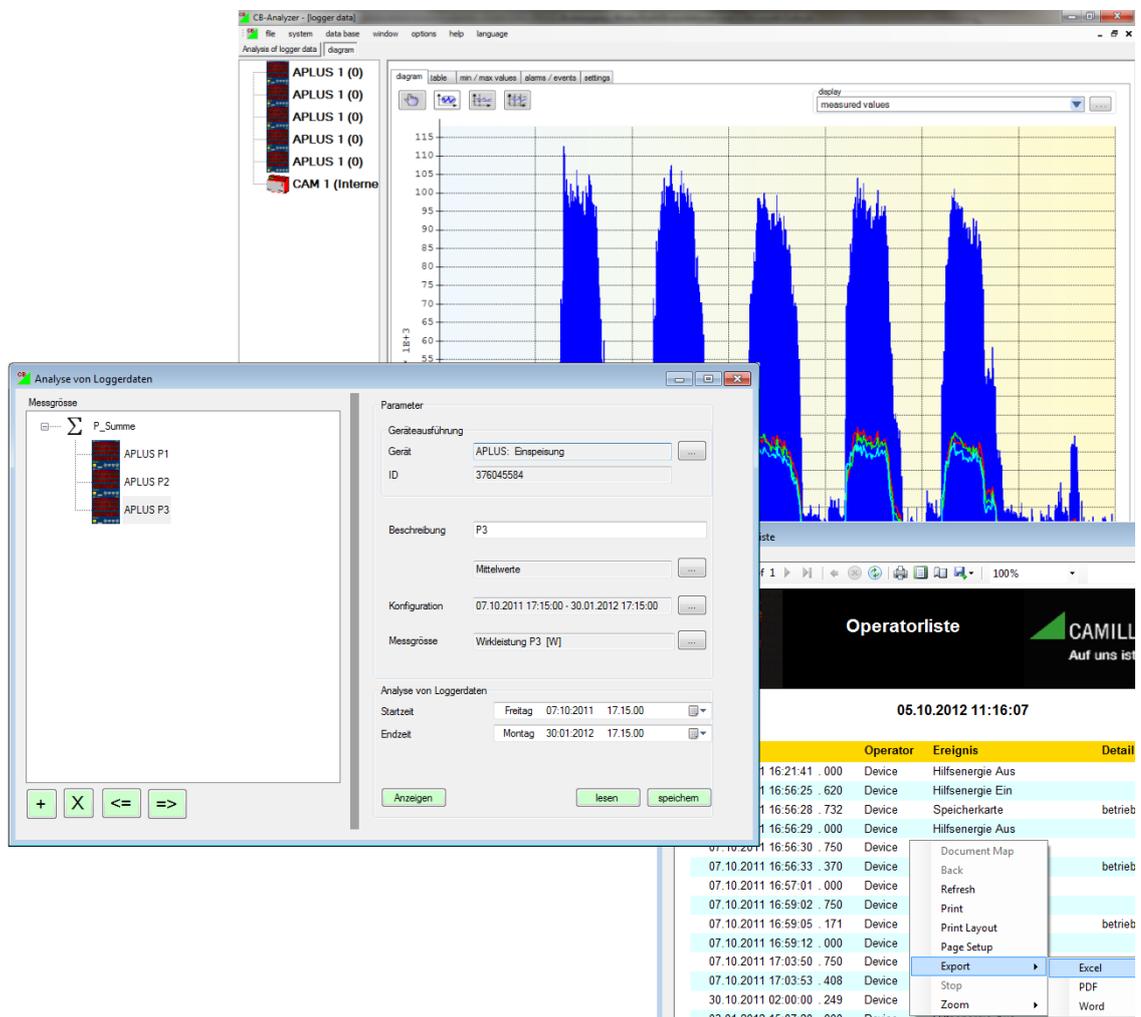


Data logger analysis using the CB-Analyz



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1 Data logger parameterization

The optionally available data loggers of the devices CAM, CAM*mobile* and APLUS can record the progressions of periodically accumulating measurements or event triggered data over a longer period of time. In fact, only data which have been selected in the logger configuration using the CB-Manager will be recorded.

Periodical data

Mean values: All mean values configured in the register mean values may be selected for periodical storage in the data logger. Only those mean values will be recorded which have been selected in the logger configuration. The storage time interval corresponds to the averaging interval.

Min/Max values: In the logger configuration the basic quantities and the averaging interval have to be selected. For each selected quantity a minimum and a maximum RMS values will then be determined for each averaging interval and stored at the end of the interval along with a the time of their occurrence.

Meter logger: For each selected meter a reading is performed in the selected interval and then stored in the logger.



For each group you can select if it should work in the **endless mode**. This means that, as soon as the assigned storage area is full, the oldest data will be deleted. If the endless mode is not selected recording stops as soon as the storage area is full.

Event triggered data

Alarm and event list: In these lists events defined in the logic module by the user will be recorded. Both the occurrence as well as the drop out of the events will then be recorded in the appropriate lists with time and date.



APLUS: If a reset of the logic module output via display, digital input or another logic function is defined, the drop out or the reappearance of an event is recorded only, if a reset of the initial occurrence has been performed. However, the „acknowledgement of alarm LEDs“ has no influence on the logging of events.

Operator list: In this list the occurrence of predefined system events will be recorded with time and date. These are events such as changing the configuration, ON/OFF of the power supply, reset operations, the acknowledgment of alarms, ON/OFF of the simulation mode or switching ON/OFF of the security system.



Alarm, event and operator list always work in the endless mode. To prevent manipulations their content cannot be reset.

Disturbance recorder: Up to 500 data sets of up to 12 measured quantities can be recorded when a definable event occurs.

Memory utilization

The available memory space may be freely assigned to the different logger parts. This is 64MB for CAM and CAM*mobile* and at least 2GB for the APLUS. The maximum storage time of each logger part will be displayed in the overview. You have to consider the following:

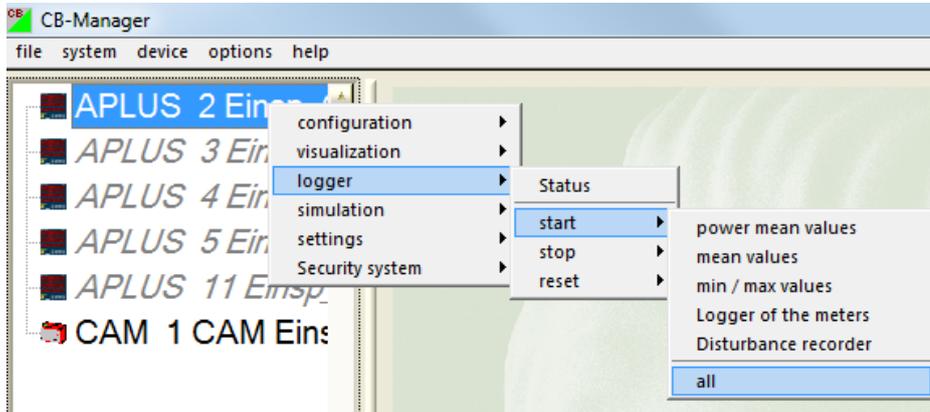
- The overall usage of the memory should be always 100%, because unused memory gets lost.
- A subsequent modification of the memory utilization deletes all previous recorded data.
- A subsequent modification of quantities to record leads to different data areas which can't be analyzed at the same time and which can't be joined together later on.

2 Logger status

Alarm, event and operator list are the logger parts for which recording is always active. So, neither you have to start their recording nor it is possible to stop them.

