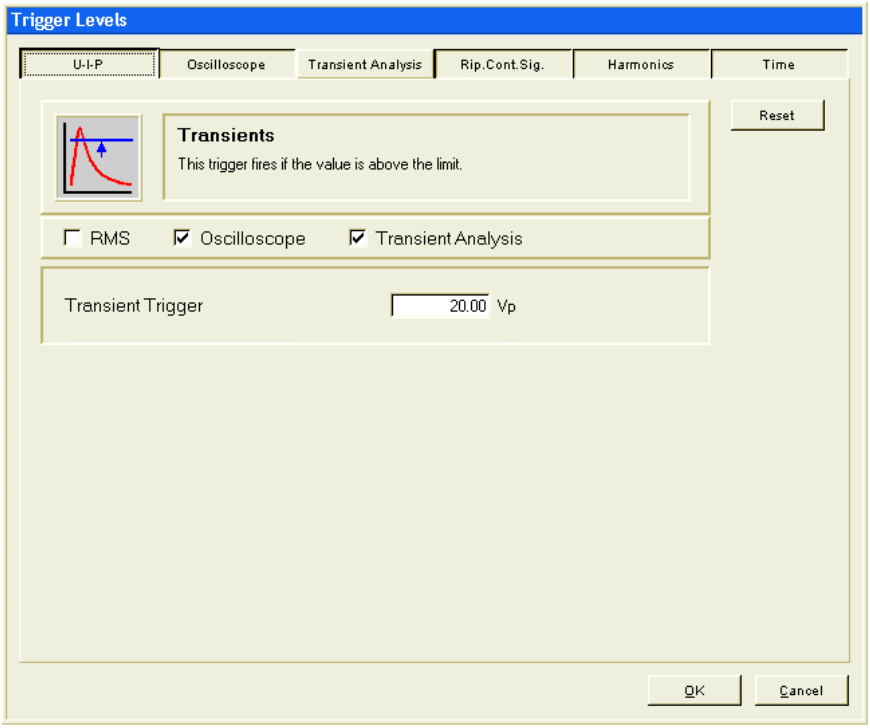
Important
To record *r.m.s.* values and/or *Oscilloscope* (sample) values, check the respective boxes:



Typical applications

This trigger type is perfectly suitable for all kinds of disturbance analysis, troubleshooting , because most of the power quality problems result in a sudden change of the waveform. From the recorded waveforms we can find the cause of distortion in most cases: switching of capacitor banks, commutation distortions, oscillations in the network, ground short in the medium voltage system show typical significant waveforms.

Trigger – Transient analysis



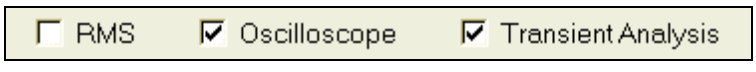
Transients are short, unexpected signals in the distribution network which occur only once and have high amplitude and high slew rate. They contain high frequency components. This is why the input signal has to pass a 1.500 Hz high-pass filter before it is fed into the trigger logic.

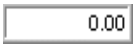
The trigger is operational for the channels *CH 1 - CH 4* for voltages, provided that the transient option is mounted in the instrument.

The standard transient option allows for sampling frequencies of between 100 kHz and 500 kHz. With the extended option, this range is enlarged to 100 kHz – 10 MHz.

If transient signals exceed the limit value, a recording of *transients*, *r.m.s.* and/or *Oscilloscope values* is triggered, depending on the actual settings.

Important
To record *r.m.s.* values and/or *Oscilloscope* (sample) or *Transient* values, check the respective boxes:



Right-click a value field 

to activate or deactivate it and enter the threshold value.

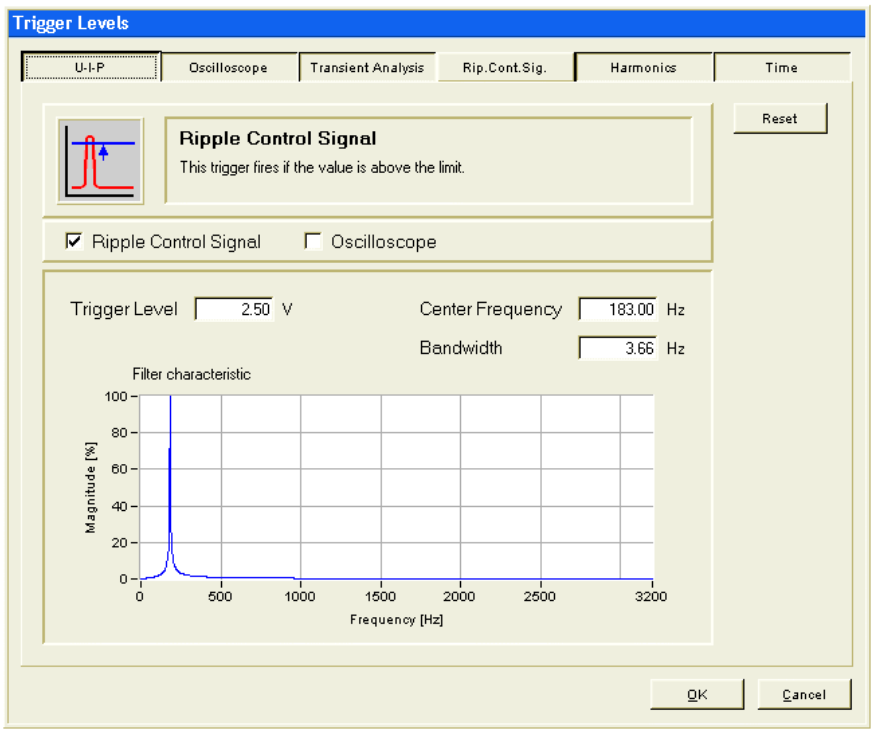
Note
When using series transformers, the scale defined in the *hardware settings* is taken into account.

Trigger –

Ripple control signal analysis

Ripple control signals are used by the power utilities to remote control assets by audio frequency signals modulated to the mains voltage (switching between day-/ night tariffs, control of street lighting are some applications).
Important for correct functionality is the appropriate signal level at the receiver site and the slew rate of the pulses. With this trigger it is very easy to record these signals and verify the functionality of the remote control system.

Topas 1000



To set this trigger, select a *Center Frequency* and a *Bandwidth*. These values must be adjusted to the ripple control system used in the local network.

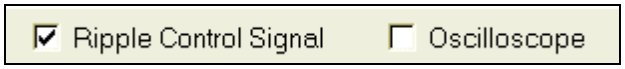
Typical settings

Centre frequency (Hz)	183	387	1.125	2.000
Bandwidth (Hz)	2	6	15	25

The 50/60 Hz frequency components are attenuated to less than 1 %. The filter graph can be checked in the diagram.
If the ripple control signal exceeds the set limit value, the system starts to record *Ripple control* values and/or Oscilloscope (sample) values.

- Right-click the input fields 0.00 to activate/deactivate them.
- Click the left mouse button to select and zoom in on sections of the filter graph.
- Click the right mouse button to return to the standard view.

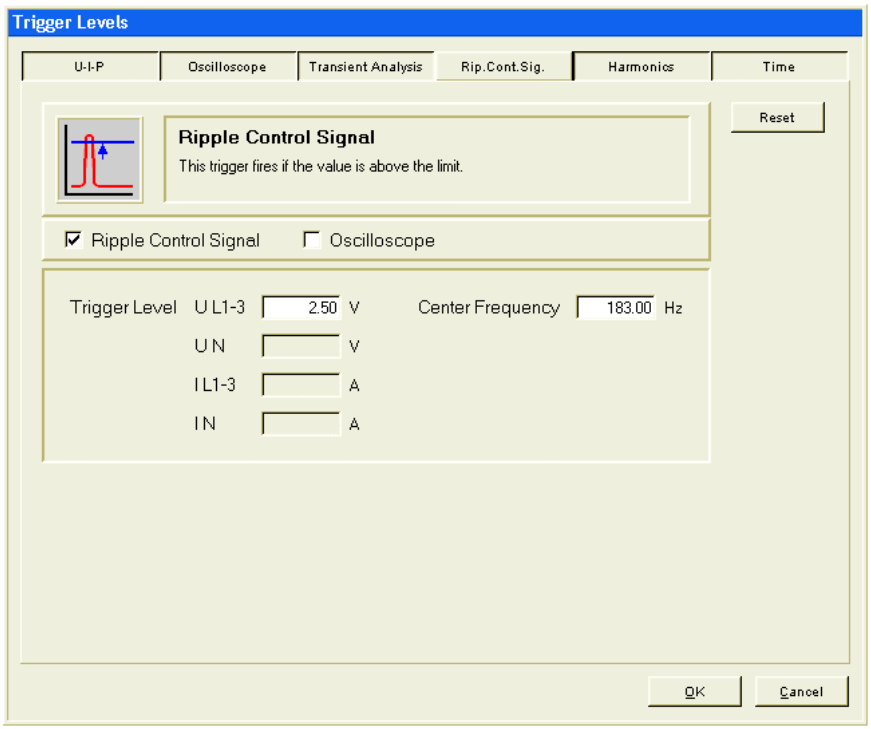
Important
To record *Ripple Control Signals* and/or *Oscilloscope* (sample) values, check the respective boxes:



Trigger –

Ripple control signal analysis

Topas 2000



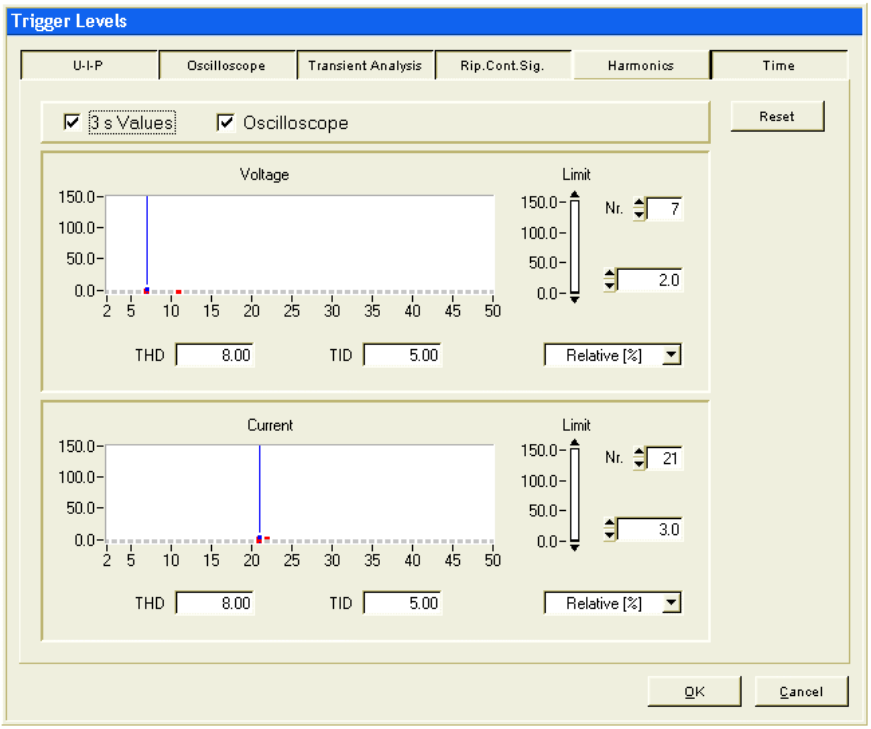
This trigger can be applied to phase voltages, to the Neutral voltage, to phase currents and to the Neutral current.

- Right click into the appropriate field and enter the thresholds. There is one limit for the phases *L1, L2, L3* for voltages and currents, and another one for the Neutral.
- Right click again to deactivate a trigger.
- Define the Center Frequency which is used by the local power utility.

The 50 / 60 Hz frequency components are attenuated to less than 1 %. If the ripple control signal exceeds the preset limit value, the system starts to record *Ripple control* values and/or *Oscilloscope* (sample) values.

Important
To record *Ripple Control Signals* and/or *Oscilloscope* (sample) values, check the respective boxes:

Trigger – Harmonics



Harmonics are components of the signal integer multiples of the fundamental frequency.

This trigger can be applied to distinct harmonics of voltages and currents and also to the total harmonic contents THD and to the total interharmonics contents TID.

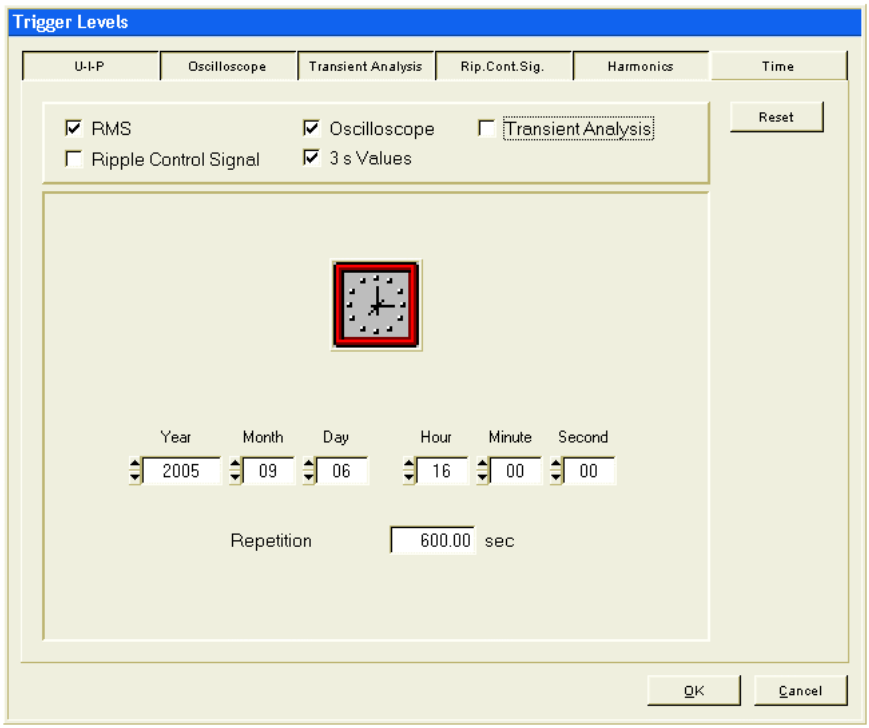
The values can be given absolutely in V or A or relative to the fundamental.

- Right-click the desired position in the diagram to set the *trigger level* for each harmonic, the THD (total harmonic distortion) or for the TIS (total interharmonics distortion) for voltages and currents.
- The individual harmonics can be defined by positioning the cursor in the spectral diagram or by means of an entry in the numerical field Nr. 30.
- The trigger level can be a numerical value by keyboard entry or by means of the mouse. Harmonics which must not trigger the system must be switched off.
- This is done by right-clicking the numerical field 0.00.
- Triggers assigned to specific harmonics can be activated by means of a right mouse-click. These trigger settings are level-sensitive, i.e. the trigger responds, if the measured value exceeds the preset r.m.s. limit value.

Note
TID is the total of all interharmonics frequencies. This function allows for the detection of intermediate-frequency interferences, irrespective of the frequency range in which these interferences occur. The TID trigger allows for the recording of instantaneous values. Based on the spectral analysis, you can then determine the frequency of the interference in offline mode. With this function, you have the option to determine effects of ripple control signals or power electronics.

Important
For the recording of *3-sec* values and/or *Oscilloscope* (sample) values, check the respective boxes:

Trigger – Time

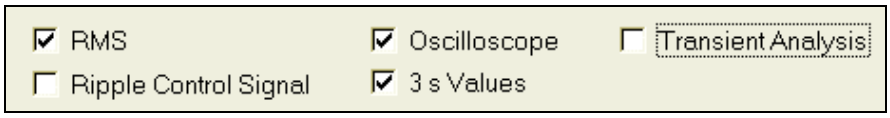


The *time trigger* allows for the recording of selected measurement values at preset time intervals, at a certain clock time.

The following options are available

- Start time of the time-triggered recording (the default value is the next full hour to the actual PC-time)
- Repeat time in seconds
- To enter a value in the *Repetition* field, right-click into the field and enter the value in seconds.

Important
For the recording of *transients, r.m.s. values*, *oscilloscope (sample) values), ripple control data* and/or *3-sec files,* check the respective boxes:

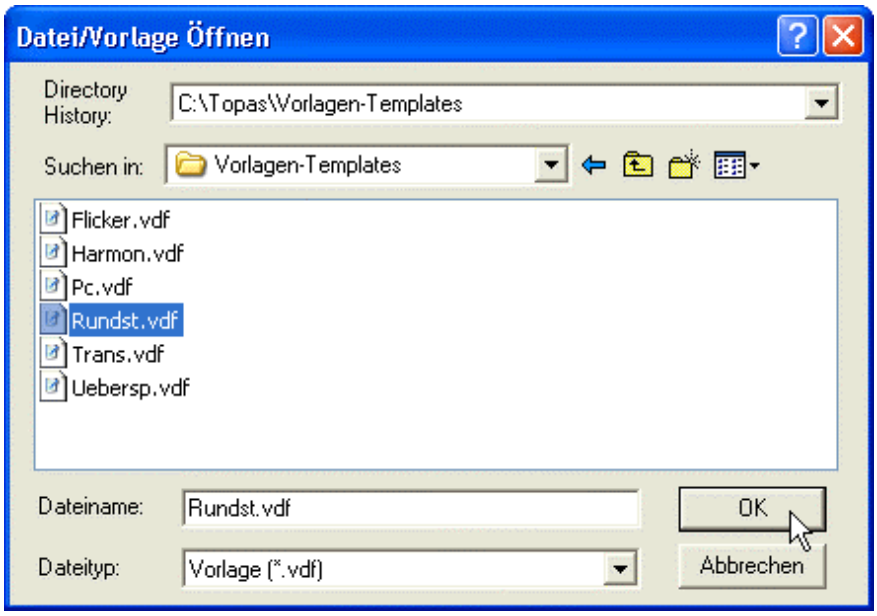


Note
The *time trigger* generates only one entry in the *event list*. The selected measurement data are stored at the required clock times in the actual data file on the Topas.

Templates

The software comes with a number of templates in the form of *.vdf* files, which have been preconfigured for certain applications. These files are stored in the *Vorlagen-Templates* folder on your Topas CD-ROM. If you wish to use these templates frequently, copy them into the Topas *installation directory*.

The general templates (**.vdf*) can be customized to suit your specific requirements, and then saved as own templates.



Flicker.vdf template

This trigger configuration is used for the recording of Flicker. It responds if the absolute values are exceeded, and if voltage fluctuations between two intervals are greater than 5 V. It might be necessary to reduce the level to a smaller value, depending on the measuring conditions. In this template, only the rms value trigger is activated.

Harmon.vdf template

This template contains the limit values according to EN 50160. A recording is started, if a limit value for voltage is exceeded. The system thereby monitors the 25 harmonics of the voltage and records 3-sec values. These trigger settings thus register any exceeding of the limit values of the voltage harmonics. The other triggers are not activated.

PC.vdf template

This template has been devised for the detection of problems with the PC, voltage dips and/or current fluctuations. It responds to under-voltages in the phases, voltage fluctuations in the neutral conductor, wave shape faults in the phase voltages and at the neutral conductor as well as voltage transients. The other triggers are not activated.

Rundst.vdf template

This template shows sample settings for a ripple control system. The centre frequency and bandwidth must always be adjusted accordingly. The ripple control signal frequency (centre frequency), the bandwidth, and the trigger level must be adjusted to the actual requirements.

Trans.vdf template

Transients over 50 V trigger the recording of rapid sample values, oscilloscope and rms values.

These settings provide the recording of non-repeated rapid events in the network, and is triggered by rapid voltage changes (over voltage and under voltage). The transient and rms data are recorded. The system detects any switching events. Peaks over 358 V trigger the recording of oscilloscope and rms values.

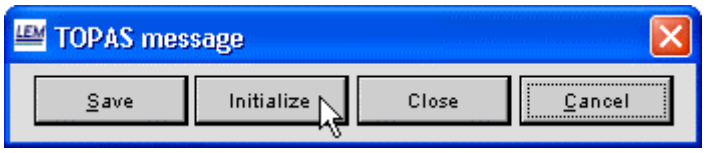
Übersp.vdf template

rms values over 253 V, sample values over 358 V, or transients over 50 V trigger the recording of oscilloscope and rms values.

These settings provide the recording of non-repeated rapid events in the network, and is triggered by rapid voltage changes (over voltage). The transient and rms values are recorded. The system detects any switching events. Peaks over 358 V trigger the recording of oscilloscope and rms values.

Exit settings menu

- Click *OK* to complete the parameterization. To save the definition data in a file on your PC, select *File – Save.*

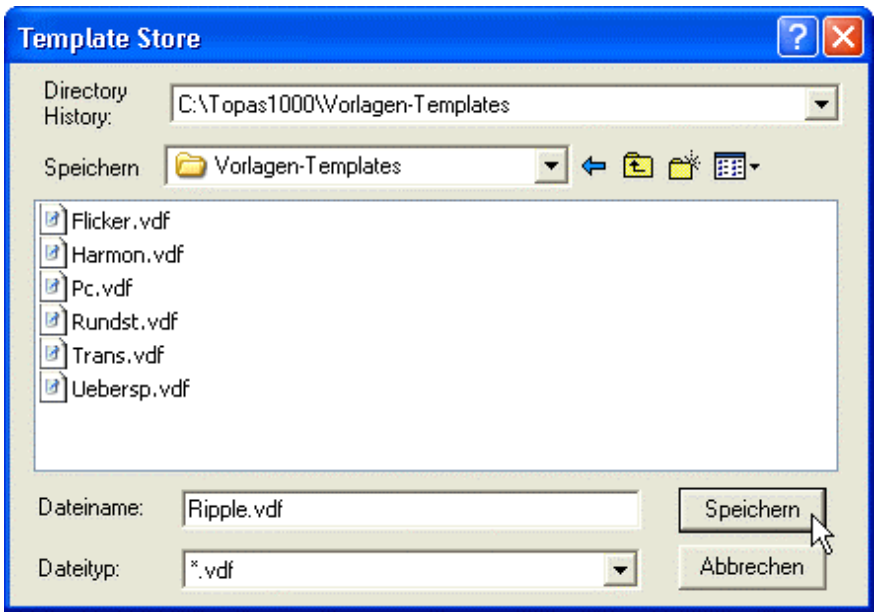


- Click *Cancel* to close all windows without saving the changes you made.

– or –

- *Close* applies the new settings to the actual measurement file, but does not save the new settings.
- *Save* saves the actual measurement file including the new settings.

If the definition file has not been saved, the following dialogue is displayed:



Use settings of an existing measurement for further measurements

Save the configuration file under a new name with the file extension *.vdf.* The new file can be used now as a configuration file for new measurements with the settings of the actual measurement. The old measurement data are no more associated to this configuration file.

Modify an existing measurement data file

Save the configuration file under the same name with the file extension .def. This way we can modify something on the existing measurement data file. We recommend to modify texts only and not relevant settings like scaling, sensor type, measurement system, etc. This could corrupt the measurement data. The recorded measurement data are still associated to this configuration file and can be evaluated as usual.

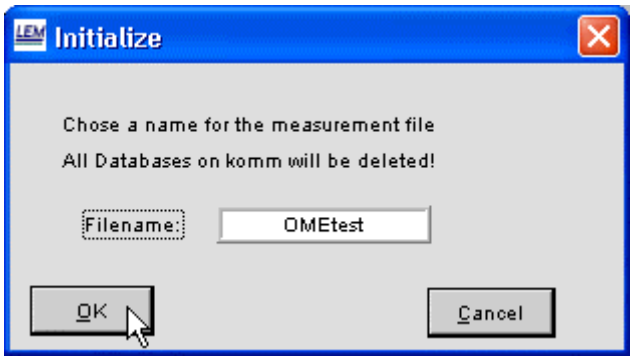
If you press *Save* to overwrite an existing file, the following warning appears:

- Click *Initialize* to clear all memories of the instrument. In this case, the definition file is transferred to the instrument and a new measurement with the new settings can be started.

Note

The file name may not include special characters. If the file name is less than 8 characters long, this name is suggested as the name of the measurement.

- Click *OK* to save the file under this name.



- Click *Cancel* to close all windows without saving the changes you made. The system returns to the *Settings* window.
- Click *OK* to send the data to the instrument.

6.3.2 *File - Open*

- Select *File - Open* or click the button to open an existing template/definition file (**.vdf*), or a measurement file for analysis *(*.def*).
- To gain a better overview of the available files, select the desired file type. You have the option to adjust the parameters of an existing file in the *Settings* window.

There are a number of templates available covering various applications. These files can be adjusted and then saved as new templates for further use. For details, see chapter *Menu: Measurement – Settings*, page 51.

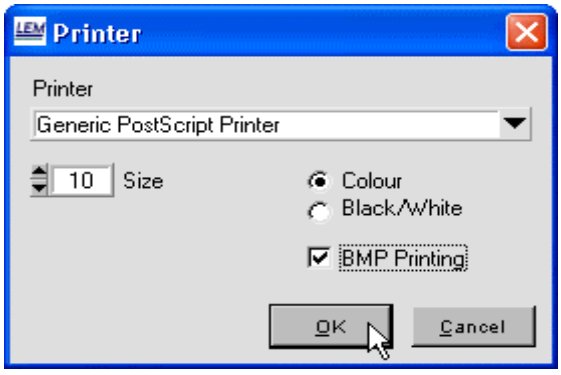
6.3.3 *File – Save as*

An open definition file can be saved under a different name. This is for example useful, if you want to save the set of measurement files under another name.

- Open the file. Enter the name of the new file in the *File Name* field.

The Topas software applies the new file name to all files of the set of measurement files.

6.3.4 *File - Print*



- Select *File – Print* or click the button to print out the current measuring data (screen with all open windows). You can choose between black&white or color printout, and select the number of copies you require.

Hint
If you want to print out a diagram there is an option for printing Bitmaps (BMP Printing) – this overcomes some scaling and resolution problems on specific network printers.

6.3.5 *File - Delete*

- Select *File – Delete* to delete obsolete files. For this purpose, enter the name of the file to be deleted and confirm with *Select.* The deletion of files is only possible, if no measurement file is open.

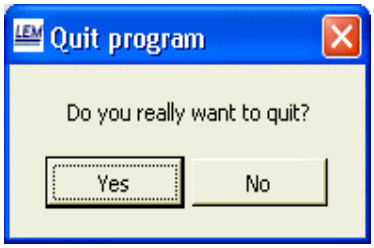
Caution!

Delete files cannot be restored!

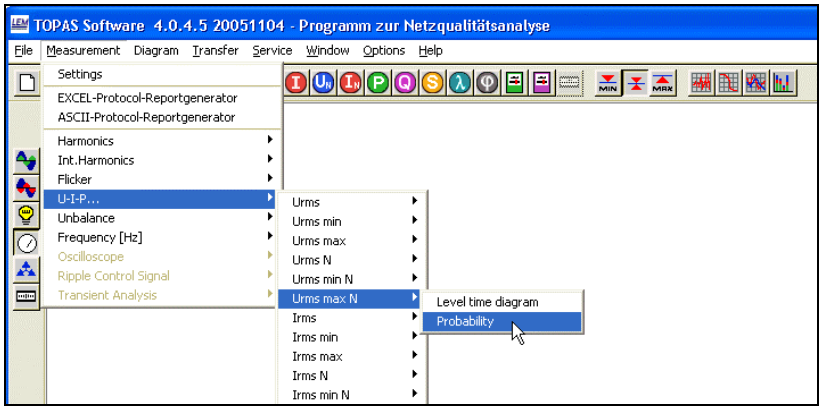
6.3.6 *File - Exit*

- Select this menu *option* to exit the Topas program.

The following dialogue is displayed:



6.4 Menu: *Measurement*



6.4.1 *Measurement – Settings*

The settings of the currently open file can be checked.

