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**bbe**  
**PhycoProbe**

**User Manual**

Version 2.7 E1, October 2018

## General Note to the Manual

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### Please Note:

Decimal points are according to local settings of Windows, i.e. internationally, the decimal point is “.” but in most of Europe it is “,”. Please pay attention to this. Most import/export difficulties are caused by the use of the “point” or “comma” and vice versa. The software screenshots in this manual contain “decimal commas”, i.e. the European system.

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## General Safety Precautions

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The bbe PhycoProbe is an instrument for the determination of the concentration of chlorophyll in water. It should only be used for this purpose.

- only instructed staff should operate this instrument.
- consult appropriate safety manual in case of using hazardous compounds and solutions. Wear gloves, coat and safety goggles.
- electrical connection of the instrument should only be carried out by trained staff.
- the instrument should only be opened by authorized staff.
- please refer to the safety instructions of any chemicals used with the PhycoProbe.
- changes to electrical connections and circuits may cause damage to the instrument and lead to loss of warranty.

### Cleaning the instrument:

The instrument should be cleaned after use. The use of aggressive cleaning fluids or water at high pressure should be avoided. Neither should any mechanical cleaners or apparatus come into contact with the sensor head or LED display. Attention: in order to obtain exact measurement results, the measuring head should be free from grease.

Before stowing the instruments should be cleaned of dirt under running water. If necessary, normal, commercially available washing up liquid can be used. Rub the instrument dry with a soft cloth and take care when drying the electrical contacts.

The simplest way to store the instrument for any length of time is in its original case, in which the accessories can also be stored and kept dry.

### Supplement to the safety instructions

Performing electrical connection may only be carried out by trained personnel. Maintenance, such as e.g. exchanging the rechargeable battery pack, may only be carried out by personnel trained and authorised by bbe Moldaenke. Replacement parts and repair materials must be issued/released by bbe Moldaenke for each case.

### Use of the PhycoProbe without Screen

The PhycoProbe must not be used in sunlight without the Screen.

## How to Quick-Start the Instrument

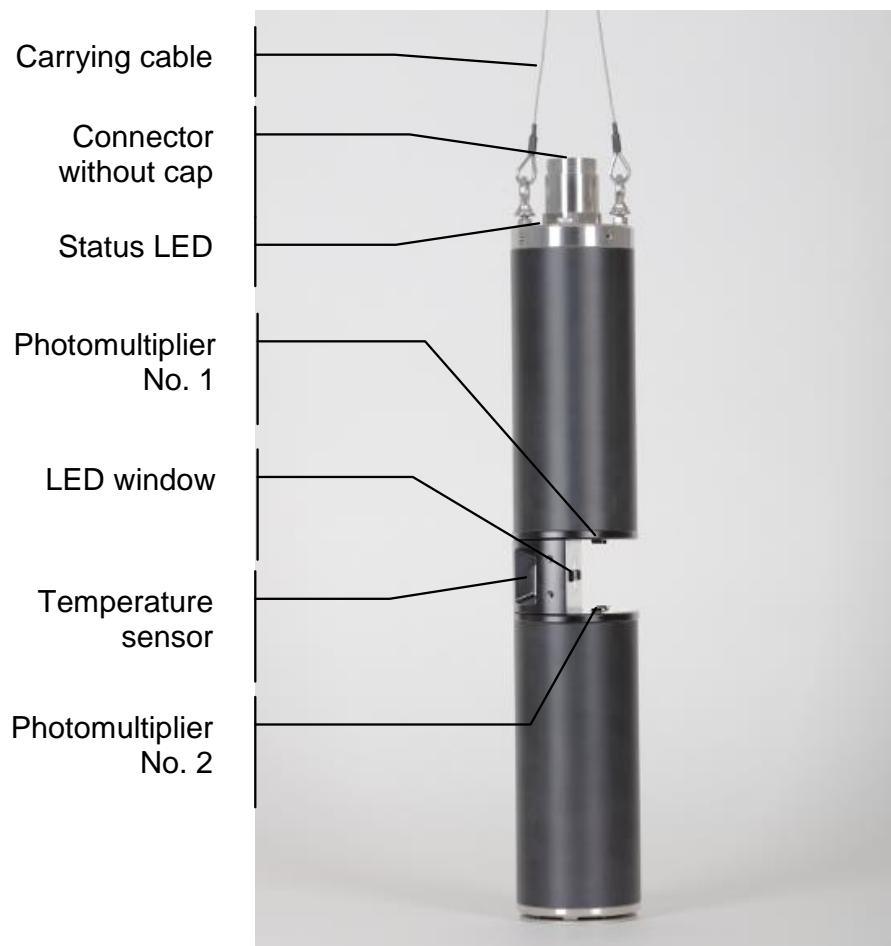
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This gives a very short overview of the measurement with the bbe PhycoProbe. For more details, please read the next chapters.

- install the PC software
- install the driver for the RS485 to USB converter from the installation CD (driver\FluporoProbe\CDM20814\_Setup)
- connect the RS485 to USB converter cable to the PC.
- connect the bbe PhycoProbe and the PC using the measuring cable/RS485 to USB converter cable; make sure that the connector has been greased sufficiently
- start the PC software
- choose the COM port for the connected instrument or let the bbe++ software search for it
- calibrate the offsets and/or the fingerprint of yellow substances especially in case of low concentrations of chlorophyll (< 10 µg/l, total chlorophyll concentration)
- set the air pressure by using this item in “Tools -> Device -> Air pressure”
- start the measurement (“Start” button in the toolbar )
- after starting the measurement, it takes about 30s until the first results appear
- submerge the PhycoProbe when the first value appears
- at the end of the measurement, stop the measurement

# Construction of the bbe PhycoProbe

## Components - without the screen



## Screen

The screen for the PhycoProbe is used when measuring small concentrations or in bright sunlight. To clean the PhycoProbe windows, the screen can be dismounted by removing the 8 screws.

### OPENING THE CASING

**Attention! Do not open the instrument - danger of leakage!**

Maintenance and repairs are to be carried out only by the manufacturer or its authorised agents.

# Installation

## Cables

There are two cables delivered with the bbe PhycoProbe:

- **The measuring cable (underwater cable):**

This cable is used during measurement with the bbe PhycoProbe. Different lengths from 2 to 100m are available. This cable is also used to operate the bbe PhycoProbe in the lab and to charge the battery. The bbe PhycoProbe can also be operated using the power supply.



- **Converter cable**

The PhycoProbe uses the RS485 standard to transmit the data to a PC. This allows the transmission of data via long cables. To connect the PhycoProbe to a PC a converter is required. The converter is integrated into the converter cable. There are two types of converter available: An RS485 to USB type and an RS485 to RS232 type.

Both converters are equipped with a wire strap to switch the PhycoProbe on as soon as the converter is connected.

- **The RS485 to USB converter cable**

Before using this cable, the USB driver needs to be installed (on the bbe CD).



- **The RS485 to RS232 converter cable (optional)**

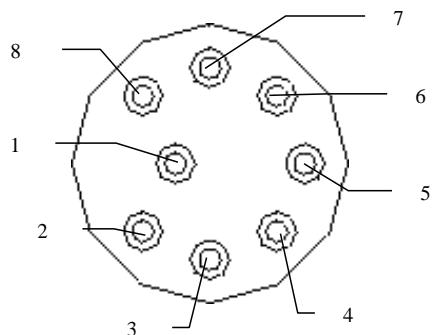
This converter cable can be used with a free RS232 port.



## Connector

Connector of the bbe PhycoProbe series 18 and up (view from the top).

**Please note: the use of the connector pins is different from previous series!**



1. Positive power supply (24 V)
2. RS 485 B
3. RS 485 A
4. Ground
5. Input to switch the PhycoProbe ON by connecting to pin 6
6. Positive pin of the battery
7. USB -
8. USB +

The converter cable connects Pins 5 and 6 to start the Probe.

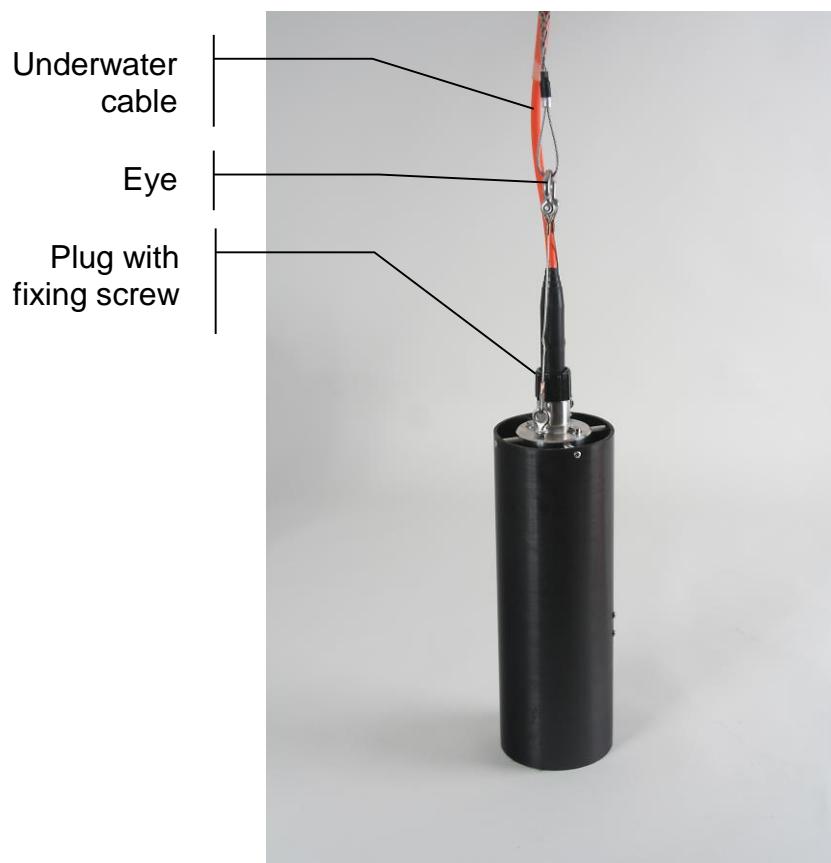
### Connector Maintenance:

The connectors have to be treated with grease regularly. Please use a Molykote 44 medium. This is available from bbe Moldaenke.

The silicon grease is only to be applied to the non-metal parts but is needed to be able to disconnect the connectors more easily after use. The grease is to be applied where the plastic parts of the male and female connectors make contact. It may be applied thinly but more than normal will not damage the instrument. It is recommended to dry the connectors roughly beforehand with a cloth or something similar.

In several tests, we have found that it does not influence operation when silicon grease is applied to the metal contacts by mistake. Nevertheless, care should be taken during application.

## CONNECTING THE PHYCOPROBE



Connecting the underwater cable:

- remove the protecting plug
- connect the underwater cable and fix the locking sleeve
- connect the carrying cable of the PhycoProbe with the eye of the underwater cable

The underwater cable is used to supply the PhycoProbe with power, to transfer the data and to suspend the PhycoProbe in the water, while submersed.

The PhycoProbe starts as soon as the power supply or the converter cable has been connected. Both items connect PIN 5 and 6 of the PhycoProbe to switch it on.

### **Power supply**

The bbe PhycoProbe is either powered by connecting the external power supply (see below) or by using the internal battery.

The PhycoProbe is switched on by connecting Pins 5 and 6 of the connector by using the power supply, the converter cable or the auto-start-plug.

This is done by connecting the measuring cable to the PhycoProbe and the converter cable to the measuring cable. Disconnect all cables when PhycoProbe is not in use.

**NOTE:**

**Connected cables may switch the PhycoProbe on. This will consume power from the internal batteries of the PhycoProbe and thus the batteries may become discharged.**

**INDICATION OF OPERATION MODE AND CHARGE STATE (SERIES 23 AND UP)**

The LED in the lid indicates the operation mode and the charge state.

The charge state is indicated by the color of the LED

Charge state	Color
Full	Green
Medium	Yellow-Orange
Nearly empty	Red

The operation mode is indicated by the type of blinking of the LED

Mode	Blinking
Off	Off
Standby	Short light pulses
Measuring	Regular pulses
Charging	On

**Start-up procedure**

In series 23 and up, there is a LED in the lid indicating the startup procedure (please see above).

The start-up procedure is indicated by the LEDs of the PhycoProbe. This can be used to control the start-up procedure. Please remove the black screen to have a better view to the LEDs.

The PhycoProbe starts after connecting the autostart plug, the converter cable or the power supply. This procedure takes about 10 s. During these 10 s the orange LED lights up. Then, a different LED indicates the status of the internal rechargeable battery for 2 s.

Green LED means: battery charged

Red LED means: battery not charged

## USING THE AUTOSTART PLUG

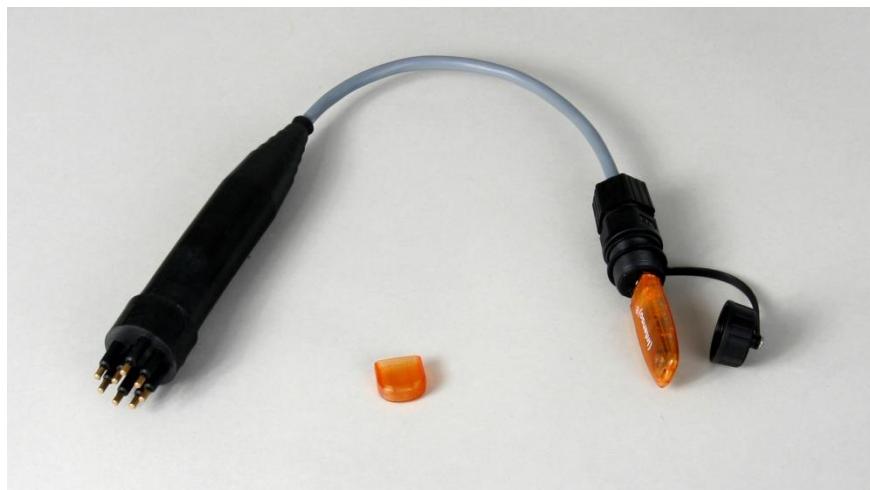
The autostart plug is used to measure without a PC or handheld device. The autostart plug connects pins 5 and 6 and initiates the measurement. The PhycoProbe needs to be configured accordingly. Please see page 109.



Remark: The outline of the autostart plug might vary.

## Downloading data from the PhycoProbe using a USB stick

To download data files from the PhycoProbe, a USB adapter can be used.



Connecting the USB plug with a USB stick to the PhycoProbe initiates the transfer of all hitherto untransferred data files to the USB stick. For PhycoProbes series 18 and 19, the transfer starts with the oldest data and must not be interrupted. In PhycoProbes series 20 and upwards, the transfer starts with the latest data and may be interrupted. Additionally, a file called "datacopy.log" is written to the USB stick. This file contains information about the copied files and the remaining files.

Example of datacopy.log:

```
Wed Jan 27 02:38:11 UTC 2010
total number of FLP files found: 48
number of FLP files copied so far: 10
number of FLP files remaining: 38
number of FLP files copied so far: 20
```

```

number of FLP files remaining: 28
number of FLP files copied so far: 30
number of FLP files remaining: 18
number of FLP files copied so far: 40
number of FLP files remaining: 8
number of FLP files copied so far: 48
number of FLP files remaining: 0

```

```

execution summary:
number of FLP files copied: 48
number of FLP files remaining: 0

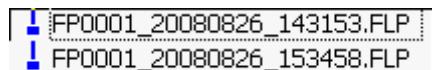
```

Each single series of measurements is stored in one \*.FLP file. The files are stored in monthly folders, with daily subfolders:



(Note: 'Wechseldatenträger' may appear as 'Removable drive' in English operation systems)

The files are named according to the date and time of the beginning of the measurement:



## Updating the firmware of the PhycoProbe using a USB stick

To update the internal firmware of the PhycoProbe get the latest software from the bbe service or the bbe website. The firmware is a file called

FPUpdate.bin

Please note: the name is the same for all kinds of updates.

Applying the update:

- Copy this file to a USB stick
- Connect it to the USB adaptor
- The PhycoProbe loads the file FPUpdate.bin. As soon as the update is finished, the file will be renamed to FPUpdate.bin.done. This shows, that the update has been successful. Depending on the update, there may be also log files on the USB stick.
- Wait until the PhycoProbe reboot (LEDs of the PhycoProbe are blinking)
- Disconnect the USB stick
- Connect the USB stick to a PC to check for FPUpdate.bin.done. For further updates of other devices, the file can be re-renamed to FpUpdate.bin.
- Send the log files to the bbe service, if requested.
- To check the software version connect the PhycoProbe to a PC with bbe++ installed and go to Parameters -> online ->common parameters -> software version

## Power Supply and Charging of the PhycoProbe

The power supply is used to charge of the internal rechargeable battery as well as to operate the PhycoProbe in stationary or "lab" mode..

The power supply has a cable with two connectors: one to supply the PhycoProbe with power/charge the batteries and the other to connect the computer to the PhycoProbe during measurement with the power supply.

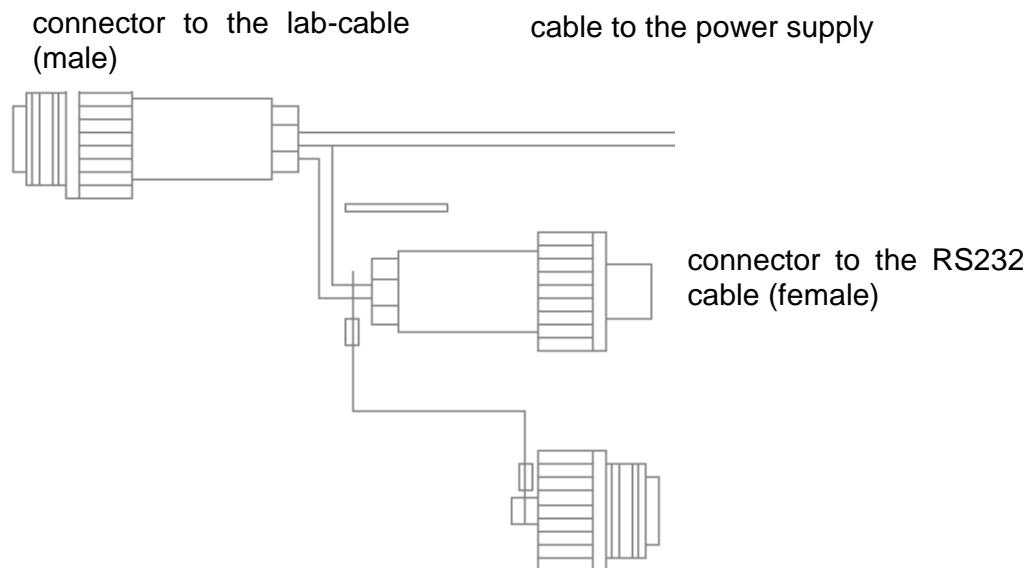
**Do not use the power supply of a series 18 and up instrument for an earlier type!**

### CHARGING OF THE PHYCOPROBE

Connect the power supply via the measuring cable to the PhycoProbe. Connect the power supply to the mains. The PhycoProbe now starts and checks the internal battery. After approximately 2 minutes, it starts charging. This is indicated by the red LED of the PhycoProbe blinking shortly each 10 seconds. When the battery is charged, the green LED blinks.

### STATIONARY OPERATION OF THE BBE PHYCOPROBE

Connect the power supply to the PhycoProbe as described above. Additionally connect the converter cable to the power supply and to the PC. The PhycoProbe can now be operated by the PC in "lab" mode.





## bbe++ Software

The bbe++ software is delivered together with bbe instruments. If a PC is delivered with the instrument or integrated in the instrument, the software is already installed.  
It provides the following functions:

- operation, control and calibration of bbe instruments
- data analysis and display in tables and diagrams
- export in different formats

This chapter describes the general functions of the bbe++ software. The examples may show data or parameters of other bbe instruments. The data and parameters of your instrument can easily be handled accordingly. Whenever this manual deals with special features of a certain instrument, this will be explained in the special instrument chapter.

The data and parameters of the instruments are stored in a database. A single database may contain the data of different instruments of the same type and also different types of instruments.

### Software Set-Up

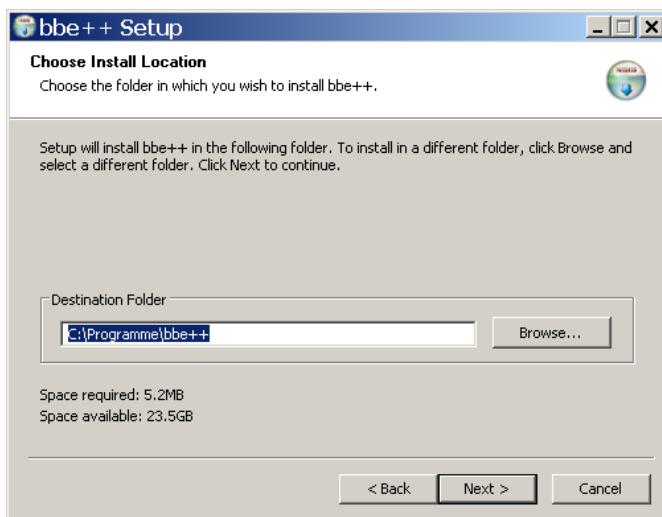
The software is stored on a CD delivered with the instrument. The latest version can also be downloaded from the bbe website after registration (<http://www.bbe-moldaenke.de/log-in/> ).

The Windows autorun function should start the installation automatically. If it does not, open the Explorer and click on **setup.exe** on the CD for installation.