The state of the logger parts with periodical data as well as of the disturbance recorder of the *APLUS* (started / not started) is not part of the device configuration. This means that after downloading the first configuration of these logger parts you have to start their recording separately. When changing the configuration later on, the previous state remains. So, if for example the meter logger was active, it remains active even if in the configuration the recording of an additional quantity has been added.

Starting, stopping and reset of logger parts is done by means of the device menu in the CB-Manager:



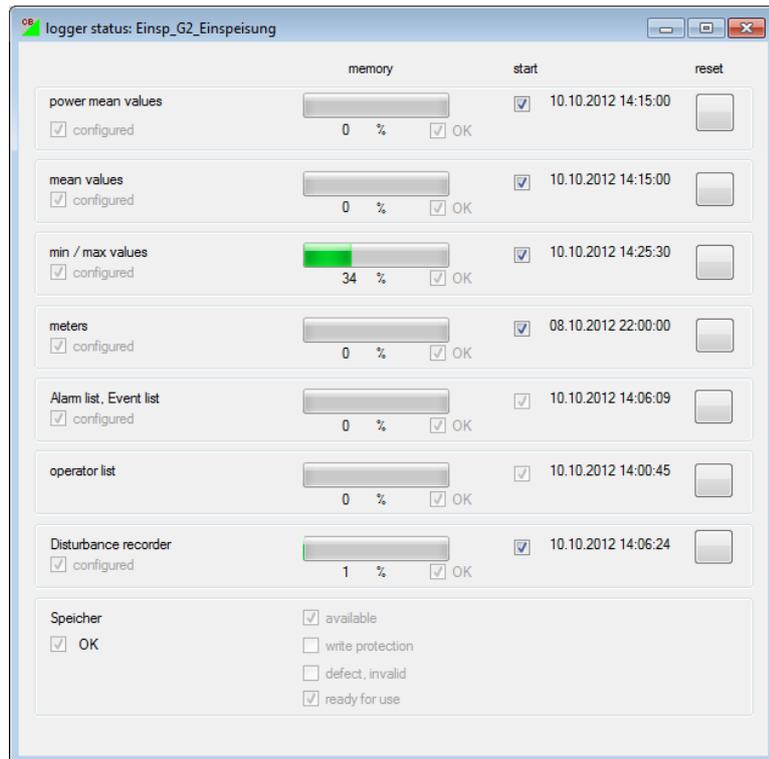
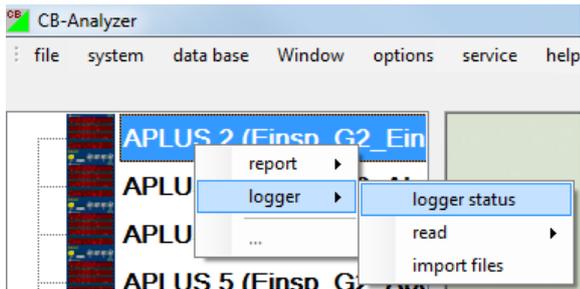
The present state of the logger parts can be requested via CB-Manager

<p>APLUS</p> <table border="1"> <thead> <tr> <th>Logger part</th> <th>memory</th> <th>Last event</th> <th>Interface</th> </tr> </thead> <tbody> <tr> <td>power mean values</td> <td>0 %</td> <td>10.10.2012 14:15:00</td> <td>start stop reset</td> </tr> <tr> <td>mean values</td> <td>0 %</td> <td>10.10.2012 14:15:00</td> <td>start stop reset</td> </tr> <tr> <td>min / max values</td> <td>34 %</td> <td>10.10.2012 14:15:00</td> <td>start stop reset</td> </tr> <tr> <td>meters</td> <td>0 %</td> <td>8.10.2012 22:00:00</td> <td>start stop reset</td> </tr> <tr> <td>alarms, events</td> <td>0 %</td> <td>10.10.2012 14:06:09</td> <td>start stop reset</td> </tr> <tr> <td>operator list</td> <td>0 %</td> <td>10.10.2012 14:00:45</td> <td>start stop reset</td> </tr> <tr> <td>Disturbance recorder</td> <td>1 %</td> <td>10.10.2012 14:06:24</td> <td>start stop reset</td> </tr> </tbody> </table> <p>Memory status: available, write protection, defect, invalid, ready for use.</p>	Logger part	memory	Last event	Interface	power mean values	0 %	10.10.2012 14:15:00	start stop reset	mean values	0 %	10.10.2012 14:15:00	start stop reset	min / max values	34 %	10.10.2012 14:15:00	start stop reset	meters	0 %	8.10.2012 22:00:00	start stop reset	alarms, events	0 %	10.10.2012 14:06:09	start stop reset	operator list	0 %	10.10.2012 14:00:45	start stop reset	Disturbance recorder	1 %	10.10.2012 14:06:24	start stop reset	<p>CAM, CAMmobile</p> <p>endless mode:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> mean values t1 <input checked="" type="checkbox"/> mean values t2 <input checked="" type="checkbox"/> min / max values <input checked="" type="checkbox"/> meters <input type="checkbox"/> Alarm list <input checked="" type="checkbox"/> Event list <input checked="" type="checkbox"/> operator list <p>memory utilization:</p> <table border="1"> <thead> <tr> <th>Logger part</th> <th>memory</th> <th>interval</th> </tr> </thead> <tbody> <tr> <td>mean values t1</td> <td>0 %</td> <td></td> </tr> <tr> <td>mean values t2</td> <td>0 %</td> <td></td> </tr> <tr> <td>min / max values</td> <td>0 %</td> <td></td> </tr> <tr> <td>meters</td> <td>0 %</td> <td></td> </tr> <tr> <td>Alarm list</td> <td>0 %</td> <td></td> </tr> <tr> <td>Event list</td> <td>0 %</td> <td></td> </tr> <tr> <td>operator list</td> <td>0 %</td> <td></td> </tr> <tr> <td>totally</td> <td>0 %</td> <td></td> </tr> </tbody> </table>	Logger part	memory	interval	mean values t1	0 %		mean values t2	0 %		min / max values	0 %		meters	0 %		Alarm list	0 %		Event list	0 %		operator list	0 %		totally	0 %	
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Alarm list	0 %																																																											
Event list	0 %																																																											
operator list	0 %																																																											
totally	0 %																																																											

After reading the device configuration the state of the individual logger parts can be seen from the configuration in the register „Logger+Lists“. Active loggers are displayed with a green LED, inactive loggers remain gray.

For the *APLUS* individual loggers can be started, stopped or reset via the logger status. In addition for each logger the time of the last recorded event is also available.

The logger status can also be read using the CB-Analyzer. Here also individual logger parts can be started or stopped. This is done by modifying the state of „start“. For each logger part by selecting „reset“ also a reset of its content is possible, by which all recorded data is deleted.



Only for the *APLUS* also the memory state is available. Because for the *APLUS* a mobile data memory (SD card) is used, you can and have to monitor its state additionally. If for example the SD card is removed during normal operation, the complete recording process of the data logger is stopped, because there is no internal memory for temporary storage available.