6.4.2 ASCII report generator

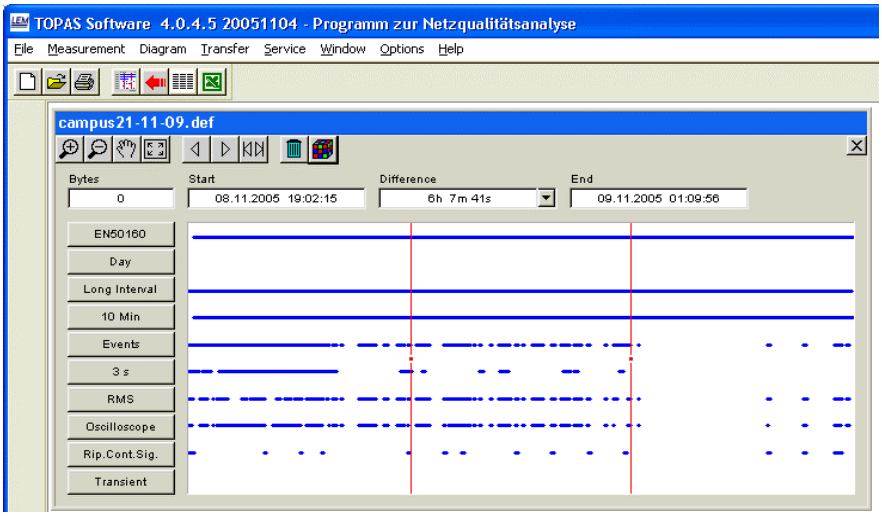
In the ASCII report generator, enter a file name for the output of a text report of the open measurements. This is only possible, if a valid protocol.ini file has been generated. For details, see chapter *Export configuration*, page 110.

6.5 The evaluation window

General

- To evaluate the recorded data, open the file (**.DEF*) with *File – Open*.

All associated measured data is stored in the measurement files that are filed in the same directory as the definition file.
As soon as a valid definition file is entered, the program loads all associated data files. In the evaluation dialogue, the user is offered a range of functions for the analysis of the measured data.



6.5.1 Dialogue field: measured data

In the *Selection* window, the various measuring systems are shown. These systems operate independently and simultaneously. The blue bars indicate the measuring times at which data is available on the PC. It is not necessary to transfer all measuring data saved in the instrument to the evaluation memory. The data is structured in such a way that a small volume of data already provides an accurate overview of the situation in the network. The user has the option to import increasingly detailed data in order to assess one or more particular events.

- The desired time range can be selected by means of the two red *cursor lines*, or entered directly in the *cursor windows*.

The *cursor windows* show the start, end and duration of the selected period of time.

- Click the button to open the *Data transfer* window. For details, see page 87. In this window, you can select the event files and transfer them to the target directory.
- Click the button to return to the *evaluation window,* where the selected data can be analysed.

Zoom in – magnify the time range between the red cursor lines

Zoom out – undo the last zoom command

“PAN” function for moving the blue lines representing available data if zoom is active

View complete measurement with activated zoom function

Moving forward and backward in blocks.
Example: If 1 hour has been set in the *Difference* window, the cursors can be moved forward and backward by 1 hour.

Deletes the recorded data referring to the range between the cursor lines

Note
The Topas measurement data are organized in blocks. The time cursors will very seldom be positioned at block borders. Therefore blocks are deleted only which are completely in the time period between the cursors to avoid deleting of too much data. A little bit less data will be deleted than marked.

Re-organize data structure (should be completed after the deletion of data to free unused memory)

Recording modes

Settings	Data	Recording options
EN50160 Day Long Interval 10 Min	Permanent, automatic recording of all data for PQ analysis	Automatic – recording is independent of trigger settings, provided that the measuring time settings are not activated; otherwise, the recording is limited to the period between the start and end times set in the program
Events	Permanent recording of values that are outside the range defined by the limit values, and recording of all trigger events	*Automatic trigger* checkbox *Manual trigger* checkbox
3 s	Harmonics/THD/ TID of voltages and currents	*Automatic trigger* checkbox *Manual trigger* checkbox
RMS Oscilloscope Ripple contr. sig	Voltages and currents with different time raster settings	*Automatic trigger* checkbox *Manual trigger* checkbox Ripple control only in manual mode
Transients	Transients	*Automatic* checkbox *Manual* checkbox
Time	Time trigger	*Automatic* checkbox *Manual* checkbox

After the data source and the time period have been selected, the pre-selection toolbar appears at the left edge of the screen (for data sources for which more than one evaluation function is

available, e.g. day files, Long intervals, 10-min files, 3-sec files). Depending on the recording method, the list of available functions may vary.

The evaluation toolbar below the menu bar also changes depending on the selected recording type and measuring function. The icons of functions that are not available are greyed out.

The evaluation functions can be selected directly by clicking the respective button, or by selecting the respective option in the *Measurement* menu.

The following functions are available:

Main toolbar

File operations

Select *File – New* to open a new definition file.

Select *File – Open* to open an existing measurement file or a definition template.

Select *Print screen* to print the current screen with all open evaluation windows on the system printer.

Evaluation window

Start selection window in foreground/evaluation.
After data transfer from the instrument to the PC, click this button to open a selection window for the data evaluation.

Data transfer **-** back to data transfer window (from instrument to PC).

ASCII report generator – automatic generation of selected measurements in a text file (*Name.txt*).

EXCEL report generator – automatic generation of measurement reports based on the *Export configuration*

Selection of the variable

- Select here the variables for the evaluation. Certain buttons might not be available, depending on the method of measurement.

Method of averaging

Minimum – average - maximum – Definition of averaging method

Method of evaluation

Selection of presentation:

Level-time chart

Probability distribution

Extreme values per day

Bar diagram (extreme values per day)

Various variables are available, depending on the method of measurement. For Long intervals and 10-min values, you can choose from the following options:

Harmonics

Interharmonics (Topas 2000 only)

Flicker

rms values

Unbalance

Frequency

Spectrum – indicates the amplitude spectrum of voltages, current and powers

Virtual measuring instruments

Different instrument types have been developed for different measuring tasks.

- rms measuring instruments
- Power and energy measuring instruments
- Harmonic measuring instruments
- Oscilloscopes
- Transient recorders
- Data logger
- Event recording instruments

The idea behind the Topas instrument was to realize a virtual unit based on software, combining various different measuring devices in a compact housing.
The instrument can thus complete a wide range of measuring tasks at the same time.
Communication between virtual measuring instruments is generally better than that between physically separated units. The results obtained with one instrument can for example be used to control the recording of data by a different instrument. All measurements are sampled and recorded simultaneously and in a synchronized manner.

EN 50160-data

EN50160 EN 50160 files are generated at intervals of 10 minutes. All parameters required according to the European power quality standard are measured and monitored against pre-defined limit values. Per week, the data of 1008 10-minute intervals is saved, which corresponds to approx. 1 MB.

Daily data

Day Measurements are recorded at intervals of 1 day. The data recorded for each day requires approx. 64 kB of storage capacity. The interval starts at 00:00:00 hours. Incomplete intervals are not deleted. This means that the first day value is often only available after two days.

Variables

- Harmonics
- Flickers
- rms values
- Unbalance
- Frequency

Long interval data

Long Interval Files whose measurements are recorded during user-defined intervals are referred to as Long interval files. (averaging time 1minute ... 1440 minutes = 1 day)

Variables

- Harmonics
- rms values
- Unbalance
- Frequency

10-min data

10 Min Measurements are recorded at intervals of 10 minutes. At the end of each 10-minute interval, approx. 12 kB of data is saved.

Variables

- Harmonics
- Flickers
- rms values
- Unbalance
- Frequency

3-sec data

3 s 3-sec files contain the measurements taken at intervals of 3 seconds. This data does not include Flicker or frequencies. The file is only generated, if a trigger event occurred. If you wish to generate rms value files, activate the respective option in the definition file by checking the *3-sec rms values* box in the harmonic trigger dialogue window. Approx. 1.8 kB is stored per 3-second interval.
The FFT calculates over intervals of 320 ms, averages the values over 10 intervals and saves them every 3.2 seconds.

rms and average data

RMS The system caters for user-defined averaging times. This file type is primarily used for the recording of power and rms values. The data is only saved, if a trigger event occurred. If you wish to generate rms value files, activate the respective option in the definition file by checking the *rms values* box in the rms trigger window. Approx. 76 byte is stored per interval.

Oscilloscope data

Oscilloscope If one of the activated trigger conditions is met, sample values are saved (17kB per 1024 values). If you wish to generate oscilloscope files, activate the respective option in the definition file by checking the *Oscilloscope* box in the oscilloscope trigger window.

Variables Instantaneous values

Event data

Events Event files contain all data regarding the time, duration and type of all events that occurred as a result of a trigger event or when EN 50160 limits were exceeded.

The system records the following event types

Overvoltage, voltage dips, interruptions, ripple control signals, transients, trigger events caused by rms and sample values. Approx. 400 bytes are stored per event.

Ripple control data

Ripple contr. sig The ripple control trigger initiates the recording of ripple control signals, provided that the *Ripple control signals* box in the ripple control trigger window is checked.
Approx. 1.8 kB is stored per 3-second interval.

Variables

- Voltage
- Current
- Active power
- Power factor

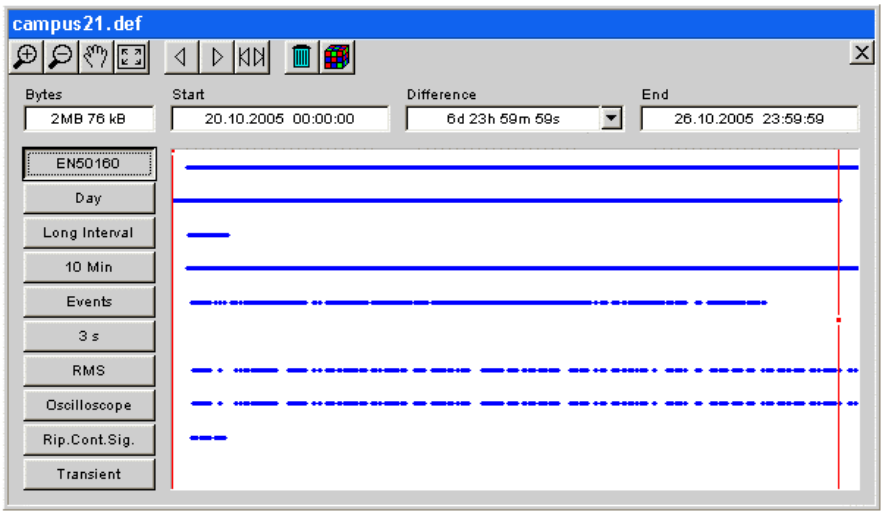
Transients data

Transients The transient trigger initiates the recording of measurements with a sampling frequency of between 100 kHz and 10 MHz, provided that the *Transients* box in the transient trigger window is checked.

6.5.2 Virtual instruments – evaluation functions

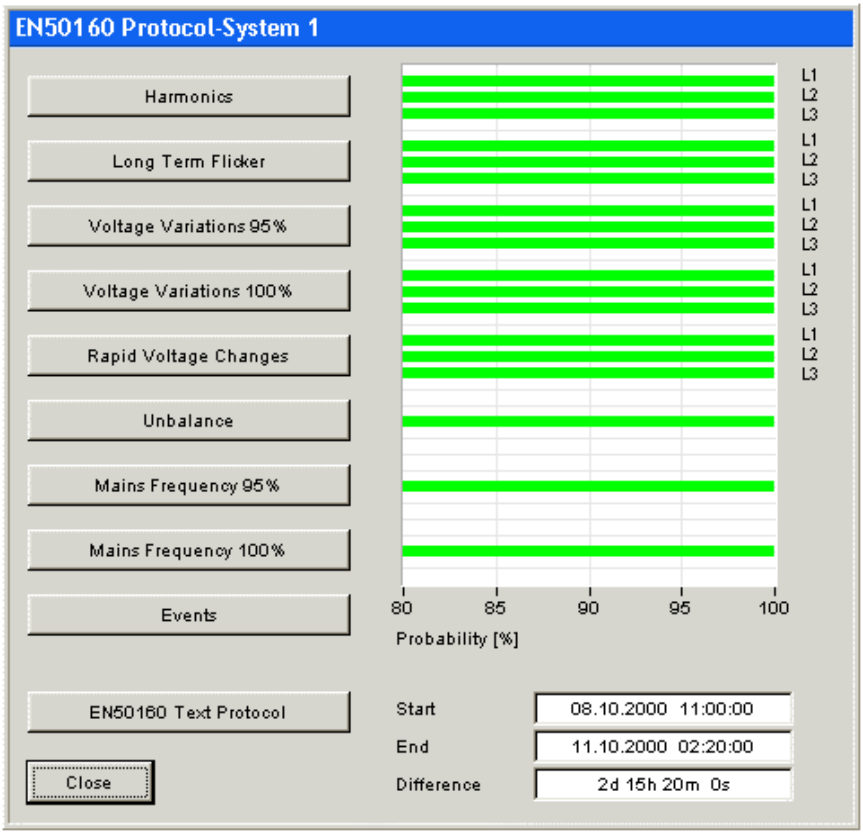
6.5.3 EN 50160 evaluation

EN 50160 evaluation



There are two diagrams available for EN 50160 evaluations.

- Click on the EN 50160 button and select the interval to be evaluated, and then click the button:



Note
If the measurement has been done in the Voltage/Voltage or in the VoltagePP / VoltagePP configuration there are two icons for system 1 and system 2. Thus the power quality can be assessed in the low and medium voltage system in parallel with one instrument.

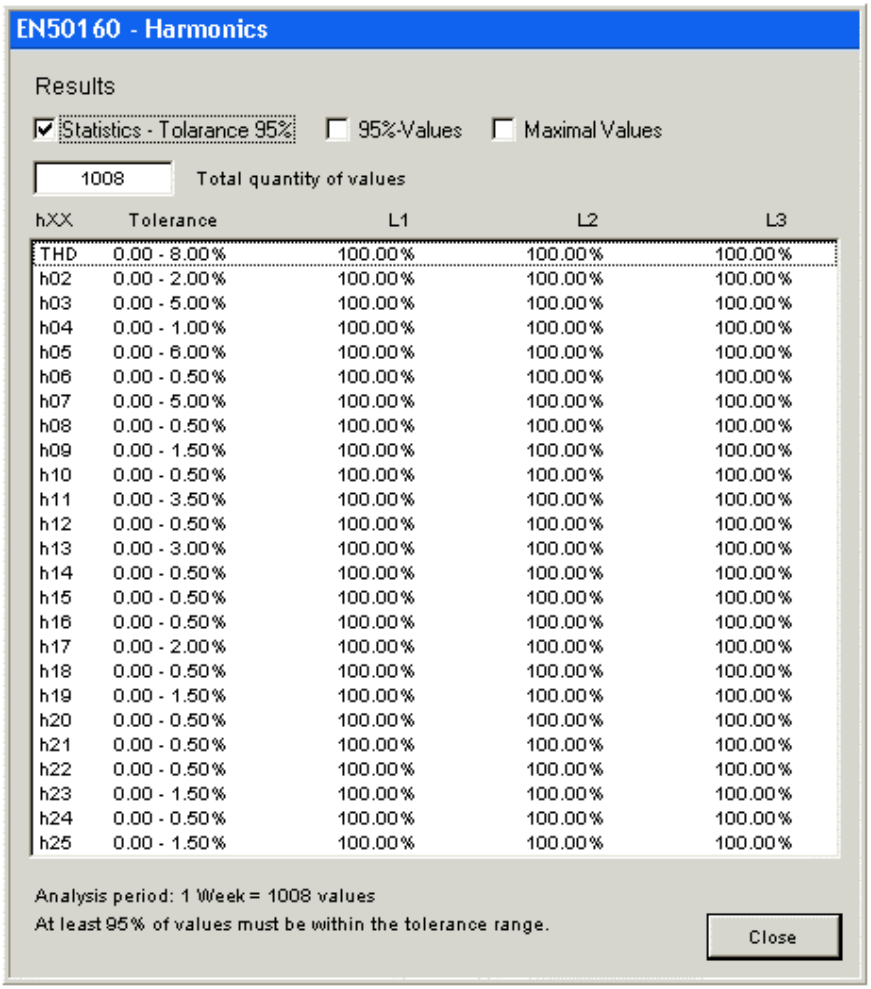
Important
If there are too less measurement values available an error message *<80 %* is put in place of the green bar in the appropriate line.

This evaluation offers a quick graphical overview of all EN 50160 parameters. The green bars represent the values defined in the definition file. The diagram shows the share of measurements that was inside the permitted range, expressed in percentages. For most values, the percentage range must be at least 95 %. Red bars represent measurements that were outside the permitted range.

- To view details, click the respective buttons in the diagram window.

Harmonics

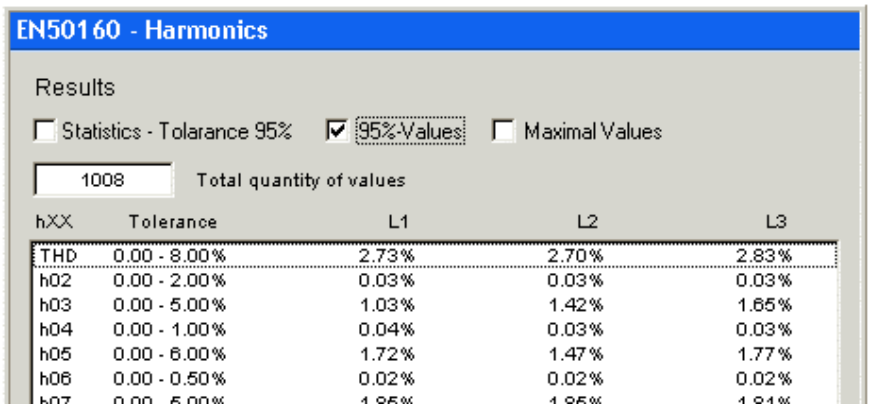
Shows the number of measurement values, THD and the rms values of each harmonic per phase.



hXX	Tolerance	L1	L2	L3
THD	0.00 - 8.00%	100.00%	100.00%	100.00%
h02	0.00 - 2.00%	100.00%	100.00%	100.00%
h03	0.00 - 5.00%	100.00%	100.00%	100.00%
h04	0.00 - 1.00%	100.00%	100.00%	100.00%
h05	0.00 - 6.00%	100.00%	100.00%	100.00%
h06	0.00 - 0.50%	100.00%	100.00%	100.00%
h07	0.00 - 5.00%	100.00%	100.00%	100.00%
h08	0.00 - 0.50%	100.00%	100.00%	100.00%
h09	0.00 - 1.50%	100.00%	100.00%	100.00%
h10	0.00 - 0.50%	100.00%	100.00%	100.00%
h11	0.00 - 3.50%	100.00%	100.00%	100.00%
h12	0.00 - 0.50%	100.00%	100.00%	100.00%
h13	0.00 - 3.00%	100.00%	100.00%	100.00%
h14	0.00 - 0.50%	100.00%	100.00%	100.00%
h15	0.00 - 0.50%	100.00%	100.00%	100.00%
h16	0.00 - 0.50%	100.00%	100.00%	100.00%
h17	0.00 - 2.00%	100.00%	100.00%	100.00%
h18	0.00 - 0.50%	100.00%	100.00%	100.00%
h19	0.00 - 1.50%	100.00%	100.00%	100.00%
h20	0.00 - 0.50%	100.00%	100.00%	100.00%
h21	0.00 - 0.50%	100.00%	100.00%	100.00%
h22	0.00 - 0.50%	100.00%	100.00%	100.00%
h23	0.00 - 1.50%	100.00%	100.00%	100.00%
h24	0.00 - 0.50%	100.00%	100.00%	100.00%
h25	0.00 - 1.50%	100.00%	100.00%	100.00%

The test results can be presented as:

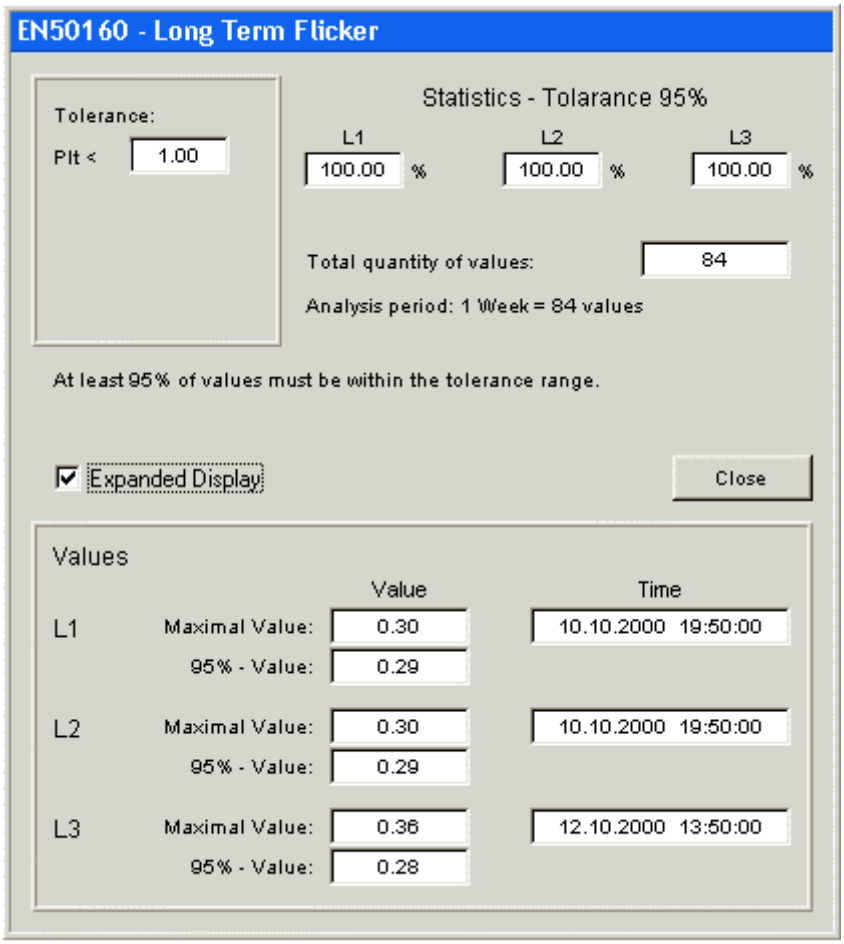
- *Statistics – Tolerance 95 %:* Percentage of measurement values which are within the 95 %-tolerance range
- *95 %-values:* 95 % of all measurement values of the campaign are below this value. The tolerance range is also given.
- *Maximal values:* Gives the maximal value in the measurement period with date/time



hXX	Tolerance	L1	L2	L3
THD	0.00 - 8.00%	2.73%	2.70%	2.83%
h02	0.00 - 2.00%	0.03%	0.03%	0.03%
h03	0.00 - 5.00%	1.03%	1.42%	1.65%
h04	0.00 - 1.00%	0.04%	0.03%	0.03%
h05	0.00 - 6.00%	1.72%	1.47%	1.77%
h06	0.00 - 0.50%	0.02%	0.02%	0.02%

Longterm Flicker

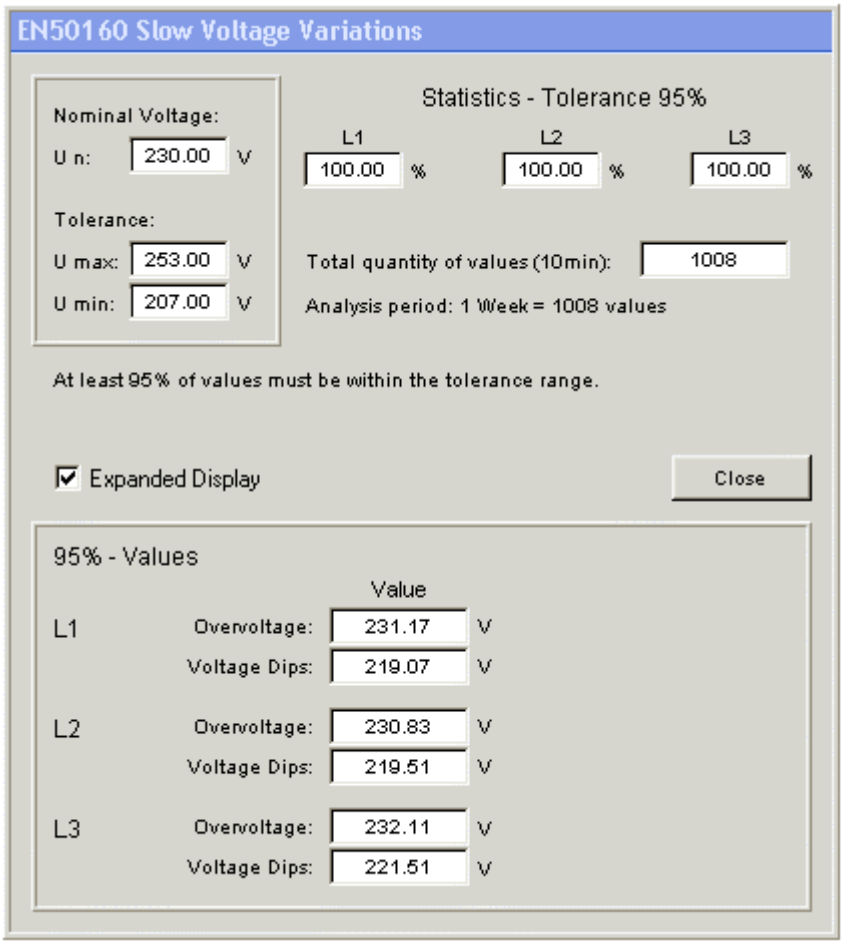
Shows, for each phase, the tolerance range, number of measurement values, and percentage of measurements that were within the permitted range for 95 % of the time period.



In the *Expanded Display* the 95 % values and the maximal values are presented with date/time per phase.

Voltage variations 95 %

Shows, for each phase, the tolerance range, number of measurement values, and the percentage of measurement values that were within the permitted range for 95 % of the time period.



In the *Expanded Display* the 95 % values are presented for Over voltages and voltage dips per phase.

Note

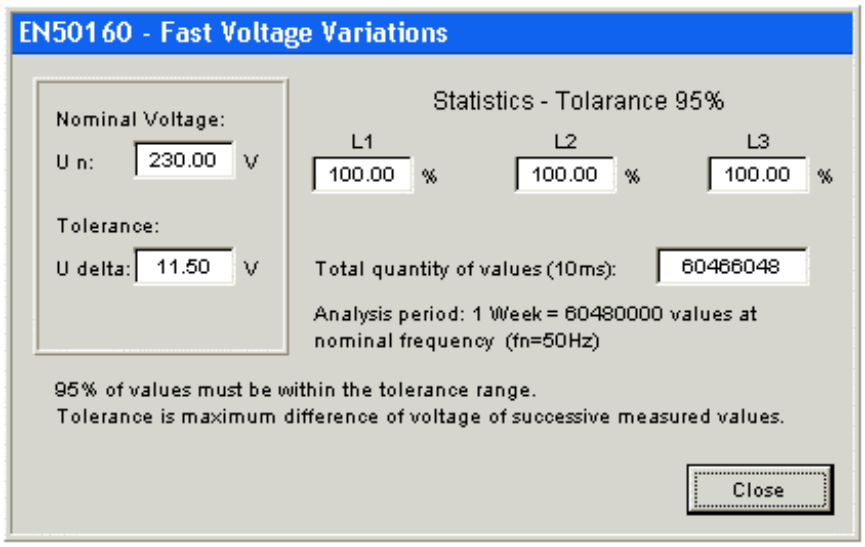
The 95 %-values are calculated as follows: All voltage measurement values are sorted according to value. Starting at smallest and at highest value 2.5 % of the values are deleted. Thus 95 % of the values remain in memory. This set of values is fit into the tolerance range that it is centred as close as possible to the nominal voltage and to the limit values. The results are 95 %-values for voltage dips and swells weighted according to the tolerance range even if the range is unsymmetrical to Un (e.g. –6 % /+4 % instead of +/-10 %).

Voltage variations 100 %

Shows, for each phase, the tolerance range, number of measurement values, and the percentage of measurement values that were within the permitted range for 100 % of the time period. In the *Expanded Display* the maximal values are presented for over voltages and voltage dips with date/time per phase.

Rapid voltage changes

Shows, for each phase, the tolerance range, number of measurement values, and percentage of measurement values which were within the permitted range for 95 % of the period.