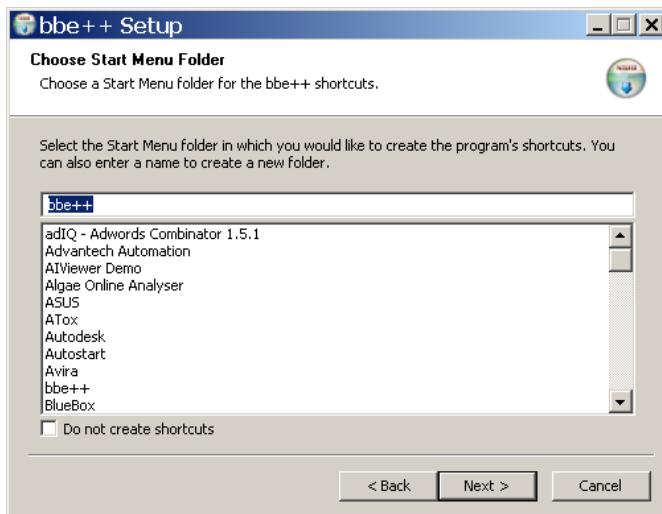
Welcome window: click "NEXT >"



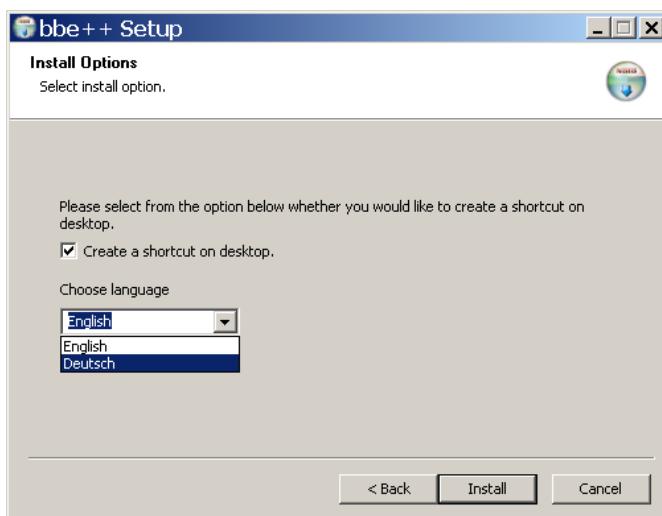
Choose the destination folder and click “NEXT >”



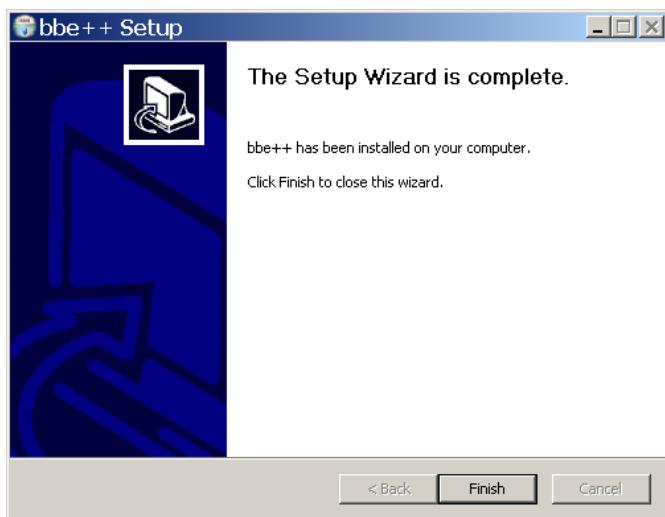
Choose a new start menu folder and click “NEXT >”



Choose your preferred language and click “NEXT >”



Final success window of the bbe++ installation. Click “FINISH”.



#### DESKTOP ICON OF THE BBE++ SOFTWARE

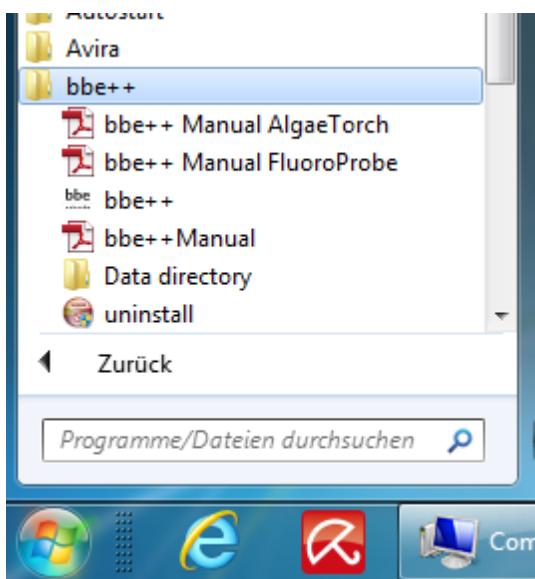
The setup installs an icon for the bbe++ software on the desktop (if chosen during installation).



#### BBE++ SOFTWARE IN THE START MENU

The bbe++ folder in the start menu contains:

- bbe++ software
- installed manuals
- link to the data folder of bbe++



## Software Update

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Updates of the bbe++ software and manuals can be downloaded from the bbe website <http://www.bbe-moldaenke.de> after registration.

## Structure of the software

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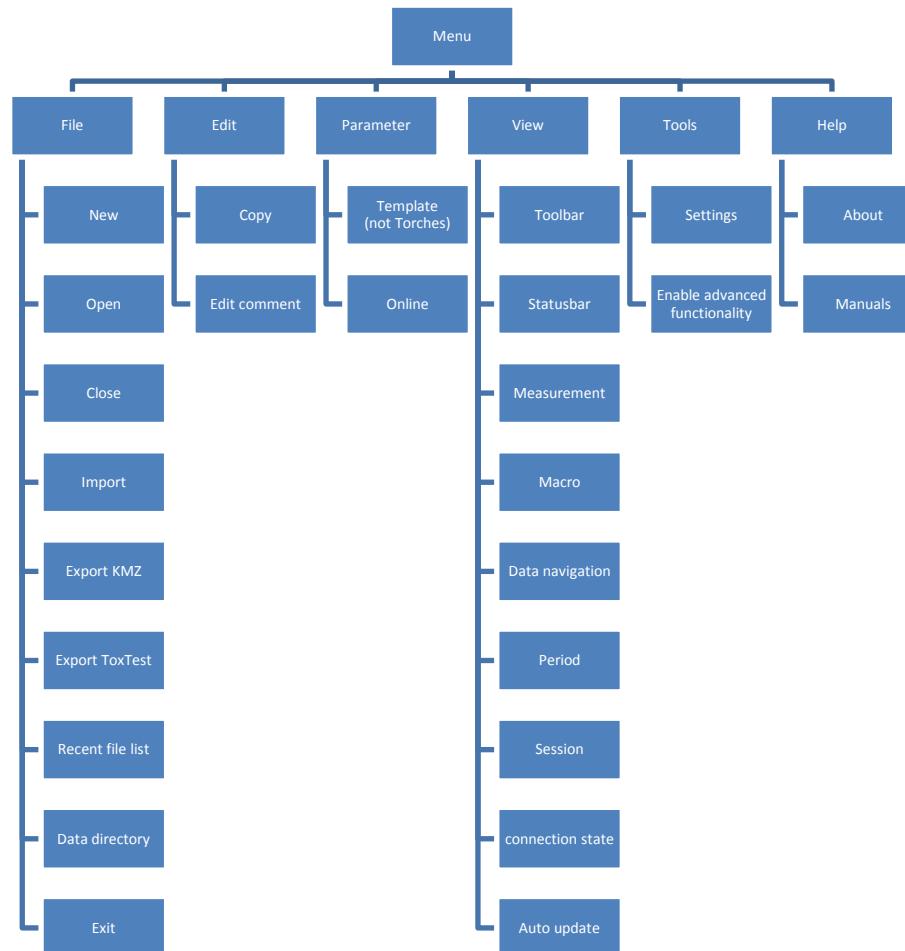
The following menus are available in the bbe++ software. Whether a menu is displayed, depends on the access level set.

- FILE contains all the input/output functions.
- EDIT contains functions to copy data and graphics.
- PARAMETER contains functions to set the parameters of an instrument and to adapt the parameters of data already measured.
- VIEW contains functions to show and hide toolbars.
- WINDOW contains functions to show the data in different types of tables and graphics as well as editors to change the layout (advanced functionality level only)
- TOOLS contains options to change settings that influence the behaviour of the bbe++ software and the way of operating the instruments.
- CALIBRATION contains the items to calibrate different bbe instruments (advanced functionality level only)
- HELP contains information about the current bbe++ version.

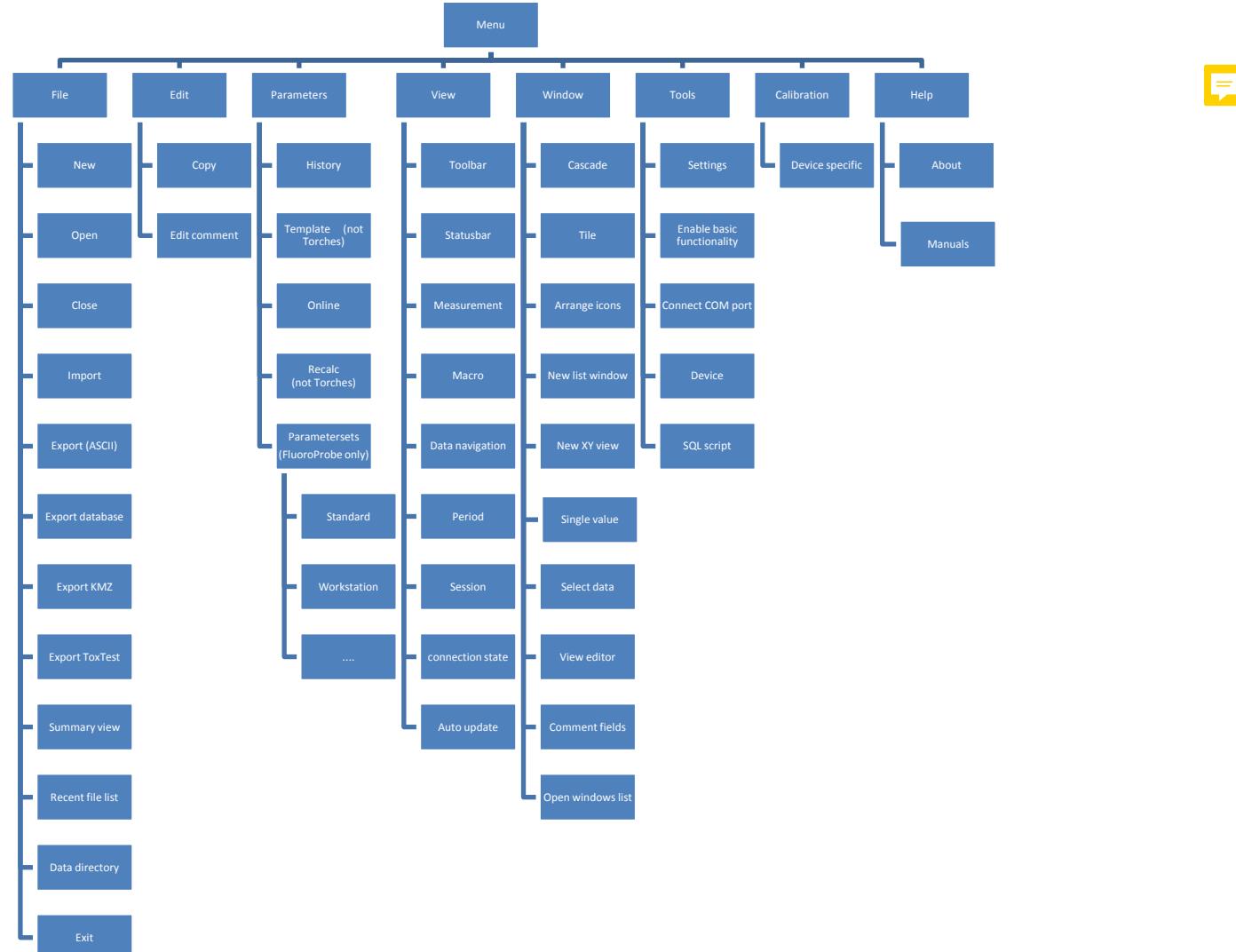
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## Menu structure (“Basic functionality”)

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## Menu structure ("Advanced functionality")



## General considerations for storing and displaying data and parameters in bbe++

### WHAT IS STORED IN A BBE++ DATABASE?

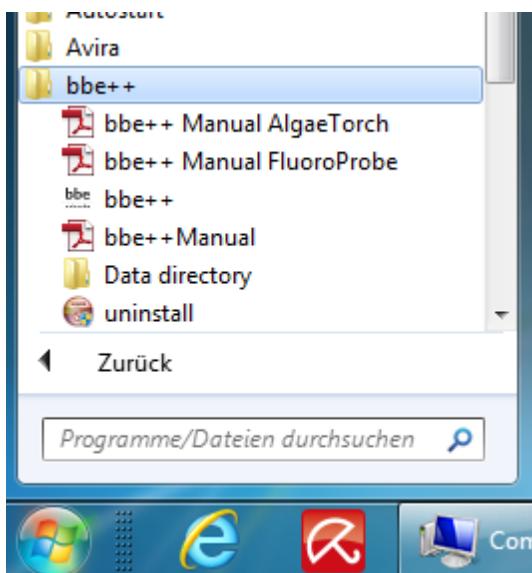
The measuring results and instrument parameters of different bbe instruments are stored. It is possible to retrieve the corresponding instrument parameters for each single result.

In the so-called "Summary View" the serial numbers of the instruments and the time ranges for all data stored in this database are shown. This view can be used to select the desired data as well as the corresponding parameters for display.

The database files are marked with the extension \*.bdb (bbe database)

### WHERE IS THE DATABASE STORED?

The database of bbe++ is stored in the standard application folder of Windows. The name of the folder depends on the operation system and the language. For example: C:\ProgramData\bbe++ in the Windows 7 English version. To access this folder easily, there is a link in the file menu of bbe++ or start menu of Windows called "Data directory":



### HOW TO DISPLAY THE DATA?

In the bbe++ software, different views have been pre-defined for each instrument:

- graphics
- tables
- single dataset
- data export

User-defined views may be added as well.

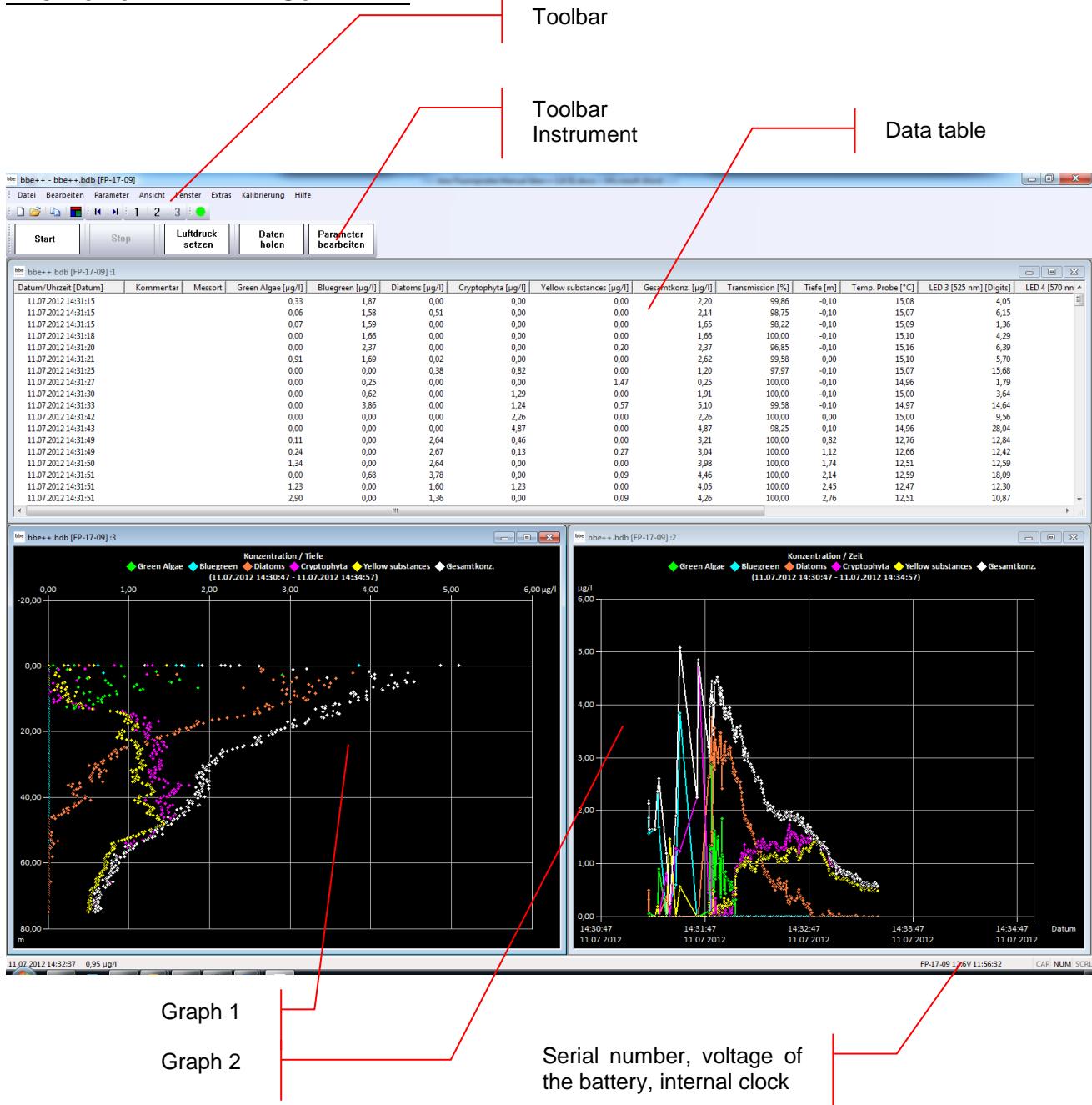
### SIMULTANEOUS DISPLAY OF DATA OF DIFFERENT TYPES OF INSTRUMENTS

After opening a database file, the data of different instruments of the same type may be displayed simultaneously. To display the data of another type of instrument from the same database file, this file can be opened more than once.

## WHO CAN ACCESS TO THE PARAMETERS OF THE INSTRUMENTS?

The bbe++ software has 2 access levels – basic functionality and advanced functionality. Depending on the different access levels, more or fewer menu items and parameters are shown. There are different settings for reading or writing access. The advanced functionality level can be password protected.

## DESKTOP OF THE BBE++ SOFTWARE.



## TOOLBAR

Toolbar to navigate within the datasets.

## TOOLBAR INSTRUMENT

Toolbar to operate the instrument

### GRAPHIC- UND TABLE VIEWS

User configurable windows with graphs and tables.

### SERIAL NUMBER, VOLTAGE OF THE BATTERY, INTERNAL CLOCK

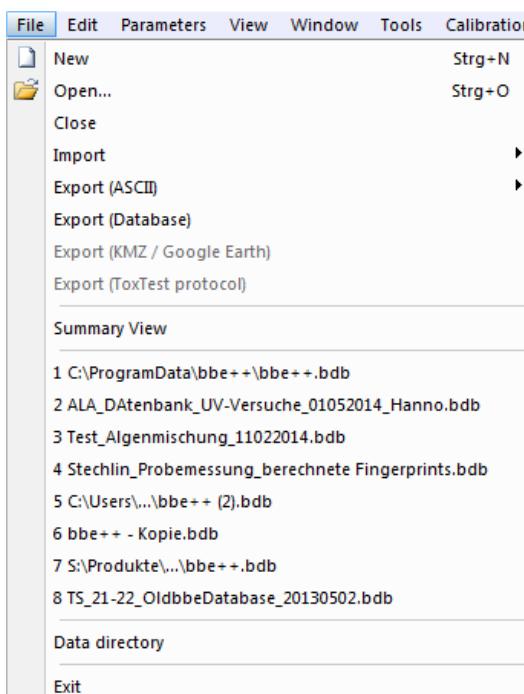
Display of the data of the connected instrument: serial number, voltage of the battery and internal clock.

# The Menus

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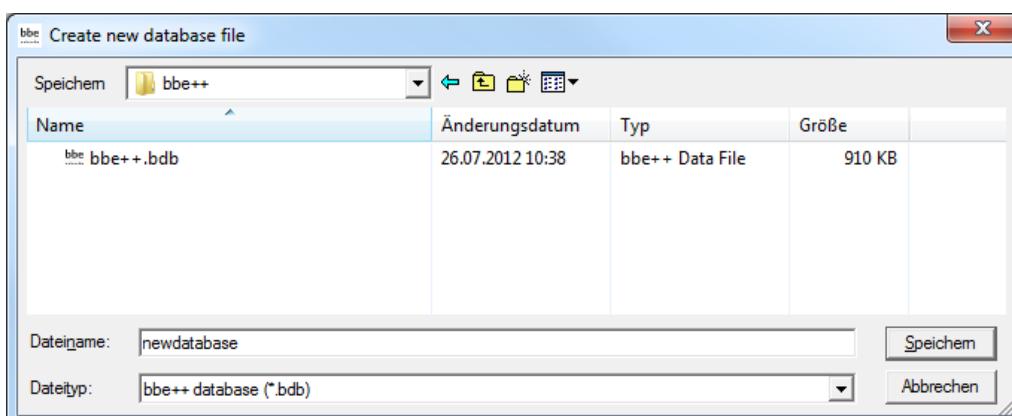
## FILE MENU

The File Menu contains all the input/output functions.