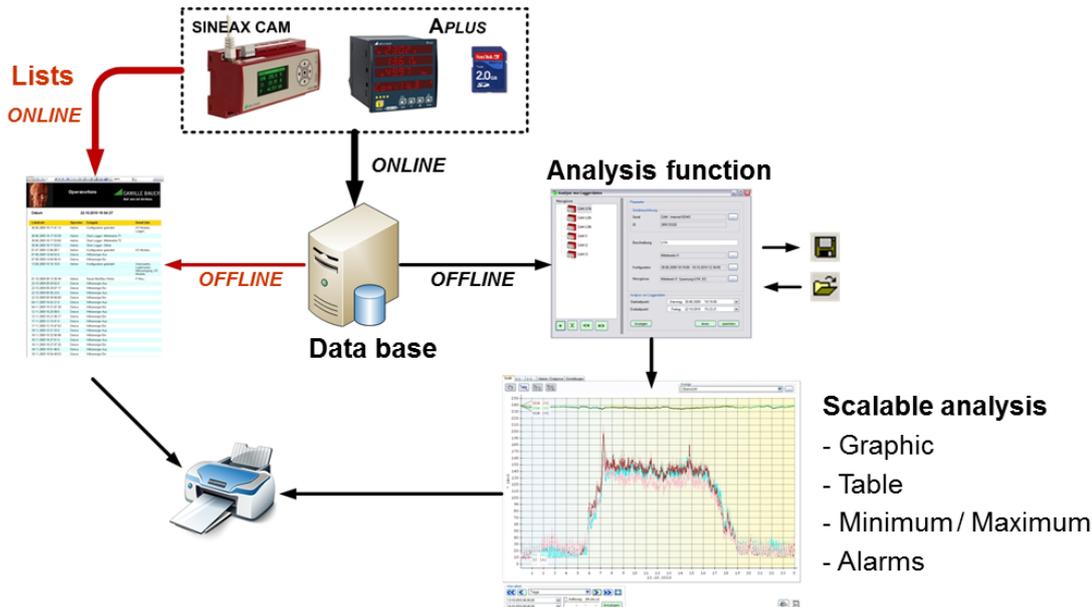
The display of the logger state can be locked using the security system. If activated, you have to enter login information (user, password). Once displayed, in the logger status display it is possible to reset, start or stop logger parts without further security mechanism.

3 Logger data analysis

For the analysis of logger data of the devices CAM, CAMmobile und APLUS the CB-Analyzer software is provided. It includes both the data server for reading the data as well as the client as a user interface.

For using the CB-Analyzer administrator rights are required !

From the structure of the CB-Analyzer shown below you can see that logger data read from the devices is stored in a data base. For the subsequent tabular or graphical analysis of the data a connection to the devices is no longer necessary.

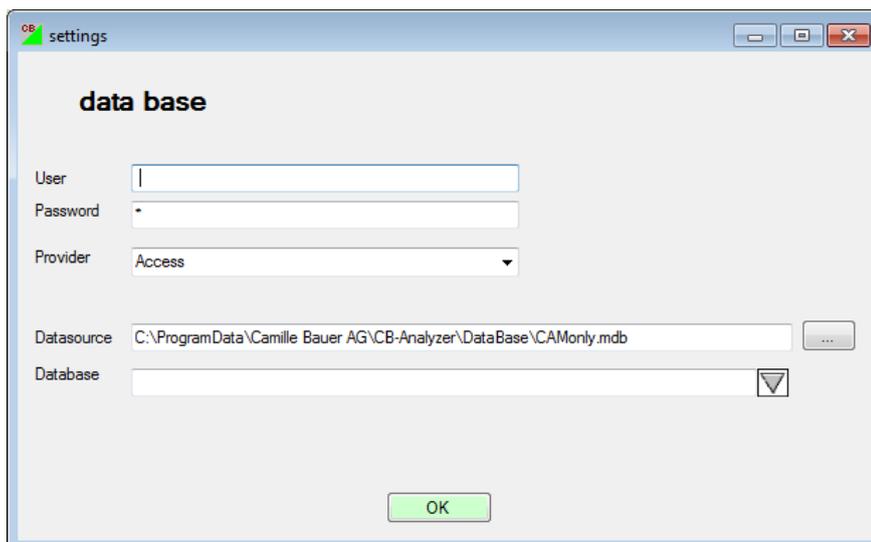


3.1 Setting the destination data base

A data base may include data of multiple devices. The ACCESS data base used in the CB-Analyzer is free of charge but is limited to a maximum of 2GB. This corresponds approximately to the storage capacity of the SD-Card of an APLUS. If more memory space is needed, you may choose one of the following two versions:

- Using a data base, e.g. SQLClient, which is not free of costs
- Divide the data on multiple ACCESS data bases

When reading logger data from the devices the CB-Analyzer writes the data into the presently selected data base. Therefore the destination data base has to be selected before starting the reading procedure. This is done via the menu **data base | settings | edit**:



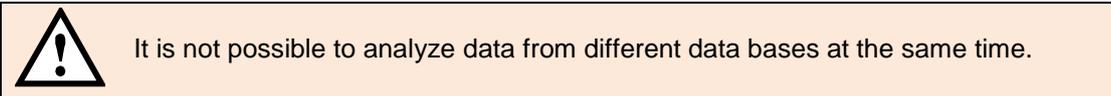
The data base selected under Datasource is used for storing the data.

As soon as the data base is full (max. 2GB) no more data can be stored. This is shown in the status line by means of the following message:



In such a case a **new data base** must be created. This can be done very easy by entering the name of the data base to create, e.g.:

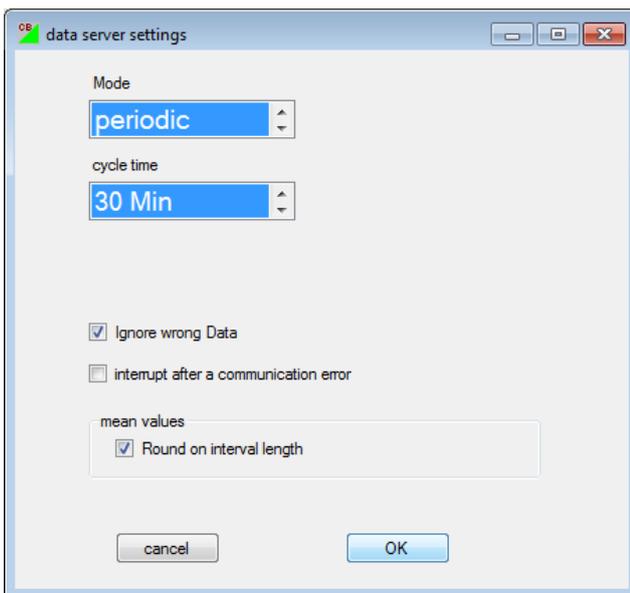
The data base is created in the given directory. The data base previously used remains and may be selected later on to add further data (if this is still possible) or to analyze the data content stored. However, you have to remind the following principle:



For a CAM or CAM*mobile* the size of the data base is no problem, because the data memory of the device has a size of 64MB only, which is much smaller than the maximum data base size of 2GB. In such a case a regular reading of the CAM data logger allows prolonging the maximum available storage time to a multiple.

3.2 Data server settings

For reading logger data from the devices the data server is responsible. Its settings define how the reading procedure takes place.



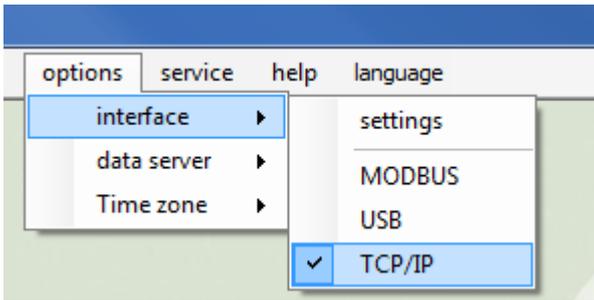
Mode: The request for data of the devices can be initiated once or periodically in regular intervals of 5 minutes up to 7 days.

Ignore wrong data: If selected, the CB-Analyzer tries to perform an automatic correction when reading wrong data. If not, the reading process is aborted and an error message is displayed.

Interrupt after a communication error: When a transmission error occurs, the reading process is aborted and an error message displayed.

Mean values | Round in interval length: The time stamps of mean values can be shifted a few [ms]. If this option is selected, the time information is automatically corrected to the theoretical interval limit.