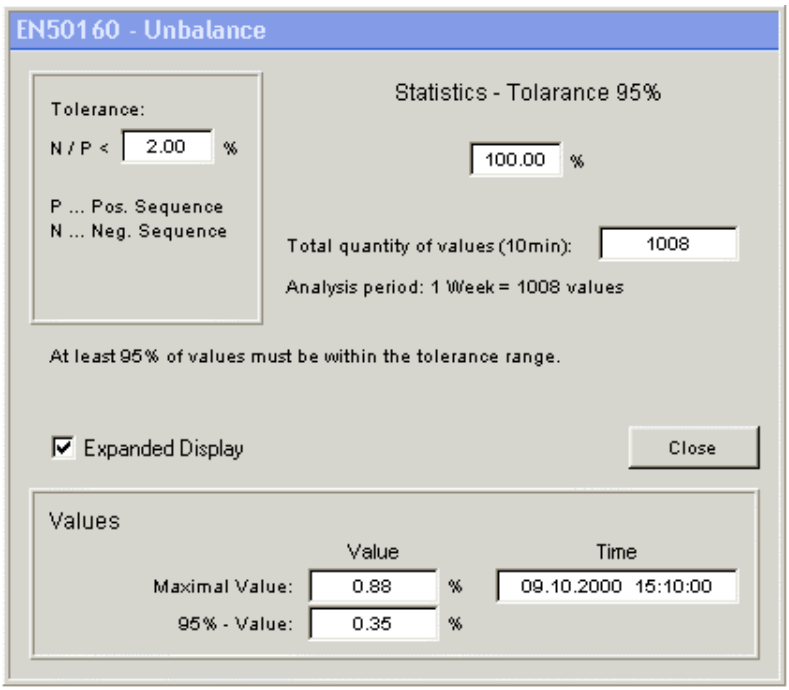


Note

The instrument checks the difference of consecutive 10 ms rms values. If the difference is higher than the tolerance value an event is recorded.
The precise number of 60.480.000 measurement values per week is achieved only if the power frequency was exactly 50 Hz during the complete measurement period. Frequency deviations and supply interruptions will have an impact on the number of 10 ms rms values.

Voltage unbalance

Shows the unbalance, tolerance range, number of measurement values, and percentage of measurement values that were within the permitted range for 95 % of the time period.



In the *Expanded Display* the 95 % value and the maximal value is presented with date/time.
The unbalance is calculated according the formulas in the norm IEC 61000-4-30.

Power frequency 99.5 %

Shows, the tolerance range, number of measurement values, and the percentage of measurement values that were within the permitted range for 99.5 % of the time period.

In the *Expanded Display* the 99.5 % values for maximum and minimum are presented with date/time.

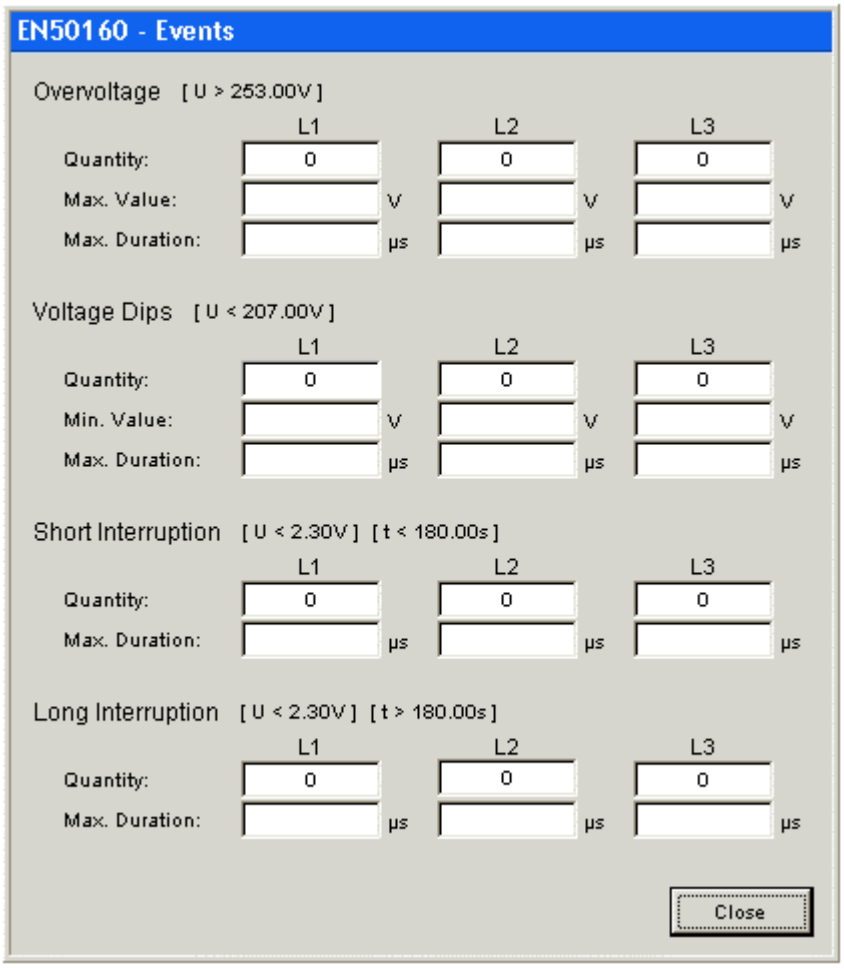
Note
The precise number of 60.480 measurement values per week is achieved only if the power frequency was exactly 50 Hz during the complete measurement period. Frequency deviations and supply interruptions will have an impact on the number of 10 s values. Please, not that in unsynchronized “island networks” another classification of 95 % of the time period is required. This can be selected in the *Settings Nominal /Limit values* dialogue. This value can also be changed after completion of the measurement because the statistical evaluation is done offline in the Topas software.

Power frequency 100 %

Shows, the tolerance range, number of measurement values, and the percentage of measurement values which were within the permitted range for 100 % of the time period (always!).
In the *Expanded Display* the maximum and minimum value is presented with date/time.

Events

Shows the limits for over-voltages, voltage dips, short and long interruptions, including total number of events, maximum value and duration.

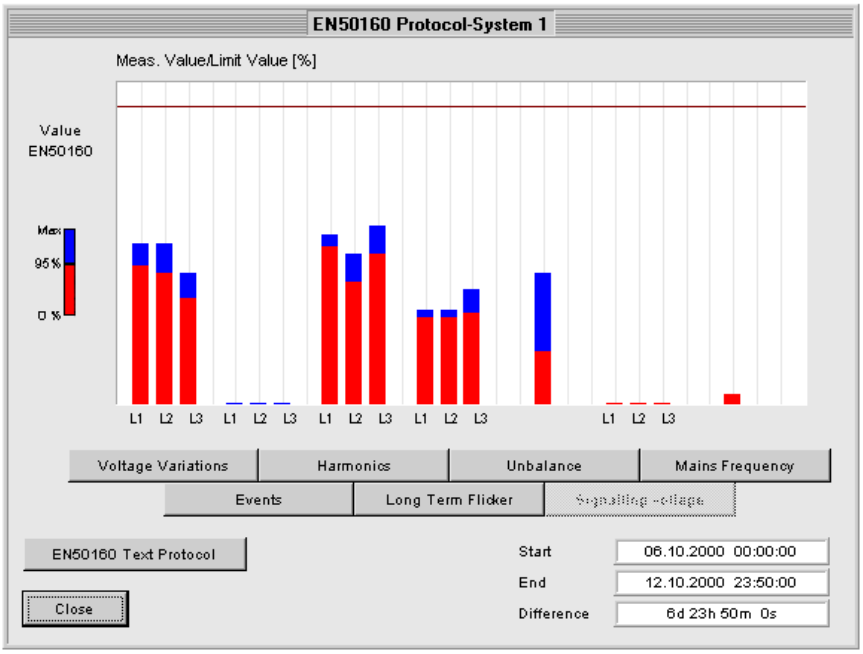


EN 50160 text report

Shows all results of the EN 50160 evaluation, including additional information such as a description and indication of the measuring period, etc. in text format. The text report can be printed, saved, copied into another application via the Windows® clipboard, or exported to MS Word®.
From MS Word® it can be stored in HTML-format for web-oriented applications.

6.5.4 EN 50160 evaluation CODAM style

- To open the diagram window select the evaluation time period, and then click on the EN 50160 button:



Functions

This diagram corresponds to the standard diagram for CODAM users.

The results during the 95 % measuring time are represented by red bars, while the results of the 100 % measuring time are shown as blue stacked bars. The 95 % value corresponds to the absolute standardized tolerance deviation that may not be exceeded for 95 % of the time. The 100 % value corresponds to the absolute standardized tolerance deviation that may not be exceeded for 100 % of the time. The distance to the standardized limit lines indicate the reserve value.

- To view details, click the respective buttons in the diagram window. The details windows are identical to the windows described in the last chapter.

Note
There is no evaluation for rapid voltage changes!

6.5.5 Evaluation of day, Long interval, 10-min, 3-sec data

Click one of the above virtual instruments to call up the following evaluations:

Virtual instrument Evaluation	Day	Long interval	10 Min	3s
Harmonics	✓	✓	✓	✓
Interharmonics		✓	✓	✓
Flicker	✓	✓	✓	
r.m.s. values	✓	✓	✓	
Unbalance	✓	✓	✓	
Frequency	✓	✓	✓	

Note

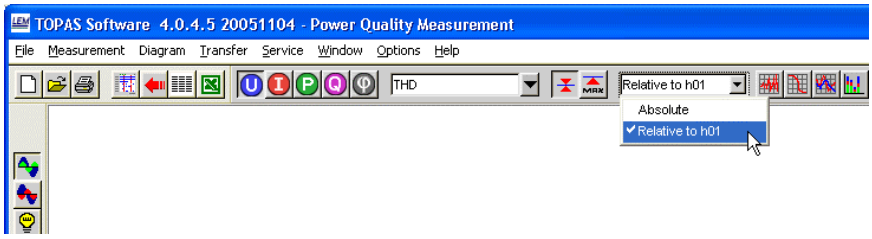
Icons like are visible only if appropriate measurement data are available.

Harmonics

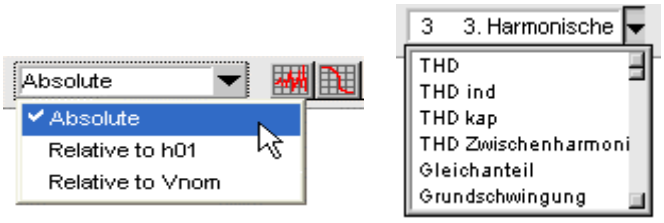
The harmonics evaluation includes the following functions:

- Time graph, average and maximum values
- Probability
- Day extreme values (Long interval, 10-min values only)
- Day extreme values bar (Long interval, 10-min values only)
- Frequency spectrum

Voltage harmonics can be viewed as *absolute* values in V, in percentages of the fundamental, or relative to the nominal voltage.



- Click U or I or P or Q or (φ) and (*average values*)



With this function, the rms or average value for powers (absolute, relative to fundamental) of a harmonic or the fundamental over the measuring interval is presented. The voltage can also be viewed relative to the nominal voltage. Cos φ can be viewed for harmonics and fundamental.
For voltage and current, you can also select THD, THD ind, THD cap, THD interharmonics and DC component.

Click U or I or P or Q or (φ) and MAX (= *maximum values*)

With this function, the maximum value (absolute, relative to fundamental, or relative to nominal voltage) or a harmonic or the fundamental across the measuring interval. The maximum value is shown for an interval of 200 ms.

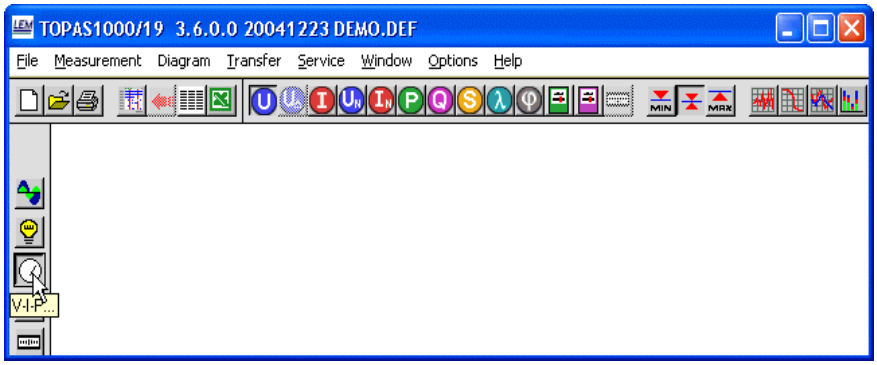
Flicker (for Day and 10-min values only)

The Flicker evaluation includes functions for the calculation of short-term Flicker Pst and long-term Flicker Plt and shows the developments over time or a statistical analysis of the level values. A number of different evaluation options are available for the various recording methods.

The short-term Flicker value Pst is calculated for periods of 10-minutes.

The long-term Flicker Plt is calculated for periods of 2 hours. A continuous averaging method is applied, so that at the end of each 10-minute interval, a Plt value is available.

rms values



This window is used for the evaluation of rms voltage and current values, as well as power. For each data source, only a subset of evaluations is available. By clicking some buttons, you can assess averages, minimum and maximum values of the measured parameters.

Settings	Application
	rms voltage value per measuring period
	Maximum or minimum rms voltage values per measuring interval
	rms values of phase-to-phase voltages, based on phase voltages
	rms current value over selected averaging interval
	Maximum or minimum rms current values per measuring interval
	rms value of neutral conductor voltage over the measuring interval
	Maximum or minimum rms values of neutral conductor voltage per measuring interval
	rms value of neutral conductor current over measuring interval
	Maximum or minimum rms values of neutral conductor current per measuring interval
	Phase and total active power over averaging time
	Maximum or minimum active power per measuring interval
	Reactive power over selected averaging time
	Maximum or minimum reactive power per measuring interval
	Apparent power (Ieff * Ueff) over selected averaging time

	Maximum or minimum of apparent power (Ieff * Ueff) per measuring interval
	Power factor (P/S) over selected averaging time
	Displacement power factor over selected averaging time
	Active work (W=P* t) over selected averaging time
	Reactive work (Wq=Q* t) over selected averaging time

Unbalance

See also EN 50160 – Unbalance. With this function, you can evaluate the values versus time and statistics of:

Settings	Application
	rms value of voltage of the zero sequence system, averaged over measuring period
	rms value of voltage of the positive sequence system, averaged over measuring period
	rms value of voltage of the negative sequence system, averaged over measuring period
	Negative sequence system/positive sequence system ratio, averaged over measuring period

Frequency

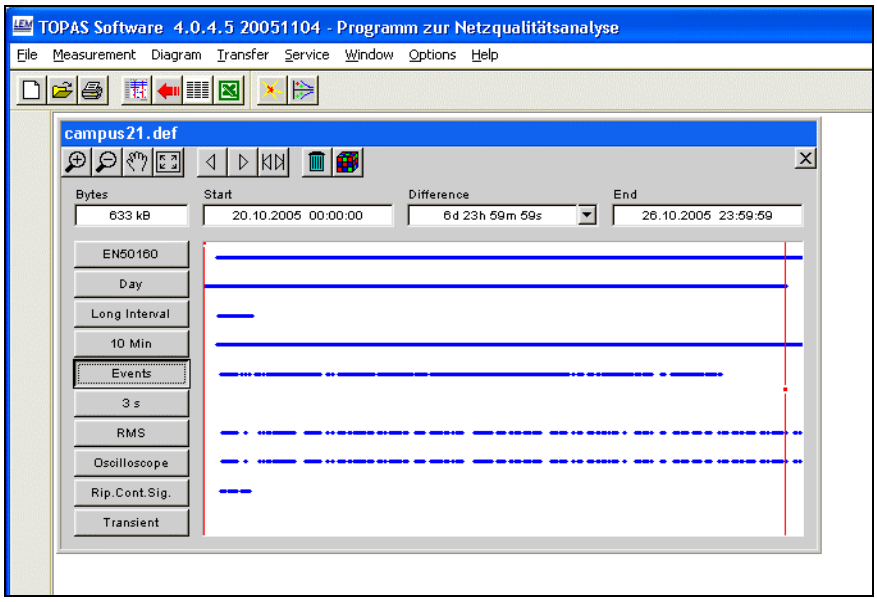
See also EN 50160 – power frequency. The system provides level-time diagrams and statistical analyses. The following functions are available for frequency evaluations:

Mean frequency over measuring period (e.g. 10 minutes).

Maximum frequency averaged over 10 seconds in measuring period

Minimum frequency averaged over 10 seconds in measuring period

Evaluation of voltage events



In addition to the event analysis in the EN 50160 report, you have the option to view detailed diagrams for over-voltages, voltage dips, short interruptions, long interruptions, ripple control signal events, transient events, harmonics (2nd – 50th harmonic), deviations of rms values (upper, lower limits) and deviations of oscilloscope (sample) values (slope/level, envelope sine, constant, phase shift).

Sorting records

All events where the EN 50160 limit values are exceeded, and all trigger events result in an entry in the event list.

- Click the button to generate an event list.

Such lists contain all voltage events that may occur during a measurement. The number of events that have actually occurred is indicated in the right column.

- To select event types, click the respective line.
- If you wish to select all active events, click the button.
- To select all events, click the button.
- To obtain a detailed output of all selected events, sorted by type, unit, start, duration and peak value, click the button.
- Click the respective headings. (Example: click heading *Peak value* –> the peak value records are sorted). Click the heading once to sort the records in descending order, click the heading twice to sort the records in ascending order (similar to MS Windows®-Explorer details view).

Viewing events

- To view other events, or to add new events to the list, select the desired events from the pre-selected list and click the button.
- Click the button to view the selected events in a CBEMA diagram:

Event list

The events selected in the event list are displayed in the form of a diagram. Select *Lock cursor* to highlight individual events.

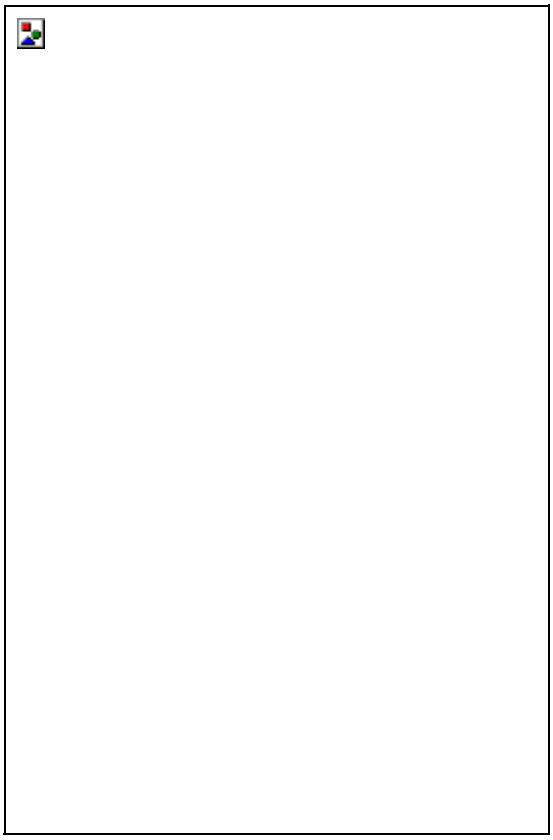
- Double-click an event to open a separate window for detailed analysis.
- The CBEMA function can also be selected directly by clicking the button.

Online event display

For the Online event view, select the events as described above.

- In *Online* mode, you can also retrieve new data by clicking the button.

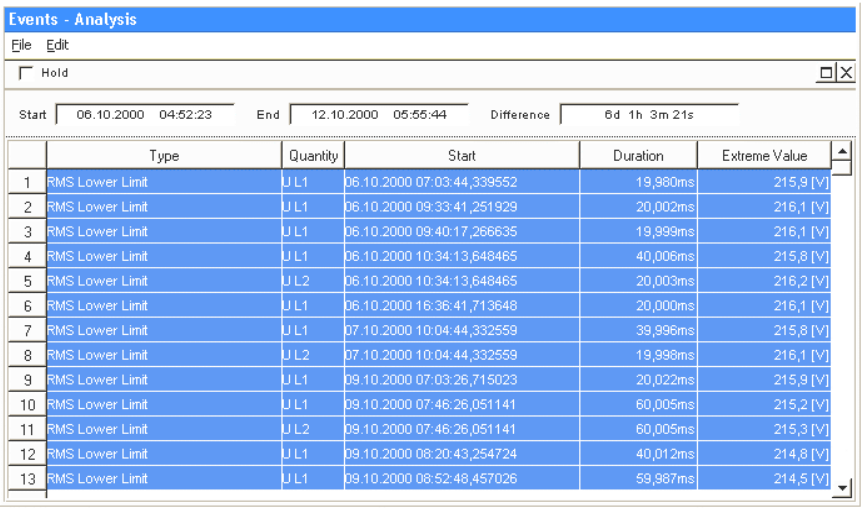
The pre-selection also shows the start and end time, as well as the duration of the measurement.



MS ®Excel-compatible table for events

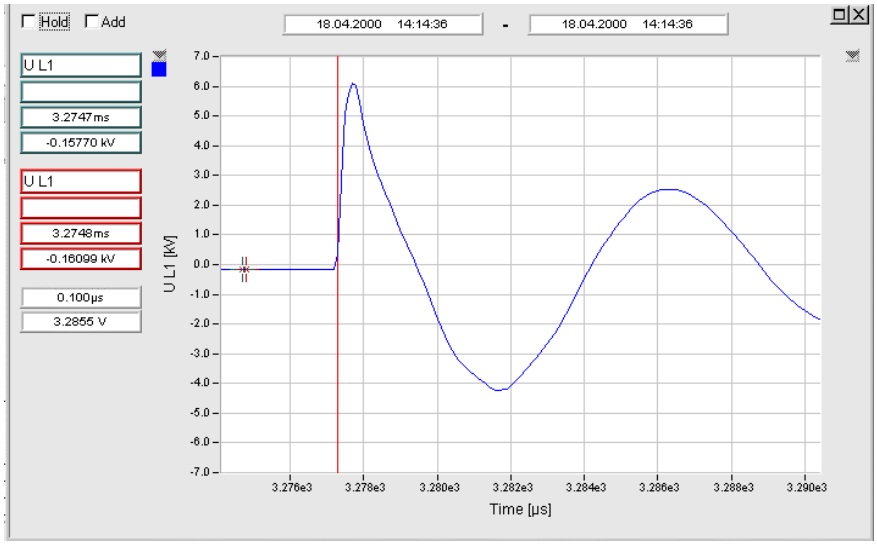
Click on to get the event list for detailed view is compatible with MS Excel®.

Example



	Type	Quantity	Start	Duration	Extreme Value
1	RMS Lower Limit	U L1	06.10.2000 07:03:44,339552	19,980ms	215,9 [V]
2	RMS Lower Limit	U L1	06.10.2000 09:33:41,251929	20,002ms	216,1 [V]
3	RMS Lower Limit	U L1	06.10.2000 09:40:17,266635	19,999ms	216,1 [V]
4	RMS Lower Limit	U L1	06.10.2000 10:34:13,648465	40,006ms	215,8 [V]
5	RMS Lower Limit	U L2	06.10.2000 10:34:13,648465	20,003ms	216,2 [V]
6	RMS Lower Limit	U L1	06.10.2000 16:36:41,713648	20,000ms	216,1 [V]
7	RMS Lower Limit	U L1	07.10.2000 10:04:44,332559	39,996ms	215,8 [V]
8	RMS Lower Limit	U L2	07.10.2000 10:04:44,332559	19,998ms	216,1 [V]
9	RMS Lower Limit	U L1	09.10.2000 07:03:26,715023	20,022ms	215,9 [V]
10	RMS Lower Limit	U L1	09.10.2000 07:46:26,051141	60,005ms	215,2 [V]
11	RMS Lower Limit	U L2	09.10.2000 07:46:26,051141	60,005ms	215,3 [V]
12	RMS Lower Limit	U L1	09.10.2000 08:20:43,254724	40,012ms	214,8 [V]
13	RMS Lower Limit	U L1	09.10.2000 08:52:48,457026	59,987ms	214,5 [V]

- The area marked in *blue* can be copied directly into an MS Excel® worksheet (use key commands *CTRL-C* and *CTRL-V*).
- You can adjust the column width by moving the vertical cell borders.
- Click the *cell* in the column heading to sort the records by the variable in this column. Double-click a *row* to view the associated diagrams with time graph, provided that the data has been recorded.
- Double-click an *event record* to view the associated detailed diagram.

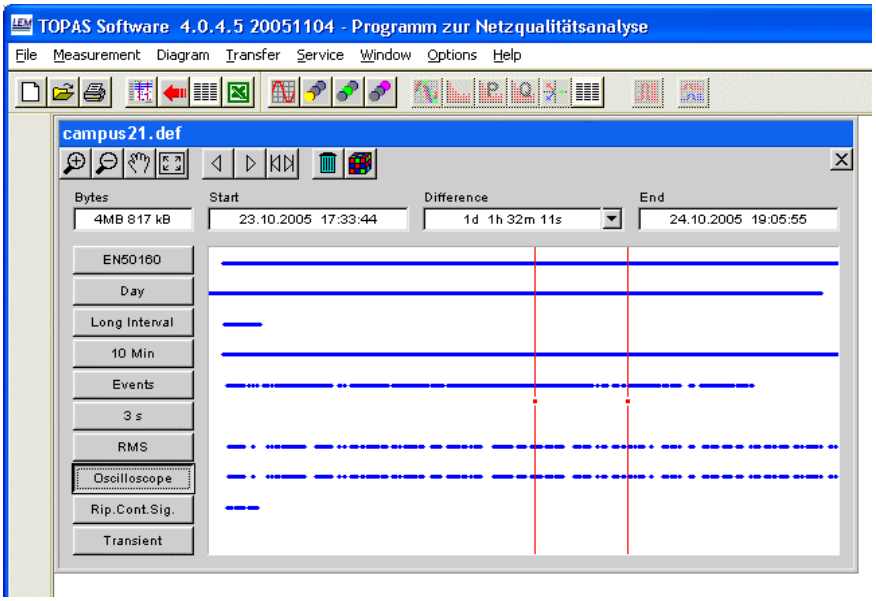


Important
A red line indicates the time of the trigger event, making it easier to accurately evaluate the data.

All recordings made at the time of the respective event are shown in individual windows (e.g. rms values, oscilloscope data, etc.). This approach allows for accurate analysis of the events at various resolutions per time unit. The diagram of the respective entry in the event list remains displayed in the foreground.
If you have for instance selected *transients*, the transient diagram is shown in the foreground window, all associated diagrams behind.

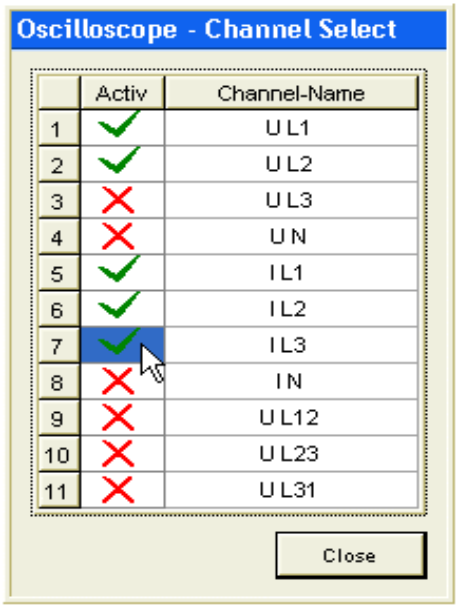
Oscilloscope evaluation

This window shows the level-time diagrams, amplitude spectrums, and vector diagrams for instantaneous values (samples).



The following tools are available:

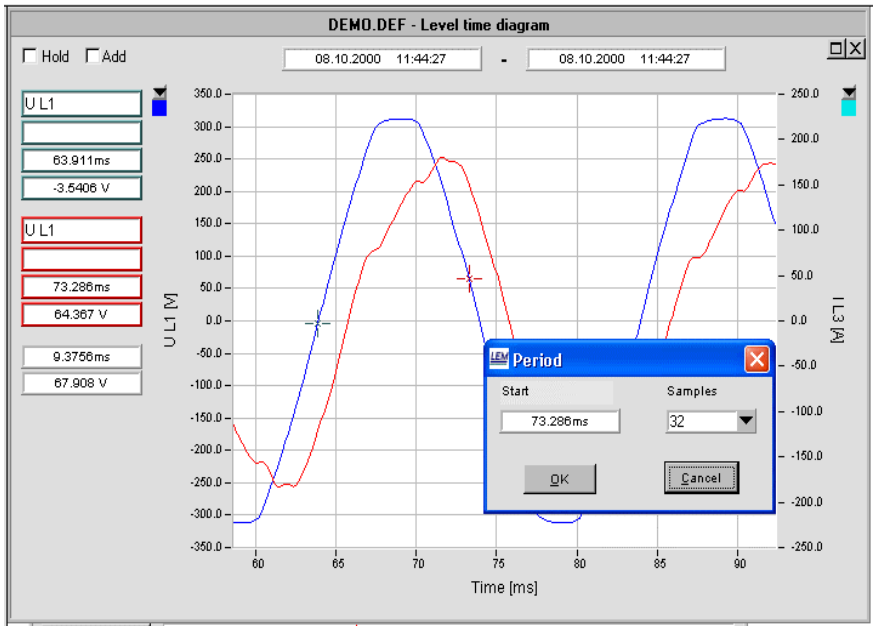
Opens the following selection window to choose the channels of which you wish to view the level-time diagram, frequency spectrum and vector diagrams for voltages and currents:



Note
Multiple selections with the CTRL and SHIFT keys are possible.