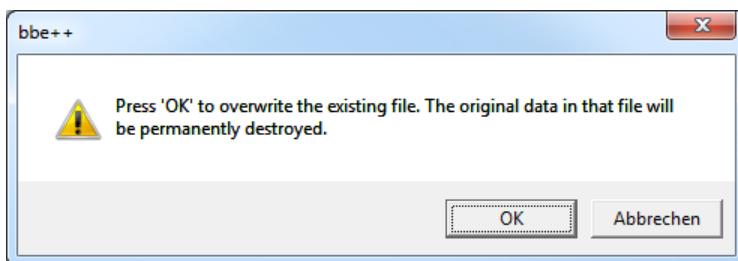


## New

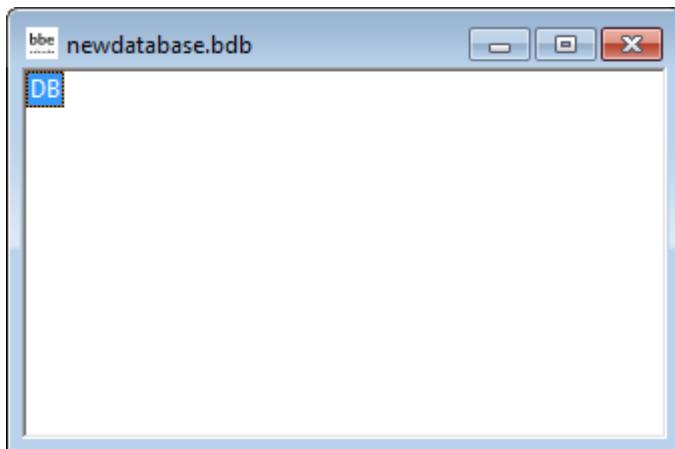
Creates a new database file for data and parameters.



If the new database already exists, the existing database is deleted after confirming the following message:



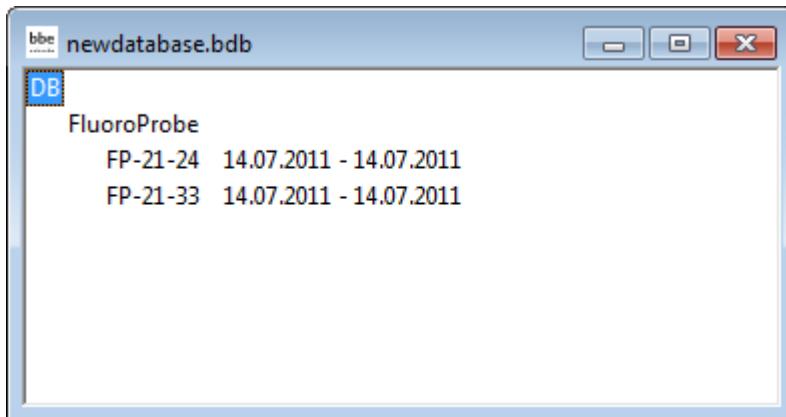
The new and empty database is displayed.



New data can be entered in the database by importing or by starting a measurement.

### Open

Opens an existing database. If there are already data in the database, the “Summary View” window appears. The type and serial number of the instrument can be chosen as well as the time range. The following example shows a database containing data from different PhycoProbes.

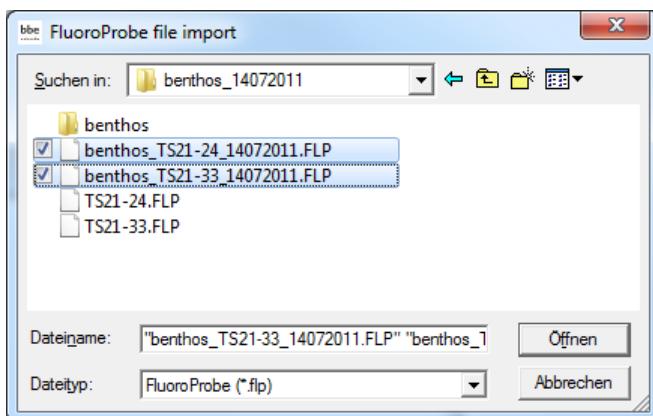


### Close

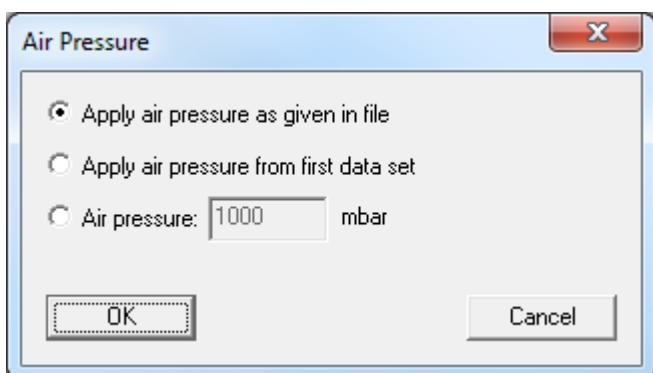
Closes the active database.

### Import (PhycoProbe / AlgaeTorch / BenthоТorch)

This function is used to import \*.FLP files into the database. These files can be results transferred from the PhycoProbe to a USB stick or files generated by the first version of the PhycoProbe software. To import, please choose the file from the file system:



It is possible to select more than one file by pressing the shift key while selecting the file.  
PhycoProbe only: Afterwards choose how to apply the air pressure and hence the calculation of depth.



#### AIR PRESSURE AS GIVEN IN FILE (PHYCOPROBE AND ALGAETORCH 100 ONLY)

Air pressure was measured at the beginning of the measurement. This value is used.

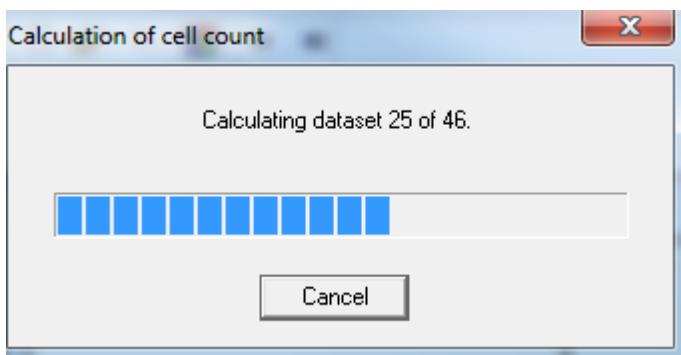
#### AIR PRESSURE FROM FIRST DATA SET (PHYCOPROBE AND ALGAETORCH 100 ONLY)

The first measurement of air pressure took place in air. This is the appropriate selection if an autostart-plug without a PC was used (for further information see the PhycoProbe-manual).

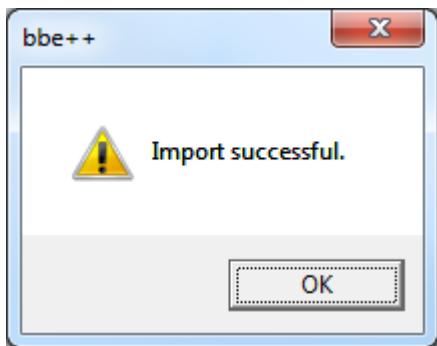
#### AIR PRESSURE (PHYCOPROBE AND ALGAETORCH 100 ONLY)

Allows the entry of a constant value. To be used if the PhycoProbe was submerged for a longer time and unable to measure the air pressure by itself.

In case of PhycoProbe data, the results are recalculated from the raw data after importing.



The calculation procedure takes place in subsequent steps. After importing all data, a success message is shown.



### Export (ASCII)

This item exports the data as an ASCII file to load them into other programs. To select columns to be exported and the separator that is used, please see the description of the View Editor. The view editor allows the user to define different export formats for each instrument. All export formats of the current instrument are shown in the menu:



The default export view is “Export all”.

After clicking on “Export all”, the name and folder of the exported file can be selected.

Hint: To transfer data to Excel, use the copy and paste feature in the “Edit” menu.

### Export (Database)

This item is used to export parts of a database to a new (and smaller) one. The exported database can be read with bbe++ again. This might be useful when parts of the database are transferred via email.

The currently selected data (“WINDOW → SELECT DATA”) are exported.

### Export (KMZ) – AlgaeTorch / BenthоТorch / PhycoProbe

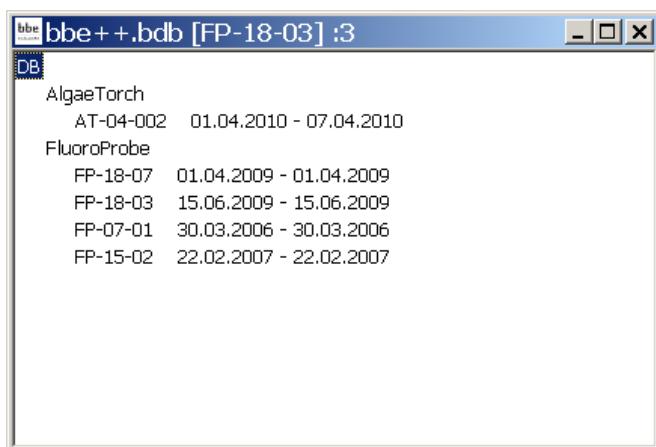
This item is used to export geo data from instruments with GPS receiver to be displayed in Google Earth.

### Export (ToxTest protocol) – AlgaeLabAnalyser only

This item is used to export the results of toxicity tests conducted with the AlgaeLabAnalyser to Excel.

### Summary View

Opens a new window that gives an overview of all the data and instruments in the current database:



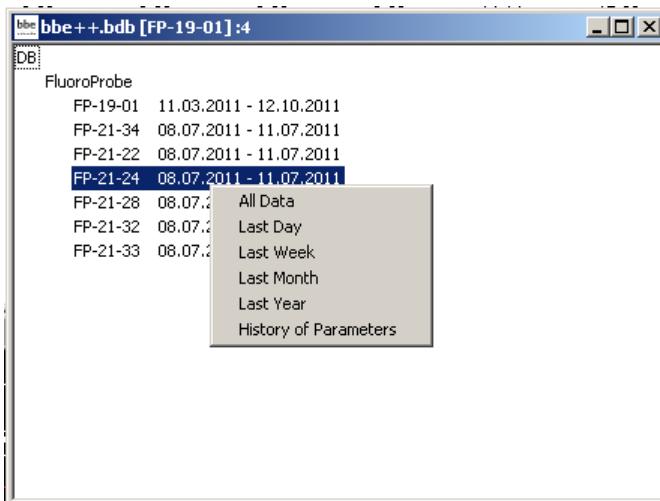
The database bbe++.bdb above contains data of two types of instruments: AlgaeTorch and PhycoProbe.

The serial numbers and the point in time of the first measurement and the last measurement stored in the database are shown below the heading with the name of the instrument.

The header of the window (bbe++.bdb [FP-18-03] :3 has the following meaning:

- the name of the database bbe++.bdb
- the serial number of the instrument for which the data in the data windows are currently shown [FP-18-03]
- the number of the window if there is more than one open window :3

The summary view can be used to directly access the data or parameters of one of the listed instruments. To do so, use the right mouse click on the serial number:



A selection of different periods and parameters are shown. After selecting one of the given periods, it is shown using the default view.

Date/Time [date]	Conc 0 [Green Algae] [ $\mu\text{g/l}$ ]	Conc 1 [Bluegreen] [ $\mu\text{g/l}$ ]	Conc 2 [Diatoms] [ $\mu\text{g/l}$ ]
22.02.2007 15:27:25	0	1,34	
22.02.2007 15:27:34	0	1,43	
22.02.2007 15:27:40	0	1,41	
22.02.2007 15:27:47	0	1,37	
22.02.2007 15:27:53	0	1,45	
22.02.2007 15:28:00	0	1,4	
22.02.2007 15:28:06	0	1,34	
22.02.2007 15:28:13	0	1,35	
22.02.2007 15:28:20	0	1,38	
22.02.2007 15:28:26	0	1,42	
22.02.2007 15:28:35	0	1,3	
22.02.2007 15:28:41	0	1,47	
22.02.2007 15:28:48	0	1,4	
22.02.2007 15:28:54	0	1,33	
22.02.2007 15:29:01	0	1,46	
22.02.2007 15:29:08	0	1,39	
22.02.2007 15:29:14	0	1,37	

For further information about the parameters window, please see the chapter Parameters.

1. ... 2. ... 3. ...

Names of the last database files opened for quick reload.

#### Data Directory

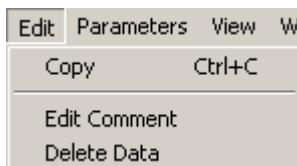
Opens the explorer with the current data directory to copy or rename the data base. This is the same function as in the start menu up to Windows 7.

#### Exit

Terminates the program.

## EDIT MENU

This menu contains commands to copy data/graphics from bbe++ and add them to the clipboard.



### Copy

The content of the active window will be copied to the clipboard. Depending on the type of the active window, this is either a graph or a table.

Tables can be pasted to EXCEL directly.

### HOW TO COPY DATA TO EXCEL:

Use “WINDOW → SELECT DATA” to select the data you want to copy to EXCEL. Use the list window type that contains all the columns to be exported. Please note: only the columns from the active view are exported.

Date/Time [date]	Conc 0 [Green Algae] [ $\mu\text{g/l}$ ]	Conc 1 [Bluegreen] [ $\mu\text{g/l}$ ]	Conc 2 [Diatoms] [ $\mu\text{g/l}$ ]	Conc 3 [Cryptophyta] [ $\mu\text{g/l}$ ]	Conc 4 [Chlorophyll a] [ $\mu\text{g/l}$ ]
15.06.2009 09:10:50	0	0,813	0	0,495	
15.06.2009 09:10:53	0	1,04	0	0	
15.06.2009 09:10:55	0	0	0	0	
15.06.2009 09:10:57	0	2,28	0	0	
15.06.2009 09:11:00	1,08	0,829	0	0	
15.06.2009 09:11:02	0	0,142	0	2,09	
15.06.2009 09:11:04	0,0475	0,956	0	0,908	
15.06.2009 09:11:07	0	0,932	0	0	
15.06.2009 09:11:09	0	1,2	0	0	
15.06.2009 09:11:12	0	0,74	0	0	
15.06.2009 09:11:14	0	0,561	0	0,936	
15.06.2009 09:11:16	0	0,698	0	0	
15.06.2009 09:11:19	0,945	0,779	0	0	
15.06.2009 09:11:21	0	0,804	0	0	
15.06.2009 09:11:23	3,35	0	0	0	
15.06.2009 09:11:26	1,07	0,488	0	0	
15.06.2009 09:11:28	0	0,261	0	2,03	
15.06.2009 09:11:31	1,52	0,227	0	0	
15.06.2009 09:11:33	0	1,1	0	0	
15.06.2009 09:11:35	0	1,58	0	1,97	
15.06.2009 09:11:38	5,41	0	0	0,883	
15.06.2009 09:11:40	3,26	0	2,18	0	
15.06.2009 09:11:42	0,792	0	2,82	0	
15.06.2009 09:11:45	0,22	0	1,22	0,05	

- click on “EDIT → COPY”
- open Excel with an empty datasheet
- click on “EDIT → PASTE” in Excel

	A	B	C	D	E
1	Date/Time	Conc 0 [Green Algae]	Conc 1 [Bluegreen]	Conc 2 [Diatoms]	Conc 3 [Cryptophyta]
2	date	μg/l	μg/l	μg/l	μg/l
3	15.06.2009 09:10	0	0,813	0	0,495
4	15.06.2009 09:10	0	1,04	0	0
5	15.06.2009 09:10	0	0	0	0
6	15.06.2009 09:10	0	2,28	0	0
7	15.06.2009 09:11	1,08	0,829	0	0
8	15.06.2009 09:11	0	0,142	0	2,09
9	15.06.2009 09:11	0,0475	0,956	0	0,908
10	15.06.2009 09:11	0	0,932	0	0
11	15.06.2009 09:11	0	1,2	0	0
12	15.06.2009 09:11	0	0,74	0	0
13	15.06.2009 09:11	0	0,561	0	0,936
14	15.06.2009 09:11	0	0,698	0	0
15	15.06.2009 09:11	0,945	0,779	0	0
16	15.06.2009 09:11	0	0,804	0	0
17	15.06.2009 09:11	3,35	0	0	0
18	15.06.2009 09:11	1,07	0,488	0	0
19	15.06.2009 09:11	0	0,261	0	2,03
20	15.06.2009 09:11	1,52	0,227	0	0
21	15.06.2009 09:11	0	1,1	0	0
22	15.06.2009 09:11	0	1,58	0	1,97
23	15.06.2009 09:11	5,41	0	0	0,883
24	15.06.2009 09:11	3,26	0	2,18	0
25	15.06.2009 09:11	0,792	0	2,82	0
26	15.06.2009 09:11	2,92	0	1,33	2,85
27	15.06.2009 09:11	6,68	0	0	1,54
28	15.06.2009 09:11	6,56	0	0,939	0,492
29	15.06.2009 09:11	0	0,111	1,16	0
30	15.06.2009 09:11	0	0,363	0	0,598
31	15.06.2009 09:11	4,4	0	0	1,77

Now the data can be used for all kinds off calculations within Excel.

### Edit Comment – advanced functionality only

To edit the comment of one or more datasets mark the datasets in the table view. A dataset can be marked with a mouse click. Multiple datasets can be marked be pressing Ctrl key while clicking on the dataset required.

Date/Time [date]	Comment	Green Algae [μg/l]	Bluegreen [μg/l]	Diatoms [μg/l]	Cryptophyta [μg/l]	#5 [μg/l]	Yellow substances [μg/l]	Total conc. [μg/l]
27.12.2011 08:41:23		0,33	1,87	0,00	0,00	0,00	0,00	2,20
27.12.2011 08:41:24		0,06	1,58	0,51	0,00	0,00	0,00	2,14
27.12.2011 08:41:24		0,07	1,59	0,00	0,00	0,00	0,00	1,65
27.12.2011 08:41:26		0,00	1,66	0,00	0,00	0,00	0,00	1,66
27.12.2011 08:41:29		0,00	2,37	0,00	0,00	0,00	0,20	2,37
27.12.2011 08:41:30		0,91	1,69	0,02	0,00	0,00	0,00	2,62
27.12.2011 08:41:34		0,00	0,00	0,38	0,82	0,00	0,00	1,20
27.12.2011 08:41:36		0,00	0,25	0,00	0,00	0,00	1,47	0,25
27.12.2011 08:41:39		0,00	0,62	0,00	1,29	0,00	0,00	1,91
27.12.2011 08:41:41		0,00	3,86	0,00	1,24	0,00	0,57	5,10
27.12.2011 08:41:50		0,00	0,00	0,00	2,26	0,00	0,00	2,26
27.12.2011 08:41:51		0,00	0,00	0,00	4,87	0,00	0,00	4,87
27.12.2011 08:41:57		0,11	0,00	2,64	0,46	0,00	0,00	3,21
27.12.2011 08:41:58		0,24	0,00	2,67	0,13	0,00	0,27	3,04
27.12.2011 08:41:59		1,34	0,00	2,64	0,00	0,00	0,00	3,98
27.12.2011 08:41:59		0,00	0,68	3,78	0,00	0,00	0,09	4,46
27.12.2011 08:41:59		1,23	0,00	1,60	1,23	0,00	0,00	4,05
27.12.2011 08:42:00		2,90	0,00	1,36	0,00	0,00	0,09	4,26
27.12.2011 08:42:00		0,95	0,00	2,92	0,14	0,00	0,14	4,01
27.12.2011 08:42:01		0,38	0,00	3,08	0,00	0,00	0,51	3,46
27.12.2011 08:42:01		0,48	0,00	3,57	0,00	0,00	0,00	4,05
27.12.2011 08:42:01		1,63	0,00	2,79	0,00	0,00	0,00	4,43
27.12.2011 08:42:02		0,71	0,00	3,36	0,36	0,00	0,00	4,43
27.12.2011 08:42:02		1,51	0,00	3,02	0,00	0,00	0,00	4,54
27.12.2011 08:42:03		1,53	0,00	2,92	0,00	0,00	0,21	4,45

Go to Edit → Edit comments or use right click on the marked datasets:

0,07	1,59
0,00	1,66
0,00	2,37
	1,69
History of Parameters	1,69
Edit Comment	0,00
Delete Data	0,25
Data Fields Selection	0,62
u,uu	3,86
0,00	0,00
0,00	0,00
0,11	0,00

Enter the new comment for the selected data:

Date/Time [date]	Comment	Green Algae [µg/l]	Bluegreen [µg/l]	Diatoms [µg/l]	Cryptophyta [µg/l]	#5 [µg/l]	Yellow substances [µg/l]	Total conc. [µg/l]	Transmission
27.12.2011 08:41:23		0,33	1,87	0,00	0,00	0,00	0,00	2,20	9
27.12.2011 08:41:24		0,06	1,58	0,51	0,00	0,00	0,00	2,14	9
27.12.2011 08:41:24		0,07	1,59	0,00	0,00	0,00	0,00	1,65	9
27.12.2011 08:41:26		0,00	1,66	0,00	0,00	0,00	0,00	1,66	1C
27.12.2011 08:41:29		0,00	2,37	0,00	0,00	0,00	0,20	2,37	9
27.12.2011 08:41:30		0,91	1,69	0,02	0,00	0,00	0,00	2,62	9
27.12.2011 08:41:34		0,00	0,00	0,38	0,82	0,00	0,00	1,20	9
27.12.2011 08:41:36		0,00	0,25	0,00	0,00	0,00	1,47	0,25	1C
27.12.2011 08:41:39									1C
27.12.2011 08:41:41									9
27.12.2011 08:41:50									1C
27.12.2011 08:41:51									9
27.12.2011 08:41:57									1C
27.12.2011 08:41:58									1C
27.12.2011 08:41:59									1C
27.12.2011 08:41:59									1C
27.12.2011 08:42:00		2,90	0,00	1,36	0,00	0,00	0,09	4,26	1C
27.12.2011 08:42:00		0,95	0,00	2,92	0,14	0,00	0,14	4,01	1C
27.12.2011 08:42:01		0,38	0,00	3,08	0,00	0,00	0,51	3,46	1C
27.12.2011 08:42:01		0,48	0,00	3,57	0,00	0,00	0,00	4,05	1C
27.12.2011 08:42:01		1,63	0,00	2,79	0,00	0,00	0,00	4,43	1C
27.12.2011 08:42:02		0,71	0,00	3,36	0,36	0,00	0,00	4,43	1C
27.12.2011 08:42:02		1,51	0,00	3,02	0,00	0,00	0,00	4,54	1C
27.12.2011 08:42:03		1,53	0,00	2,92	0,00	0,00	0,21	4,45	1C