3.3 Setting the communication interface



The communication interface is designed the same way as for the CB-Manager. The search for devices therefore delivers the same result. Therefore also devices without data logger will be found or devices with data logger from which data can't be read because the required protocol is not supported by the selected interface.

Direct access on logger data

Device	Modbus	USB	TCP/IP
APLUS	-	-	<input checked="" type="checkbox"/>
CAM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CAMmobile	-	<input checked="" type="checkbox"/>	-



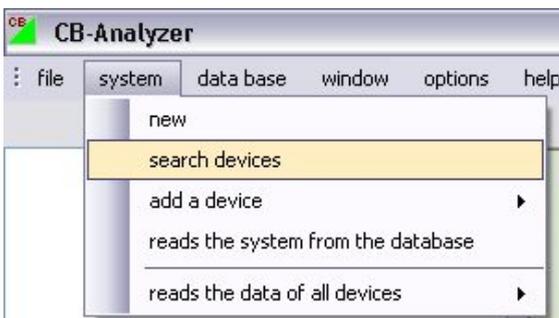
For an *APLUS* without Ethernet interface logger data cannot be read directly. These data must be imported via SD card.

3.4 Creating a device list

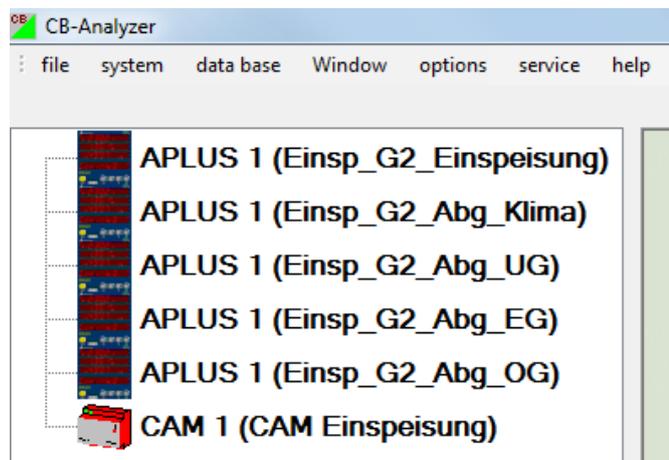
To be able to read logger data from the devices, first a device list must be created. All devices have to be reachable via the selected communication interface.

- If the devices to be readout use different interfaces, the reading process must be divided in multiple processes and between them the interface must be changed. However, this way a periodical reading via data server (see 3.2) is no longer possible.
- If logger data cannot be read via the selected interface (e.g. *APLUS* with Modbus interface), you have to import the data via SD card (see 3.6).

Searching for connected devices:



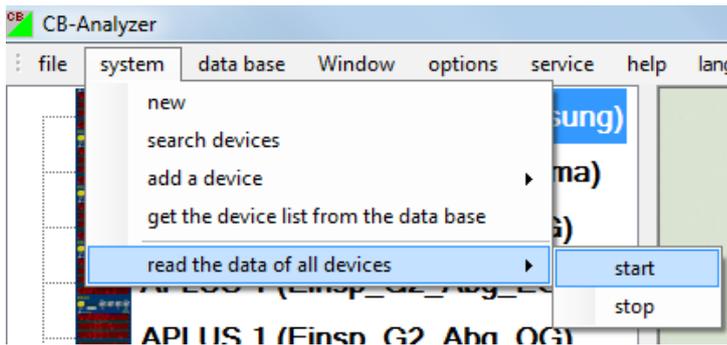
Search result:



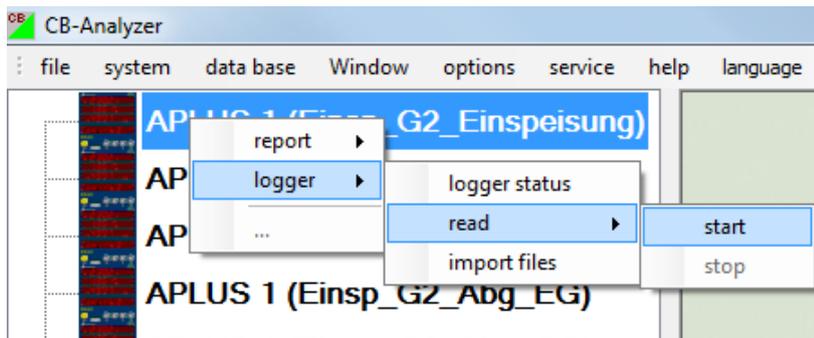
3.5 Reading logger data

The reading of logger data of the devices can be performed in two ways:

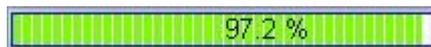
- For all devices at the same time



- For each device individually

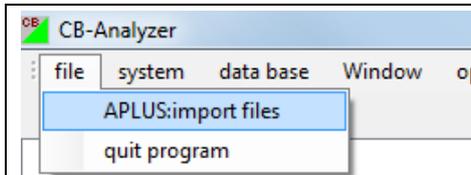


The progress of the reading process is shown via a bar at the bottom:

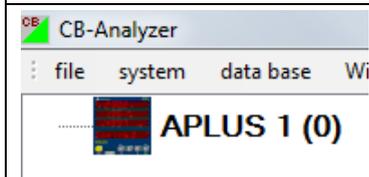


3.6 Importing logger data (APLUS only)

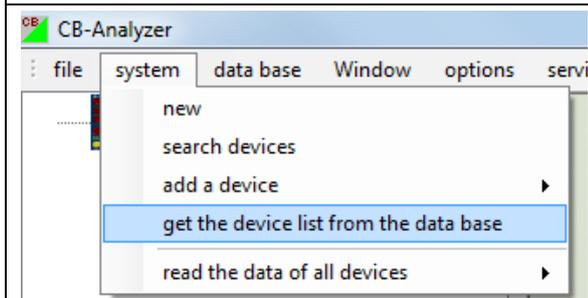
The import of logger data of an *APLUS* can directly be performed from the SD card or via intermediate storage in a directory on the PC.



You are asked to select the **directory** where the files are stored in.



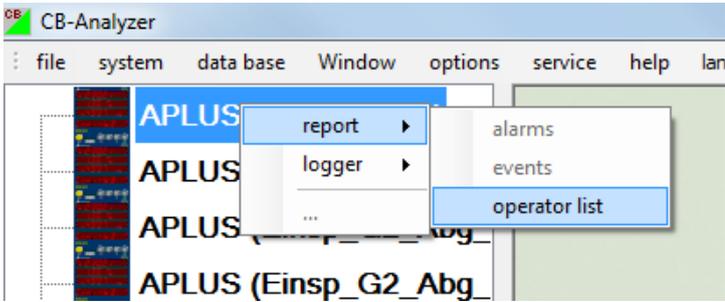
For the import a **virtual APLUS** is displayed in the device list. Only one device is shown, even if data of multiple devices are read one after the other.



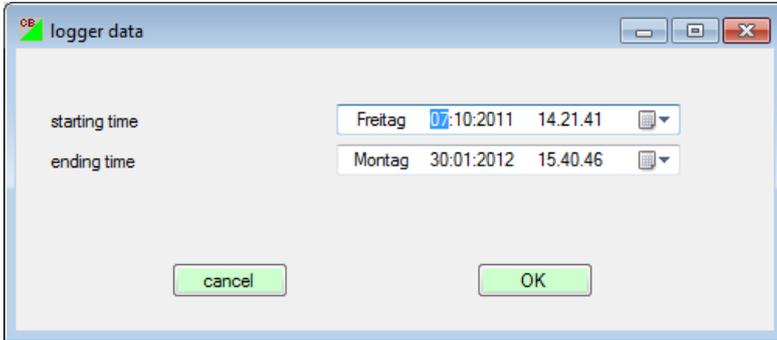
To analyze reports the device list must be created from the data base, because for virtual devices no data access is possible.