Evaluation of sections of the trend graph and frequency spectrum

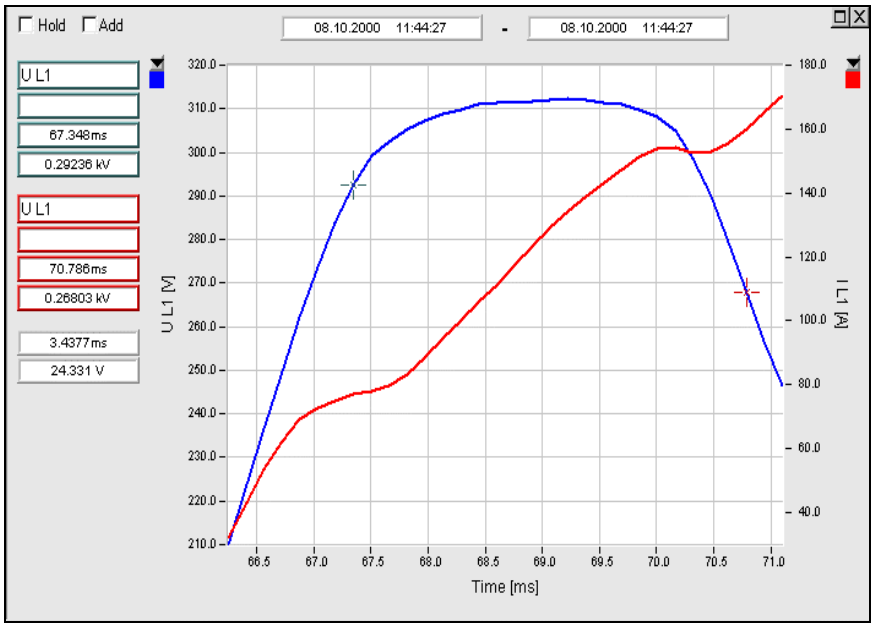
Level-time diagram for selected channels.



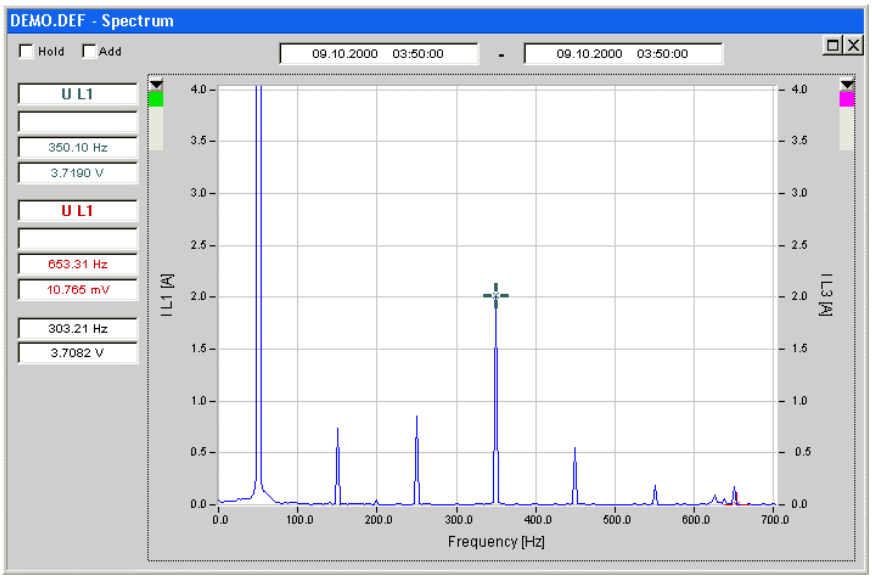
- Select section: Double-click the desired *start point* and enter the number of samples.

All subsequent evaluations (e.g. for spectrum, mean and rms values, vector diagram, output in table format) refer only to the selected section then.

Examples



Frequency spectrums for the selected channels.



The frequency resolution of the spectrums increases with the number of recorded samples.

For Topas 1000

Samples	Frequency resolution	Measuring time
1 024	6.25 Hz	160 ms
2 048	3.125 Hz	320 ms
4 096	1.563 Hz	640 ms
8 192	0.781 Hz	1.28 s
16 384	0.391 Hz	2.56 s
32 768	0.195 Hz	5.12 s
65 536	0.098 Hz	10.24 s

For Topas 2000

Sample	Frequency resolution	Measuring time
1 024	10 Hz	100 ms
2 048	5 Hz	200 ms
4 096	2,5 Hz	400 ms
8 192	1,25 Hz	0,8 s
16 384	0,625 Hz	1,6 s
32 768	0,3125 Hz	3,2 s
65 536	0,156 Hz	6,4 s

- Select the phases for the diagram of the active and reactive power spectrums and the vector diagram of the apparent power.

If currents and voltages were recorded, you can display the active and reactive power spectrums for the individual phases.

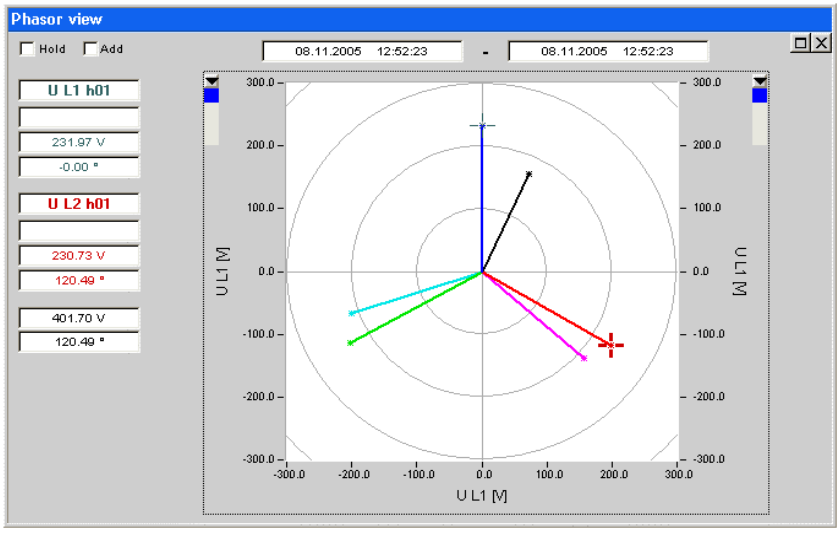
Vector (phasor) diagram

- Select the desired channels.
- Click the button

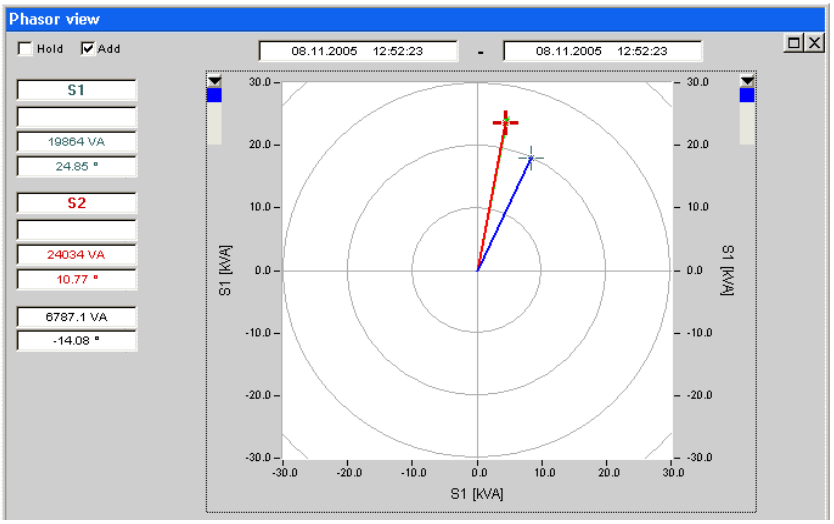
to display voltage and current vectors.

- Click *Phase selection* in order to call up the vectors for the *apparent power*.
- To add more *indicators*, check the box.

Voltage vector diagram



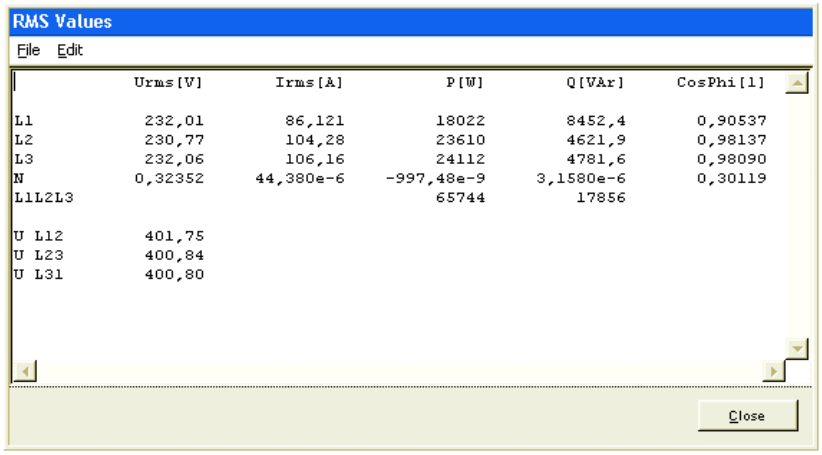
Vector diagram for apparent power



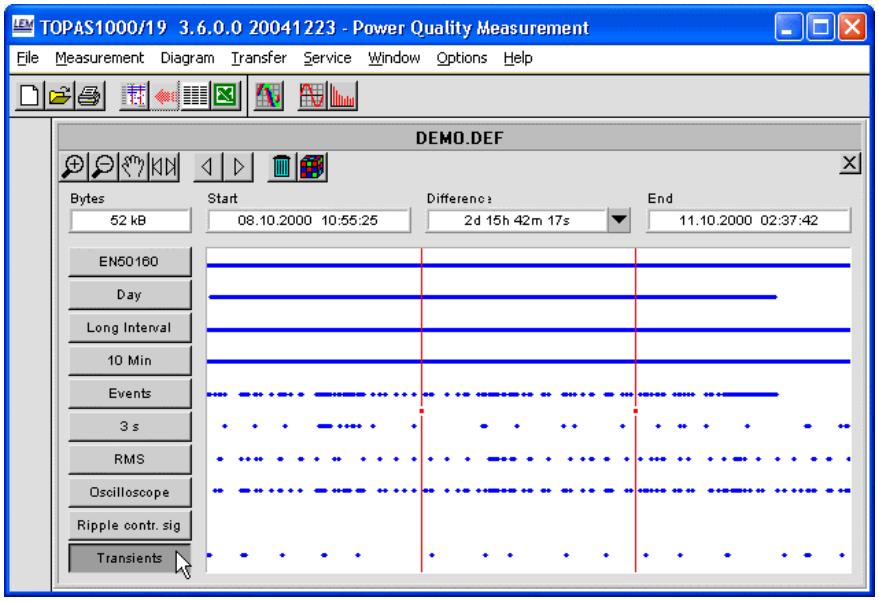
The fundamentals of the apparent powers S1 of the three phases are shown according to their value and phase angle.

Table format

The system allows for the tabular display of the rms and mean values for recorded measurements, based on the number of samples per triggered recording.

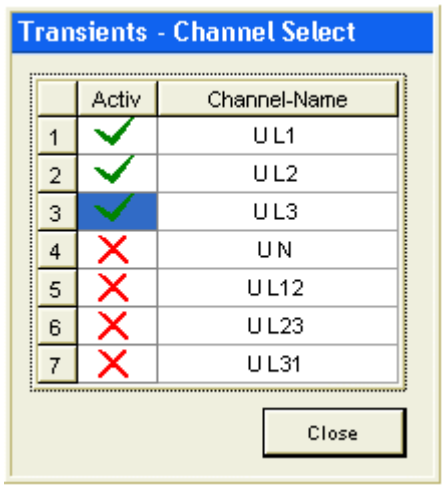


6.5.6 Evaluation of transients



Channels *CH1* to *CH4* are available for voltage transient measurements. The system provides *level-time diagrams* and *spectrums*.

- Click this button to open the selection window where you can choose the cannels for the level-time diagram and the frequency spectrum:



Note
Multiple selections with the CTRL and SHIFT keys are possible.

Transients of the selected channels.

Frequency spectrum for the selected channels. The frequency resolution of the spectrums increases with the number of recorded samples.

6.5.7 Presentation of measurements in diagrams

The existing measurement can be represented in two different ways:
- level-time diagrams, or
- statistical analysis (cumulative frequency).

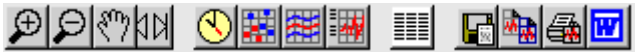
The diagram window can be opened several times, whereby the data in the windows is not changed. The name of the parameter file of the associated measurement and the evaluation function are quoted in the title bar.

- To select between the representation options, click the following buttons:

Representation of one variable in the form of a level-time diagram

Representation of the probability distribution of a series of measurements

Diagram toolbar



This toolbar allows for the modification and visualization of the graphs.

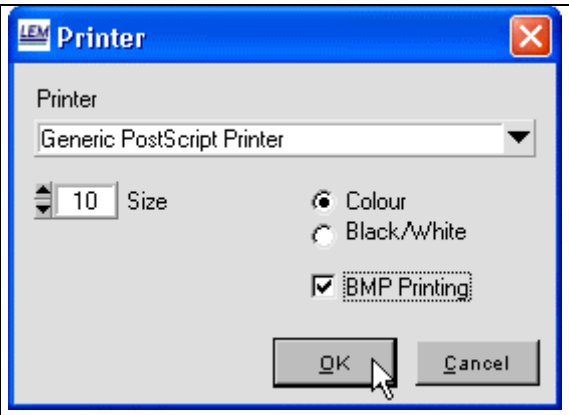
Selection of period

- A period for analysis can be selected by positioning the *red cursor lines* or selecting a *rectangle*. To choose between these two options, right-click the diagram area and then select the desired mode in the *Zoom Mode* menu. The period selected by positioning the red cursor lines must be within a rectangular frame.

Zooming

- To zoom in or out, click the or button.
- To zoom in on a selected range highlighted with a rectangle, define the desired zooming range while keeping the mouse button pressed.
- As soon as the mouse key is released, the selected area is increased in size.

Settings	Application
	Undo the last zoom in action.
	The zoomed area can be moved within the diagram area (*PAN function*).
	After zooming, click this button to reset the view to show the entire measurement.
	Switching between absolute or relative time representation.
	Switching between line diagram and dot chart. The generation of dot diagrams, where every dot represents a measurement value, might take some time for large volumes of data.
	Add or remove the measurements of individual channels.
	Add or remove the various display fields of the cursor positions (graph selection, time, value).
	Export displayed data to an ASCII file. The data can be printed, saved or copied to a template.
	Copy the ASCII log to a file.
	Copy diagram to clipboard.
	Print diagram:



By activating *BMP printing*, you can print the diagrams in bitmap format instead of vector graphic format, so that the widths of the lines are the same, irrespective of the printer type.

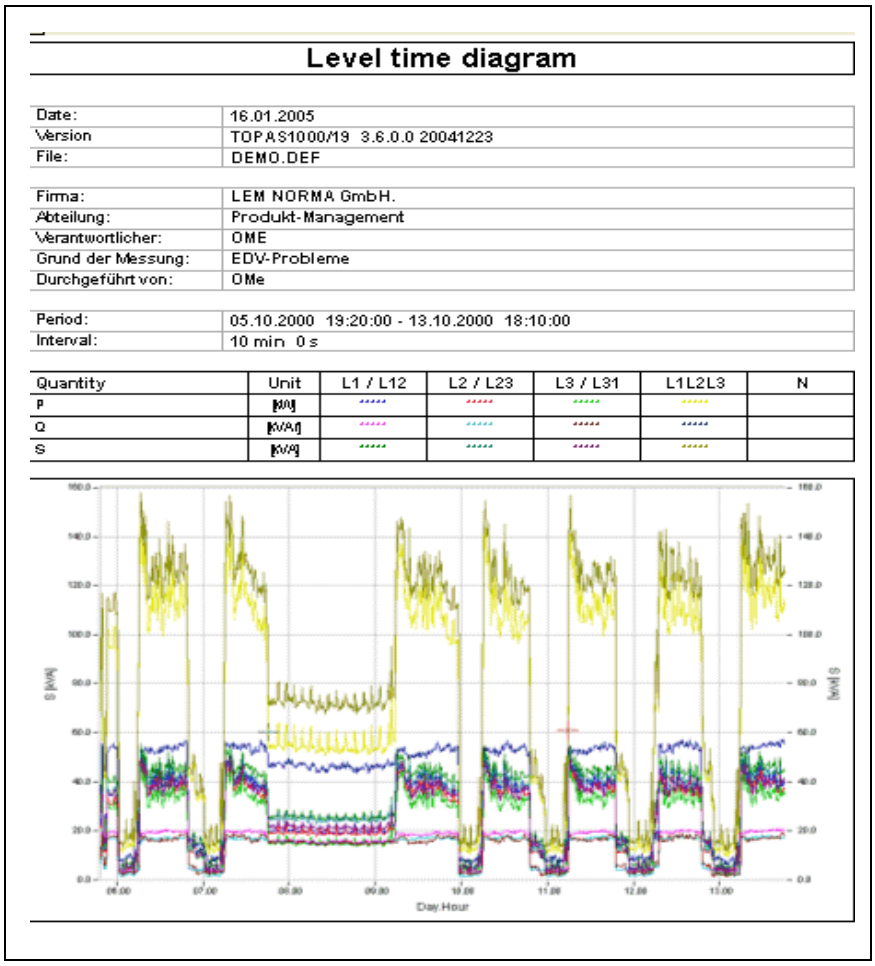
- Select the graph for scaling of Y-axis.

Hold Prevents the current diagram from being overwritten. This means that several diagrams of various measurement files can be opened.

Add Adds the diagram to the next selected evaluation. If this option is selected, several graphs representing the same variable can be compared in one evaluation. Please, note that only measurements with identical time scales can be superimposed.

Generate a log of the active graph window in MS Word® format. The header showing the main settings and a legend explaining the graph are added automatically.

Example



Level time diagram

Date:	16.01.2005
Version	TOPAS1000/19 3.6.0.0 20041223
File:	DEMO.DEF

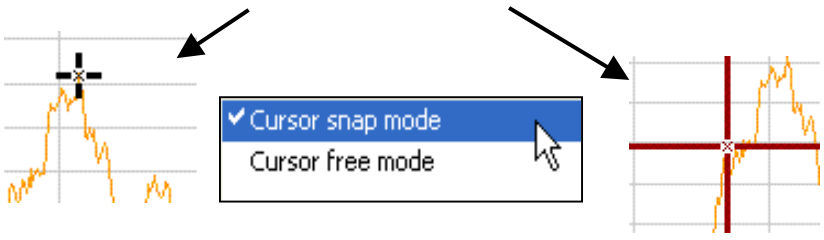
Firma:	LEM NORMA GmbH.
Abteilung:	Produkt-Management
Verantwortlicher:	OME
Grund der Messung:	EDV-Probleme
Durchgeführt von:	OMe

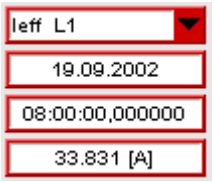
Period:	05.10.2000 19:20:00 - 13.10.2000 18:10:00
Interval:	10 min 0 s

Quantity	Unit	L1 / L12	L2 / L23	L3 / L31	L1L2L3	N
P	[W]	*****	*****	*****	*****	
Q	[VAr]	*****	*****	*****	*****	
S	[VA]	*****	*****	*****	*****	

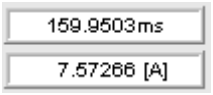
These fields show the start and end time of the displayed measurements.

- Right-click the diagram to toggle between the two available *cursor modes*: *locking of measurements (cursor locking)* and *free positioning (cursor free)*.





These fields show the variable, date, time, value and unit. Select cursor mode *Cursor locking.*



Time and amplitude difference between the two cursors. The time difference is always displayed, while the amplitude difference is only shown, if the cursors are locked to graphs with identical units.

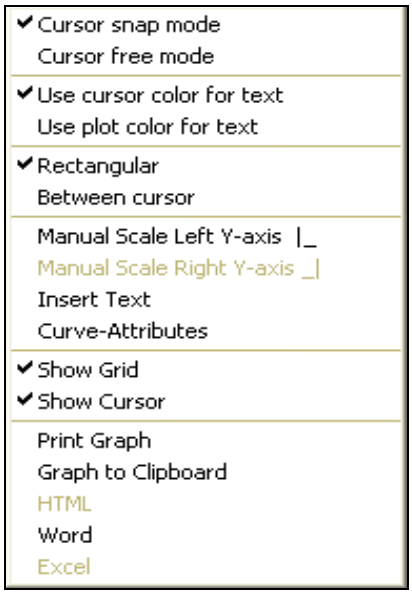
Maximize window

Standard window size (restore)

Close window

Mouse functions

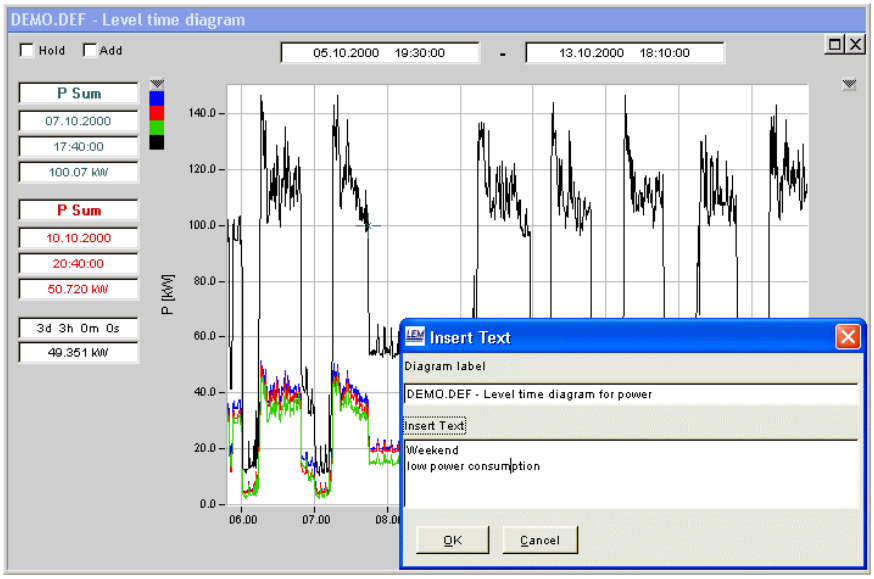
- Right-click the diagram to access the following *tools*.



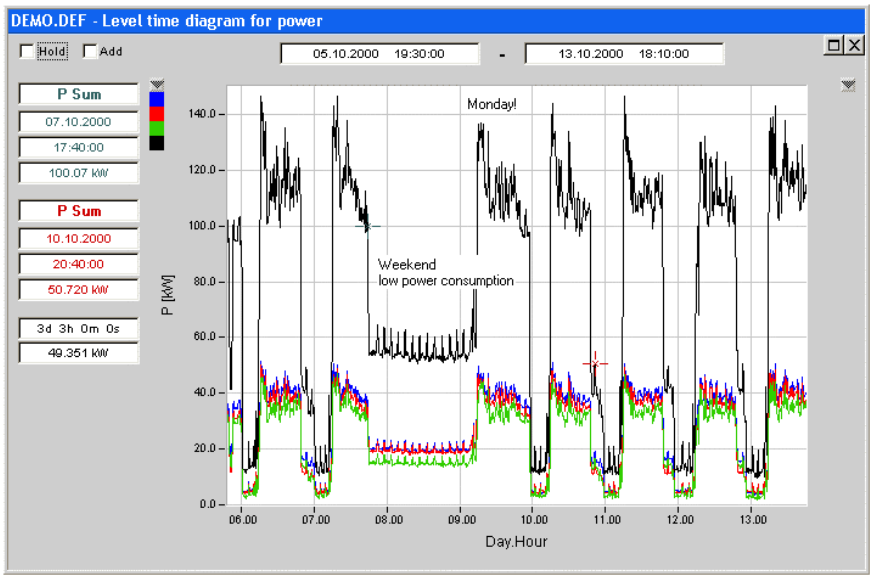
6.5.8 Placement of text labels in diagrams

Comments can be placed directly into diagrams in order to mark specific areas of the curves. The text modules are linked to the curves and will move during scroll but not during ZOOM actions. The top left corner is the reference location. The texts will appear also on printouts of the diagram.

- Open an *evaluation diagram*
- *ZOOM* in as required
- Right click into the diagram and select menu *Insert text*.
- In the dialogue *window enter/modify* the diagram headline and the required text. Multiple independent text boxes are allowed.
- Quit the dialogue with *OK*.
- Move the text box to the final location with the left mouse button.



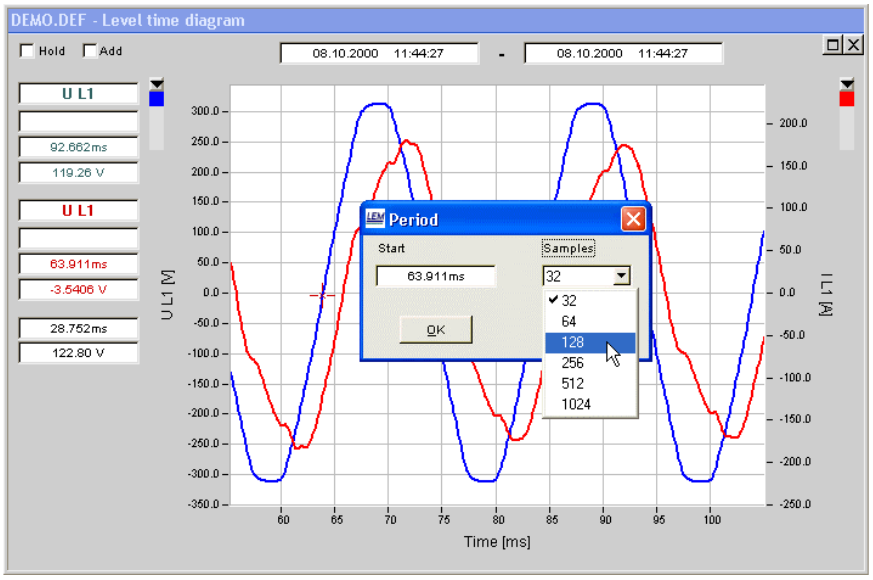
The result:



6.5.9 Oscilloscope diagrams

Special function *Period*

By double clicking with the left mouse button into an oscilloscope diagram we can set the start position for a segment evaluation:



In the dialogue window we can see the start time and we can enter the amount of samples (i.e. length of the segment, e.g. 128) to be evaluated.

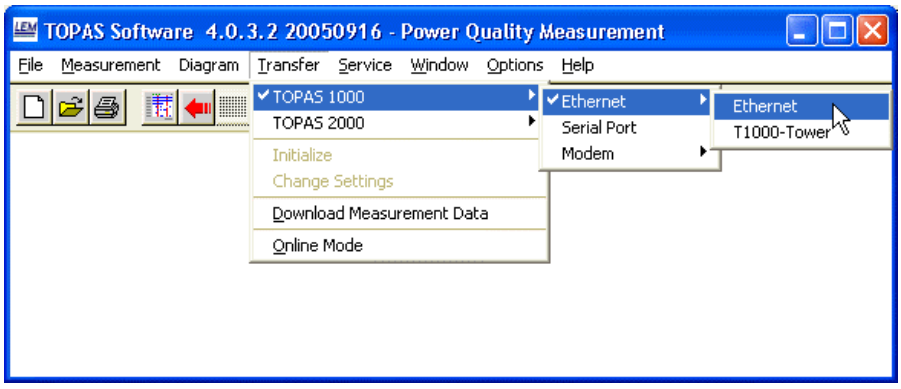
- Close the dialogue with *OK*.
- Open a new diagram with icons or .
- From now on all evaluations like amplitude spectrum are based on the selected evaluation period.
- Moving the time cursor in the evaluation window resets the segment settings.

6.6 Menu: *Transfer*

6.6.1 *Transfer – Topas 1000*

The system communicates with the instrument via Ethernet, a serial direct connection or a modem. For Ethernet and modem connections, you must first configure the system.