Click OK:

Date/Time [date]	Comment	Green Algae [µg/l]	Bluegreen [µg/l]	Diatoms [µg/l]	Cryptophyta [µg/l]	#5 [µg/l]	Yellow substances [µg/l]	Total conc. [µg/l]
27.12.2011 08:41:23	This is the new comm...	0,33	1,87	0,00	0,00	0,00	0,00	2,20
27.12.2011 08:41:24	This is the new comm...	0,06	1,58	0,51	0,00	0,00	0,00	2,14
27.12.2011 08:41:24	This is the new comm...	0,07	1,59	0,00	0,00	0,00	0,00	1,65
27.12.2011 08:41:26	This is the new comm...	0,00	1,66	0,00	0,00	0,00	0,00	1,66
27.12.2011 08:41:29	This is the new comm...	0,00	2,37	0,00	0,00	0,00	0,20	2,37
27.12.2011 08:41:30	This is the new comm...	0,91	1,69	0,02	0,00	0,00	0,00	2,62
27.12.2011 08:41:34	This is the new comm...	0,00	0,00	0,38	0,82	0,00	0,00	1,20
27.12.2011 08:41:36	This is the new comm...	0,00	0,25	0,00	0,00	0,00	1,47	0,25
27.12.2011 08:41:39	This is the new comm...	0,00	0,62	0,00	1,29	0,00	0,00	1,91
27.12.2011 08:41:41	This is the new comm...	0,00	3,86	0,00	1,24	0,00	0,57	5,10
27.12.2011 08:41:50		0,00	0,00	0,00	2,26	0,00	0,00	2,26
27.12.2011 08:41:51		0,00	0,00	0,00	4,87	0,00	0,00	4,87
27.12.2011 08:41:57		0,11	0,00	2,64	0,46	0,00	0,00	3,21
27.12.2011 08:41:58		0,24	0,00	2,67	0,13	0,00	0,27	3,04
27.12.2011 08:41:59		1,34	0,00	2,64	0,00	0,00	0,00	3,98
27.12.2011 08:41:59		0,00	0,68	3,78	0,00	0,00	0,09	4,46
27.12.2011 08:41:59		1,23	0,00	1,60	1,23	0,00	0,00	4,05
27.12.2011 08:42:00		2,90	0,00	1,36	0,00	0,00	0,09	4,26
27.12.2011 08:42:00		0,95	0,00	2,92	0,14	0,00	0,14	4,01
27.12.2011 08:42:01		0,38	0,00	3,08	0,00	0,00	0,51	3,46
27.12.2011 08:42:01		0,48	0,00	3,57	0,00	0,00	0,00	4,05
27.12.2011 08:42:01		1,63	0,00	2,79	0,00	0,00	0,00	4,43
27.12.2011 08:42:02		0,71	0,00	3,36	0,36	0,00	0,00	4,43
27.12.2011 08:42:02		1,51	0,00	3,02	0,00	0,00	0,00	4,54
27.12.2011 08:42:03		1,53	0,00	2,92	0,00	0,00	0,21	4,45

#### Delete Data – advanced functionality only

To delete data, mark the datasets as described above.

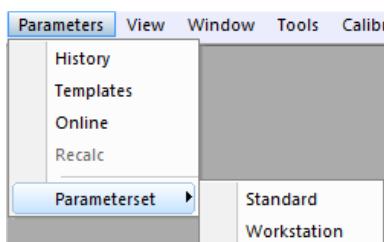
Go to “EDIT → DELETE DATA” or use right click on the marked datasets:

0,07	1,59
0,00	1,66
0,00	2,37
	1,69
History of Parameters	
Edit Comment	0,00
Delete Data	0,25
Data Fields Selection	0,62
u,uu	3,86
0,00	0,00
0,00	0,00
0,11	0,00

Click OK to delete the data.



## PARAMETERS MENU



Item	Function	Available for
History	Display parameters of datasets stored in the database	All instruments
Template	Apply a user-defined selection of parameters to an instrument	All but AlgaeTorch and BenthoTorch
Online	Display and change parameters in the instruments	All but AlgaeTorch and BenthoTorch
Recalc	Recalculate the datasets in the database with another set of calibration parameters	All but AlgaeTorch and BenthoTorch
Parameterset	Select a parameter set from the ones stored in the instrument – see description below.	PhycoProbe with parameter sets

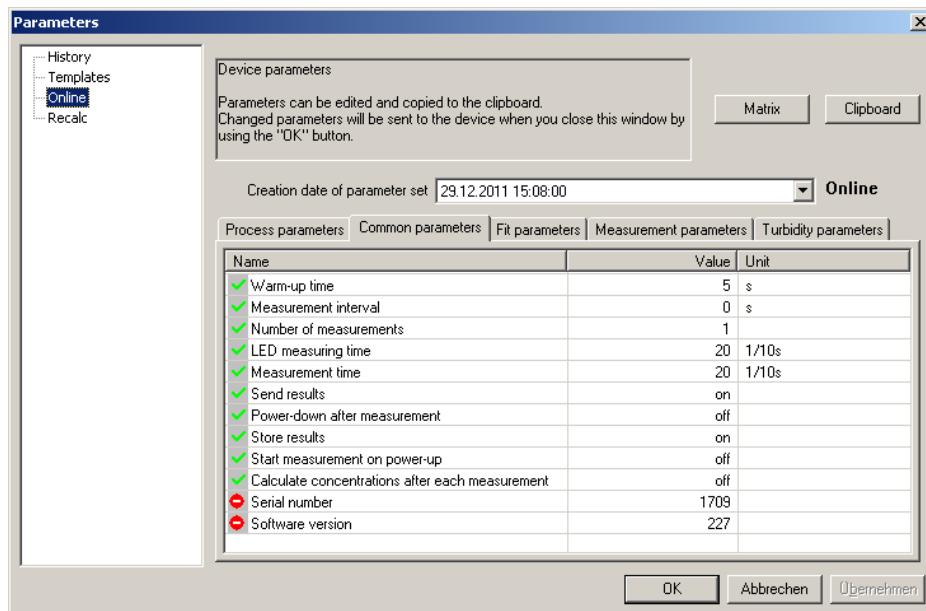
The first 4 selections in the menu lead to one tab of the Parameters window.

**Please note:**

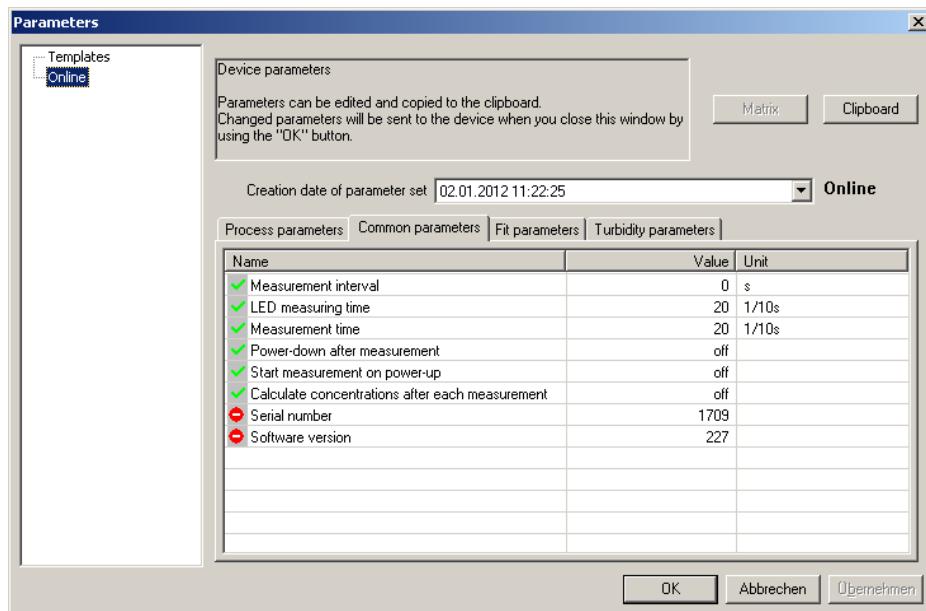
**Only parameters of the current type of instrument are shown.**

**It depends on the user level, whether a parameter is shown or not. The higher the user level, the more parameters are shown.**

For example of parameter listings for user levels, please see the examples below.  
Access level “advanced functionality”:

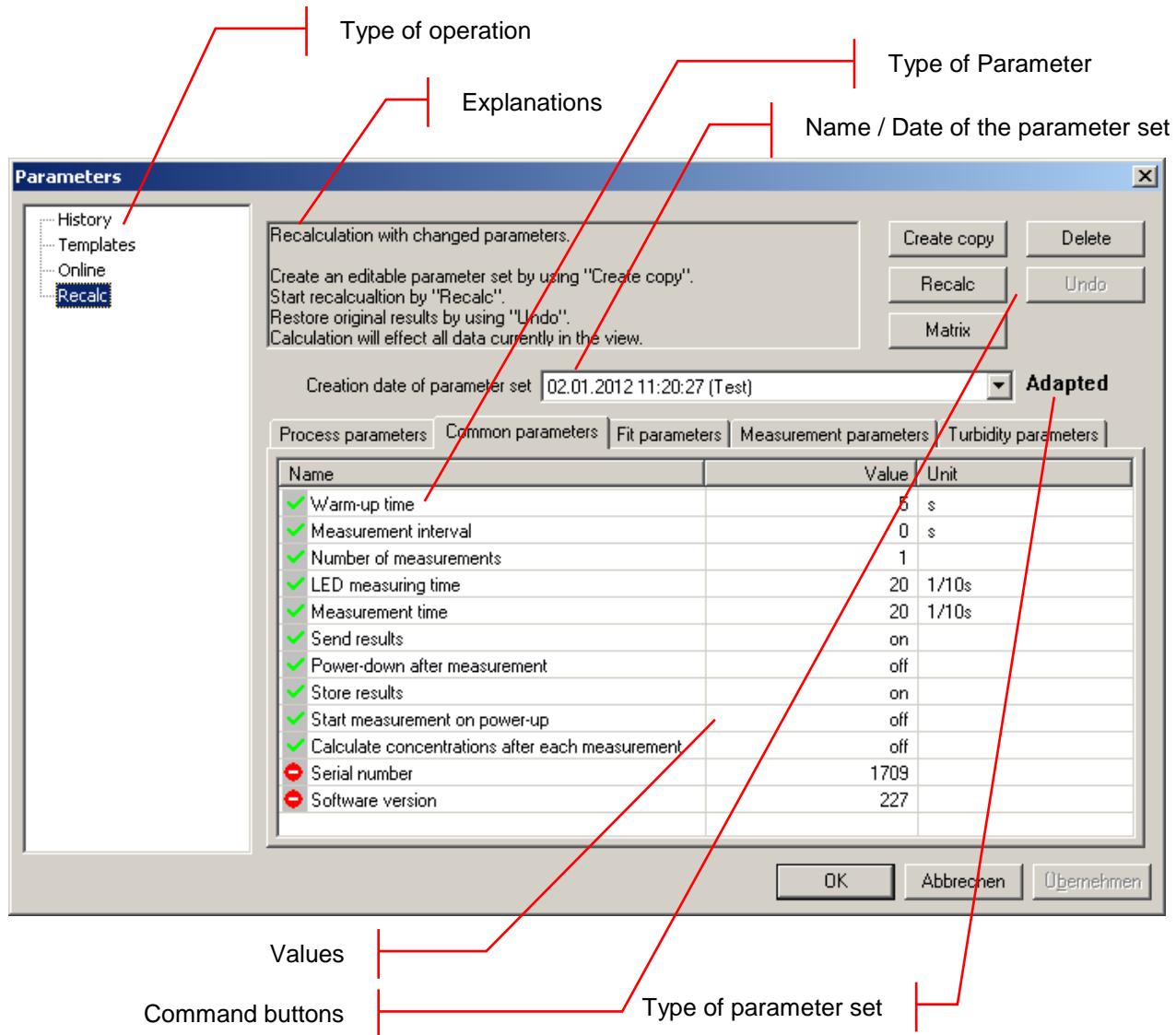


Access level “User”:



Depending on the parameters and on the access level, the parameters are read only or read and write .

## Overview



### TYPE OF OPERATION

The selection of the type of operation corresponds to the commands in the menu. Depending on the selection, different types of operations can be done.

### EXPLANATIONS

Gives a short introduction to what can be done.

### BUTTONS

Export: exports the current parameter set to another database for recalculation

Clipboard: copies the current parameter set to the clipboard to paste it into another application such as Office Word or Excel etc.

Upload: sends the parameters to the connected instrument

Matrix: shows all the calibration parameters of the connected instrument in one window.

### NAME OF PARAMETER SET

Each set of parameters can be identified by its time and date. Edited parameter sets or templates have an additional name given by the user.

**TYPE OF PARAMETER**

Each tab shows the parameters of a specific topic.

**VALUES**

Shows the current values of the parameters. Depending on the type of operation the value can be edited.

**TYPE OF PARAMETER SET**

Indicates the type of parameter set:

Original: this parameter set has been used originally for a measurement, it cannot be deleted.

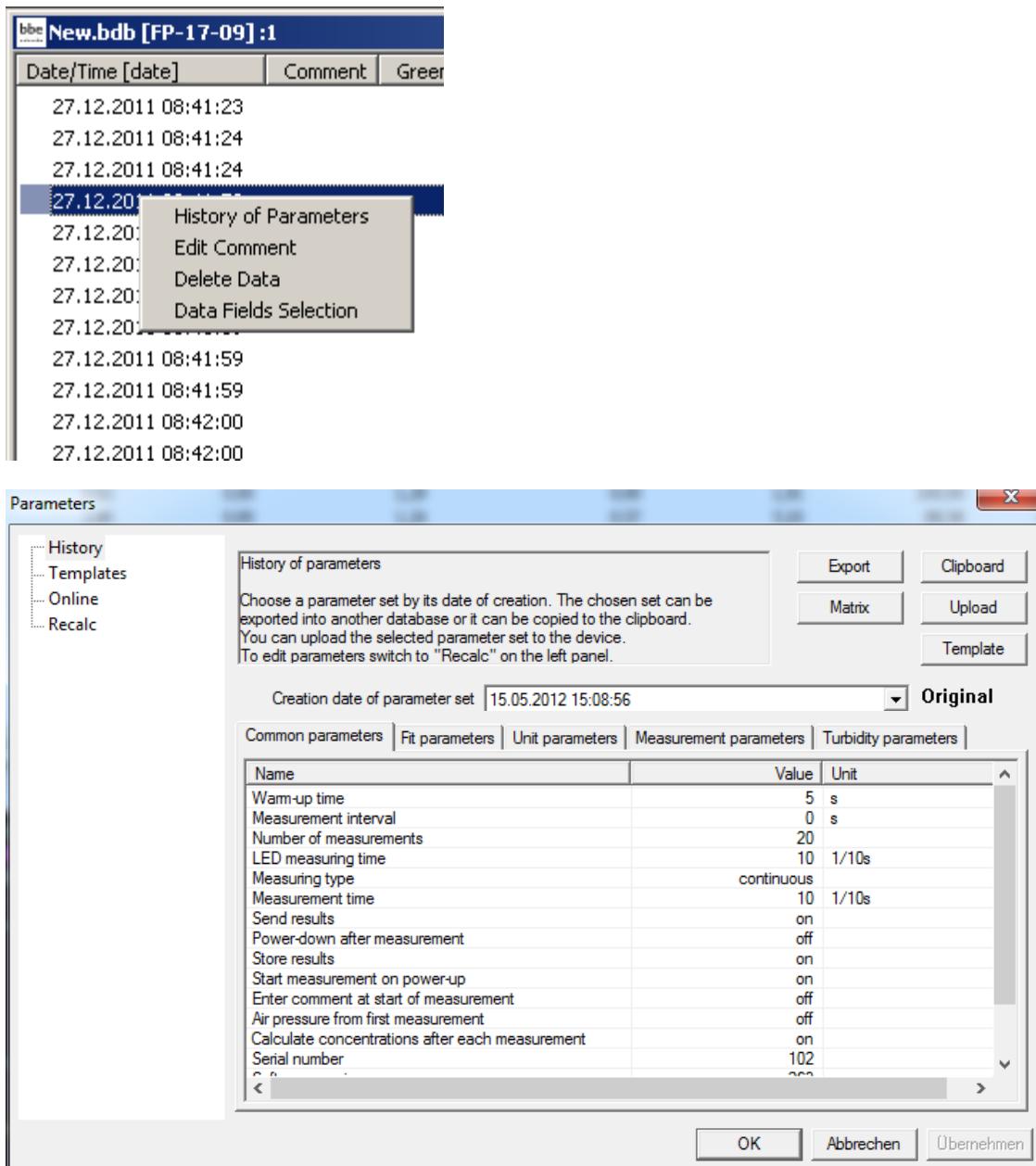
Adapted: this is a parameter set has been adapted by the user, it can be used to recalculate the datasets.

Shows the current values of the parameters. Depending on the type of operation the value can be edited.

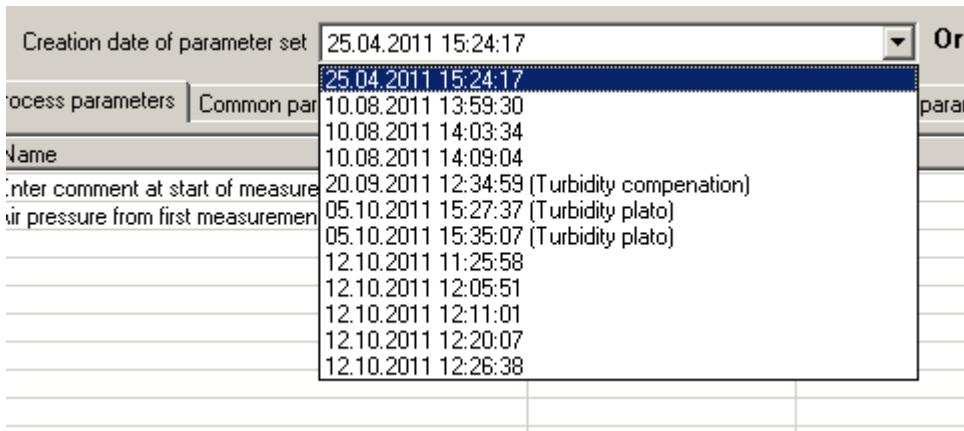
**History – advanced functionality only**

Displays the parameters of the active dataset.

The history is also available on the Context Menu in table view:



All parameter sets in the database can be displayed. To choose one parameter set, select the date from the drop-down box:



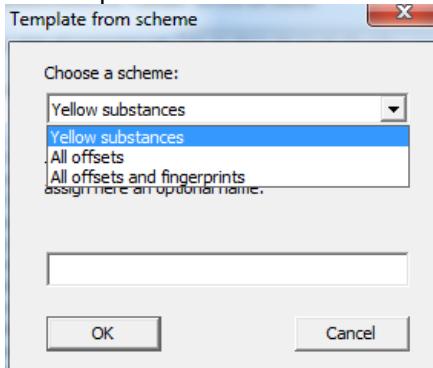
#### TEMPLATE BUTTON

The „Template“ button is used to generate a new template from the current parameter set using different schemes. A scheme is a predefined selection of parameter – for example all the fingerprints. The parameter of the selection will be copied to a new template. Parameters that are not in the scheme will not be copied.

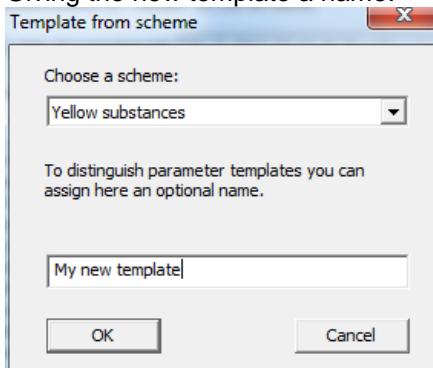
This is more convenient, than entering the parameter to a new template by hand.

The new template can be edited as any template.