3.7 Analyzing reports

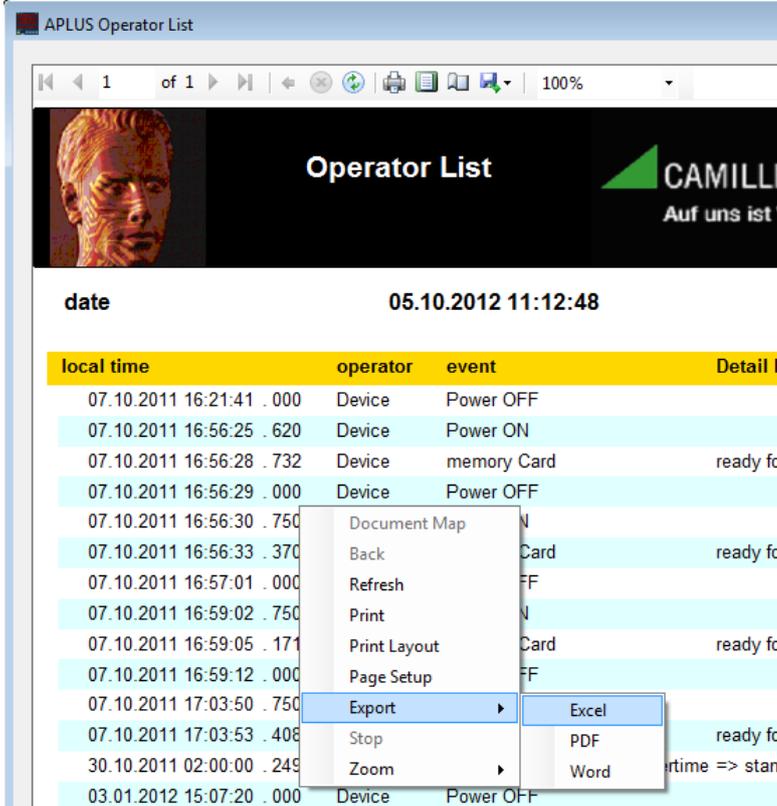
This analysis is done using data from the data base. No devices have to be connected.



If one or more of the report types are displayed in gray and cannot be selected, then the corresponding lists are still empty and contain no entries.



Before reports are displayed you can select the time range to analyze.

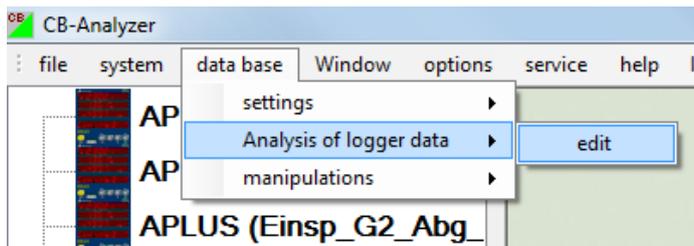


By right-clicking on the report a context menu is displayed, which allows list export as Excel, PDF or Word file.

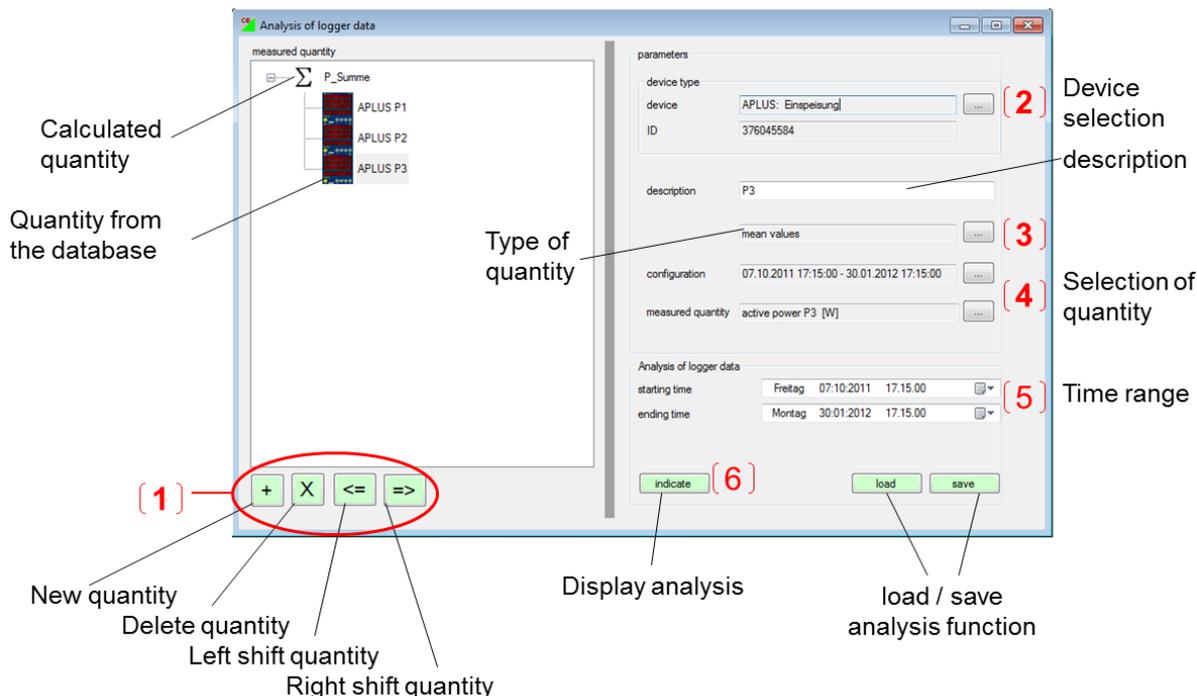
The lists consist of entries in time ascending order about the occurrence of events monitored by the appropriate list type. To each event a time stamp is assigned, which either is given in UTC or local time (depending on the setting under *options | Time zone*).

3.8 Graphical data analysis

This analysis is done using data from the data base. No devices have to be connected.