- To establish a connection to the instrument, go to *Transfer – Topas 1000.*



- Select one of the interfaces described below.

Ethernet

Ethernet networks allow for the operation of several instruments. Go to *Options - Configure Sites* to register additional instruments in the *station list.*

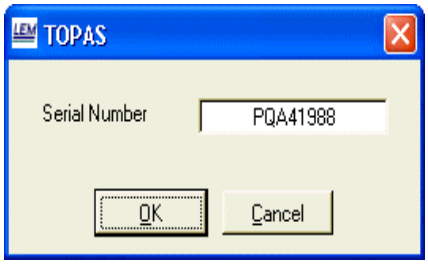
▸ Click the *Transfer – Topas 1000* button to select an interface and the desired instrument from the list. Alternatively, identify the instrument by entering its serial number code (*PQAxxxxx*) or its *station name*.

Serial number

Each instrument is uniquely identified by a combination of PQA followed by a five-digit serial number.

This number is printed onto the type plate of the instrument. Example of a valid serial number: *PQA74485*.

▸ Enter this code in the text field.



Ethernet

Ethernet is the default communication interface between the instrument and the evaluation PC.

As soon as a connection is established, the cursor changes to an hourglass.

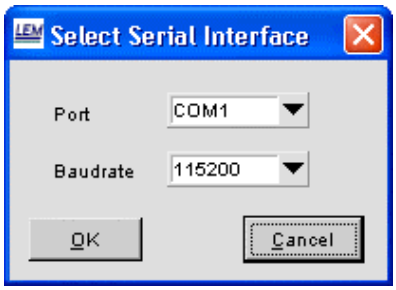
In case of communication problems, please refer to chapter *Ethernet Communication*, page 11 and *Service TCP/IP settings*, page 99.

Important
If you are running different software versions on the PC and the instrument, we recommend that you upgrade your system. The release date of the software indicates the software version. It is not possible to configure the instrument, if the software version on the instrument deviates from that on the PC.

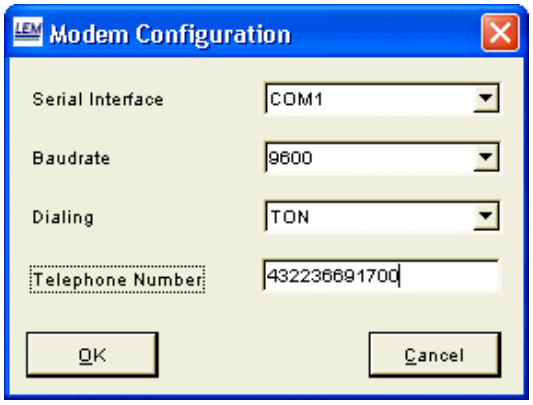
Serial direct connection to Topas 1000

The serial port should only be used, if communication via Ethernet is not possible. In this window, define the Baud rate of the serial interface. The Baud rate must correspond to that set at the instrument.

The default configuration is *COM1*, 57.600 Baud.



Modem connection to Topas 1000



- For communication via modem, connect the modem to the serial interface and set the Baud rate.
- Also enter the telephone number to be dialed, and the dialing mode (tone or pulse).

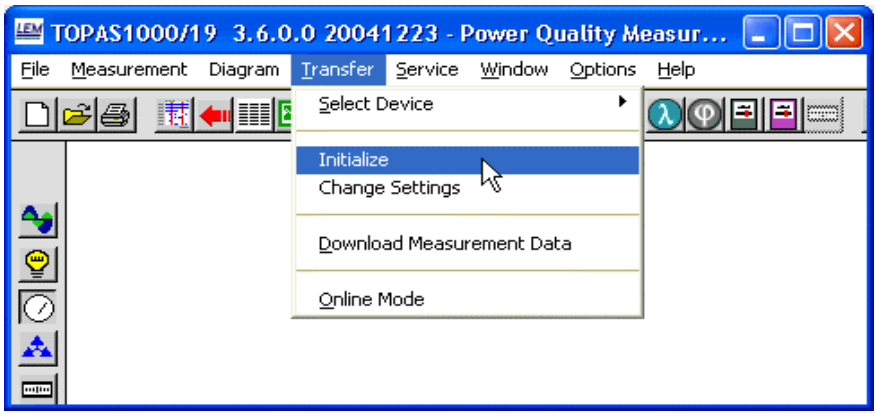
Where the connection is established through extension lines, configure the modem accordingly (e.g. *X0*), as there might be no dial tone.

For detailed instructions, refer to chapter *Service – Change modem string*, page 98.

6.6.2 *Transfer* (Topas 2000)

The communication procedures are similar to the Topas 1000 but additionally there is a feature to search for Topas 2000 instruments in the Ethernet network.
For details see chapter *Ethernet communication* on page 14.

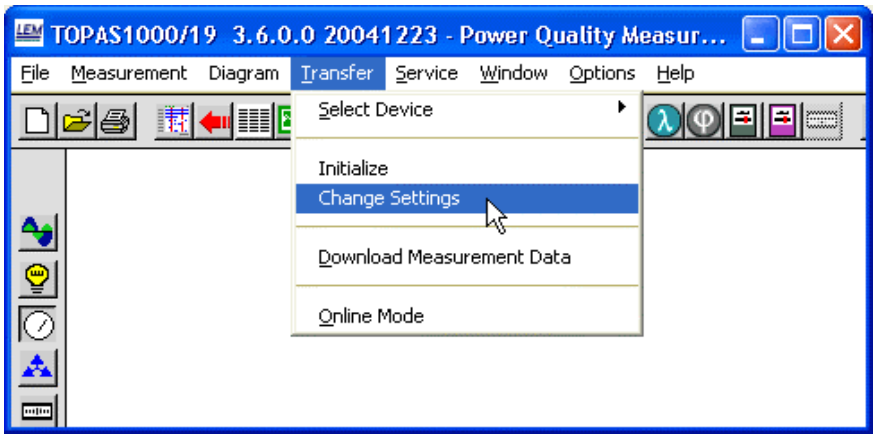
6.6.3 *Transfer - Initialize*



Use the *Initialize* command to send the definition file from the PC to the instrument. In this process, the instrument is reinitialized (*reset*), and a new measurement is started.

Important
Please note that all measurement data stored in the instrument is deleted!

6.6.4 *Transfer – Change Settings*



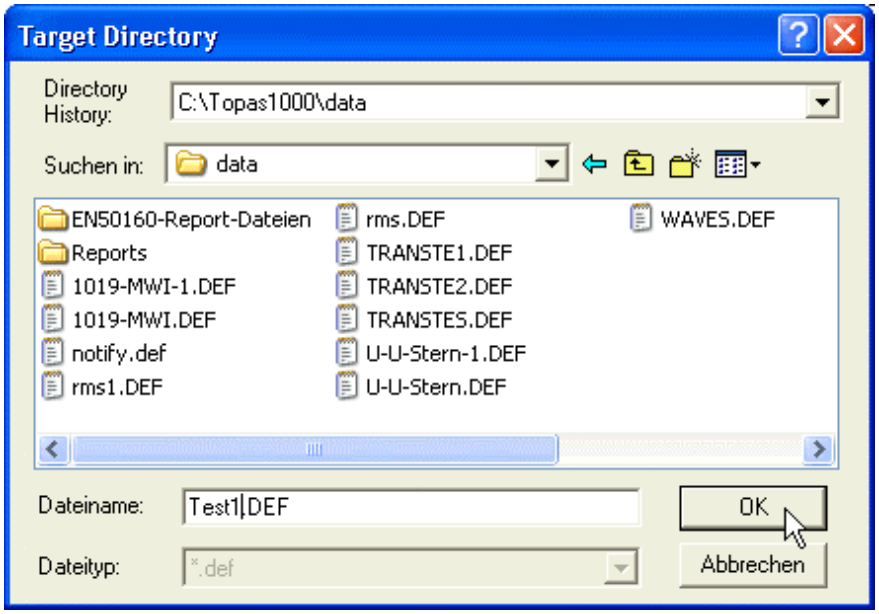
The settings for trigger conditions, recording modes, memory management, hardware and CBEMA representation can be changed during the measuring process.

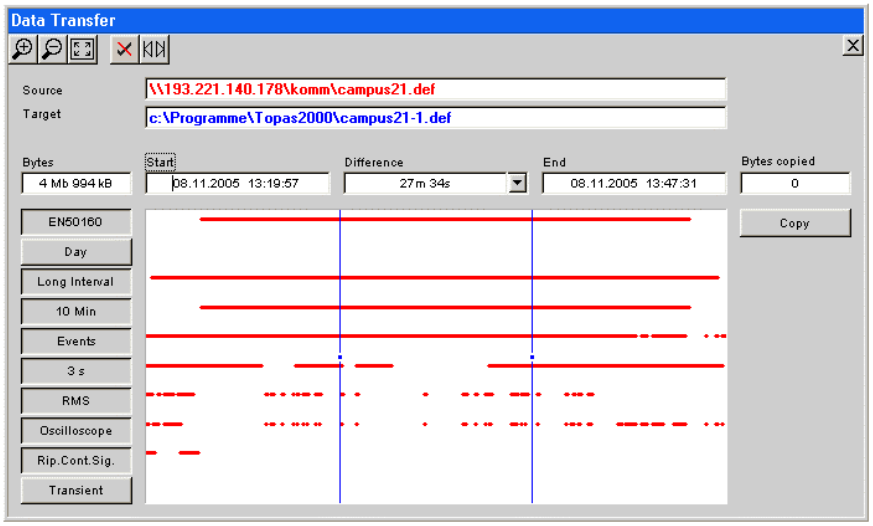
- Confirm the changes with *OK*, and
- click *YES* to transfer the data to the instrument.

6.6.5 *Transfer - Download Measurement Data*

This command transfers the data stored in the instrument to the evaluation PC. This process can be completed at any time, without affecting any current measuring process.

- In the next window, specify the *target directory*.
- Confirm with *OK*. The name shown in the *File name* field corresponds to the name of the *definition file* used for initialization.
- You have however the option to enter a different name.

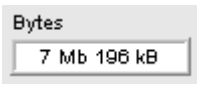




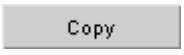
The next window shows the source and target directory and their contents.

- Select the desired recorded data,
- and choose the desired time period, using the two cursors. If several result files have been highlighted for copying, you can deselect a file by clicking it again.

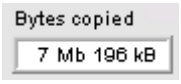
Note
All virtual instruments are marked automatically if measurement data are available on the Topas 2000. If you do not want to transfer data from a specific instrument deactivate it. Activation/deactivation of all virtual instruments is don with the icons and .



Shows the data to be transferred.



Transfers the data to the target directory of the evaluation computer.



Shows the data that has already been transferred.

- To terminate the copying process, click *Cancel*.

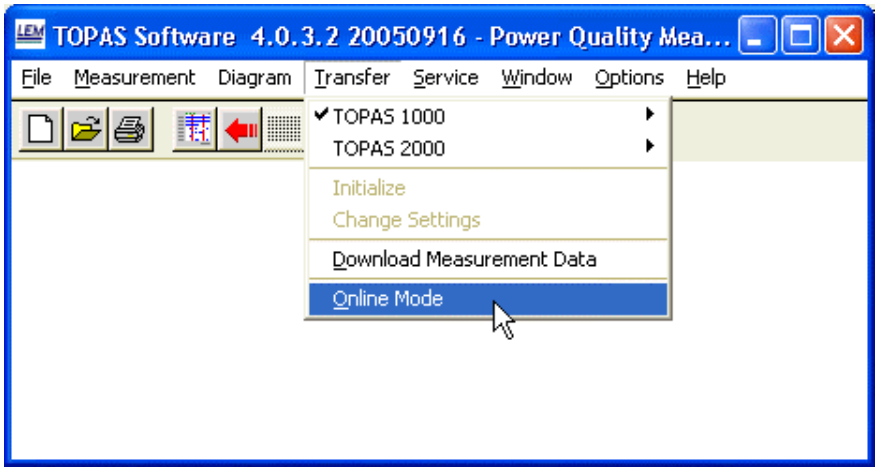
Note
Data that has been transferred previously to the PC is not copied again, even if it is included in the *Selected bytes*.
The Topas measurement data are organised in blocks. The time cursors will very seldom be positioned at block borders. Therefore blocks are copied which are partially within the time period between the cursors to ensure to copy all required data. A little bit more data will be copied as have been marked.

Already copied data is indicated with blue lines below the red lines

Evaluates the selected data

Click this button to return to the *data transfer* window. Continue with selecting and transferring other data.

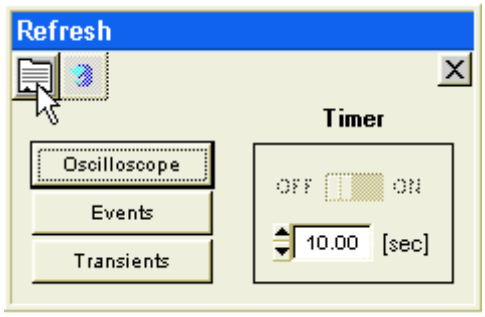
6.6.6 *Transfer – Online Mode*



In *Online* mode, the instantaneous values and frequency spectrums of the currently applied signals are displayed.

- To activate the *Online* mode, select *Transfer/Online Mode*.

The *Refresh* window is displayed:



Retrieving new measurements

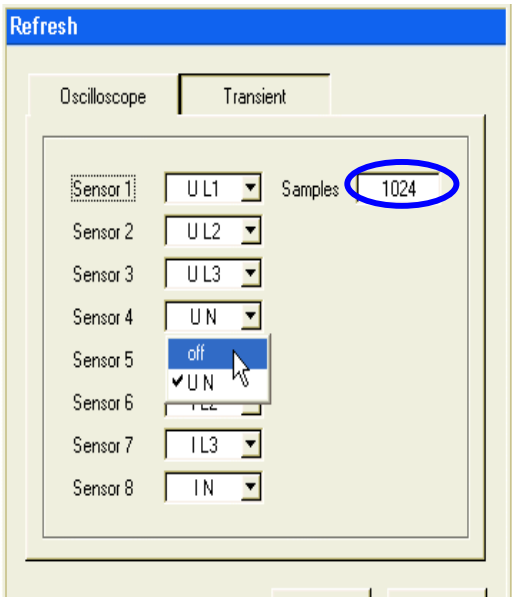
- The retrieval of new measuring data from the instrument can be automated and timer-controlled *(Timer ON)* or started manually by clicking the (Refresh) button.

Save online data – Topas 1000 only!

If the *Store* switch is activated, the online data is also saved in the instrument.

Hardware settings for online operation.

Important
These settings apply only to online operation.



Samples

Number of samples of a measurement.
1024 is sufficient for measurements in the power supply network.

The number of *samples* determines time required for the transfer of the data, the measuring time and the frequency resolution in the spectral analysis:

For Topas 1000

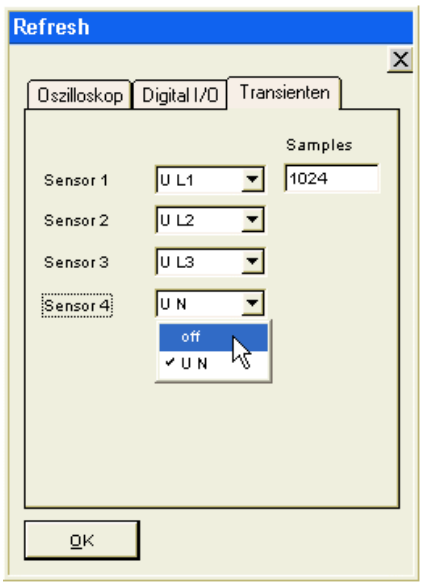
Samples	Frequency resolution	Measuring time
1 024	6.25 Hz	160 ms
2 048	3.125 Hz	320 ms
4 096	1.563 Hz	640 ms
8 192	0.781 Hz	1.28 s
16 384	0.391 Hz	2.56 s
32 768	0.195 Hz	5.12 s
65 536	0.098 Hz	10.24 s

For Topas 2000

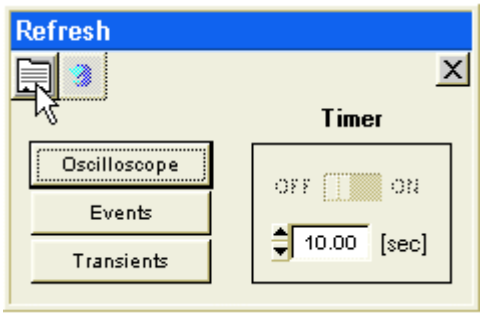
Sample	Frequency resolution	Measuring time
1 024	10 Hz	100 ms
2 048	5 Hz	200 ms
4 096	2,5 Hz	400 ms
8 192	1,25 Hz	0,8 s
16 384	0,625 Hz	1,6 s
32 768	0,3125 Hz	3,2 s
65 536	0,156 Hz	6,4 s

Settings for transients

Topas 1000



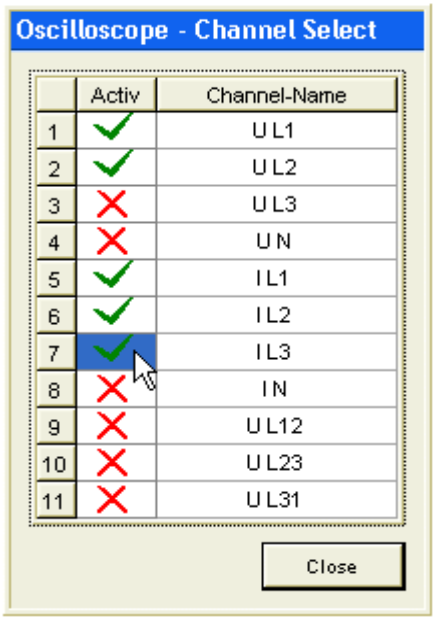
Oscilloscope online view



- Click the Oscilloscope button to evaluate waveforms.
- To retrieve new measuring data, click the button.
- Generate diagrams, using the *buttons* in the *toolbar*.

Voltages, currents

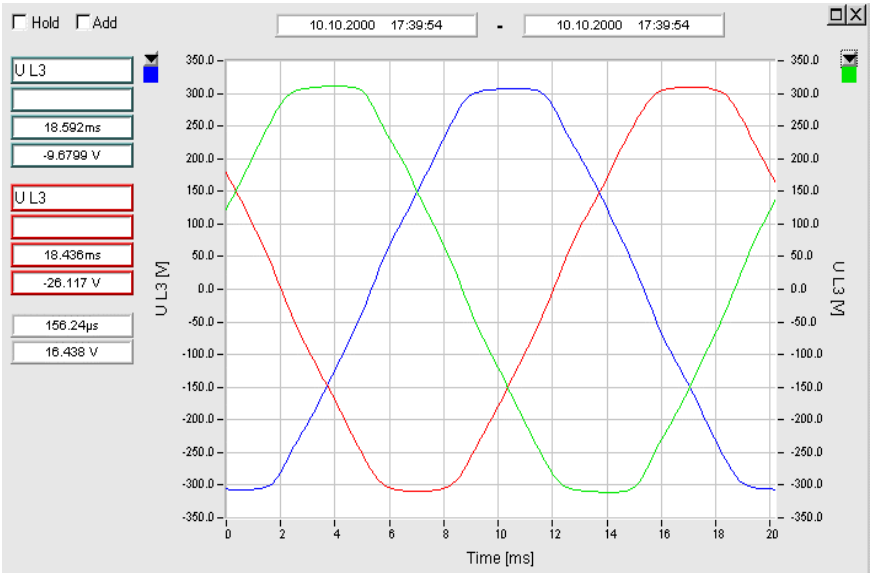
- Select the channels for the diagram with the button.
- – use the *SHIFT* and *CTRL* keys for multiple selections as usual under Windows®.



- Click a button in the toolbar to select the diagram type:

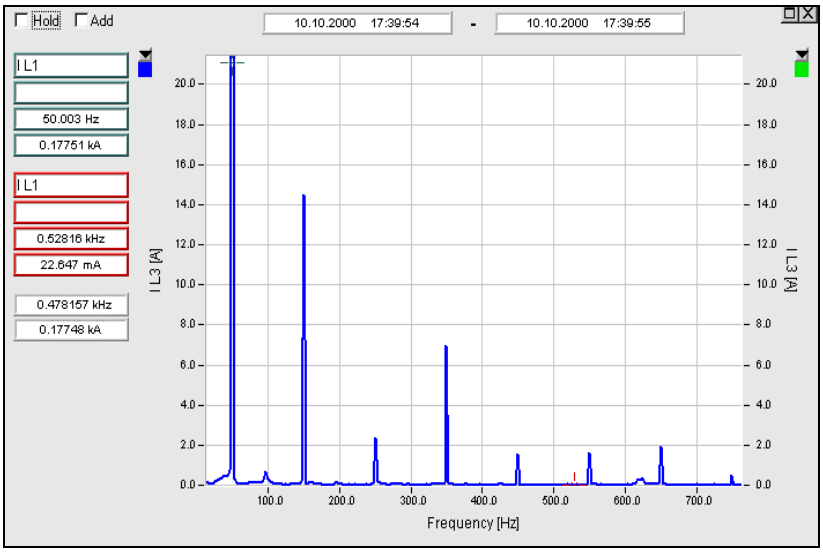
  - Level-time diagram
  - Frequency spectrum for voltage and current
  - Vector graph for voltages and currents
  - Mean values over a measuring interval, displayed in table format

Level-time diagrams –



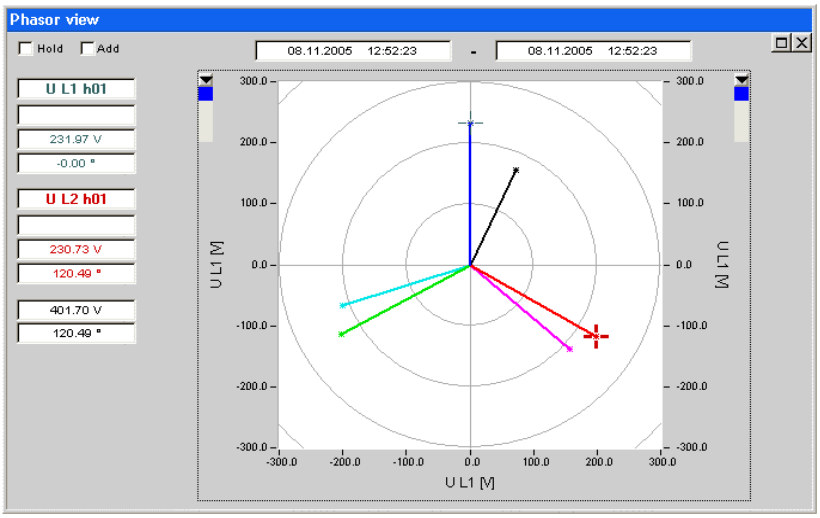
- To include other variables in a diagram, check the *Add* box
- Click again the button for *graphs* .
- Select the channel you wish to add.
- Click the button to display the graphs.

Amplitude spectrum



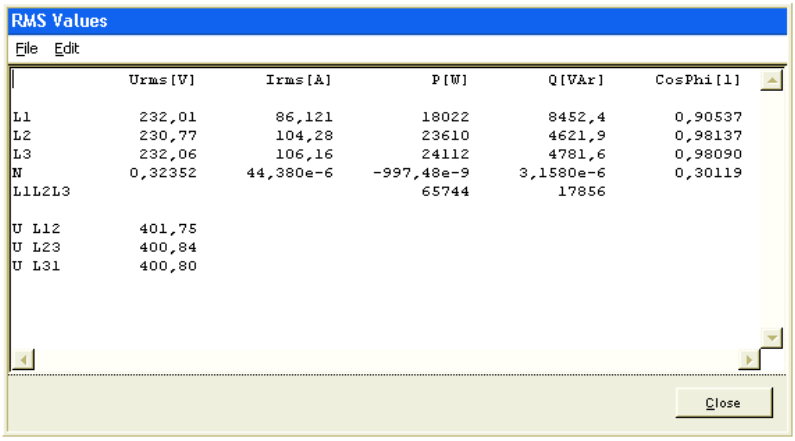
The amplitude spectrum of the selected graph(s) is displayed.

Vector diagrams



The relation between phases for voltages and currents, as well as between different phases is visualized, and can be accurately quantified by means of the cursor.

Table of mean values



	Urms[V]	Irms[A]	P[W]	Q[VAr]	CosPhi[1]
L1	232,01	86,121	18022	8452,4	0,90537
L2	230,77	104,28	23610	4621,9	0,98137
L3	232,06	106,16	24112	4781,6	0,98090
N	0,32352	44,380e-6	-997,48e-9	3,1580e-6	0,30119
L1L2L3			65744	17856	
U L12	401,75				
U L23	400,84				
U L31	400,80				

Note
The list of *rms values* can be used to check whether the sensors are correctly connected.

Power values

- Click the button for *L1-L2-L3*

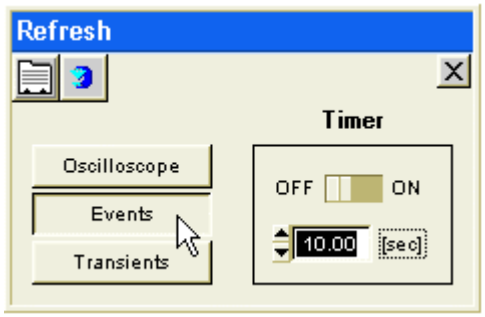
- Click a button in the toolbar to select the diagram type:

Display options

- Frequency spectrum of active power P or reactive power Q
- Vector diagram of the fundamental apparent power S
- Mean values over a measuring interval, displayed in table format

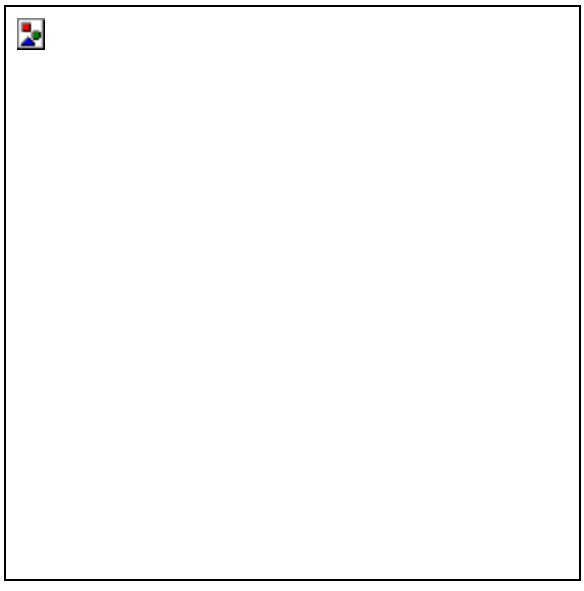
- Click the *Refresh* button to manually retrieve the new measurements from the instrument, or activate the timer (*Timer ON*) for automatic retrieval.

Online event display

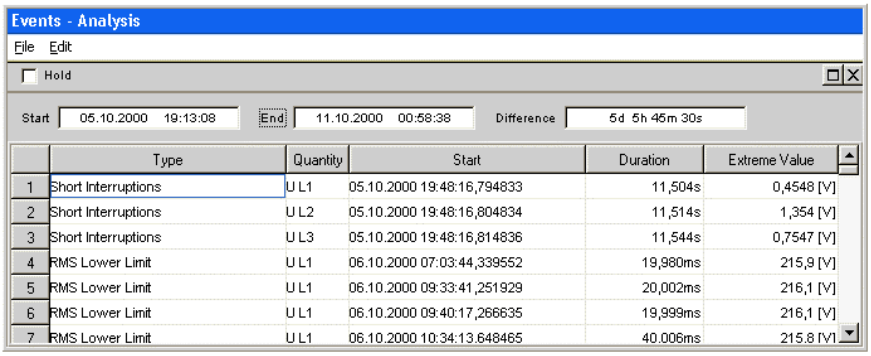


The *online event display* shows all active events and enables users to optimise the *trigger limit settings.*

- Click the *Event* button in the *Refresh* window to view the events that are currently active. Completed events are not displayed.
  The active events can be viewed as an *event evaluation* in the form of a list, or as entry in the *CBEMA diagram*.