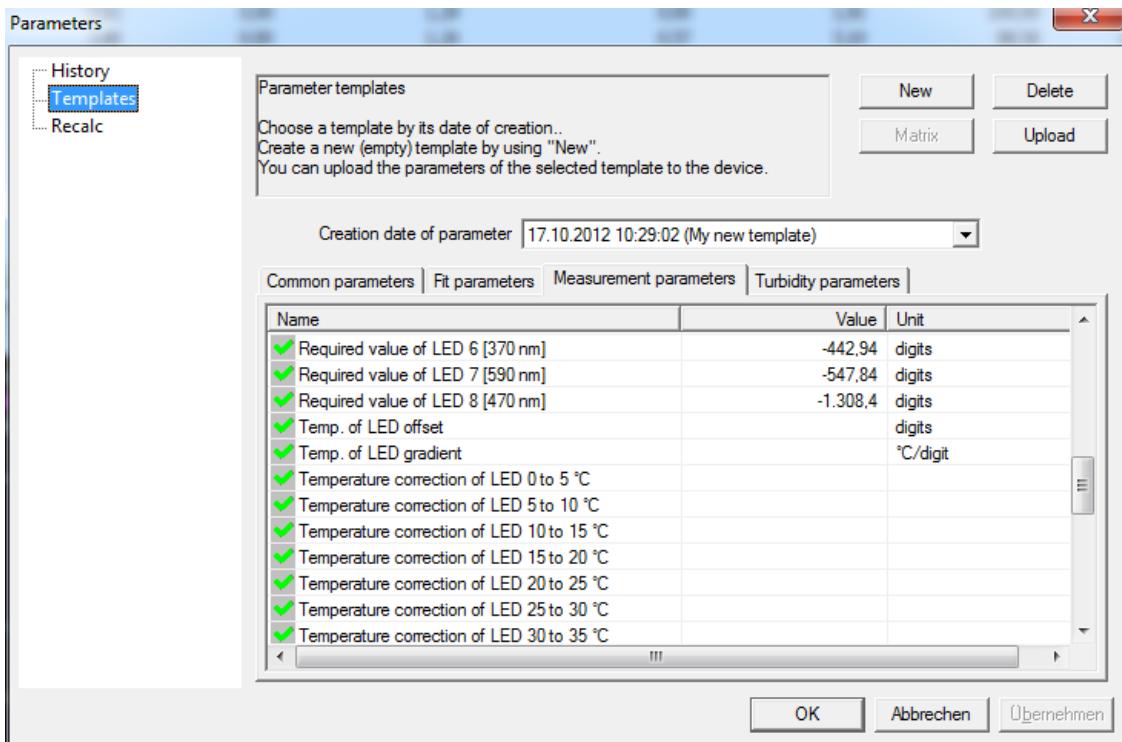
First step is to choose the scheme with the selection of parameters.



Giving the new template a name:

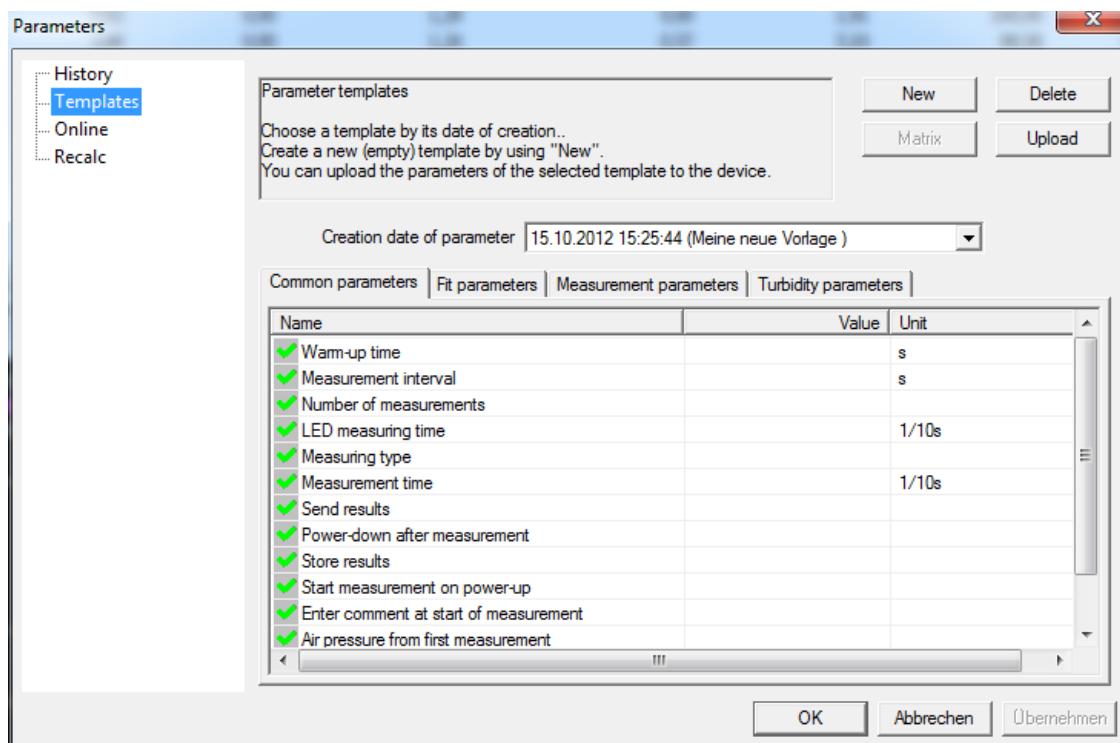


Afterwards the new template can be displayed and edited. It can be used as any other template.



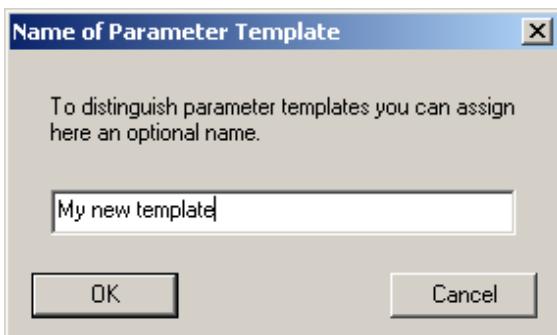
## Templates

The purpose of parameter templates is to store a partial set of parameters (for example offsets or measuring times or air pressure handling) in one set. This makes it easy to apply different setting to an instrument, depending on the location.



**CREATE A NEW TEMPLATE**

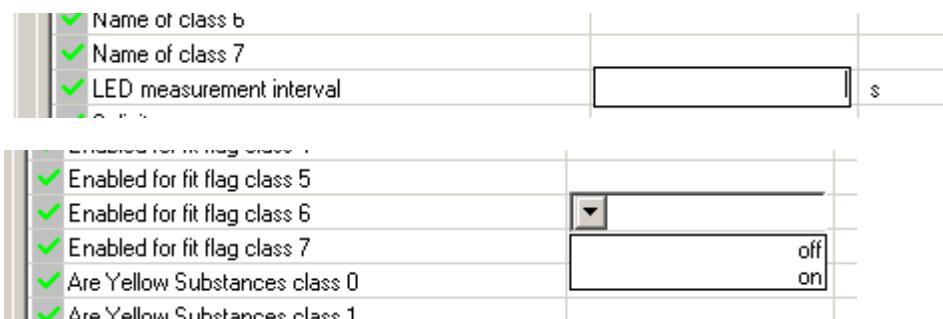
Click new, all parameters of the current user-level are shown and empty. To change an entry, double click on the value box. When entering the first value, a name for the parameter set is requested:



The name and date is shown in the headline of the table:



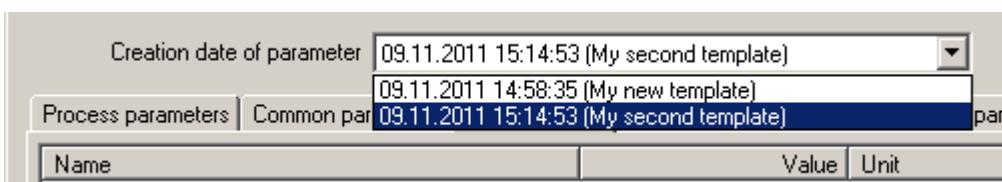
Depending on the type of parameter, either an input box or a drop-down box is used:



Click OK to store the template.

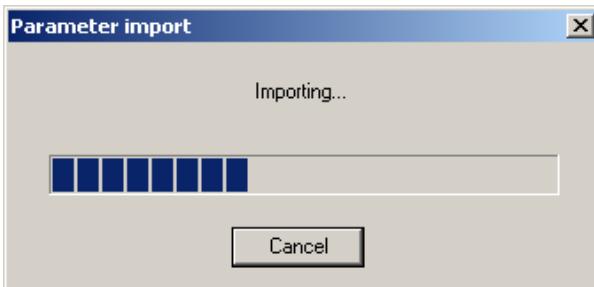
**UPLOAD A TEMPLATE**

1. connect the instrument to the PC ("TOOLS → CONNECT COM PORT")
2. go to "PARAMETER→ TEMPLATES"
3. select the template from the drop-down box:



4. Click "UPLOAD":

bbe++ loads all the parameters from the instrument:



and sends the changed parameters back to the instrument.



All parameters not defined in the template will not be overwritten in the instrument.

#### DELETE A TEMPLATE

- select the template to be deleted
- click delete

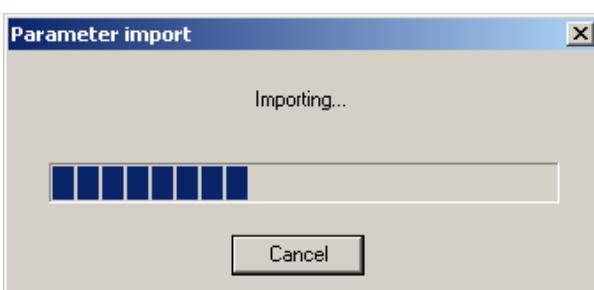
#### Online

The section "Online" is used to change the parameters of the instrument.

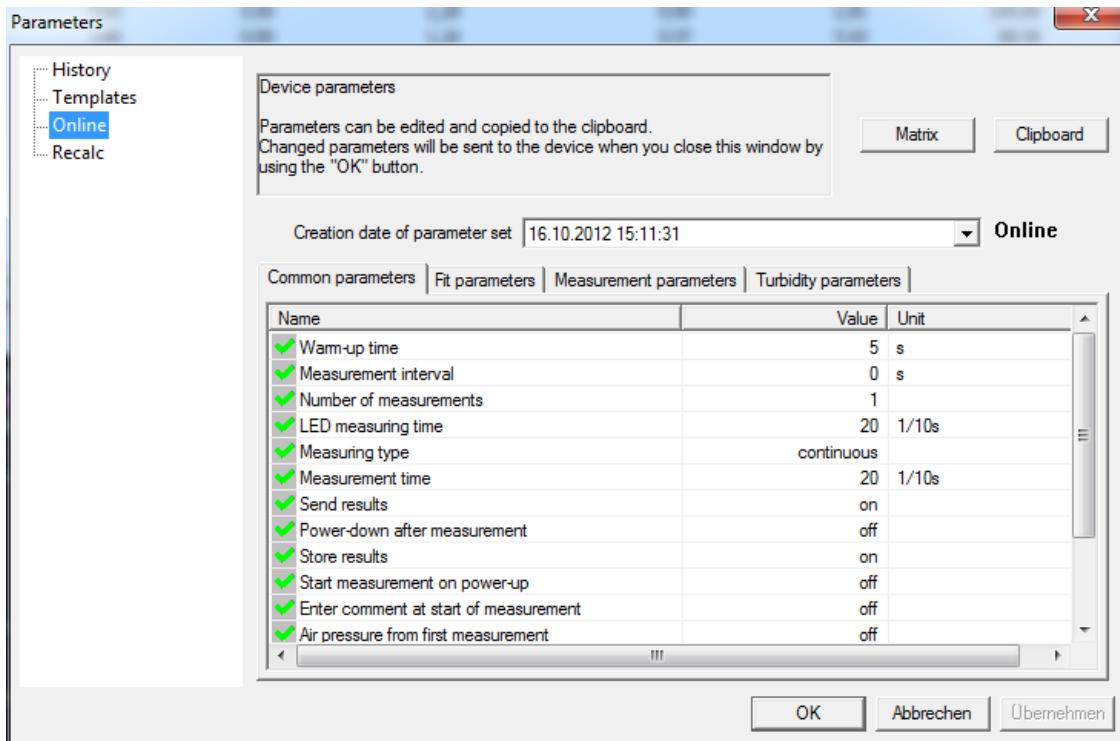
This item is available as soon as an instrument is connected.

1. connect the instrument to the PC ("TOOLS → CONNECT COM PORT")
2. go to "PARAMETERS → ONLINE"

bbe++ loads all the parameters from the instrument:



The parameters are shown:

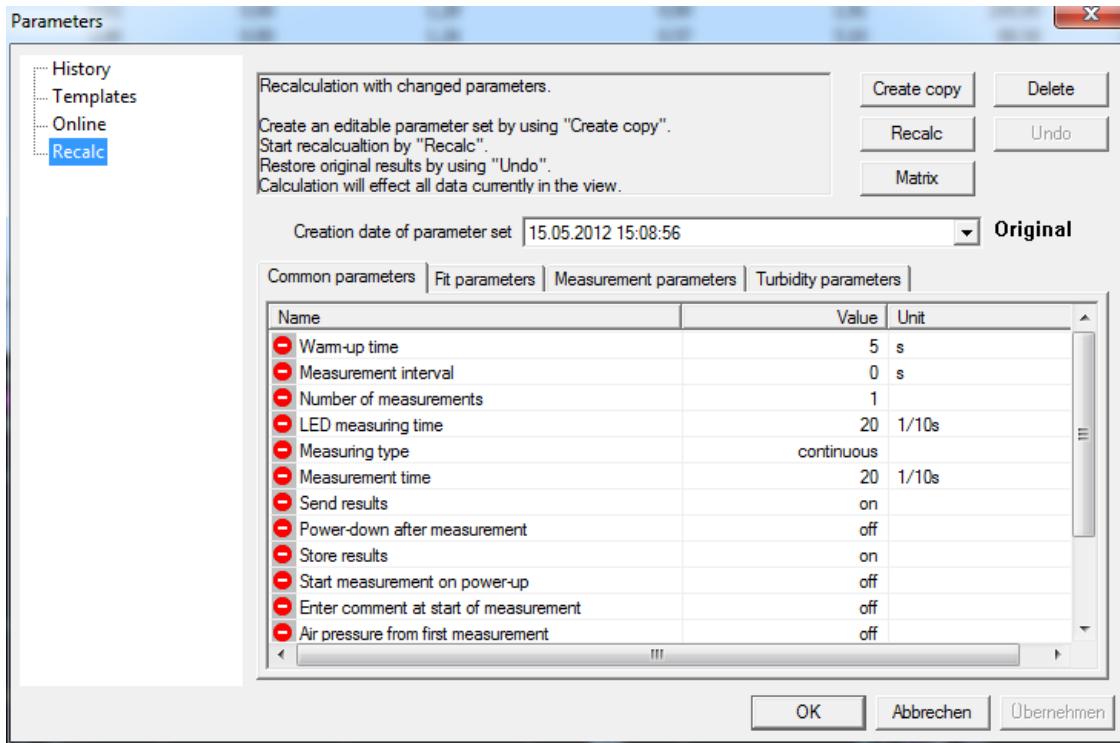


3. change the parameters as described in the “Template” section.
4. click OK to upload the new parameters
5. Use the “clipboard” button to copy all the parameters to the clipboard and paste it into EXCEL for example:

	A	B	C	D	E	F
1	Date: 09.11.2011 15:52:32					
2	Device: FP-17-09					
3						
4						
5	Process parameters					
6						
7	Name	Value	Unit			
8	Enter comment at start of measurement	on				
9	Air pressure from first measurement	off				
10						
11						
12	Common parameters					
13						
14	Name	Value	Unit			
15	Measurement interval	0	s			
16	LED measuring time	20	1/10s			
17	Measurement time	20	1/10s			
18	Power-down after measurement	off				
19	Start measurement on power-up	off				
20	Serial number	1709				
21	Software version	227				
22						
23						
24	Fit parameters					
25						
26	Name	Value	Unit			
27	Enabled for fit flag Green Algae	on				
28	Enabled for fit flag Bluegreen	on				
29	Enabled for fit flag Diatoms	on				
30	Enabled for fit flag Cryptophyta	on				
31	Enabled for fit flag sdsds#4	off				
32	Enabled for fit flag #5	off				
33	Enabled for fit flag #6	off				
34	Enabled for fit flag Yellow substances	on				
35	Date of calibration	21.11.2007				
36						
37						
38	Turbidity parameters					
39						
40	Name	Value	Unit			
41	Turbidity compensation	off				

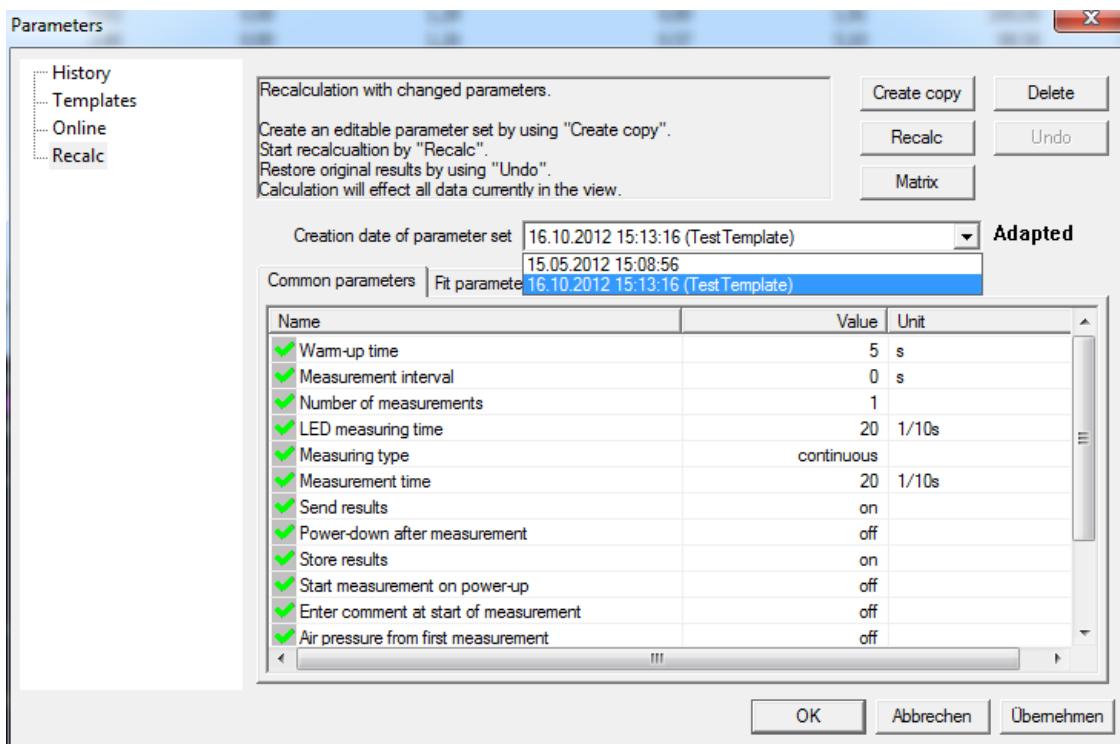
### Recalc – advanced functionality only

The recalculation option is available in all instruments except for the AlgaeTorch. For the BenthоТorch the recalculation is limited to the recalculation by using another parameter set from the BenthоТorch. Editing of the parameter sets and templates are not available for the BenthоТorch.

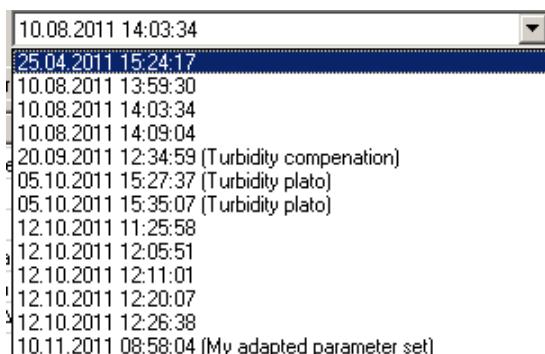


To change the settings and recalculate the results, the following steps have to be executed:

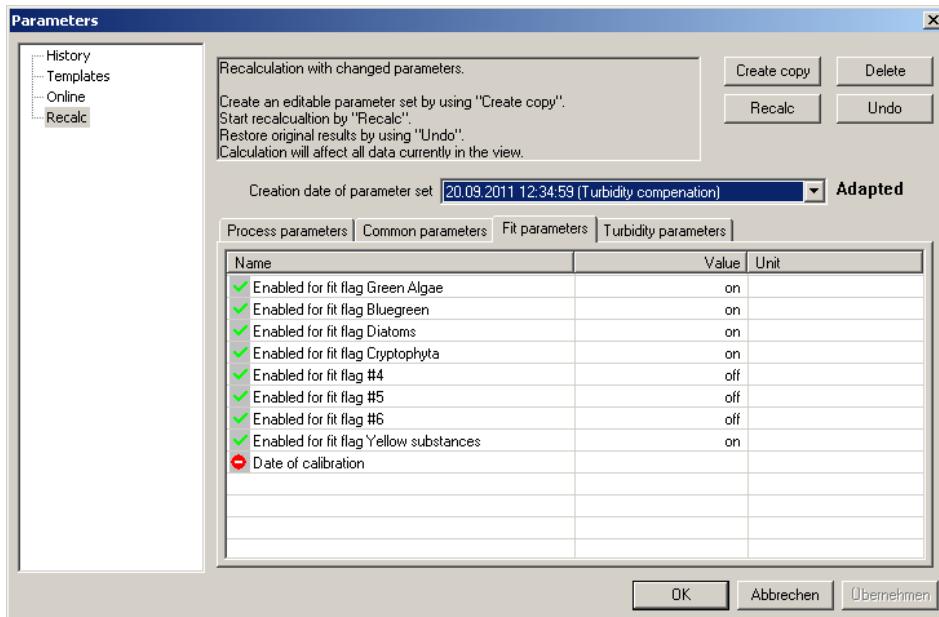
1. Select the instrument and time period ("WINDOW → SELECT DATA").
2. Go to "PARAMETERS → RECALC"
3. Select a new dataset from the dropdown box or create a new one by editing a copy. Please note: only copies of an original parameter set can be edited. These sets are marked with "adapted".