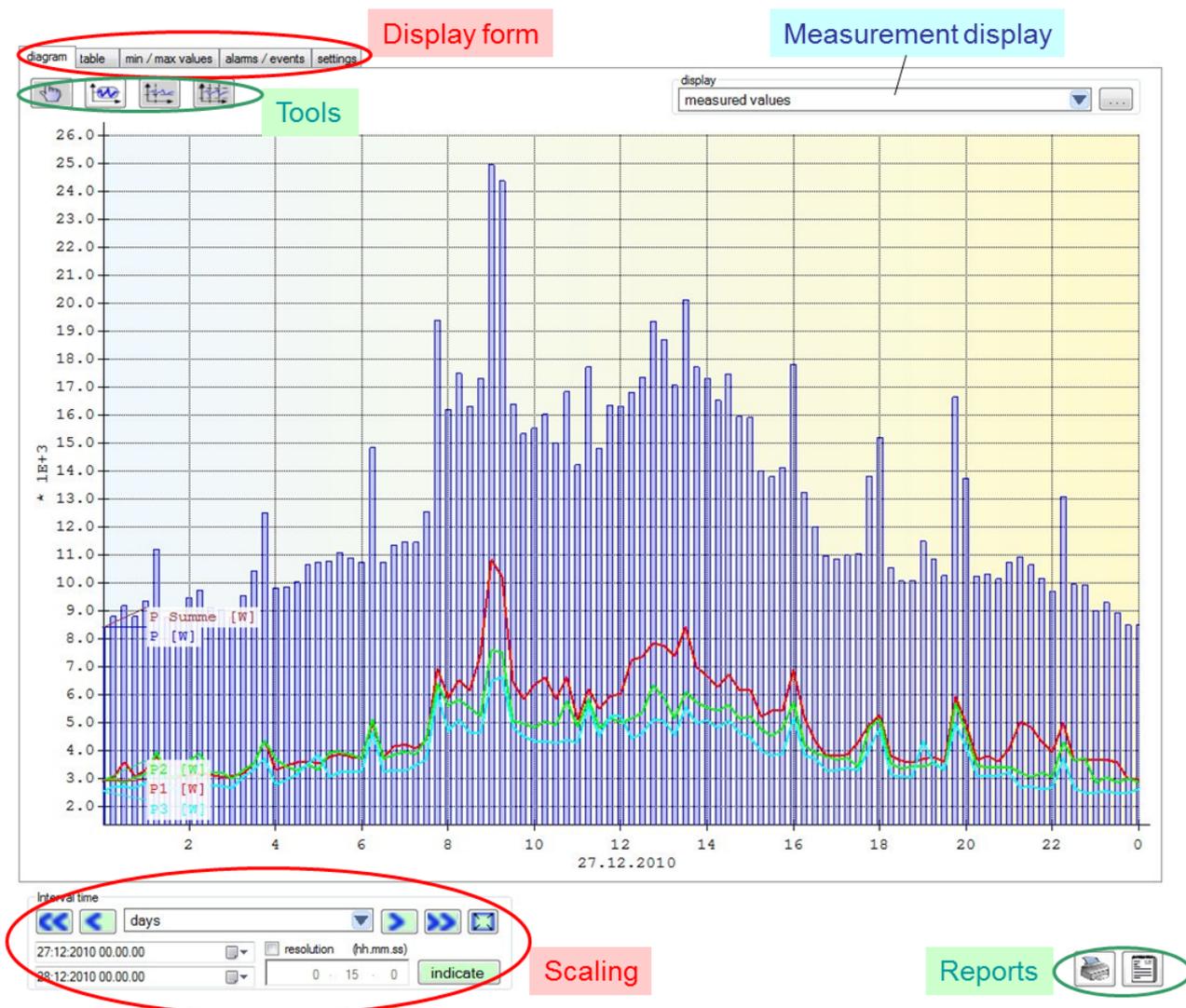
An analysis function may consist of multiple measured quantities, which can be graphically displayed at the same time. Thereby also a calculation of aggregates or differences can be made, e.g. to build the sum of feeders in a transformer station or to calculate the resulting net energy of incoming minus outgoing energy.



1	In the first step quantities must be added to the analysis function. These will be displayed in the measured quantities list on the left. The above example shows the summation of the power quantities P1, P2 and P3 to build the quantity P. To do so, the quantities P1, P2 and P3 must be shifted to the right. The resulting quantity is automatically the sum P. A difference is build similar. To build e.g. the quantity P2 you have to assign a measured quantity to the entries P, P1 and P2. P2 will then automatically become P2=P-P1-P3.
2	Selection of the measurement device. All devices are selectable, for which measurement data is stored in the data base. A description can then be assigned to the selected quantity in the list. Note: The input of a description text must be terminated by <ENTER>, otherwise the text is not accepted.
3	Select a quantity type (meter, mean values, min/max values, alarms)
4	Select a quantity. Only measured quantities are provided which have entries in the data base. Monitored alarms resp. logic functions are also valid quantities. Because the logger may have recordings with different device configurations a pre-selection of a logger sequence with unique configuration must be performed.
5	For the graphical analysis a starting and ending time can be defined.
6	Once the function is completed it can be saved on disk. So next time the same function can be loaded from disk without the need to define the function again. As soon as all quantities from the measurement list are defined the graphical analysis can be displayed.

Data display handling

Once displayed there are a lot of functions and options to adjust the display to your individual needs. You may zoom-in, adjust the time-scaling, choose a different measurement display form or indicate individual values using the cursor tool.



Display form

diagram: as shown above

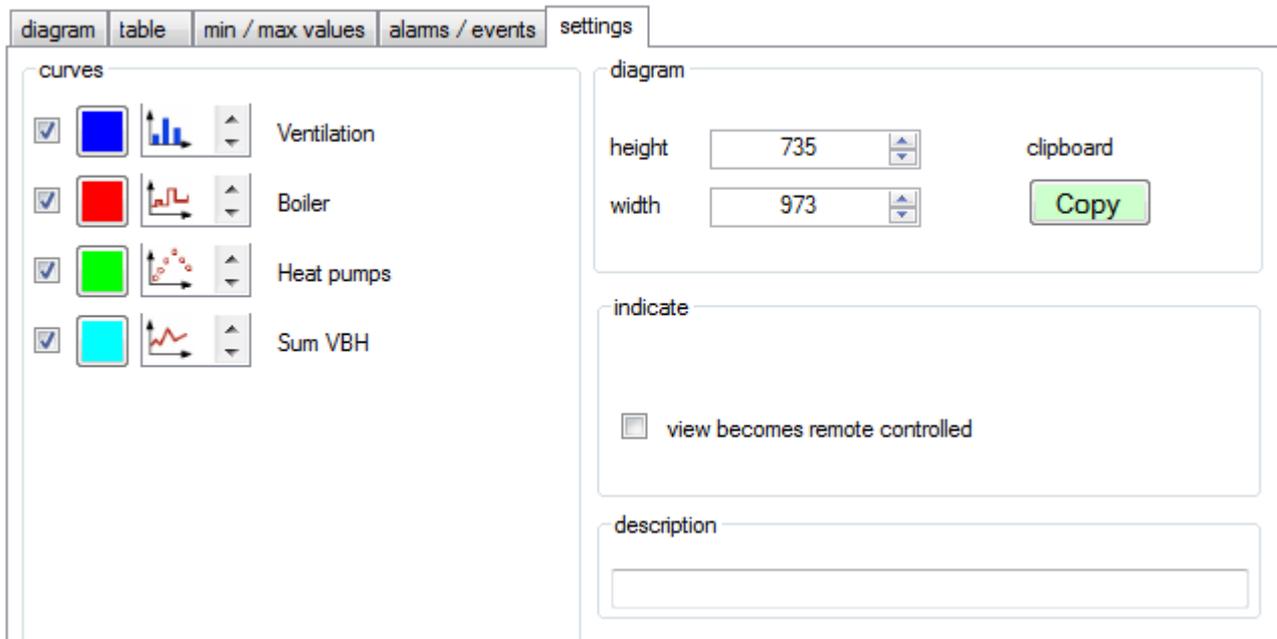
table: the diagram information in list form. Use <CTRL><C> to copy parts of the table and <CTRL><V> to paste e.g. into Excel.

	UTC	P	1	P1	2	P2	3	P3	4
▶ 1	27.12.2010 00:00:00	8.421	kW	2.922	kW	2.956	kW	2.542	kW
2	27.12.2010 00:15:00	8.805	kW	3.073	kW	3.006	kW	2.725	kW
3	27.12.2010 00:30:00	9.188	kW	3.606	kW	2.858	kW	2.722	kW
4	27.12.2010 00:45:00	8.797	kW	3.080	kW	3.053	kW	2.664	kW
5	27.12.2010 01:00:00	9.367	kW	3.321	kW	3.173	kW	2.872	kW

min/max values: For every quantity the absolute minimum and maximum value within the selected time range is shown

alarms / events: If existing, events occurred in the selected time range will be displayed in table form. For that it is necessary to define the events to display as measurements in the analysis function.

settings: Allows to change display parameters or to copy the displayed graphic into the clipboard.



curves: For each individual measurement the display may be switched on or off. The colour of each curve can be modified by selecting the coloured rectangle. As well the form of the display can be selected by choosing your preferred type from the list.

diagram: By selecting „Copy“ the displayed measurement graphic can be transferred to the clipboard and from there pasted as an image into any other Windows application. For that height and width of the graphic may be preselected in number of pixels, in the above example these are 735 x 973 px.
Only the measurement graphic and its scaling will be copied, all other elements will be omitted.

indicate: When „*view becomes remote controlled*“ is selected, this analysis becomes remote controlled by another, concurrently displayed analysis.
For this selection it is therefore assumed that a second analysis graphic is present.