- Click the *Event list* button to view the related details:

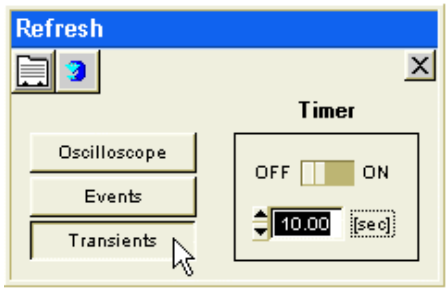


	Type	Quantity	Start	Duration	Extreme Value
1	Short Interruptions	U L1	05.10.2000 19:48:16,794833	11,504s	0,4548 [V]
2	Short Interruptions	U L2	05.10.2000 19:48:16,804834	11,514s	1,354 [V]
3	Short Interruptions	U L3	05.10.2000 19:48:16,814836	11,544s	0,7547 [V]
4	RMS Lower Limit	U L1	06.10.2000 07:03:44,339552	19,980ms	215,9 [V]
5	RMS Lower Limit	U L1	06.10.2000 09:33:41,251929	20,002ms	216,1 [V]
6	RMS Lower Limit	U L1	06.10.2000 09:40:17,266635	19,999ms	216,1 [V]
7	RMS Lower Limit	U L1	06.10.2000 10:34:13,648465	40,006ms	215,8 [V]

Active but not yet completed events are listed without duration.

Transient online mode - Topas 1000 only

This window shows the current instantaneous values and frequency spectrums.



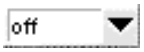
In the *Online Hardware Settings – Transient Analysis* window, select the channels you wish to display, and the number of measured samples per measurement. The duration of the measurement depends on the set sampling rate.

- The sampling rate can be adjusted in *Settings – Recording Modes* to a value between 100 kHz and 10 MHz.

Important

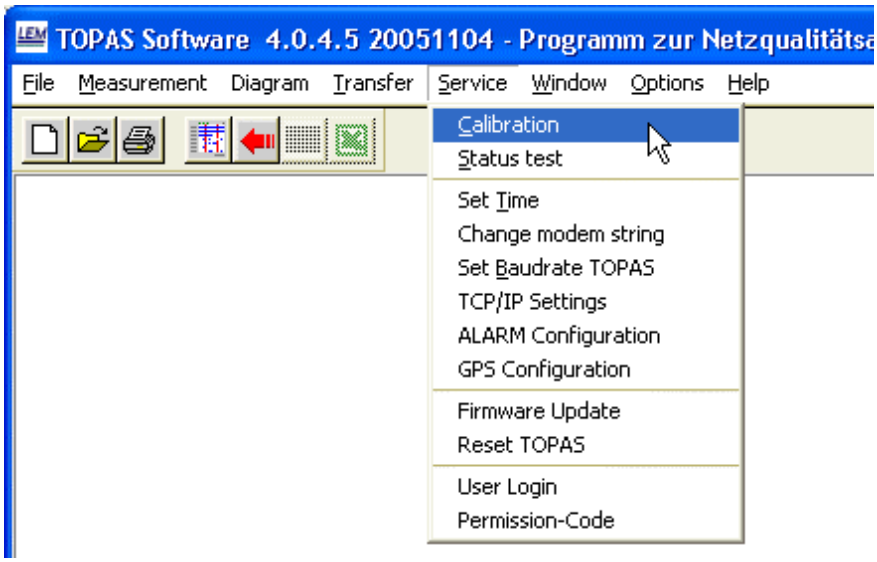
☑ This function is only available, if a transient option is installed. Sampling frequencies of > 500 kHz require a license.

The number of samples determines the duration of the data transfer, as well as the frequency resolution of the spectral analysis.

It is therefore recommended to switch off () channels that are not used.

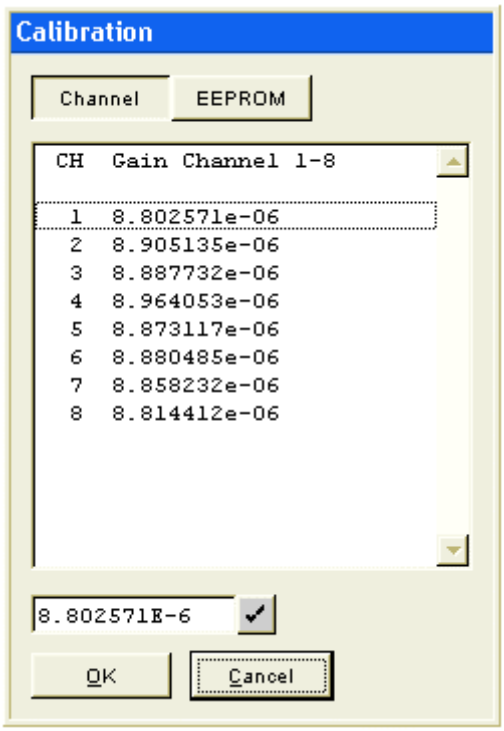
The variables are displayed as described in chapter *Level-time diagrams*.

6.7 Menu: *Service*



This menu allows users to view and adjust the basic instrument settings.

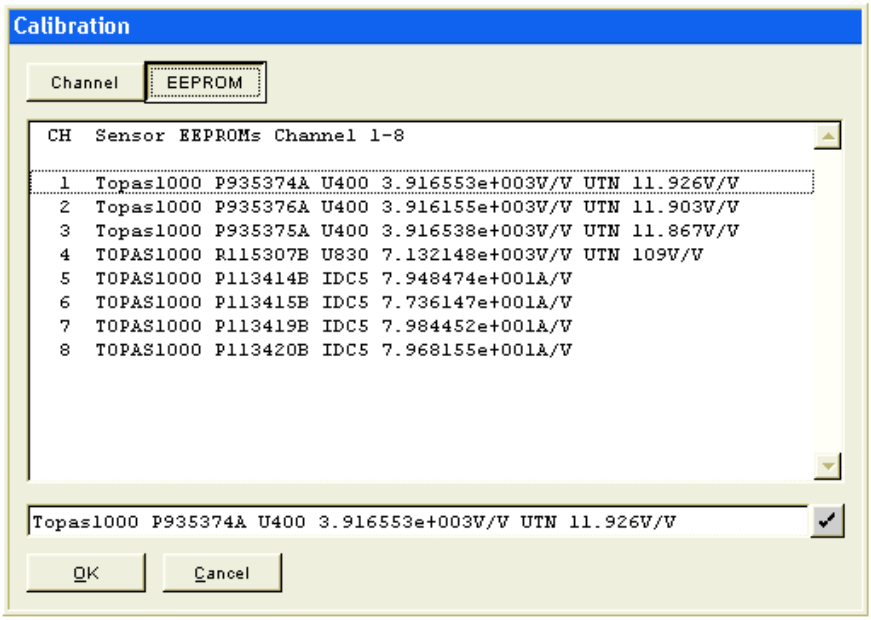
6.7.1 *Service - Calibration*



With this function, you can view the gain factors of the eight channels *CH1* to *CH8*, and the calibration data stored in the sensors.

Important
The gain factors may not be changed, as they determine the accuracy of the instrument.

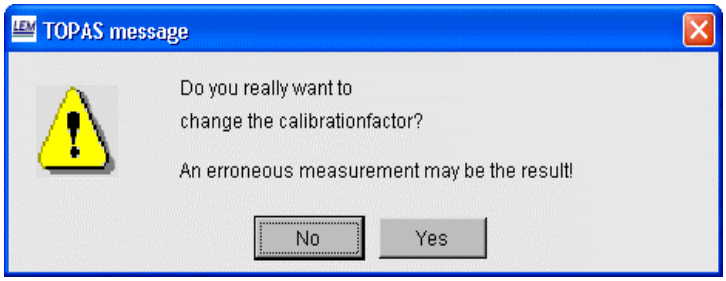
- To change a gain factor, enter the respective value in the 8.908434E-6 field and confirm by clicking .
- To view the calibration data of the connected sensors, click the *EEPROM* button:



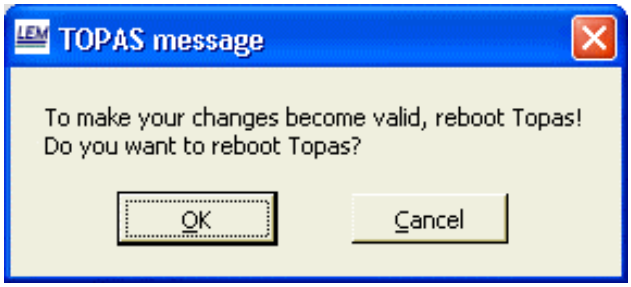
Note
Value 1 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx indicates that no sensor has been connected to the respective channel.

Important
If the name of a sensor is changed, the device cannot be detected by the instrument.

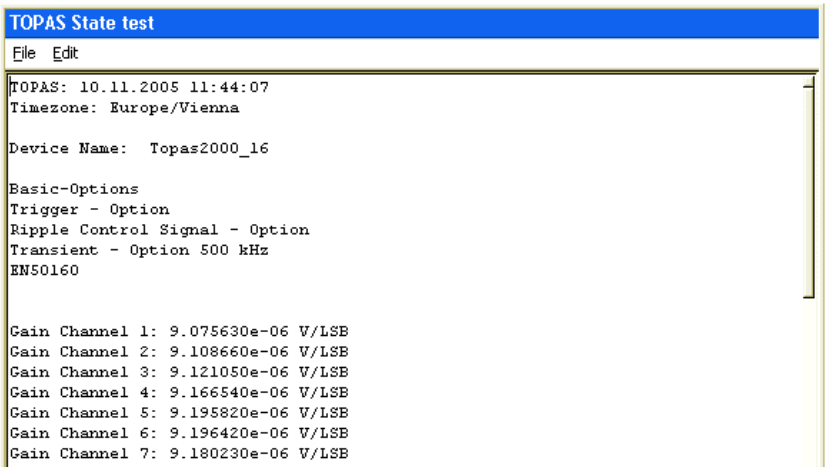
- Click and confirm with *YES* to transfer the data to the instrument.:



The changes are only applied after the instrument is restarted.



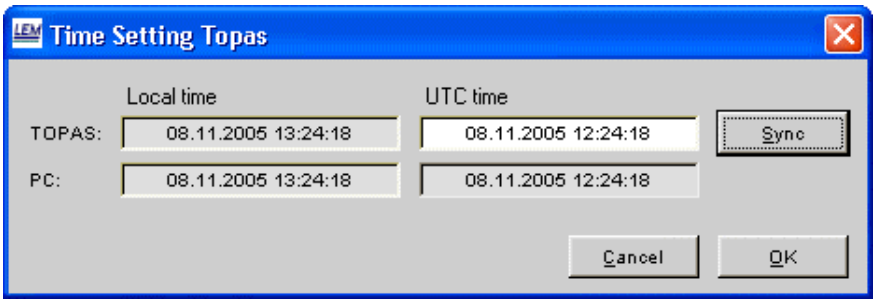
6.7.2 *Service – Status test*



This status test assesses and displays the following information about the instrument:
- System time and time zone of instrument
- Options installed at instrument
- Offset of analogue measuring channels
- Effective noise value in measuring channels
- Gain factors of measuring channels
- Connected sensors

- Battery: voltage, temperature, current, capacity
- Status of GPS-option

6.7.3 *Service – Set Time*



Local time shows the current PC time.

Instrument time shows the current instrument time.

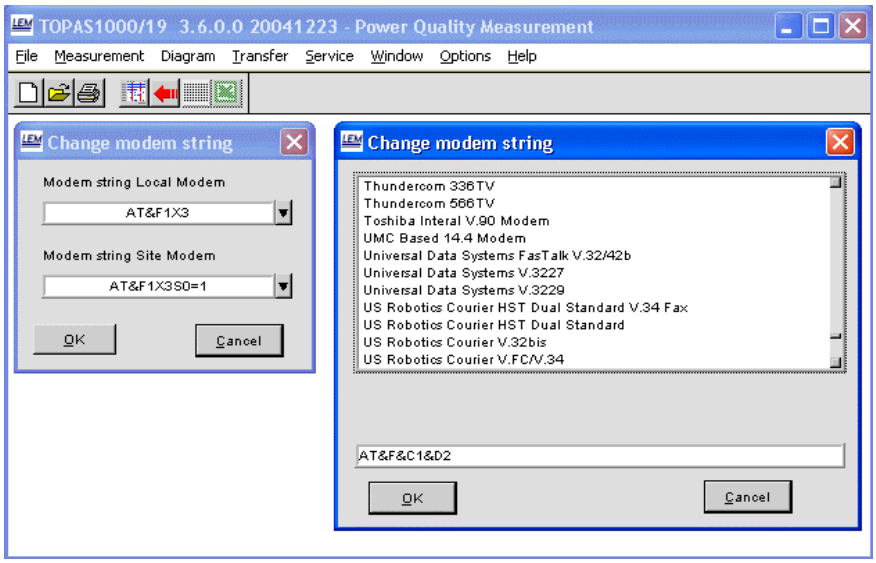
synchronize

- Click the Sync button to apply the PC system time to the instrument.

OK

- Click OK to transfer the current time to the instrument and to close the window.

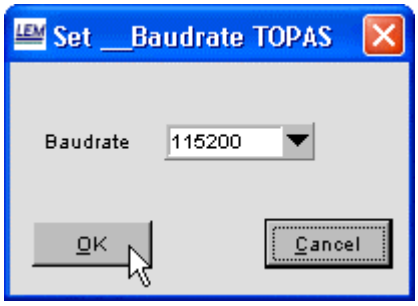
6.7.4 *Service – Change Modem String* (Topas 1000)



This menu option allows users to select the modem to be used for the communication between the instrument and the evaluation PC.

- Where the connection is established through extension lines, configure the modem accordingly (e.g. with *X0* instead of *X3*), as there might be no dial tone.
- Click the arrow beside the *Modem string of local PC* field to call up a selection window showing the most commonly used modems.
- Click the record of your local modem. The text field shows the correct modem string. Click *OK* to close the dialogue window.

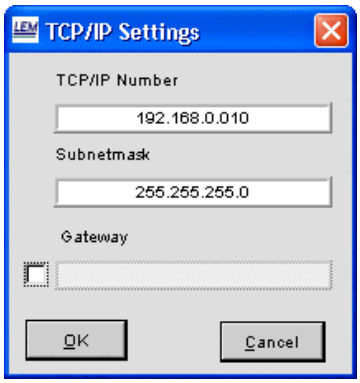
6.7.5 *Service – Set Baud Rate* (Topas 1000)



- Establish a connection to the instrument, using *Transfer-Serial Port*. Use the set Baud rate The default rate is 57.600 Baud.
- Select the new Baud rate you wish to use: 9600, 19.200, 57.600 or 115.200.
- Confirm with *OK*. The new Baud rate is transferred to the instrument and will be used for future communication.

Important
After transfer of the Baud rate, the instrument is rebooted to activate the new settings. Afterwards you have to use the new Baud rate for communication.

6.7.6 *Service - TCP/IP Settings* (Topas 1000)



If both the instrument and the PC are within the same network segment, you have the option to communicate by means of the *NETBEUI* protocol (included in all recent Windows® versions, but might have to be installed in Windows XP®). In this case, these settings do not have to be adjusted.
See also explanations in chapter *Communication via Ethernet*, page 11.
If you wish to use TCP/IP as protocol for Ethernet communication, you must adjust certain settings (*IP address*). We recommend that you request your network administrator to complete this task.

TCP/IP address

Each instrument must be assigned a static *IP address*, which must be unique within the network. All instruments are assigned a default IP address chosen by the manufacturer.

Important
Even if no changes have been made, and if a valid *IP address* is displayed, we recommend that you confirm the settings with *OK*. Restart the instrument firmware to ensure that the new *IP address* is used for all future network communication.

All instruments are factory-configured with the same *IP address*. If you wish to commission several newly delivered instruments in your network, you must first change the default *IP address* to a unique address for each instrument. Identical *IP addresses* in a network are not permitted, as certain devices might not be accessible, even when the *NETBEUI* protocol is used!

Subnet mask The subnet mask is determined by the address class.

Gateway These settings are required to access an instrument outside the local network, using a gateway. Instruments that are assigned a correct gateway address can be operated in WANs (Wide Area Networks).

- Confirm the settings with *OK* to transfer them to the instrument.

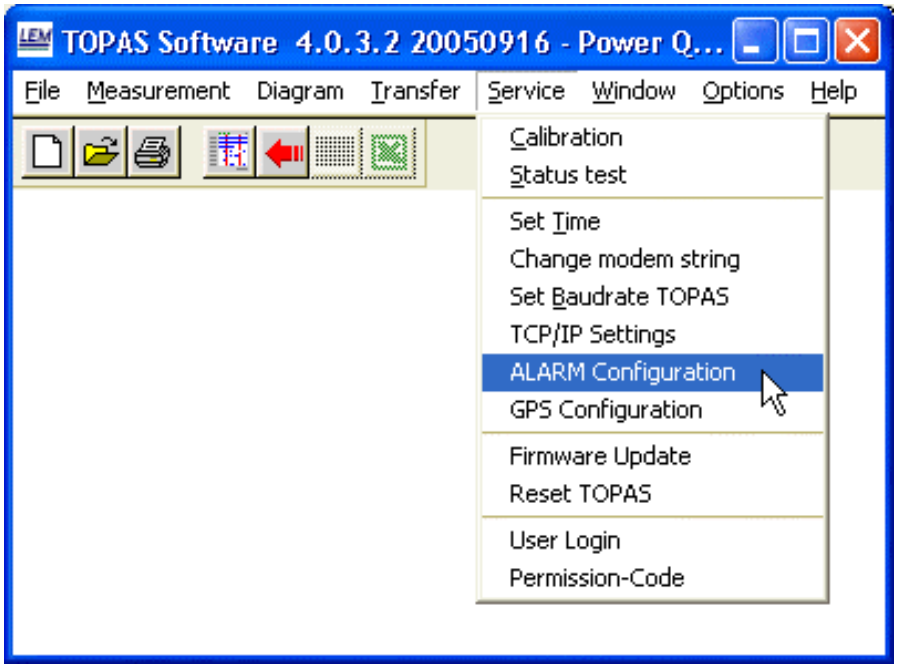
Note
The instrument is automatically restarted. This takes about 40 seconds.

6.7.7 *Service – ALARM Configuration* (Topas 1000)

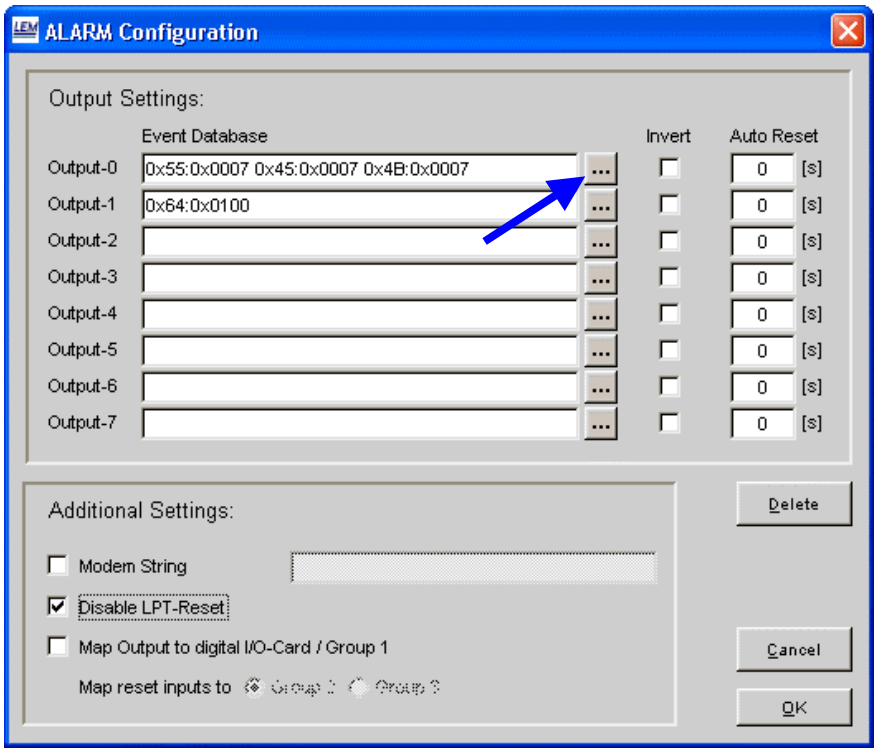
Each event which can be defined in the trigger settings dialogue (also the time trigger!) can be used for alarming – i.e. an output on the 25-pole feature connector of the Topas will be set or the fault messaging software *NOTIFY* will issue a fault message to the control PC.

We have to set the required trigger conditions fort he Topas and we have to assign the trigger events to the alarm outputs.

- For configuration use the menu *Service/Alarm/Configuration*:



In the next dialogue the Outputs *Output-0* to *Output-7* are configured individually:



With *Invert* the alarm output can be switch to low active, this means if the alarm is active the potential on the alarm output is 0 V, if the alarm is not active it will be +5 V.

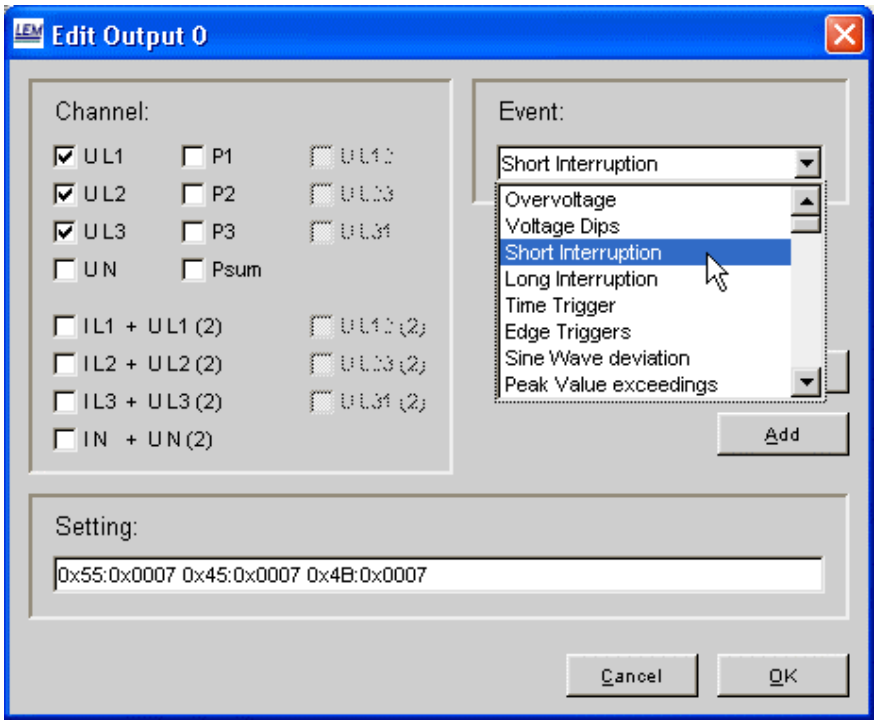
If we want to reset the Alarm output automatically after some seconds we have to enter the time period in the field *Auto Reset*.

If the messaging software NOTIFY shall send a message via modem to the control center enter a modem string with the valid dialing number into the field *Modem String* and check the tick mark.

If the mark *Disable LPT-Reset* is checked it is not possible to reset the alarm output via the reset input on the25-pole feature connector.

For Topas 1019/QWave Premium instruments the alarm outputs can be rerouted to the digital I/O option group1 if is mounted. For this check the tick mark *Map Output to digital I/O-Card/Group 1.* Map the reset input to *Group 2* or *Group 3* with the appropriate marks.

- Clicking on *OK* stores the alarm settings on the Topas instrument
- For the configuration of the individual outputs click on the button ... for the appropriate output:



- Select the Topas channel the trigger condition shall be applied to (e.g. UL1) and the kind of the trigger (e.g. Short Interruption). All trigger conditions which are provided for the Topas can be used
- Click the button *Add* to add the actual settings.

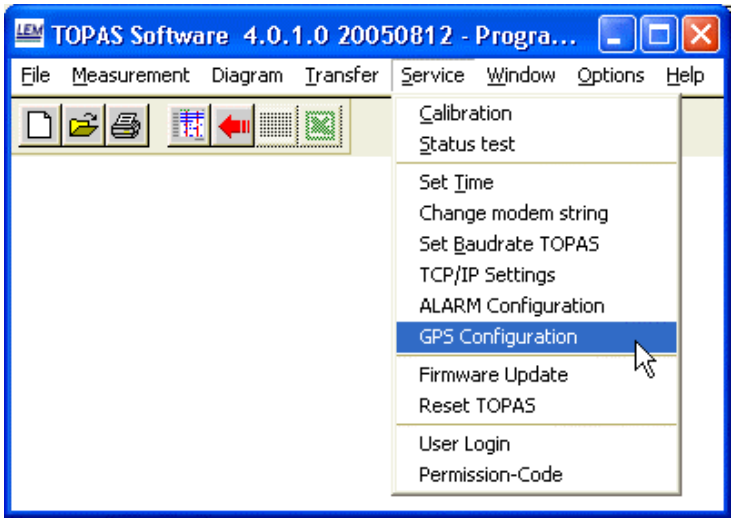
In the field *Setting* the information is prepared for the Topas.

- Clicking on *OK* quits the alarm output dialogue.

Caution!
The outputs and inputs are not potential-free and not protected against over-voltage. The signals have a 5 V TTL level. The settings are applied after the Topas has been restarted.

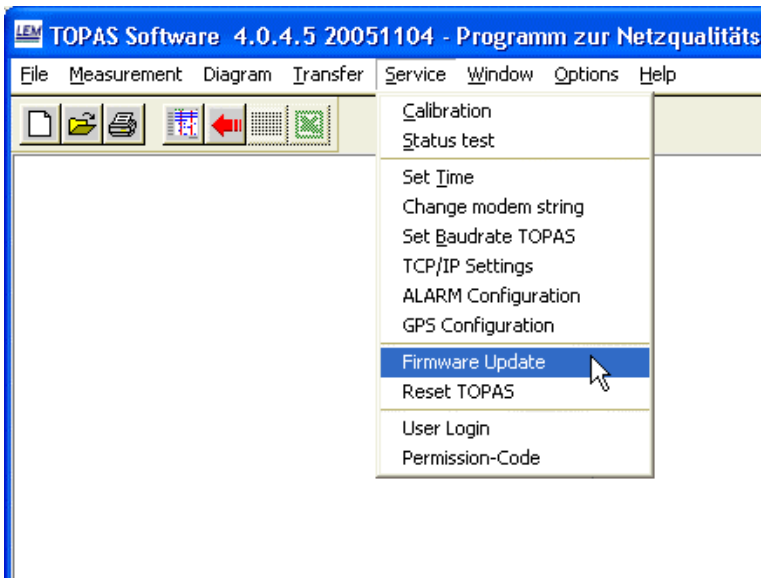
Note
The ALARM settings are stored in the Topas instrument and are not affected by a *RESET* or a software upgrade.

6.7.8 *Service – GPS Configuration* – for GPS option



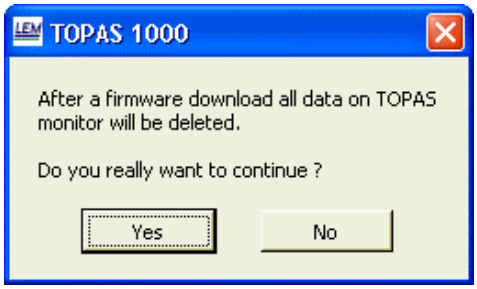
For details, see chapter *Options – GPS time synchronization*.

6.7.9 *Service – Firmware Update*



Upgrades of the firmware can be installed on the Topas. The latest firmware is always supplied as a part of a new evaluation software package (i.e. included on supplied CD-ROM).

- Before installing the upgrade, you are asked whether you wish to load the new software:

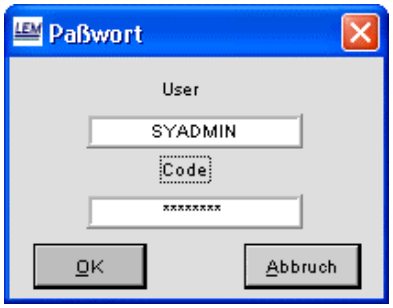


Important
To ensure trouble-free operation, ensure that the versions of the software installed on the instruments and the PC are identical.