4. To create a new parameter set (not in the BenthоТorch), select one, click "CREATE COPY" and enter a name for this parameter set.



5. Select the new parameter set and edit the settings as described in the "Template" section. Please note the number and type of parameters shown depends on the user-level. Only the parameters marked with the green symbol can be changed.



6. Click "APPLY" to store the changes in the new parameter set.
7. Click "RECALC" to recalculate the data with the new parameters.
8. Recalculated data sets are marked in table view at the beginning of each line:

bbe bbe++.bdb [FP-19-01]:1		
Date/Time [date]	Comment	Gr
12.10.2011 11:25:14	0	
12.10.2011 11:25:36		
12.10.2011 11:25:58		

#### RESTORE DATA WITH ORIGINAL PARAMETERS

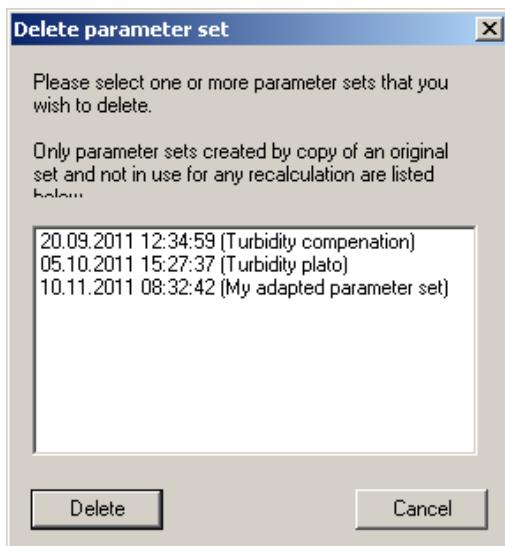
The original data of the measurement is not deleted by the recalculation. It is always possible to see the results calculated with the parameters valid when the measurement was taken.

To restore the original data:

1. Select the instrument and time period ("WINDOW → SELECT DATA")
2. Go to "PARAMETERS → RECALC"
3. Click "UNDO". Please note: This item is only available when recalculated data are available in the selected time period.

### DELETE ADAPTED PARAMETER SETS

To delete adapted parameter sets click “DELETE”. All unused parameter sets will be shown. Parameter sets that are in use cannot be deleted.



Select the parameter sets to be deleted and click “DELETE”.

### Parameter set

In PhycoProbes with software version 2.65 and above it is possible to store more than one set of parameters. This makes it easy to change parameter sets for using the instrument for profiling purposes or in the bbe workstation 25.

Please select the required set before starting the measurement.

The name of the parameter set is stored together with the parameter and can be looked up in the common parameters.

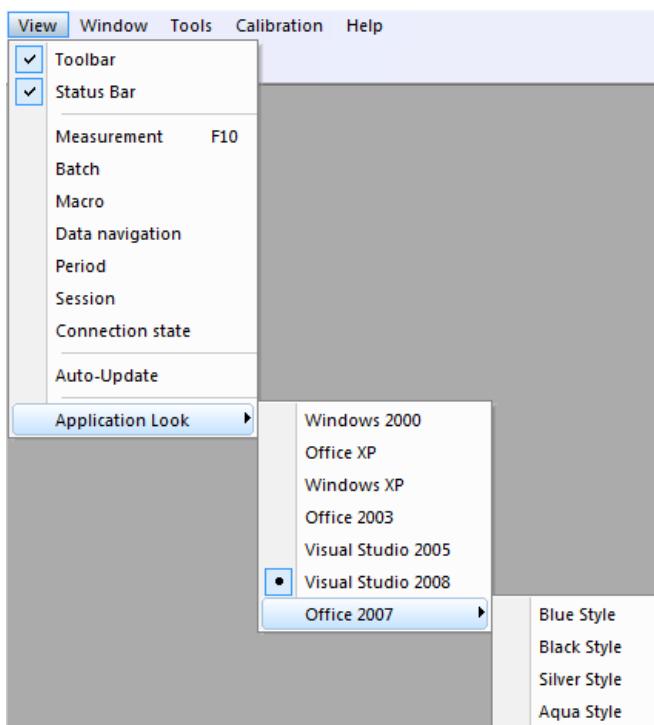
#### **Please note:**

Any changes in the parameter like changing the measuring time or applying a new calibration is stored in the current parameter set. All other parameter sets will not be affected.

In case of no available named parameter set in the PhycoProbe, this item is not available.

To add a named parameter set, please contact bbe service.

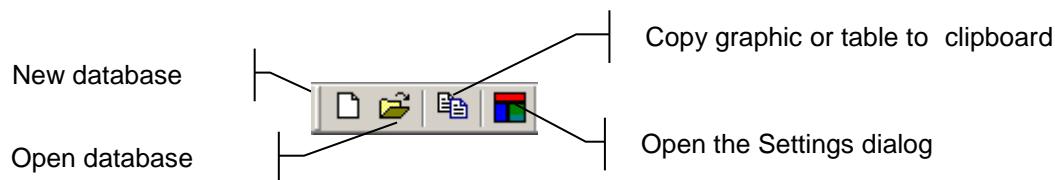
## VIEW MENU



### Toolbar

Displays or hides the toolbar.

The toolbar allows quick access to some important instructions:



### Status Bar

Displays or hides the status bar.

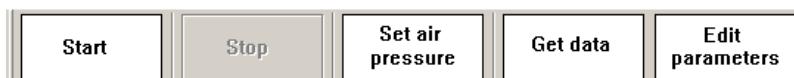


### Measurement

Displays / hides the measurement toolbar.

The toolbar "Measurement" is different for each type of instrument. It allows quick access to functions such as starting and stopping the measurement or retrieving the parameters.

The measurement toolbar of the PhycoProbe is given here as an example:



## Macro

The toolbar “Macro” contains buttons to access to the user-defined view macros. For details, please see the chapter “TOOLS” → “SETTINGS” → “MACRO MANAGER”.



For the grey buttons, no macro has been defined.

## Data Navigation

The toolbar “Data navigation” contains buttons to navigate within the data. “One page” corresponds to the time scale of the Concentration vs. Time graphs.



- ◆ go to the first dataset
- ◆ one page backwards
- ◆ one page forwards
- ◆ go to the last dataset

## Period

The toolbar “Period” contains buttons to scale the time axes to a given value:



- ◆ 1 hour
- ◆ 6 hours
- ◆ 1 day
- ◆ 7 days

## Session

The toolbar “Session” contains buttons to navigate from one measurement to another. One measurement is defined as a number of consecutive data sets that do not differ in the point of measurement by more than a given value. This value can be set in “TOOLS” → “SETTINGS” → “DISPLAY”.



## Connection State

The toolbar “Connection state” shows the status of the connection to the connected instrument:



The colour indicates the status:

- |                   |   |
|-------------------|---|
| Black:            | Not connected, the PC has not tried to establish a connection |
| Yellow, blinking: | Not connected, the PC is trying to establish a connection     |
| Green:            | Connected   |

To open the COM port setting click the connection state button

### Auto-Update

If auto-update is activated and a new data-set is generated during the measurement, this data-set is shown in the graphic or list window. If the displayed period does not contain this current point in time, the displayed period is changed automatically, so that the latest data-set is shown.

If auto-update is deactivated, the displayed period does not change. This is useful when doing data analysis during the measurement.

### Application look

Changes the style of the application

## Window – Advanced functionality only

This menu contains commands to show, arrange and edit different views to display the data.



### New Table Window

Opens a new window and displays the data according to the selected window type.



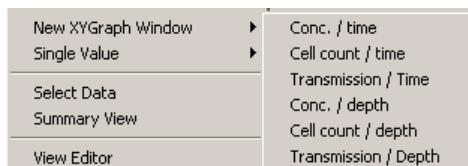
(See below)

Please see the list window "Concentration" of an AlgaeTorch as an example.

bbe bbe++ .bdb [AT-04-002] :4				
Date/Time [date]	Cyano [µg/l]	Conc Total [µg/l]	Turbidity [FTU]	Depth [
07.04.2010 11:33:33	36,1	77,5	0	
07.04.2010 11:33:47	35,8	76,9	0	
07.04.2010 11:34:02	35,8	76,9	0	

### New XYGraph Window

Opens a new window and displays the data according to the selected window type.

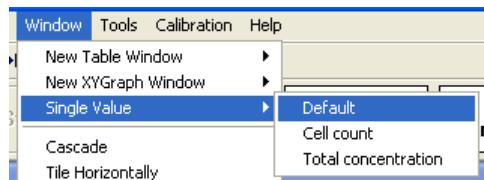


There are some view types pre-defined for each instrument. It is also possible to add new window types by using the view editor.

The following diagram shows the development of different algae classes measured with the bbe PhycoProbe.

### New Single Value View

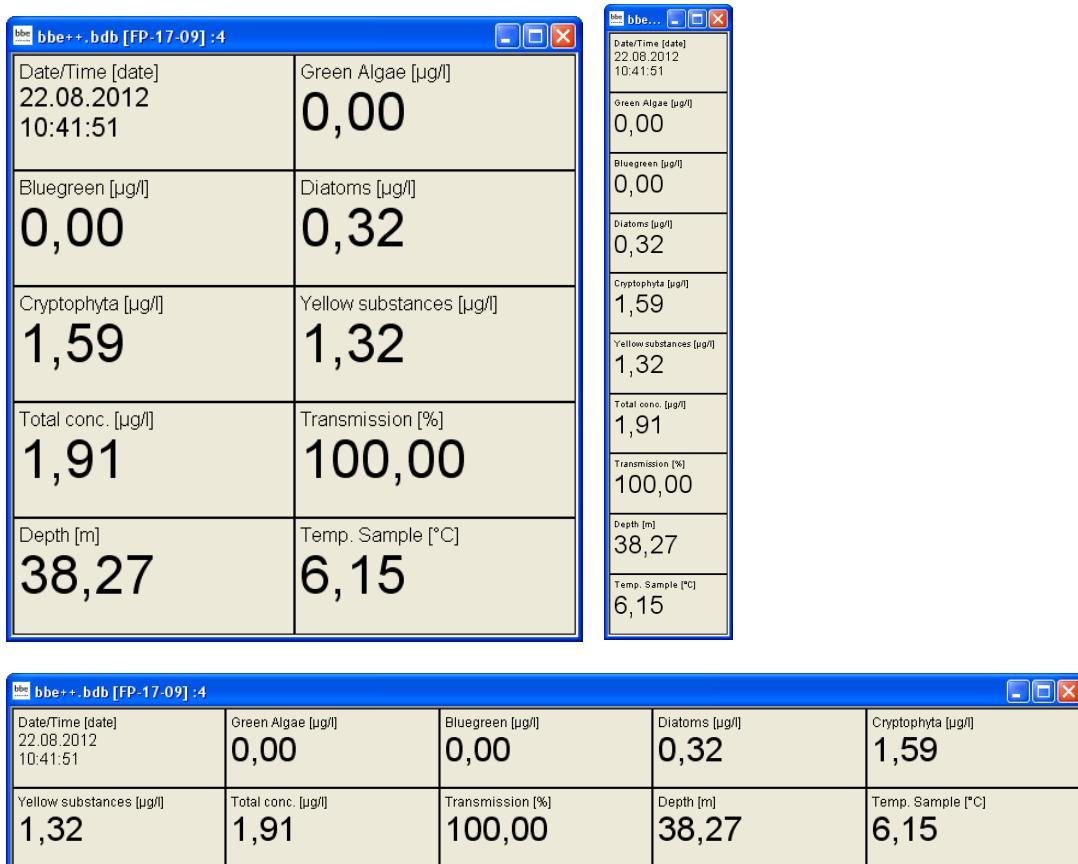
Opens a new window and displays the data of one data-set according to the selected window type.



The data-set is shown in larger digits to help the user read the display even in bright sunlight. The latest data-set is shown.

bbe bbe++.bdb [FP-17-09] :4		
Date/Time [date] 22.08.2012 10:41:51	Green Algae [ $\mu\text{g/l}$ ] <b>0,00</b>	Bluegreen [ $\mu\text{g/l}$ ] <b>0,00</b>
Diatoms [ $\mu\text{g/l}$ ] <b>0,32</b>	Cryptophyta [ $\mu\text{g/l}$ ] <b>1,59</b>	Yellow substances [ $\mu\text{g/l}$ ] <b>1,32</b>
Total conc. [ $\mu\text{g/l}$ ] <b>1,91</b>	Transmission [%] <b>100,00</b>	Depth [m] <b>38,27</b>
Temp. Sample [°C] <b>6,15</b>		

The “Single Value View” can be adapted to the screen by changing size and/or proportion of the window:



### Cascade

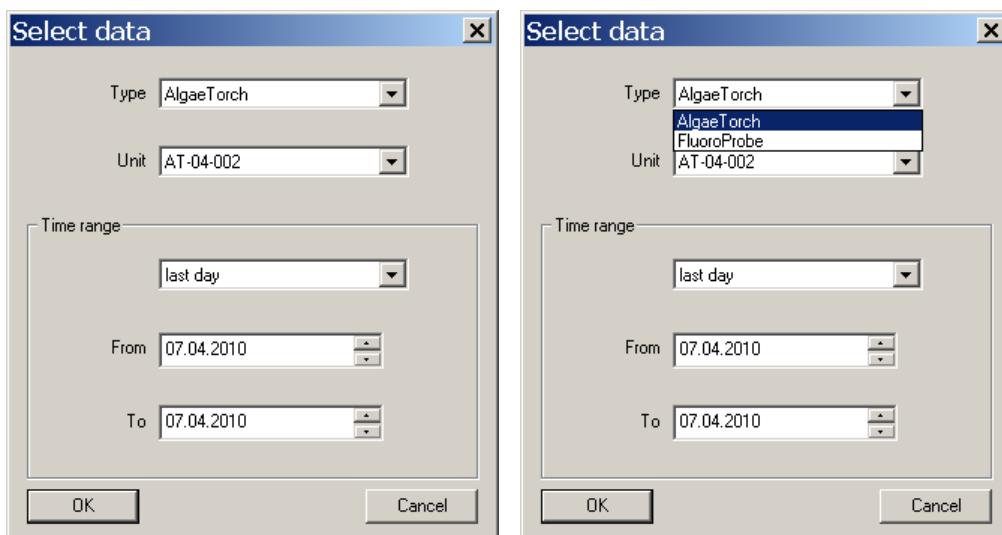
Arranges the windows one behind the other.

### Tile Horizontally/Vertically

Initiates the organization of the screen into mutually non-overlapping frames.

### Select Data

The “Select Data” window can be used to select data of a specific instrument and a specific time range from the current database.



Type: shows the types of instruments available in this database.  
 Unit: shows the serial numbers of the type of instruments chosen above available in this database.

TIME RANGE

Selects the time range of data to be selected. It is possible to select a fixed time range such as "last month" or to do a manual selection by entering a range FROM "date" To "date".

**Hint: Further selections can also easily be made in a graphic window.**



After selecting the time range, the data is shown in the default view.

Date/Time [date]	Conc 0 [Green Algae] [ $\mu\text{g/l}$ ]	Conc 1 [Bluegreen] [ $\mu\text{g/l}$ ]	Conc 2 [Diatoms] [ $\mu\text{g/l}$ ]
22.02.2007 15:27:25	0	1,34	
22.02.2007 15:27:34	0	1,43	
22.02.2007 15:27:40	0	1,41	
22.02.2007 15:27:47	0	1,37	
22.02.2007 15:27:53	0	1,45	
22.02.2007 15:28:00	0	1,4	
22.02.2007 15:28:06	0	1,34	
22.02.2007 15:28:13	0	1,35	
22.02.2007 15:28:20	0	1,38	
22.02.2007 15:28:26	0	1,42	
22.02.2007 15:28:35	0	1,3	
22.02.2007 15:28:41	0	1,47	
22.02.2007 15:28:48	0	1,4	
22.02.2007 15:28:54	0	1,33	
22.02.2007 15:29:01	0	1,46	
22.02.2007 15:29:08	0	1,39	
22.02.2007 15:29:14	0	1,37	

View Editor

The View Editor is used to generate your own table or graphic window type as well as a template for the export to text files. The View Editor is an assistant that leads through the whole process.

When starting the View Editor, the current view is selected automatically to be edited or used as a template for a new view. Other views may be selected.

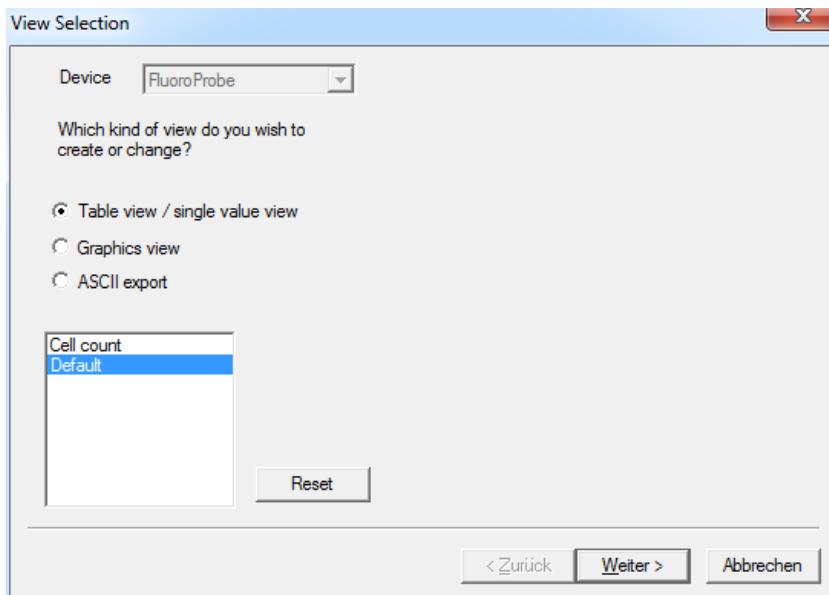
For each instrument there are pre-defined views. These views can be edited but not deleted. Changes in pre-defined views can be reset to their original status. User-defined views can be edited and deleted.

GENERATING AND EDITING A TABLE VIEW WINDOW

To explain the function of the View Editor, in the following steps a table view showing date/time, total chlorophyll concentration, Bluegreen concentration and depth is generated as an example.

## *View Selection*

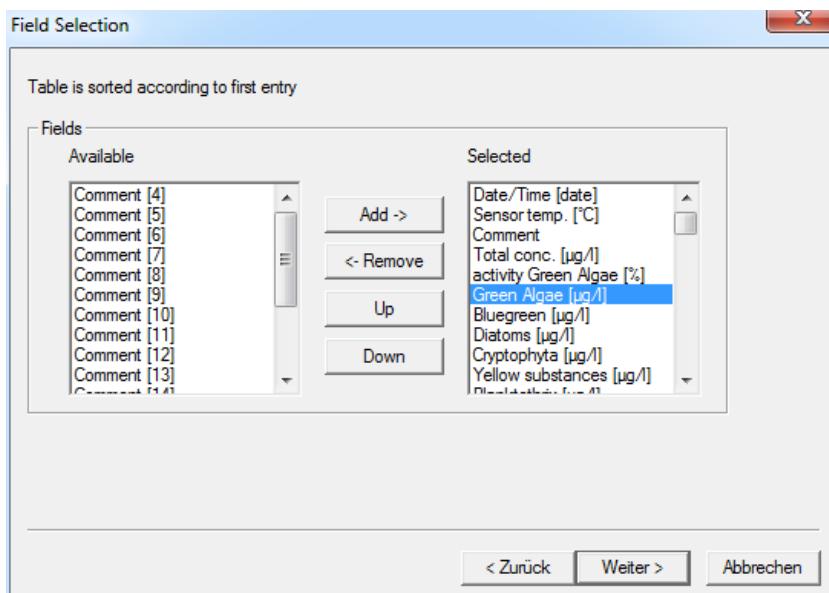
1. Open the view editor:



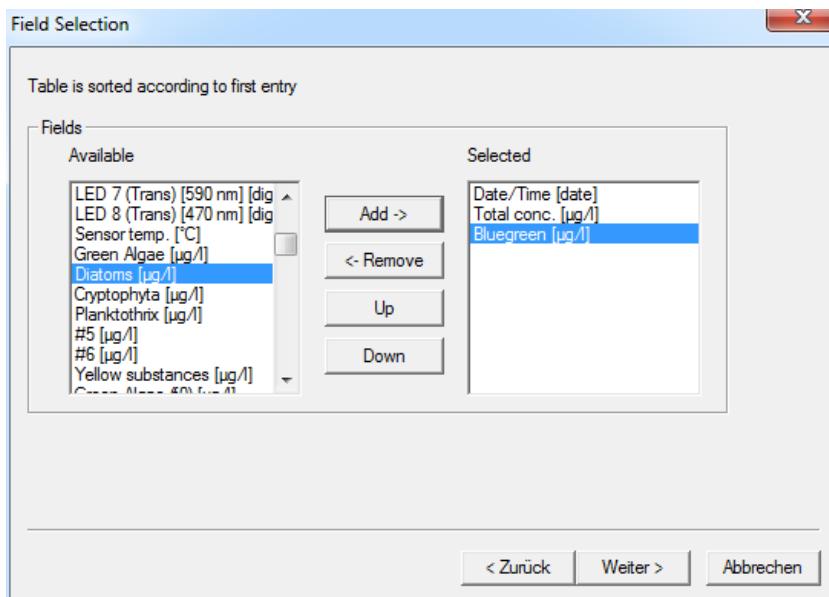
2. Choose the type of instrument the view is to be used for (in the example "PhycoProbe").
  3. Choose the type of view that is to be generated or edited (in the example "Table view / single value view").
  4. Choose one existing view to edit or as a template for a new one.
- In case of a pre-defined view, the view can be reset to the original status ("RESET").  
In case of a user-defined view, the view can be deleted (choose a custom view and click "DELETE").
5. Click "NEXT".