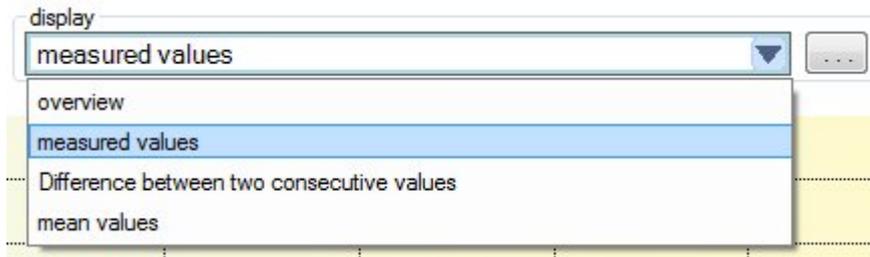
description: A description entered into this text field will be displayed below the time axis of the graphical display. This description is transferred as well when the graphic is copied to the clipboard via „Copy“.

Tools

	The hand tool is used to shift the graphic by means of the mouse.
	The zoom tool allows selecting the area of interest within the diagram.
	The cursor tool allows displaying the individual values of each graph.
	The double cursor tool allows to set a cursor (by pressing SHIFT) and then using the second cursor to make comparisons.

Measurement display

Depending on the time-scaling there can be ten-thousands of data points to be displayed, which takes a lot of time. The type of measurement display can therefore be selected:



overview: (default) The time needed is decreased by displaying minimum, maximum and mean-value of multiple points only. This setting should be activated during the search for parts of interest. It should not be activated during final analysis.

measured values: All measurements within the selected time range will be displayed.

Difference between two consecutive values: When displaying meter readings this selection can be used to visualize meter increments

mean values: The amount of existing measurements will be reduced by creating mean-values (see: resolution in scaling)



Allows to perform a pre-selection for meter and mean-value display

Scaling

Here the displayed **time range** can be set. Also a fixed scaling, like days, weeks or months may be selected. Further buttons are:

	Jump to the beginning of the time range
	One time unit back
	One time unit forward
	Jump to the end of the time range
	Show the complete time range (reset of all previous zooming steps)

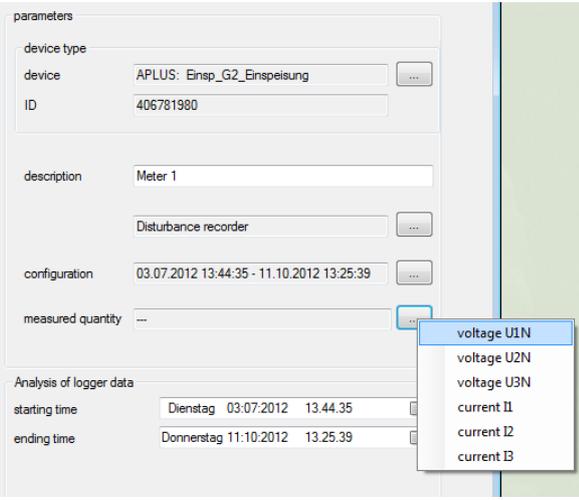
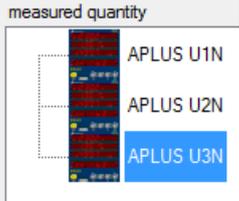
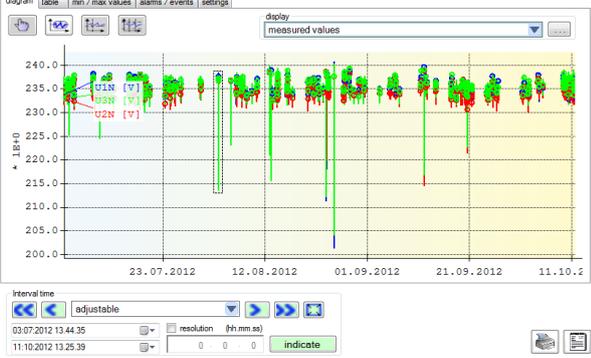
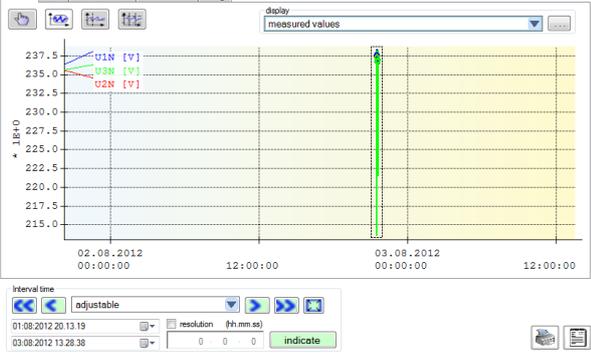
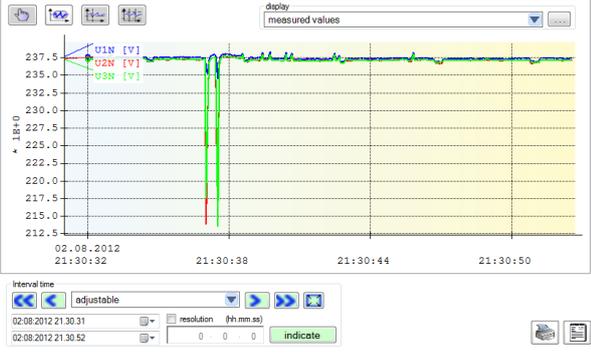
Resolution (hh:mm:ss) corresponds to the distance in time between the displayed measurements. This time can be prolonged to e.g. reduce the amount of displayed data by creating mean-values.

Reports

	A list of all the values, including minimum and maximum, for the selected time range will be created. These data may be printed or exported (Excel or PDF format).
	Prints the displayed measurement chart

3.9 Disturbance recorder analysis (APLUS only)

A disturbance recording consists of data sets of multiple measured quantities. The time range covered depends on the number of data sets configured, but is in the range of a few seconds only. For the analysis of such data you have to zoom-into until only the event of interest is displayed.