6.7.10 *Service - Reset* (Topas 1000)

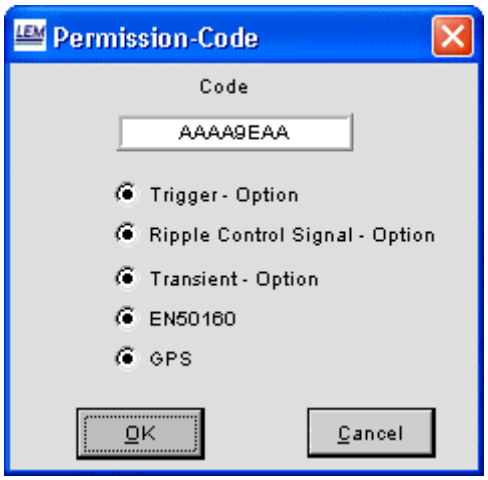
This menu option allows you to manually reset (restart) the instrument, if required.

6.7.11 *Service – User Login* (Topas 1000)



By calling up this menu option, all registered users can log in using their *Code*. New users must first be set up in Options – User Management.

6.7.12 *Service – Permission Code* (Topas 1000)

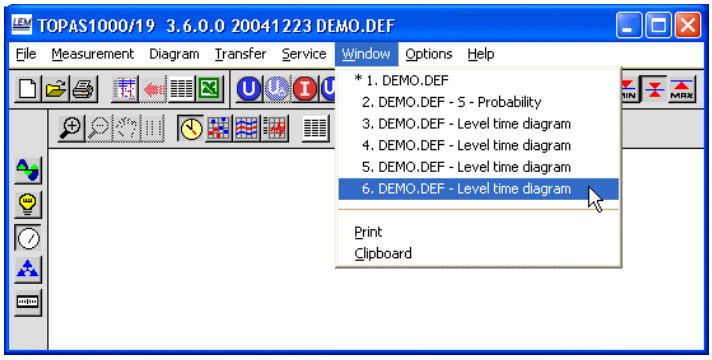


- Select this *menu option* to view the options with which the instrument is equipped.

If you have purchased a new option, enter here the respective code. The new option is available after the instrument has been reset (re-booted).

6.8 Menu: *Window*

6.8.1 *Window - List*



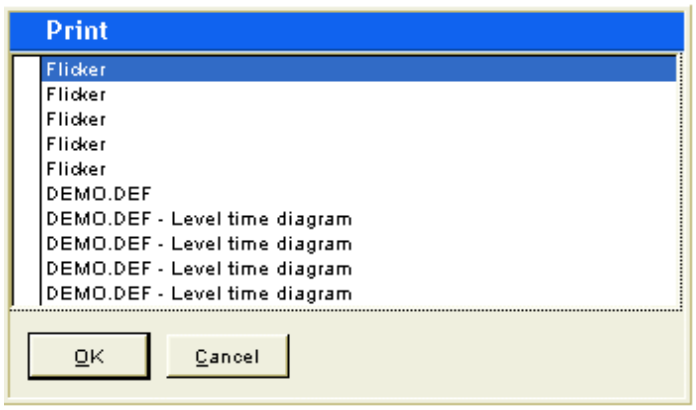
The *Window* menu includes a list of currently open diagram windows.

- By clicking an entry in the list, the associated diagram is displayed in the foreground.

6.8.2 *Window - Print*

Select menu option *Print* in the *Window* menu to view a list of all open windows.

- Select all windows you wish to print and confirm with *OK.*



6.8.3 *Window - Clipboard*

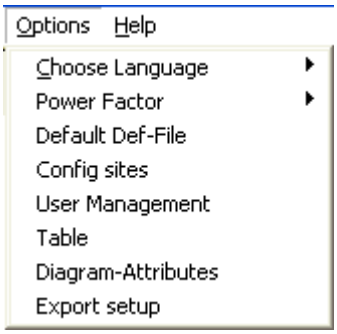
The window contains a list of currently open windows.
You have the option to select a window and to copy it to the clipboard. In this manner, you can export evaluations (diagrams), events and trigger settings to an MS Word® or MS Excel® file.

Important
You can only copy one window at a time to the clipboard.

6.9 Menu: *Options*

Options

This menu allows you to enter the required basic settings as regards user interface, data administration and output formats.



6.9.1 *Options – Choose Language*

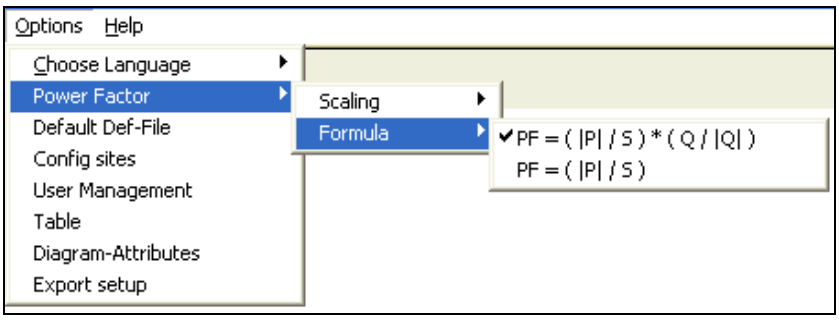
Language selection

- Select this *menu option* to select the language of the user interface.

German, English, French, Italian, Spanish, Dutch, Croat, Czech

6.9.2 *Options – Power Factor*

There are different algorithms for calculation of the power factor depending on the application. Select the appropriate formula:

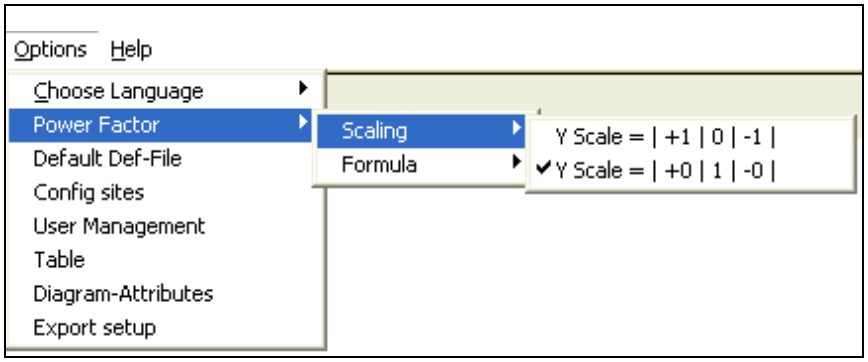


Note

- Select the required formula before you open the measurement data file.

In the first formula the sign of the reactive power Q defines the sign of the power factor. According to the load type (inductive or capacitive) the sign of the power factor changes.
The second formula is the classical definition. The sign is always positive, independent of load type and direction of power flow.

Additionally the scaling of the diagrams can be defined:



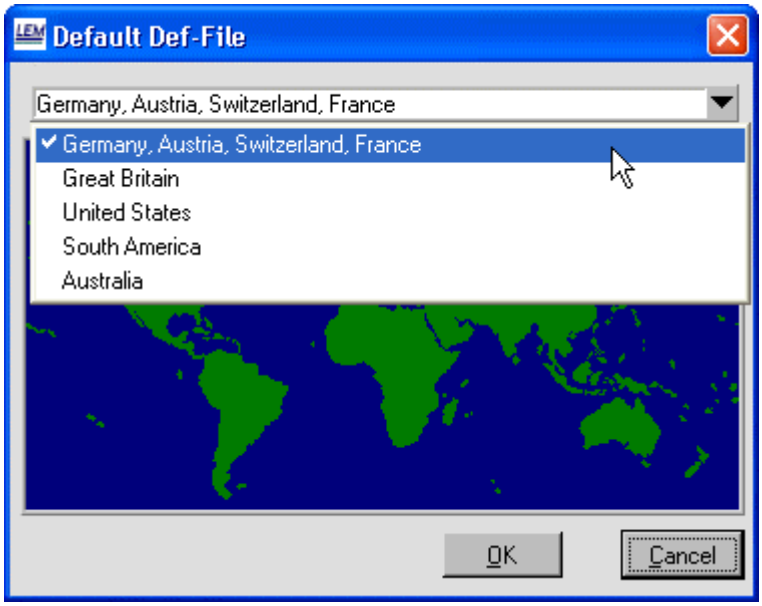
Note

- Select the required formula before you open the measurement data file. The second scaling method is optimal if the power factor fluctuates permanently around +/-1. Then the diagram is not overcrowded with vertical lines.

The second type is commonly used in power metering applications in energy distribution.

6.9.3 *Options - Default Definition File*

- Select here the Default.*def* files you wish to use in connection with menu option *File – New,* e.g. *euro.def.* These templates have been customized to suit the different regions (e.g. for United States: f= 60 Hz).



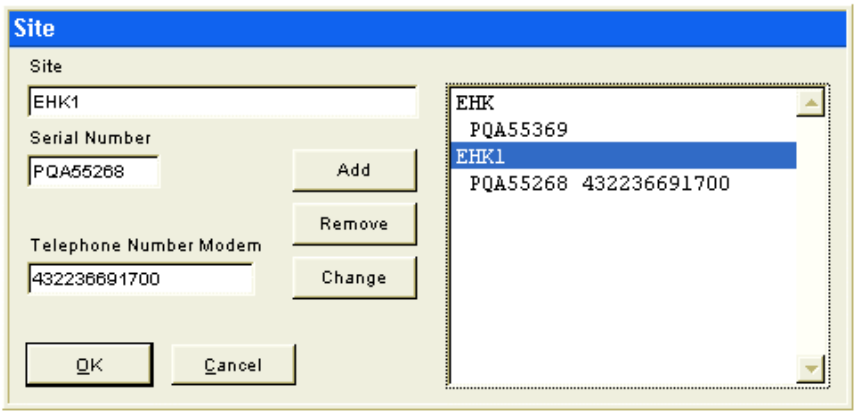
These files are supplied with the program and are located in the *vdf_10* directory. You also have the option to adjust the template, e.g. by setting the limit values to suit your needs. Save the amended file under the old name, so that it will be opened as the standard template.

Note

Before amending templates, we recommend to make a backup of the original files.

6.9.4 *Options – Configure Sites – Topas 1000*

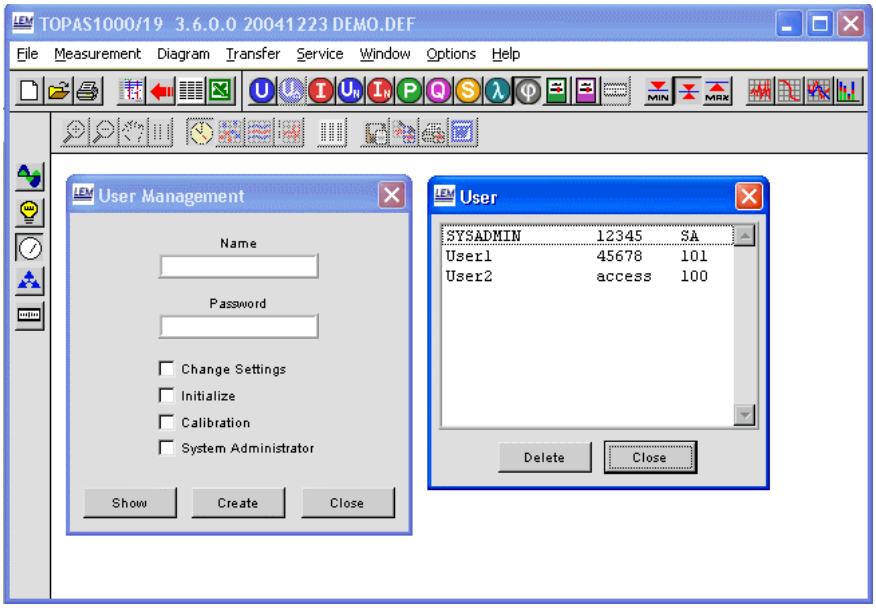
The menu *option* allows you to assign station and instrument names to your devices. These names can then be used when establishing connections to the instrument using the Transfer menu (see chapter *Menu: Transfer*).



6.9.5 *Options – User Management* (Topas 1000)

Important

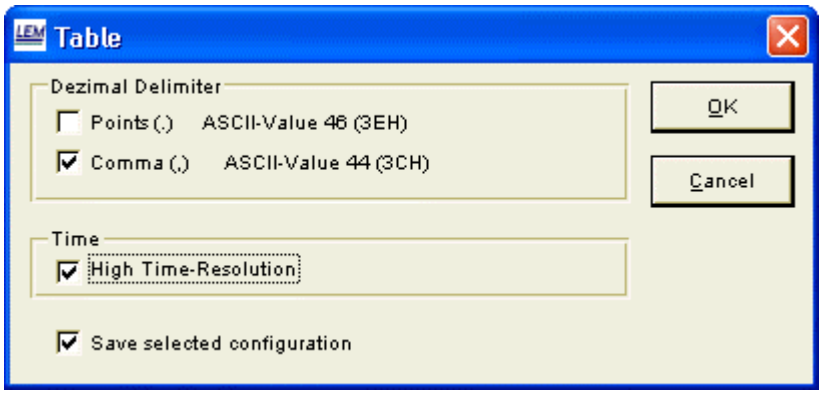
Please make a note of your password, especially if it is assigned to *SYSADMIN* access. If you have forgotten your password, you cannot access the instrument features and need the assistance of the system administrator to get a new password.
At least one administrator has to be created, who can create other users with a subset of permissions. The administrator cannot be deleted.



- Select option *Create* to set up additional users with access rights.
- Click the *User* button to view a list of already registered users and their access rights:
  0 = not authorized, *1* = authorized.

Users must log in, using menu option *Service- User Login.*

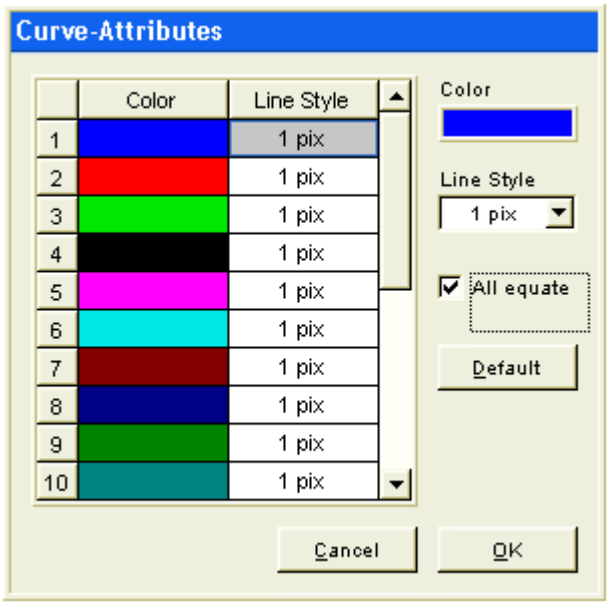
6.9.6 *Options – Table*



Selection	Description
Decimal delimiter	With this option, you can define the format of export tables for transfer to spreadsheet programs (text file). In the various countries, a comma or a full stop are used as a decimal separator. ▸ Ensure that your settings in this window correspond to those of your spreadsheet program.
High time resolution	If this option is checked, fractions of seconds are shown, where appropriate. This might be useful in connection with events.
Save selected settings	The settings are saved as defaults and remain thus active even after a restart of the system.

6.9.7 *Options – Diagram Attributes*

Principle



Each graph is assigned a color and line thickness. The settings are saved as defaults and remain thus active even after a restart of the Topas software.

If we check the *All equate* box the line width is used for all curves – this makes settings quite easier.

6.9.8 *Options – Export Configuration*

The Topas application software can be used to generate freely configurable measurement reports in MS Excel®. In a further step, such files can be processed with a macro (supplied with the software) to create reports in MS Word®, which are based on predefined templates.

Advantages

The templates must only be formatted and configured once, and later for consistently formatted reports.

- Reports showing the latest measurements can be generated with a click of a mouse button.
- First, you must define the variables to be exported and save this information in a configuration file.

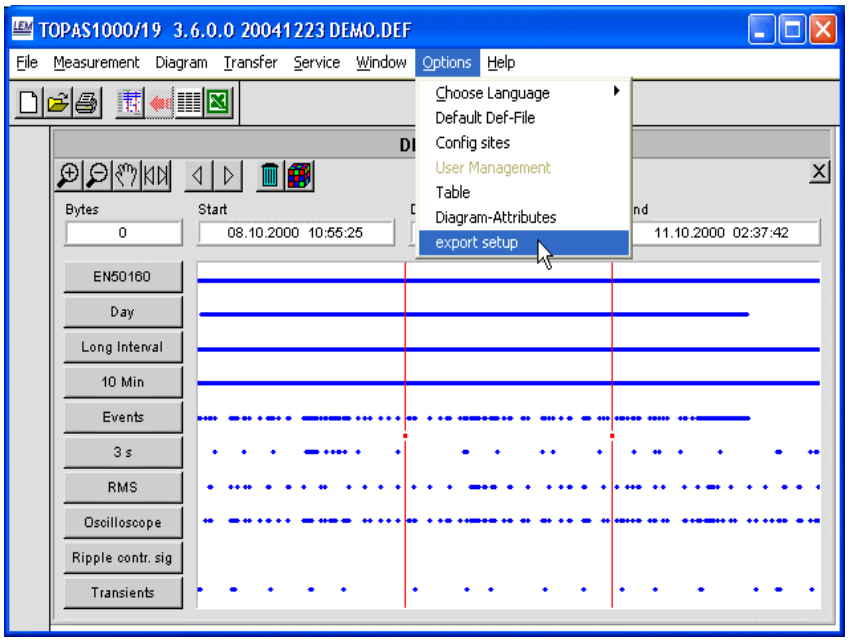
The system supports customized reports containing design elements in MS Excel®.

- Using the supplied macro, you can then generate the final report in MS Word®, based on such a temporary MS Excel® file.

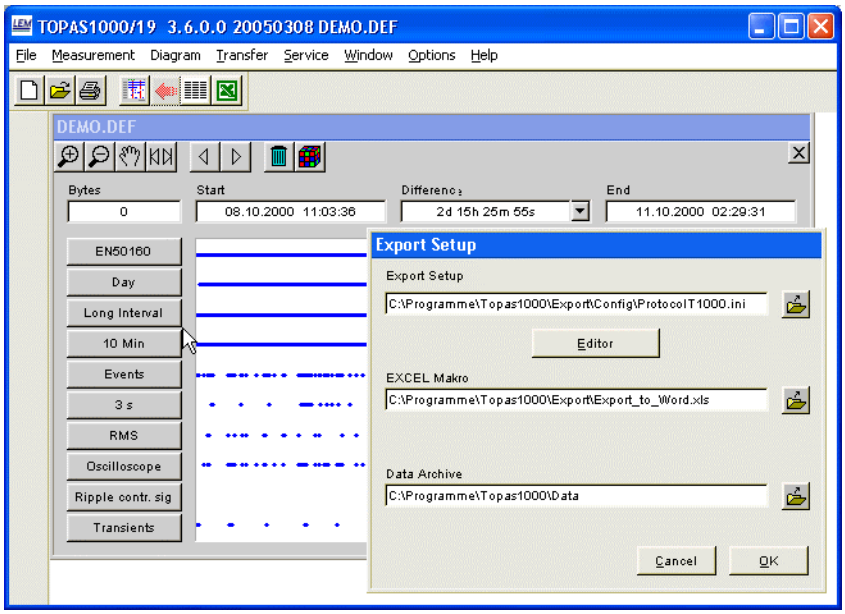
The final report includes all basic instrument settings and all diagrams from the MS Excel® file. The position of the various elements is defined by means of placeholders, e.g. *#pic1#* in the template.

Define export configuration

- Select *Options – Export Setup*:



- In the *Export setup* dialogue, enter the file names for the export file (configuration of variables) and the MS Excel® file to which the data is to be copied.



The supplied MS Excel® and MS Word® files are write-protected.

- Please, make a backup of these files and work only with copies.
- Save files containing data under a different name.

Files Protocol*T1000.ini* and Protocol_*empty.ini* are not write-protected and can thus be used at once for setting up the export configuration.

By default, the files necessary for this procedure are stored in the *C:\Programs\Topas1000* or *C:\Programs\Topas2000* directory respectively:

Configuration

C:\Programs\Topas1000\Export\Config\ProtocolT1000.ini
C:\Programs\Topas2000\Export\Config\ProtocolT1000.ini
In the ProtocolT1000.ini file, define and save the measurement parameters for export. File *ProtocolT1000.ini* already contains a number of useful variables. Alternatively, use the blank *Protocol_empty.ini* file.

EXCEL Makro

C:\Programs\Topas1000\Export\ Export_to_Word.xls
C:\Programs\Topas2000\Export\ Export_to_Word.xls
The program includes two pre-formatted MS Excel® files:
With the *Export.xls* file, you can export measurements into MS Excel®.
The *Export_to_Word.xls* contains a macro for the subsequent transfer of the evaluation diagrams into an MS Word® files.

Data archive

Enter the path of measurement files. The archive also contains the MS Word® templates for final reports.
The *TEST_Report.doc* file is the template for a report containing the measurement configuration and all exported diagrams. The data is imported from string #settings# in the sequence in which it is displayed in the MS Excel® file.

The *TEST_ReportExt.doc* file contains a number of placeholders for the positioning of diagrams, tables and labels.

Name	Description

#settings#:	placeholder for the settings.
#table1#, #table2#:	placeholders for tables (diagram legends)
#pic1# #pic2#, etc.:	placeholders for diagrams that are inserted as graphics

The *Report_2Spalten.doc* file is formatted in such a way that the diagrams appear in two columns in the report.

- Click *OK* to close the window.
- The file names can be entered manually or selected by browsing with .
- The selected file names are saved when the window is closed and are subsequently used for the export of data.
- Click *OK* to close the window.

The export editor

- Open a Topas measurement file.
- Open the export editor, using

.

The export editor contains lists of the already defined variables.

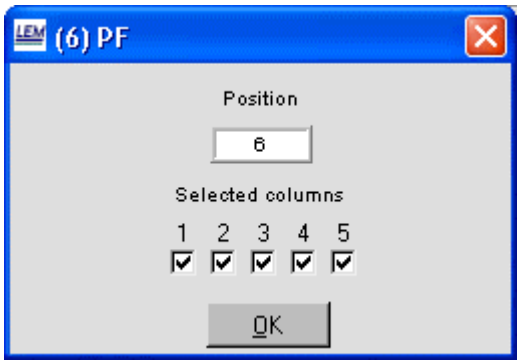
- Expand list by clicking the + signs (similar to Windows® Explorer).

Figures in brackets after the variables indicate the column position of the respective measurements in the MS Excel® table.

Note
The number does not correspond to the column number but to the sequence of export. Many variables are actually displayed in several columns (e.g. time and 3 phases, shown in 3 columns).

Opens a dialogue where the position number of the variable and the number of columns to be exported can be edited.

If the new position number corresponds to a number that is already assigned to another variable, all subsequent numbers are incremented by 1. This allows for the insertion of a variable at any chosen position.



One variable may be displayed in 1 to 5 columns.

Example

Power factor PF:
column 1: time; column 2: PF phase L1; column 3: PF phase L2; column 4: PF phase L3.

Normally, all data relating to a variable is exported, i.e. including time axis and all value axes.
For the export of several variables measured during the same interval, it might be useful to import the time axis only once.
If the time axis of some of the variables is hidden, these respective graphs are combined into one diagram. If the time axis of the variables is not hidden, a separate worksheet is set up for the diagram.
With a similar method, users also have the option to omit individual phases.

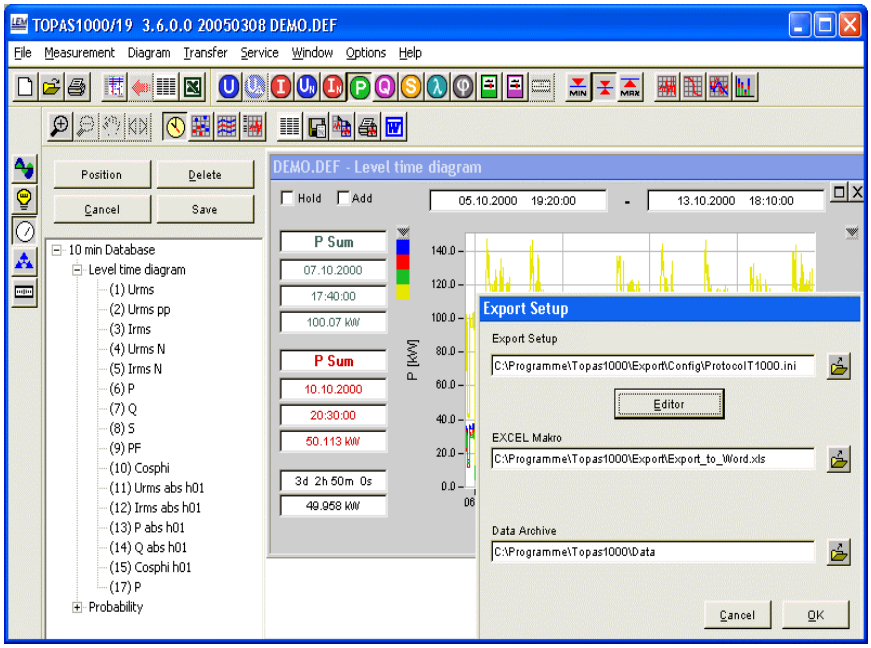
- Click *Delete* to remove already configured values from the list.

- Click *Cancel* to close the export editor without saving the changes made to the configuration.

- Click *Save* to save the changes made in the configuration to the selected file and to close the export editor.

Adding new variables

The logic of the export editor is similar to that of the macro tool in MS Office® applications.
If the export editor is activated, each evaluation carried out with the loaded measurements results in a new entry in the list.



Procedure

- Select *time period*
- Select variable e.g.
- Select averaging mode, e.g.
- Select evaluation, e.g.

The program returns a diagram and a list entry for the respective variable.

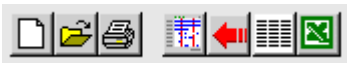
- In *Position,* hide columns you do not wish to display (e.g. time for other variables).

- Select the next variable.
- Save the protocolT1000.ini file by clicking

6.9.9 Report generation

To create reports, we have to prepare a configuration file (see previous chapter) and create an MS Excel® file into which the data is exported, e.g. the supplied *Export.xls* file.

- If a measurement file has been loaded, all variables included in the configuration file can be exported by a simple mouse-click.
- However, you must first select the period for the export.



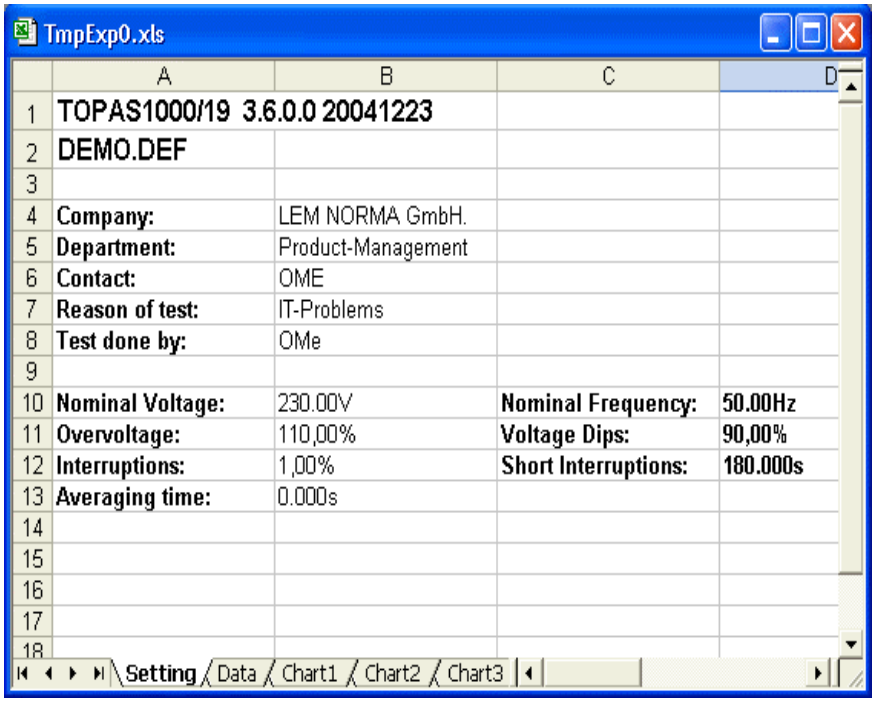
Starts the ASCII report generator

Starts the Excel report generator

Generation of MS EXCEL® reports

- Select measurements.
- Select time period.
- Create or select configuration file.
- Click *Excel Export* in the standard toolbar.

MS Excel® is started and the temporary file *TmpExp0.xls* is generated: The variables are imported into worksheets. The number of rows is determined by the number of exported time intervals.



Note
The export might take some time, depending on the number of selected time periods and parameters.