## *Field Configuration*

This window shows all available data of the selected instrument. The left column shows the data that is currently not used in the chosen view. In the right column are data that will be displayed in the resulting view. The order in the right column corresponds to the order in the table.



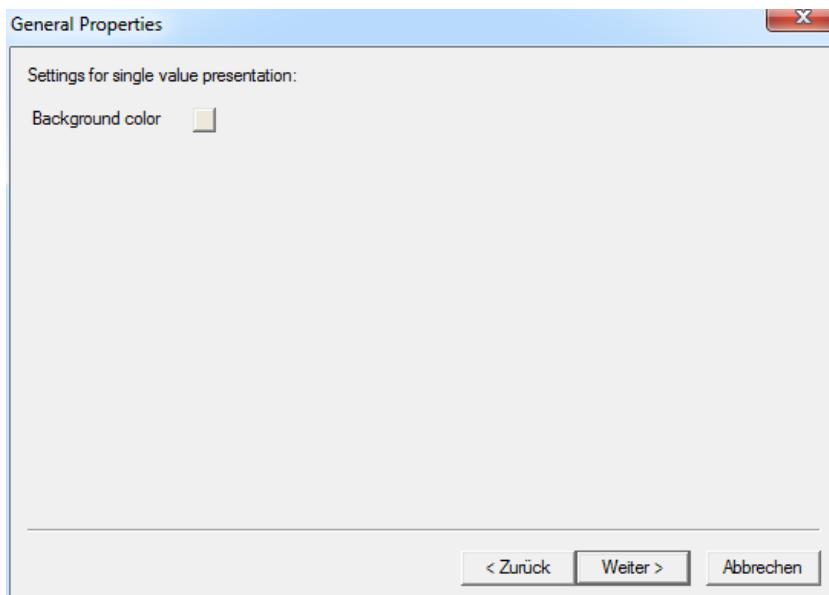
6. Click on “Green Algae [µg/l]” and “← REMOVE” to remove the concentration of green algae from the view.
7. Repeat with all entries but “Date/Time (date)”; “Bluegreen [µg/l]”, “Total conc. [µg/l]” and “Depth [m]”.
8. Click on “Total conc. [µg/l]” and “UP” to change the order.



9. Click “Next”.

### *General Properties*

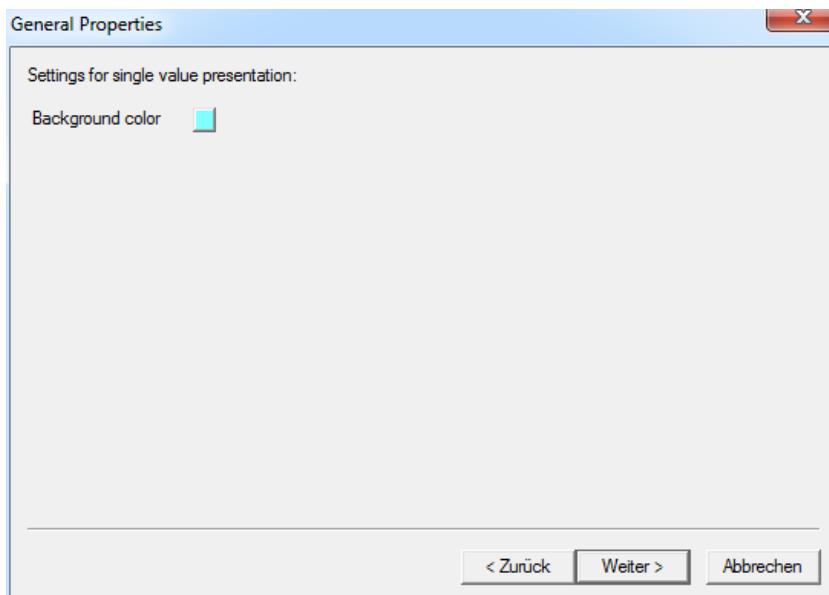
The General Properties page allows the user to change the background color of a “Single value” view.



10. Click on the color picker box behind „Background color“ and choose a new color.



The chosen color is now shown in the color picker box

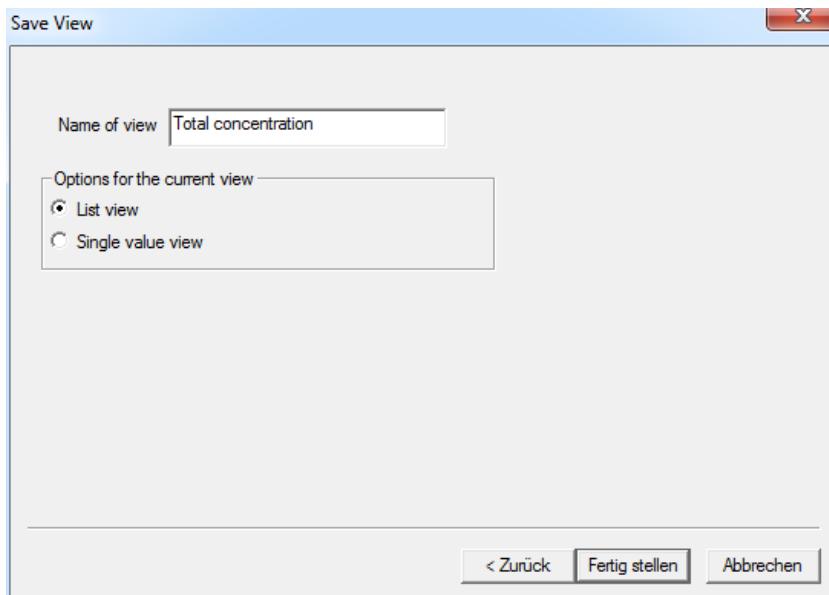


Example of a change in background color:



*Save View*

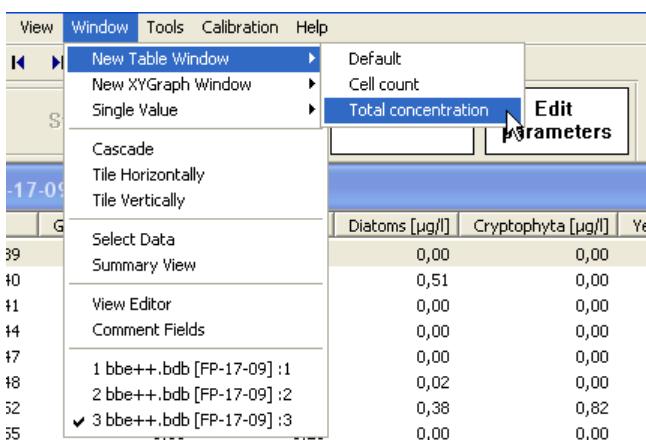
11. Enter a name for the view.



12. Click "OK" to confirm. The current data is then shown with the new view.

Date/Time [date]	Total conc. [ $\mu\text{g/l}$ ]	Bluegreen [ $\mu\text{g/l}$ ]	Depth [m]
22.08.2012 10:40:18	3,21	0,00	0,82
22.08.2012 10:40:18	3,04	0,00	1,12
22.08.2012 10:40:20	3,98	0,00	1,74
22.08.2012 10:40:20	4,46	0,68	2,14
22.08.2012 10:40:21	4,05	0,00	2,45
22.08.2012 10:40:22	4,26	0,00	2,76
22.08.2012 10:40:23	4,01	0,00	3,16
22.08.2012 10:40:23	3,46	0,00	3,47
22.08.2012 10:40:24	4,05	0,00	3,78
22.08.2012 10:40:25	4,43	0,00	4,08
22.08.2012 10:40:26	4,43	0,00	4,39
22.08.2012 10:40:26	4,54	0,00	4,69
22.08.2012 10:40:27	4,45	0,00	5,00
22.08.2012 10:40:28	4,30	0,00	5,31
22.08.2012 10:40:29	4,33	0,00	5,61
22.08.2012 10:40:29	4,22	0,00	5,92
22.08.2012 10:40:30	4,34	0,00	6,23
22.08.2012 10:40:31	4,03	0,00	6,53
22.08.2012 10:40:32	4,29	0,00	6,74
22.08.2012 10:40:33	4,14	0,00	7,14

13. The new view is now available in the Window menu.

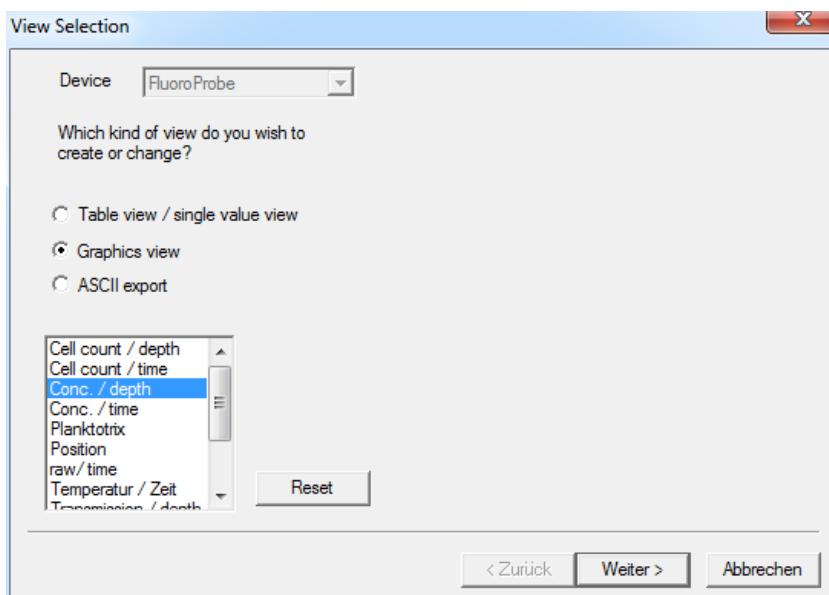


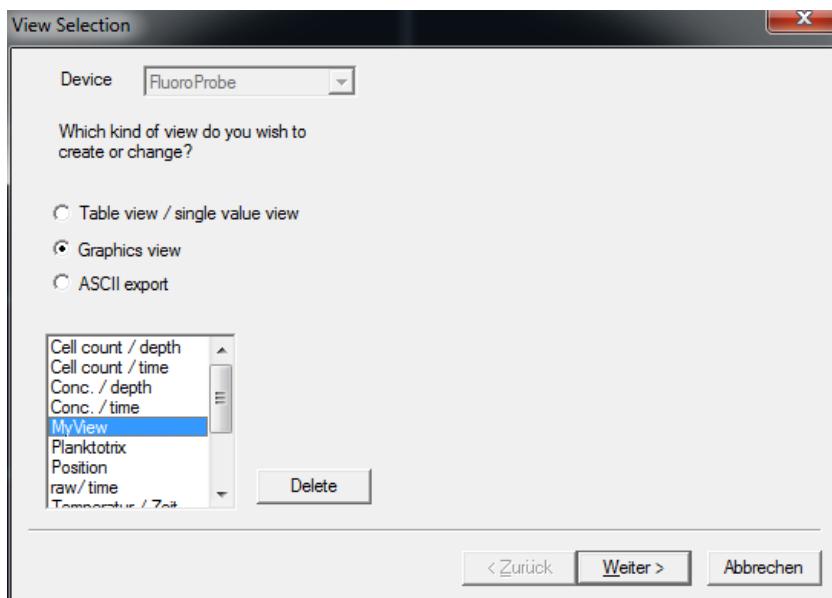
## GENERATING AND EDITING A GRAPHIC VIEW WINDOW

To explain this function, in the following steps a graphic view showing date/time and total chlorophyll concentration is generated as an example.

### *View Selection*

1. Open the view editor:

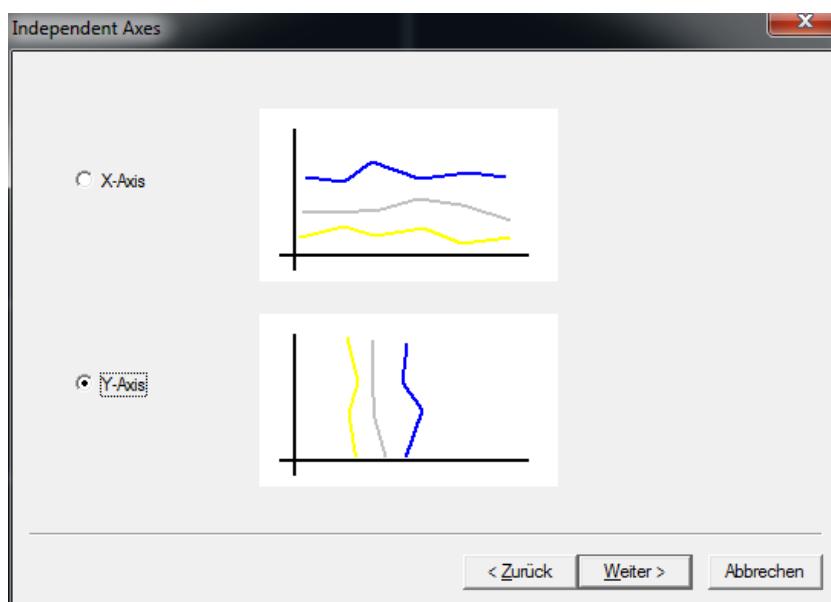




2. Choose the type of instrument the view is to be used for (in the example “PhycoProbe”).
3. Choose the type of view that is to be generated or edited (in the example “Graphics view”).
4. Choose one existing view to edit or as a template for a new one (in the example “Conc. / depth”).  
In case of a pre-defined view, the view can be reset to the original status (“RESET”).  
In case of a user-defined view, the custom view can be deleted (“DELETE”).
5. Click “NEXT”.

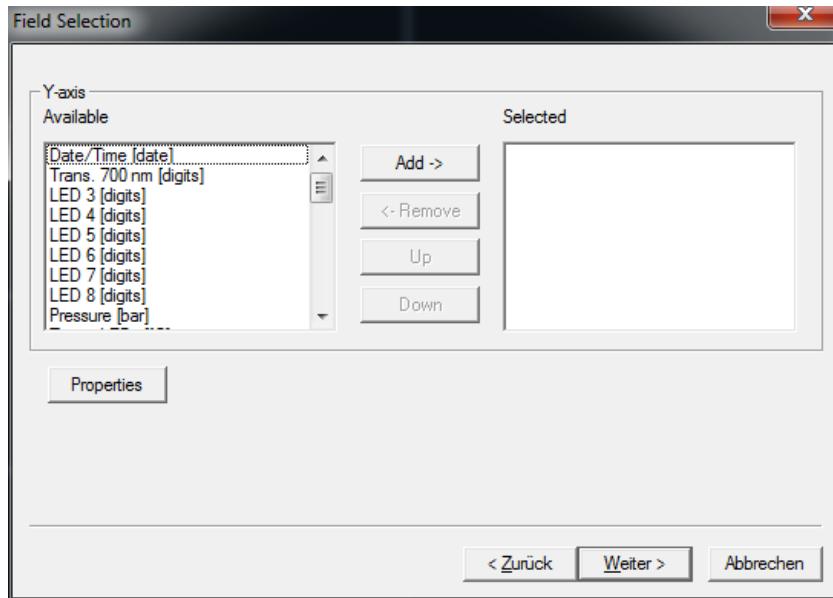
#### *Independent Axis*

6. Choose the design according to the given examples (in the example Y-Axis)

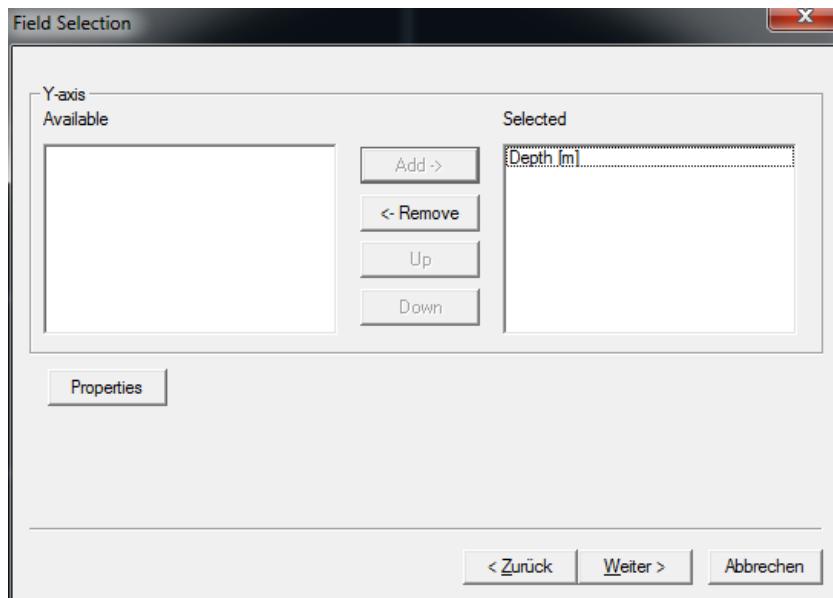


*Field Configuration*

7. Select the data for the axis chosen and click on “ADD→”. Only one of the available entries is possible (in the example “Depth”)



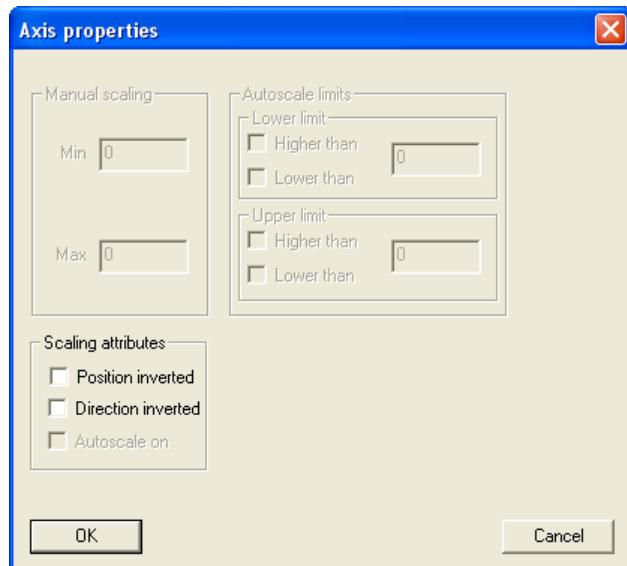
8. After choosing one entry all other entries vanish. Removing the entry by clicking “← REMOVE” brings back all available entries.



9. Click on „PROPERTIES“

### Axis Properties - first axis

Some properties can be set for each axis. For the first axis, this is the position and the direction.