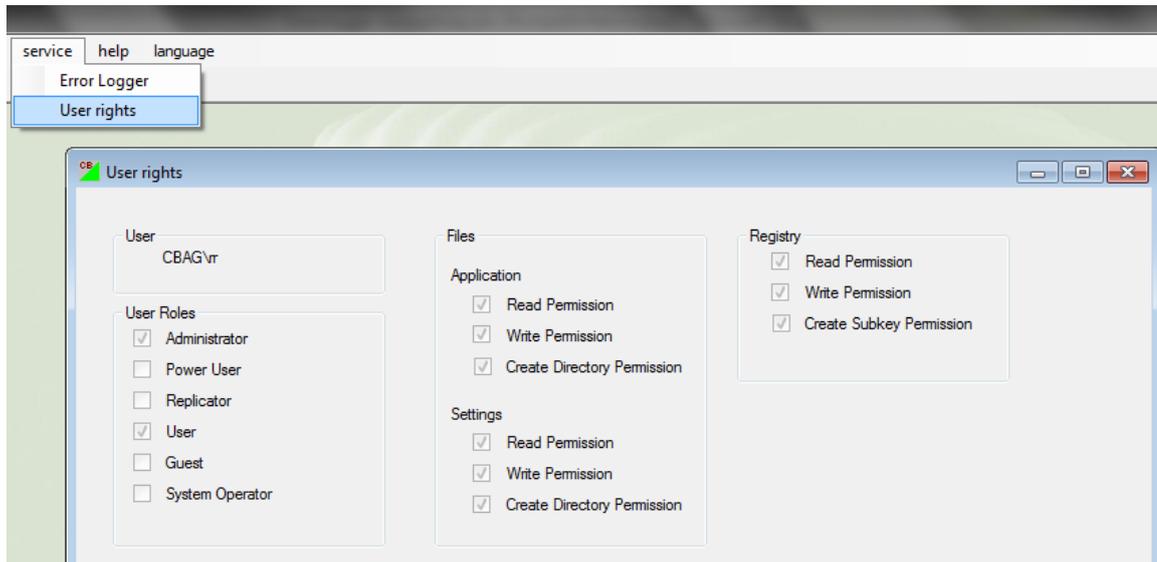
	<p>In the opposite example the disturbance recordings consists of data sets of all phase to neutral voltages and all phase currents.</p> <p>If, for example, you want to make a graphical analysis for all voltages, define an analysis function (see 3.8) consisting of all voltages:</p> 
	<p>In the graphical measurement display you first have to change the display mode to “measured values”.</p> <p>The graphic shows all disturbance recordings. To see details of a specific recording you have to zoom-in.</p>
	<p>In the subsequent graphic display again zoom-in.</p> <p>If there are problems with the graphical display, e.g. dotted lines instead of continuous line, change the register to settings and go back to diagram. The display will be refreshed and this way improved.</p>
	<p>Finally only the data of one specific disturbance recording are shown.</p>

4 Error analysis

The service functions allow an extended analysis of the environmental conditions of the CB-Analyzer.

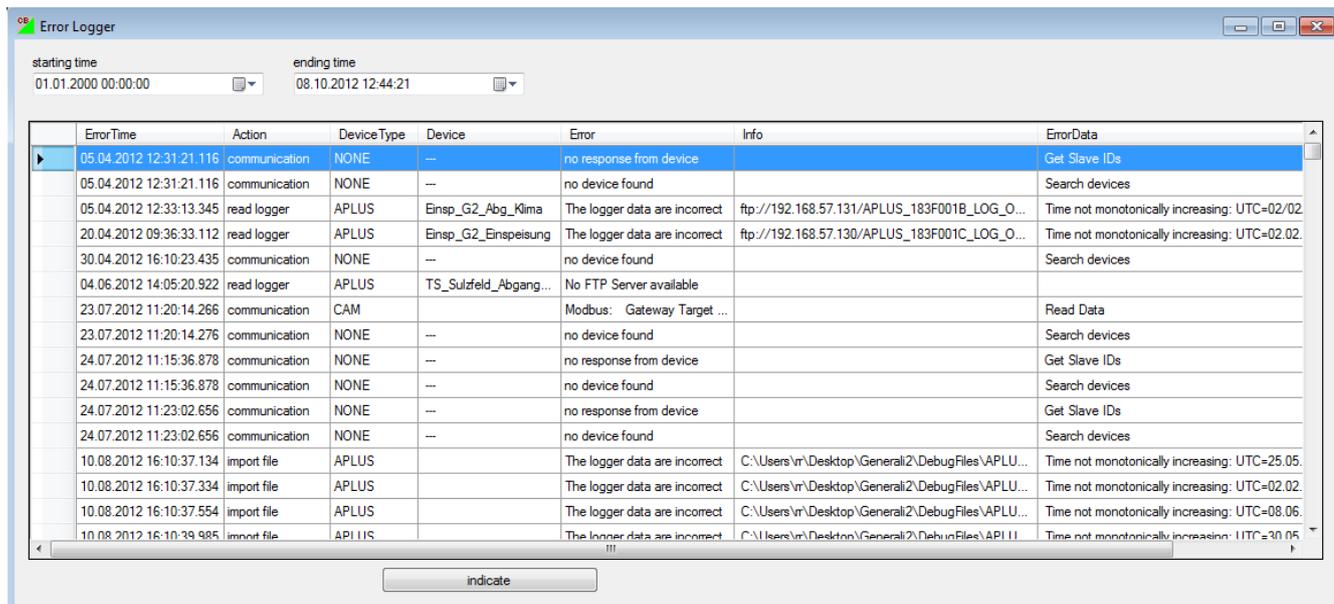
User rights

Here you may check if the user rights granted are sufficient to execute all functions of the CB-Analyzer software.



Error Logger

This list shows in time ascending order what went wrong during the execution of the CB-Analyzer Software.



The storage location of the file „ErrorLogger.txt“ depends on the used Windows version. Maybe this directory is not displayed due to Windows Explorer settings handling it as a protected folder. The directory names shown below may be different depending on the used Windows and language version.

Windows 7 / Windows Vista

C:\ProgramData\Camille Bauer AG\CB-Analyzer\DebugFiles

Windows XP

C:\Documents and settings\All Users\Application Data\Camille Bauer AG\CB-Analyzer\DebugFiles

In the same directory also the file „DebugLogger.txt“ is stored. If unrecoverable runtime errors occur, this file along with the ErrorLogger file should be sent to Camille Bauer for further investigations on the software behavior.

5 FAQs

Problem

The CB-Analyzer does not start correctly. Only an empty window with description MdiParent is displayed.

Possible reason

The software has been started without administrator rights.

Problem

*The function **system | search devices** delivers no result though devices are connected.*

Possible reasons

- 1) The communication interface hasn't been set, see chapter 3.3
- 2) Modbus: COM-Port, baud rate, parity or number of stop bits are set incorrectly
- 3) Modbus: The range of possible addresses does not cover the devices

Problem

*The function **system | search devices** delivers no result though devices have been recognized in the TCP/IP settings.*

Possible reason

The search for devices in the TCP/IP settings is performed using a UDP Broadcast telegram, which is a message sent to all devices within a network. Devices were not accessed via IP address but using a Camille Bauer specific part of the MAC address. This works even if the IP addresses of the devices and that of the PC are not in a common network segment.

In the device search in the system menu a connection attempt using Modbus/TCP telegrams is performed, which access the devices via IP address. This works only if both PC and devices are located in the same routable network segment.

Problem

Although the device search delivers a device list as a result, no logger data can be read from the devices

Possible reasons

- 1) *APLUS* with Ethernet interface: The FTP protocol used for reading the logger data is most likely blocked by the PC or network firewall.
- 2) *CAM* with Ethernet interface: The Modbus/TCP protocol used for reading the logger data is most likely blocked by the PC or network firewall.
- 3) *APLUS* with Modbus interface: The logger data cannot be directly read via Modbus interface, see chapters 3.3 and 3.6

Problem

When reading data the error message „The logger data are incorrect ...“ appears and the communication is aborted.

Possible reason

Most often the reason is an incorrect or an imprecise time stamp. This can be improved by changing the settings of the data server (see chapter 3.2). Occurred errors still will be recognized and stored, but a correction of the time stamps is made and the communication is not aborted. Such errors can be displayed using the menu item *service | ErrorLogger* (see chapter 4).

Camille Bauer AG
Aargauerstrasse 7
CH-5610 Wohlen / Switzerland
Phone: +41 56 618 21 11
Telefax: +41 56 618 35 35
e-Mail: info@camillebauer.com
<http://www.camillebauer.com>