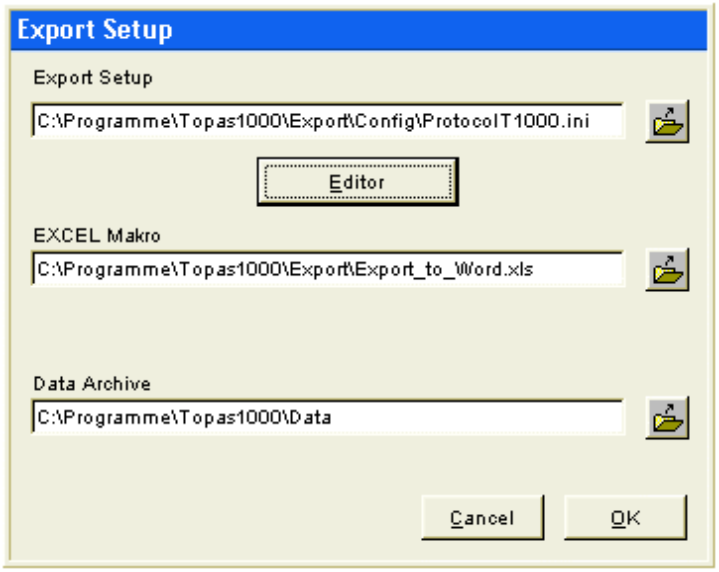
Worksheets	Contents
Settings	- file name, - user texts, - important measurement settings such as limit values and conversion factors of the channels.
Data	measurements organized in columns as defined in the configuration file. The number of rows is determined by the number of exported time intervals. The next sheet is labeled *Chartx* and contains diagrams (with legends, etc.) for each variable.

This MS Excel® sheet can be saved under a different name. You also have the option to generate charts for any series of measurements in the file using the MS Excel® chart tools.

Important
If the variables that are specified in the configuration file are not available in the export data, blank columns are inserted at the respective positions in the MS Excel® worksheet. The positions of the columns are thus not adjusted.

Generation of MS Word® reports

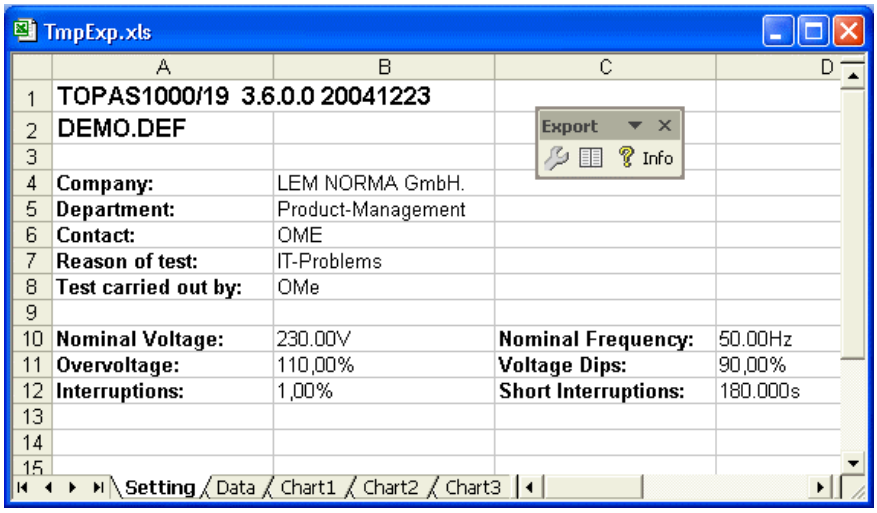
In the export configuration, select the *Export_to Word.xls* file (included in software) as the target file for the export. This file contains a macro that allows you to generate perfectly formatted MS Word® reports at the click of a button.



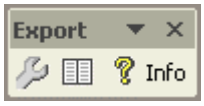
- Open the measurement file.
- Select a time period, using the red cursors.
- Click the *Excel Export* button in the top toolbar.

- The *Export_to_Word.xls* file is opened in MS Excel®. It contains a macro and a temporary file *TempExp.xls*, which is the actual report to be exported to MS Word®.

The first worksheet is named *Settings* and contains the file name, user texts and the important measurement settings such as limit values and conversion factors of the channels. The second sheet is labeled *Data* and contains the measurements values organized in columns as defined in the configuration file.
In addition to these two sheets, there is a separate worksheet labeled *Chart xxx* for each diagram. The number of rows is determined by the number of exported time intervals.

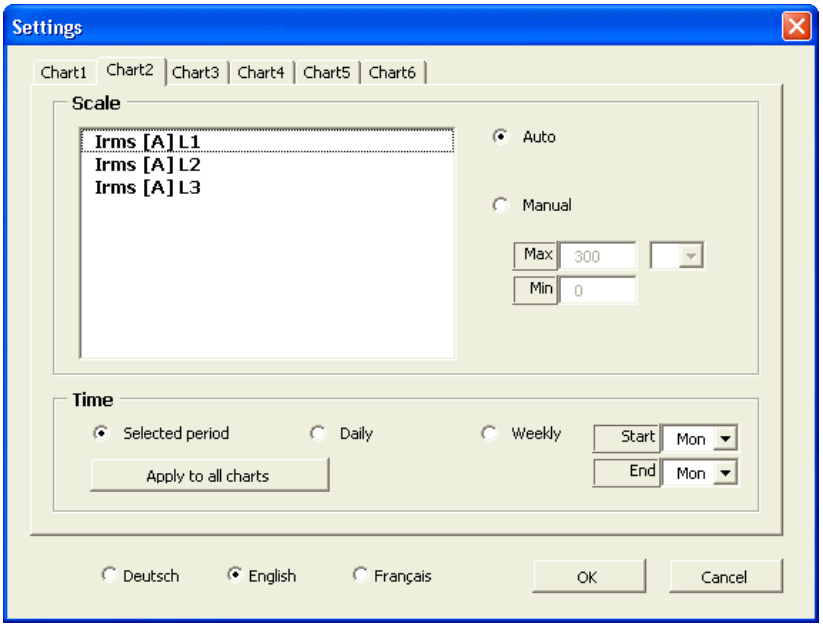


The worksheet window includes the following toolbar:



Additional settings for the export

- Click



Languages

- Select the report language (German, English or French).

Scaling of diagram

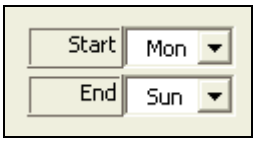
- *Automatic* or *manual* scaling of diagram: With *manual* scaling,

enter the lower limit value (*min*) and the upper limit value (*max*) of the scale; you also have the option to add a prefix such as "kilo" or "mega". With *Automatic* scaling, the ranges and the prefix are selected automatically for best display.

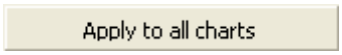
Choose time period

Choose between *Selected period*, *Daily*, or *Weekly*.

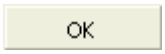
Settings	Description
Selected period	The diagrams on the worksheets are generated across the time period selected in the software for export.
Daily	In addition to the current sheets, new worksheets are generated, each containing the data of one weekday, provided of course that this data is available in the system.
Weekly	The diagrams are generated for weeks.



- Enter the first and last weekday of the period to be displayed. Ensure that all weekdays are entered, e.g. *Mon-Sun*. *Sat-Sun* results in a diagram for a single day!

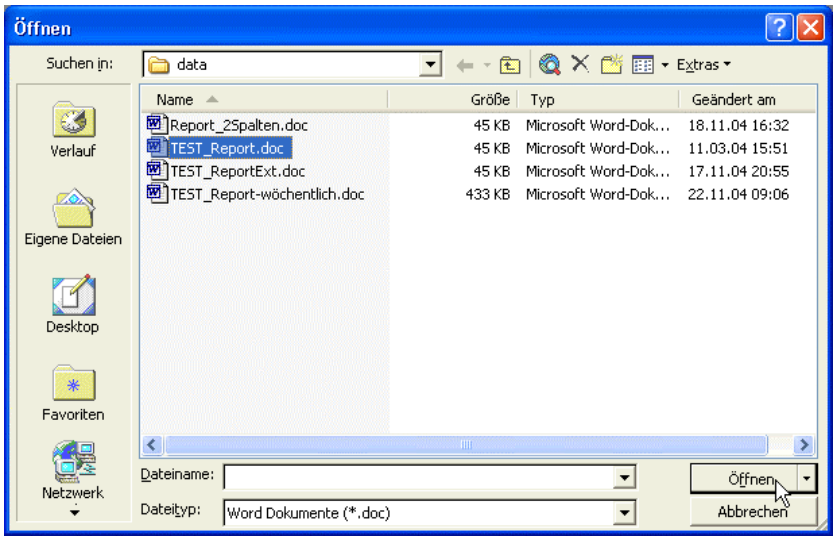


- Click this button to apply the settings you made for the current sheet to all other table sheets.



- Click *OK* to close the configuration window and apply the settings to the measurement diagrams.

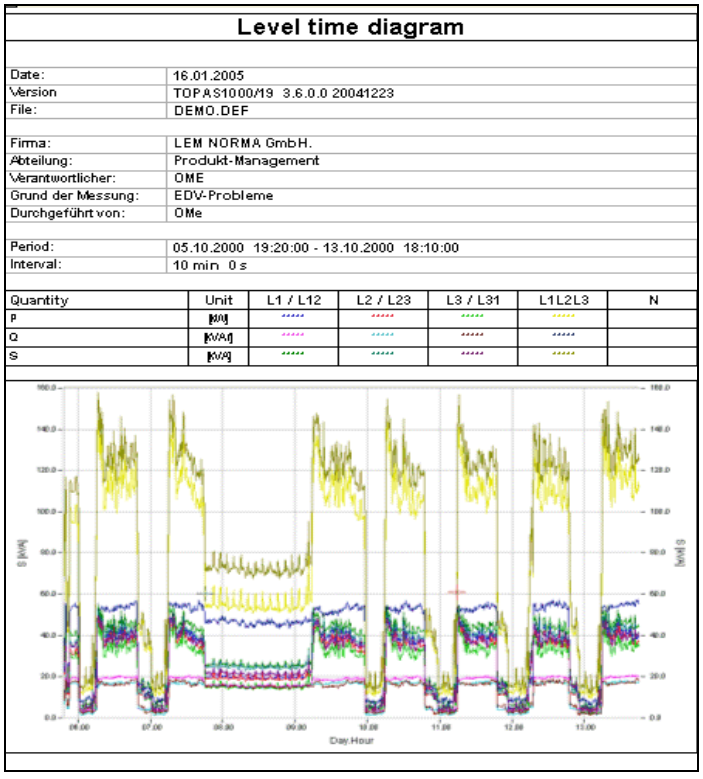
- Click this button to transfer the diagrams from the MS Excel® file to the MS Word® template.
- Choose one of the supplied MS Word® files or a file prepared by you:



Use files *Test_Report.doc* or *Test_ReportExt.doc*, or select a suitable MS Word® document formatted by you for this purpose. Use the following placeholders for MS EXCEL® diagrams:

Placeholders	**used for**
#settings#	settings
#pic1#, #pic2#,….	diagrams
#table1#, #table2#,	tables (legends of diagrams)

A properly formatted report is generated, whereby the diagrams are inserted into the MS Word® document. This export facility saves time and ensures a consistent layout for your reports, especially in connection with repeat measurements, at the click of a mouse button!



Level time diagram

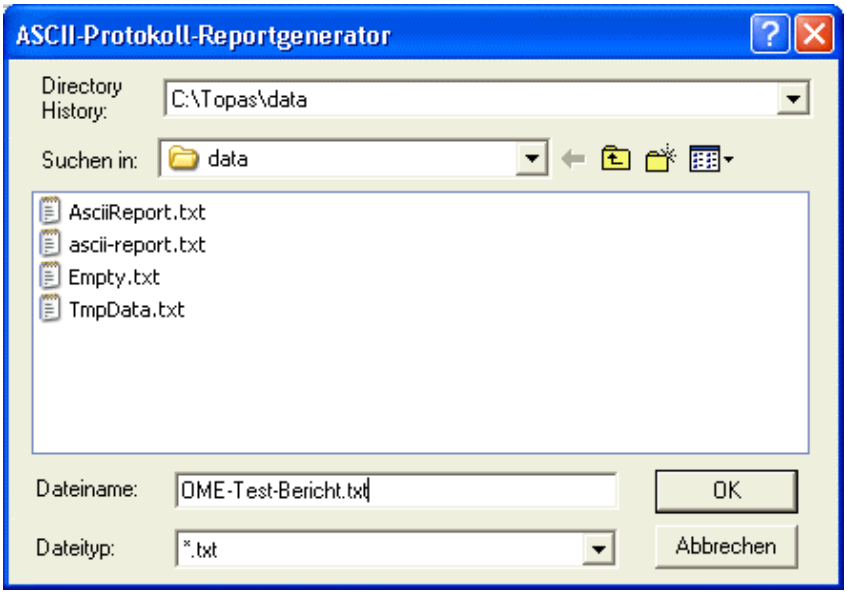
Date:	16.01.2005
Version	TOPAS1000/13 3.6.0.0 20041223
File:	DEMO.DEF
Firma:	LEM NORMA GmbH.
Abteilung:	Produkt-Management
Verantwortlicher:	OME
Grund der Messung:	EDV-Probleme
Durchgeführt von:	OMe
Period:	05.10.2000 19:20:00 - 13.10.2000 18:10:00
Interval:	10 min 0 s

Quantity	Unit	L1 / L12	L2 / L23	L3 / L31	L1L2L3	N
P	[W]	*****	*****	*****	*****	
Q	[VAr]	*****	*****	*****	*****	
S	[VA]	*****	*****	*****	*****	

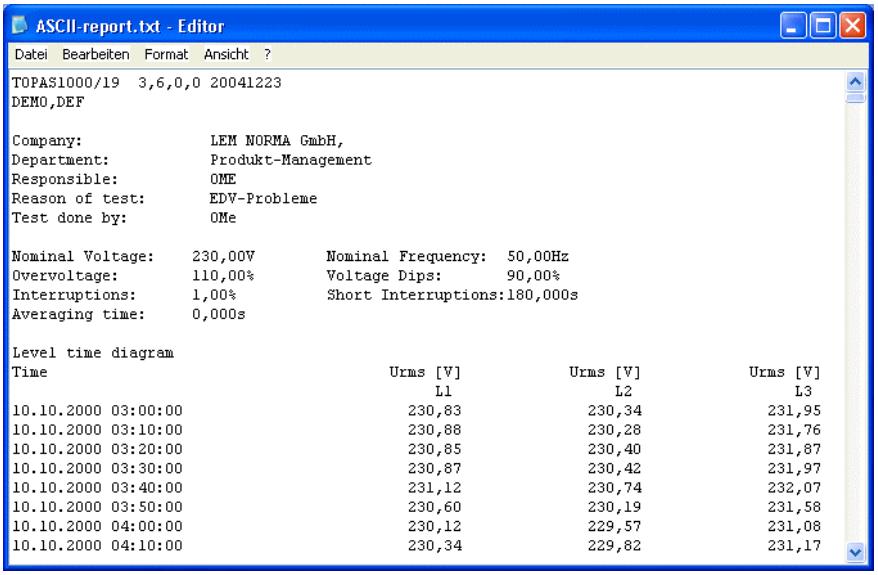
Generation of ASCII reports

To generate ASCII reports, use the preset configuration file *ProtocolT1000.ini* (see also chapter *Generation of MS Excel® reports*).

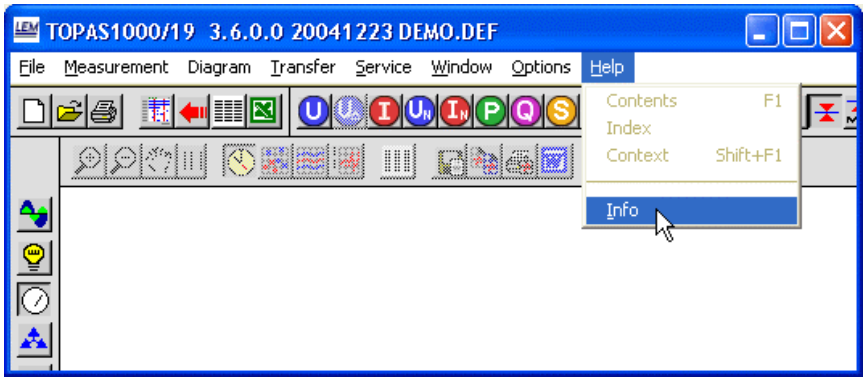
- Open measurement file.
- Select period.
- Create or select configuration file.
- Click the *ASCII report generator* button:
- Enter a new name for the file.



- The system generates an ASCII file (*name.txt), which can be edited with any text editor.* Alternatively, the data can be imported into a database or similar application.

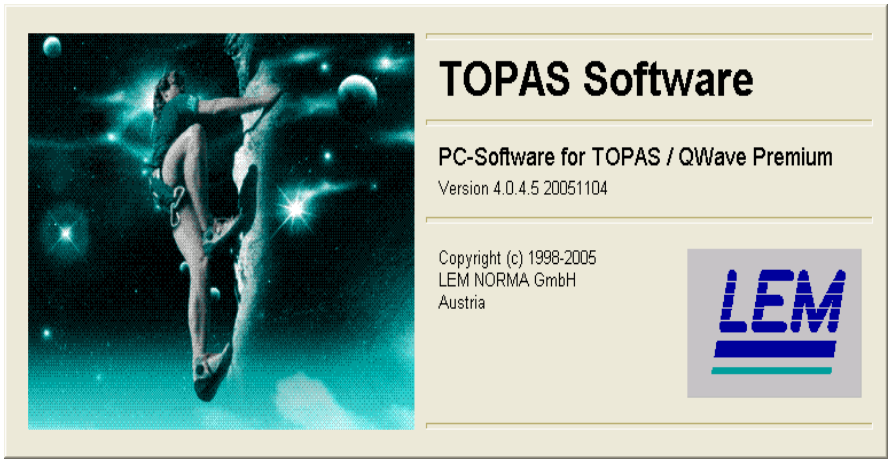


6.10 Menu: *Help*



- Select *Info* to view the software version details.

The enclosed operating instructions in pdf format (on the CD-ROM) also contains useful information about your software version.



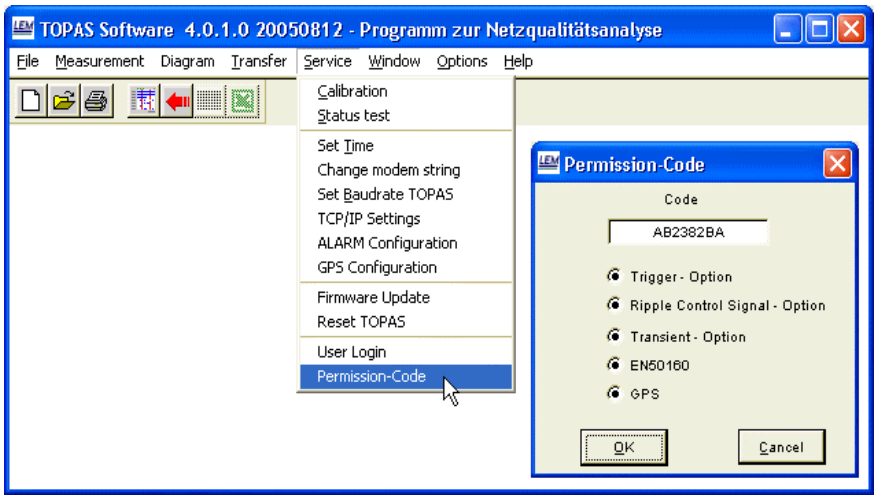
7 Options

7.1 GPS time synchronization option

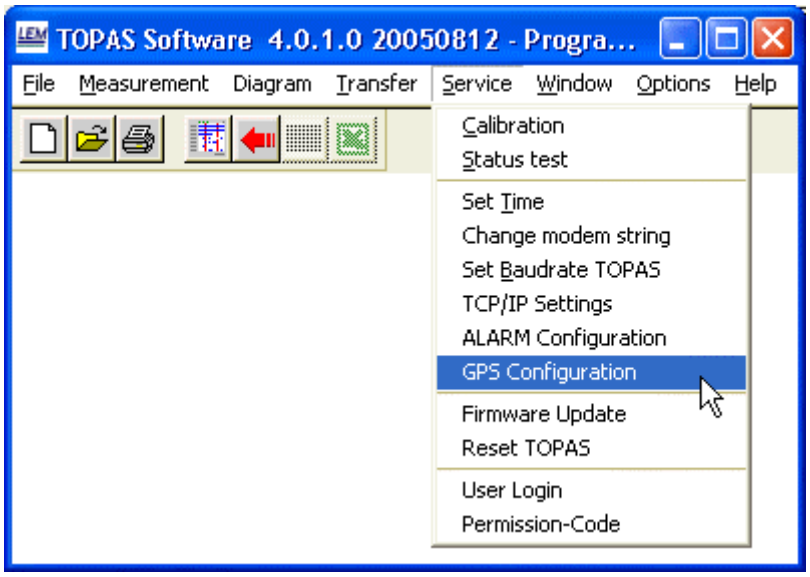
To use the GPS functionality (time synchronization with the help of the GPS system), you need a special license code for the instrument.

All Topas 2000 instruments are delivered with this option.

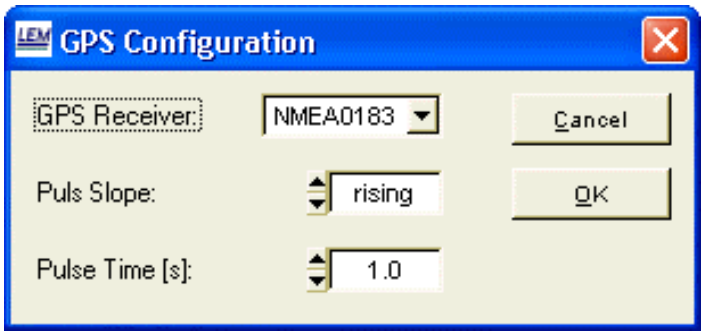
- For verification check the *Service Permission-Code* menu:



Important
This option is required if power quality measurements according to the norm IEC 61000-4-30 have to be performed



In this dialogue all basic settings for the GPS-option are defined:



GPS Receiver

- Select the protocol your receiver is using.
- Select between:
  - TSIP0x0B
  - NMEA 0183
  - HOPF
  - HKW

Note

- Select *NON* if you want to use external pulses without a GPS-time –information.

Pulse Slope

- Select which slope of the synchronization pulse shall be used for time synchronization, the rising or the falling one.

Pulse Time

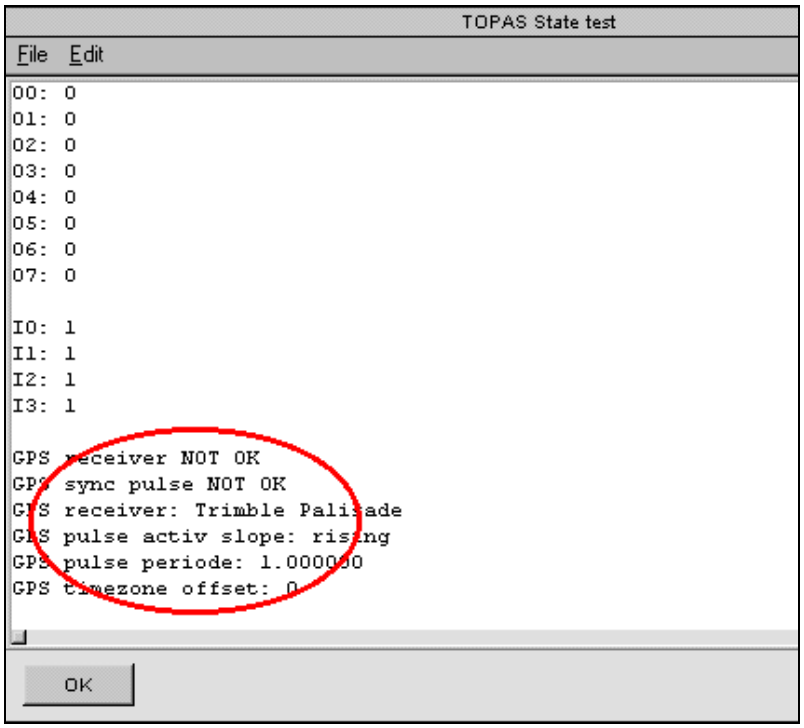
- Enter the pulse duration seconds between 1 s and 70 s. Usually 1s or 1 min (= 60 s) pulses are applied.

TZ Offset

- Enter the time zone offset in seconds between your local time zone and the UTC (**U**niversal **T**ime **C**oordonné, coordinated universal time).. Universal Time Code).
- Close the dialogue with *OK.*

The Topas software suggests to *Reset* the instrument to make the new settings active.

- Select the *Service Status test* menu option to view additional information regarding GPS time synchronization:



If the sections marked in the above window are not in the list, or are not complete, the GPS option is not activated, as there is no authorization code.

GPS receiver NOT OK

OK indicates that the data packets containing time information are received through the serial interface of the instrument. The number of visible satellites is also shown in this line. We recommend using at least 4 satellites (adjust the external GPS aerial accordingly).

GPS sync pulse NOT OK

OK indicates that the GPS receiver gets periodic synchronization pulses. The instrument is then synchronized with these pulses with an accuracy of 1 microsecond.

The GPS option allows for time parcels, synchronization pulses or both types of signals combined.

You can adjust the interval between 2 synchronization pulses to a period between 1 and 70 seconds (*Service- GPS.TXT*).

GPS receiver

Trimble Palisade
Indicates the type of the configured GPS receiver. The system currently supports model GARMIN 18.

GPS pulse active edge: rising

For synchronization purposes, you can use the rising or falling edge of the GPS pulse. This configuration is saved in *gps.txt*.

GPS pulse period: 1.000000

Configured period of GPS synchronization pulse. Permitted values: 1 second to 1 minute.

GPS time zone offset: 0

With GPS time zone offset 0, all times are shown in UTC. To enter the times in a local time one, you have the option to set an offset of ±86.400 seconds.

Time synchronization details

Data of the transient option (maximum sampling rate 10MHz) and the graphs of the standard channels of various instruments can be synchronized to each other with a tolerance of 1 microsecond. The time is added after the conversion from analogue to digital. This means that the measured event actually occurred at the indicated time, minus the signal travel time. This delay is the same for each sampling rate and corresponds to 16 sample values.

The delay of the channels of the transient option is < 1 microsecond. There is currently no automatic compensation for this delay.

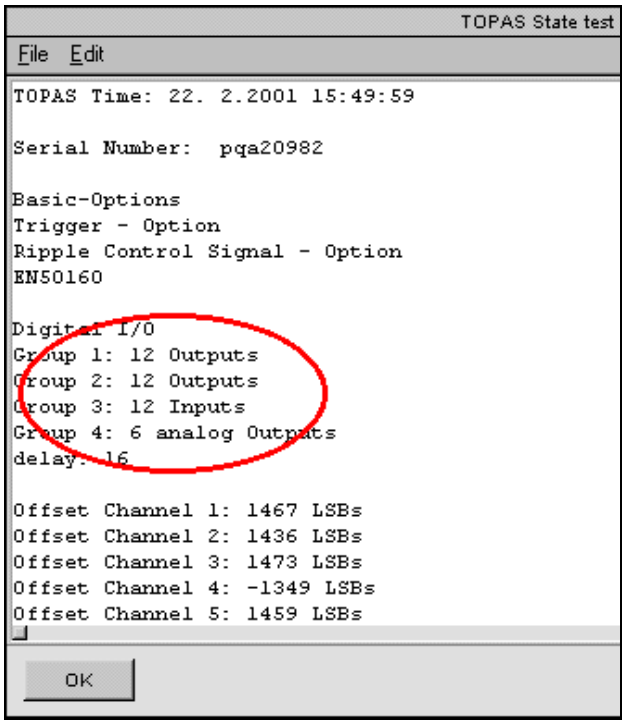
7.2 Option Digitale Eingänge / Ausgänge (I/O)

Diese Option ist nur für den Topas 1019/QWave Premium vorgesehen.

Sie besitzt 3 Gruppen von Eingängen oder Ausgängen. Jede Gruppe besteht aus jeweils 12 Eingängen oder Ausgängen.

Eine Gruppe kann entweder mit nur Eingängen oder mit nur Ausgängen bestückt werden (Option bei der Bestellung).

Wichtig
Alle Eingänge und Ausgänge einer Gruppe sind potentialfrei mit einer gemeinsamen Masse.



Existiert der rot markierte Bereich im Service-Statustest, so ist eine digitale I/O Option vorhanden.

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