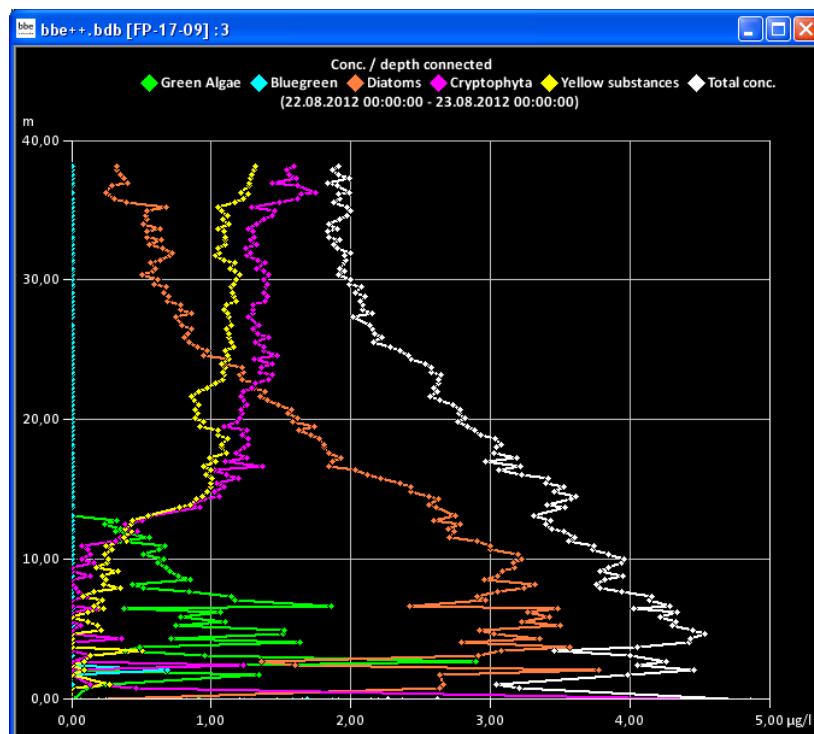


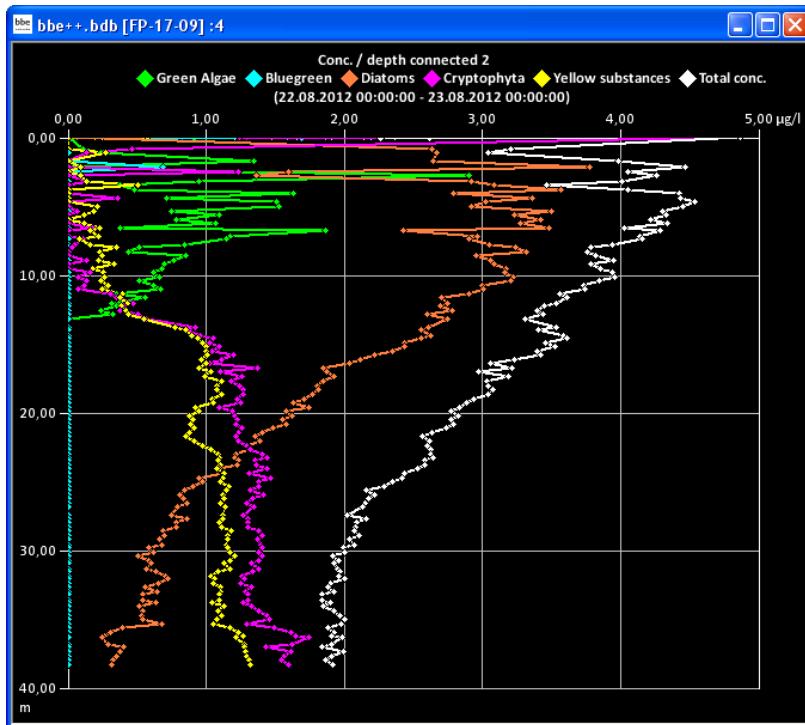
Normally the first axis is on the lower or left side of the graph. The direction is normally defined as:

X-Axis: left side → low values right side → high values

Y-Axis: bottom → low values top → high values

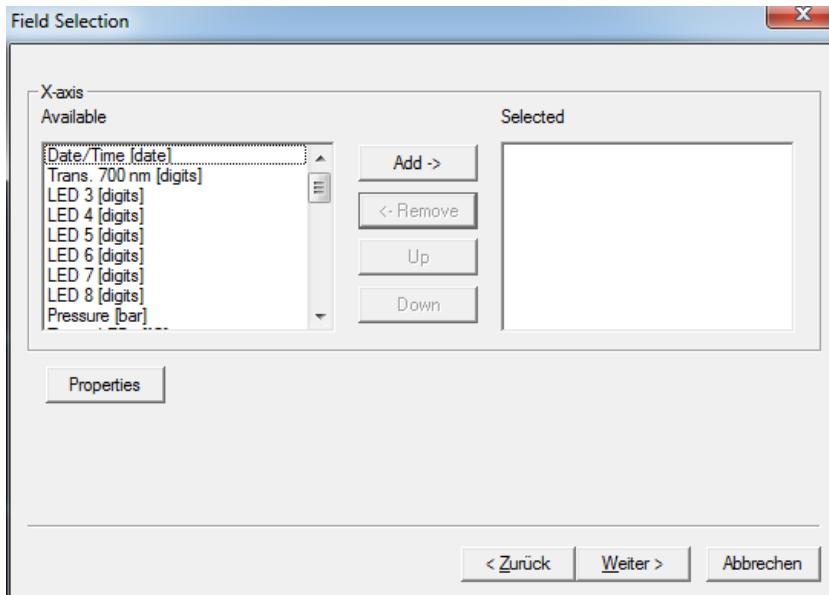
To display e.g. chlorophyll concentration versus depth, it is easier to use the top position of the X-axis and to invert the direction of the Y-axis for the depth. Please see the following example: the first picture shows the standard settings, the second one with a direction-inverted Y-axis and inverted position of the X-axis.



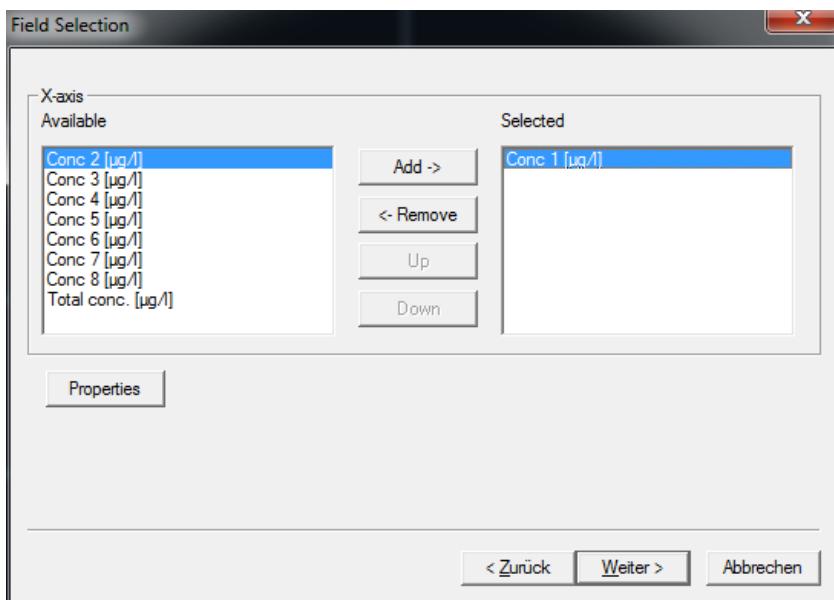


10. Click "OK" to confirm the settings.
11. Click "NEXT".
12. Now the data and settings for the other axis can be selected.

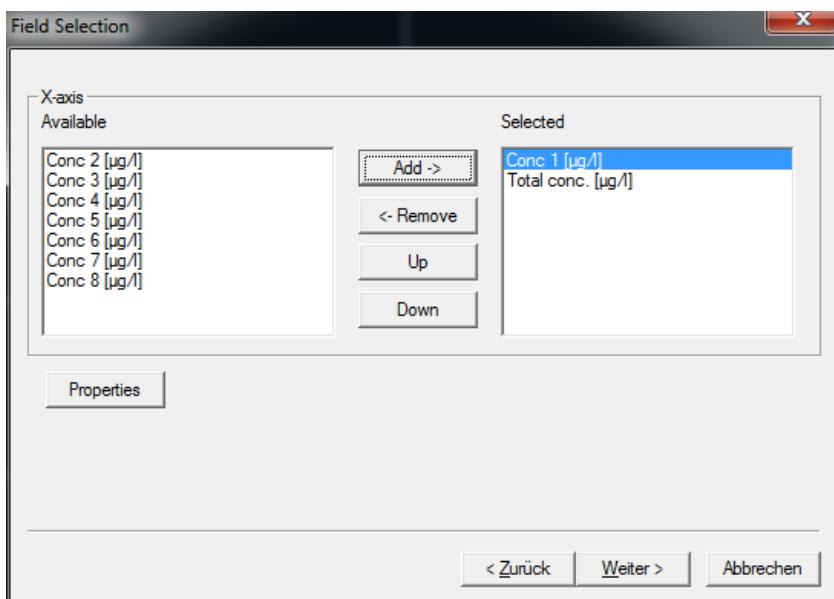
#### *Field Configuration - second axis*



13. After selecting one type of data, only those types which have the same unit(s) remain in the right column.

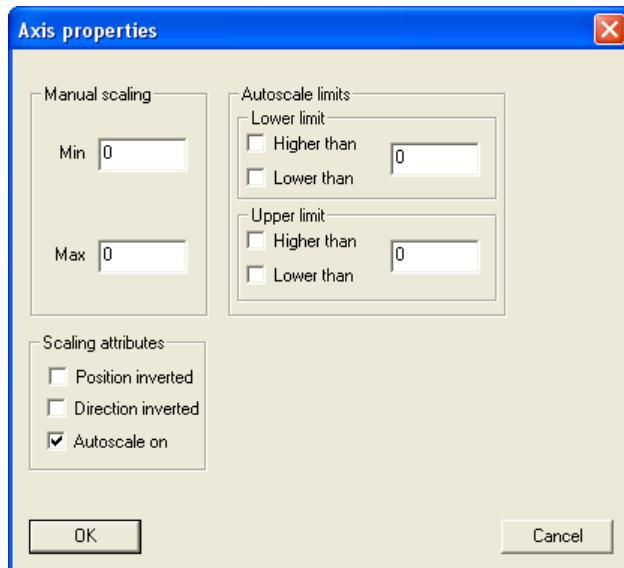


14. For example, "Total chlorophyll concentration" and "Bluegreen" have to be selected here.



*Axis Properties - second axis*

For the second axis, the properties can be set as shown above. Additionally available scaling options are:



**Manual scaling:** enter fixed values for the minimum and the maximum of this axis - enter 0 for both to disable this feature.

**Auto-scale on:** enables the auto-scaling feature - the axis will be scaled so that all selected data are visible.

**Auto-scale limits:** these settings are used to obtain a nice looking graph in two special situations:

- datasets with very low noise:

In the auto-scaling mode, the graph looks as if there are extreme variations, but the range is very small due to the auto-scaling. In this case, it is better to use the option:  
lower limit: lower than and

upper limit: higher than

This leads to a minimum span in the graph.

- datasets with outliers:

In this case, it is difficult to analyze the data because the auto-scaling generates a high span value. To prevent this, please use:

lower limit: higher than for outliers with low values and

upper limit: lower than for outliers with high values

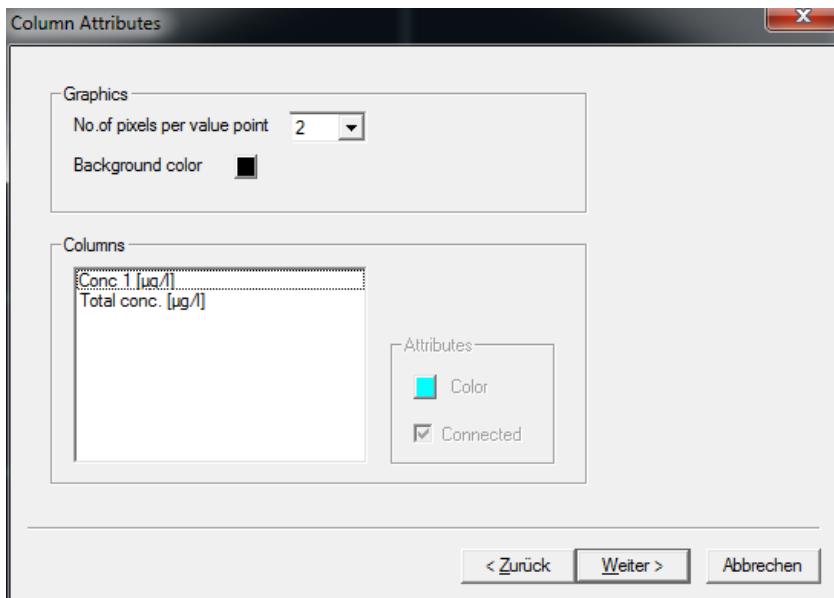
This leads to an optimized span in the graph.

15. Click "Next"

*Attributes*

This sets the color and size of the dots and lines as well as the color of the background.

16. Set the value in the attributes window according to your needs.

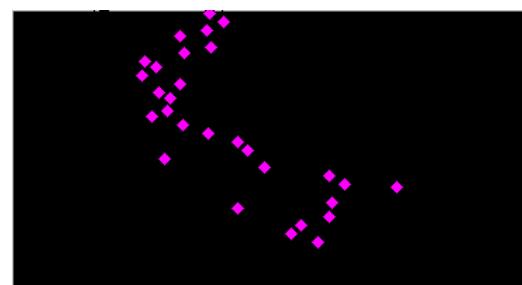
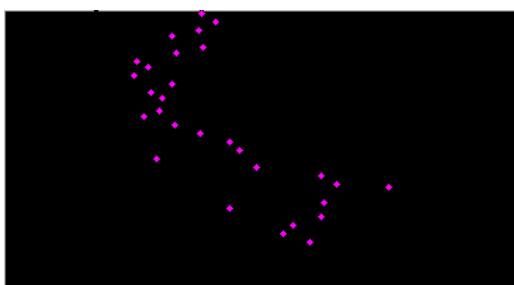


Pixel number: enter the dot size of the value points.

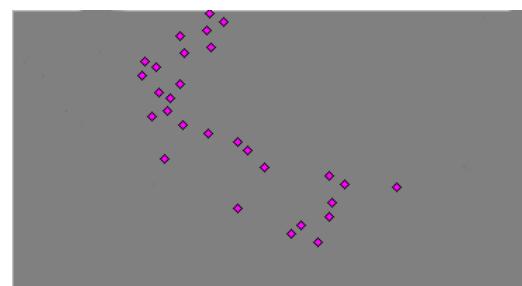
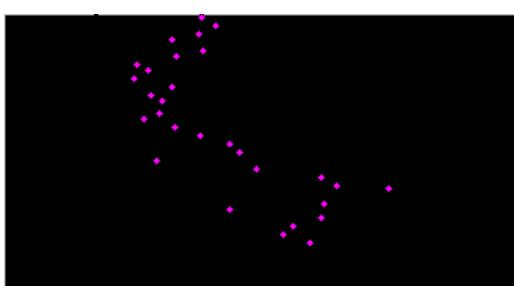
Background color: click on the colored button to change the background color of the graph.

For illustration, please see the examples with connected and unconnected dots, different sizes and background colors.

Different dot sizes:



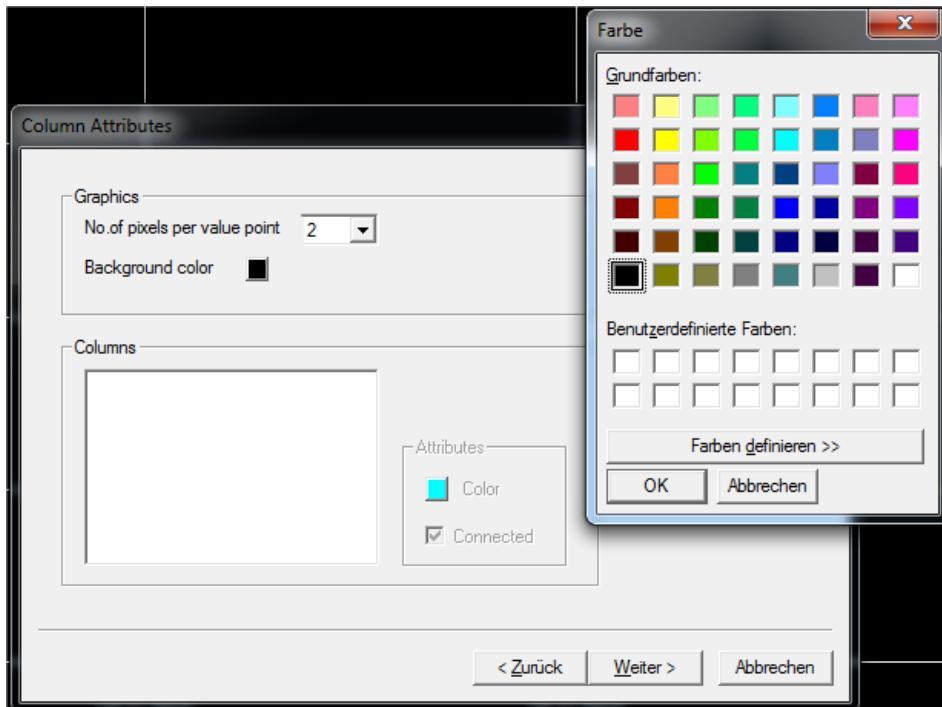
Different background colors:



**Column Attributes**

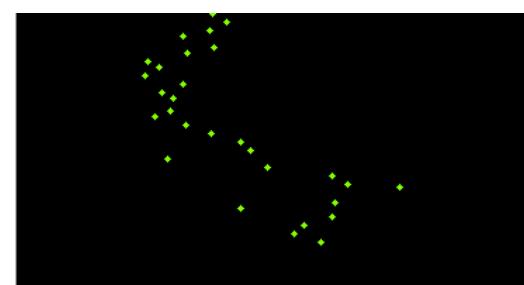
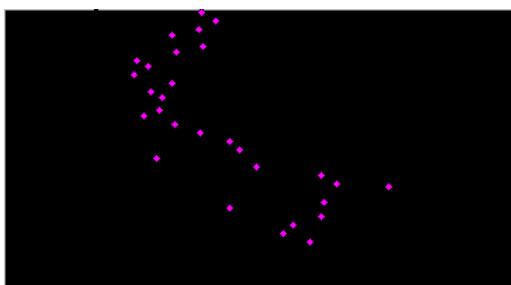
Select a dataset.

Color: select a dataset and click on the colored button to change the color of the dots.  
 Connected: check the box to connect the dots in the graph.

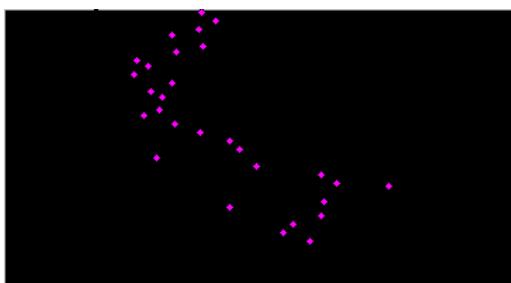


**Hint:** The data points are not connected if the time of measurement differs more than the given value in "TOOLS → SETTINGS → DISPLAY".

Different dot colors:



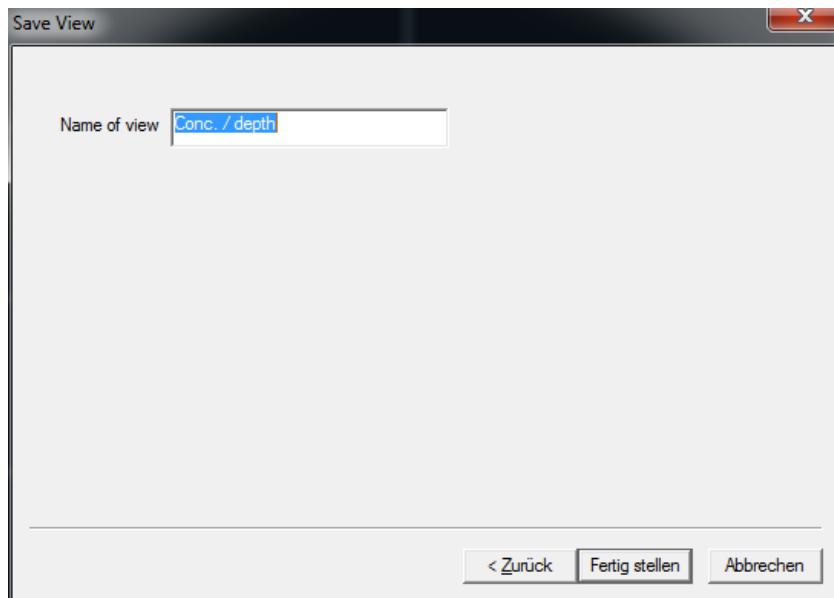
Unconnected dots / connected dots:



17. Click "Next"

*Save view*

18. Enter a new name for the view. It is not possible to edit pre-defined views. Please store a view based on a pre-defined view with a new name.



19. The current data is shown using the new view after clicking "OK".





## GENERATING AND EDITING AN ASCII EXPORT

### *View Selection*

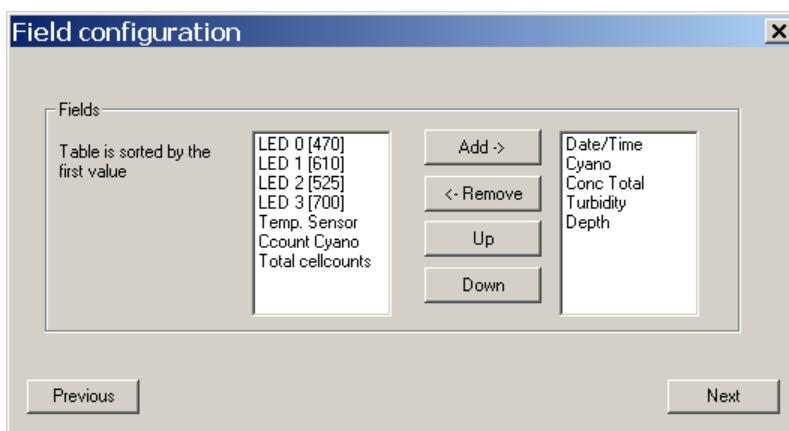
1. Open the view editor:



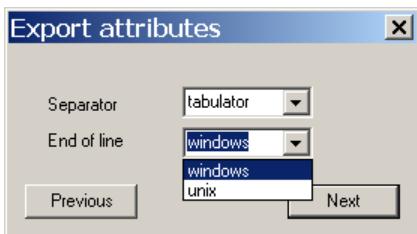
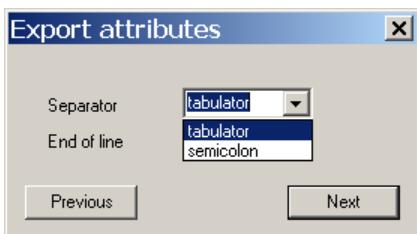
2. Choose the type of instrument the export is to be used for (in the example “AlgaeTorch”)
3. Choose the type of export that is to be generated or edited (in the example “ASCII export”)
4. Choose one existing view to edit or as a template for a new view. The delete button is used to delete a view. It is not possible to delete pre-defined views.
5. Click “NEXT”

### *Field Configuration*

This window shows all available data of the selected instrument. The left column shows data which are not currently used in the chosen view. In the right column are data that are to be displayed in the view. The order in the right column corresponds to the order in the table.



6. Select the required datasets from the right column. Use the up and down buttons to determine the order of the data in the export table.
7. Click “Next”.



8. Define separator and end of line characters according to the needs of the importing software.
9. Click "Next".

#### Save View

10. Enter a new name for the view. It is not possible to edit pre-defined views. Please store a view based on a pre-defined view with a new name.

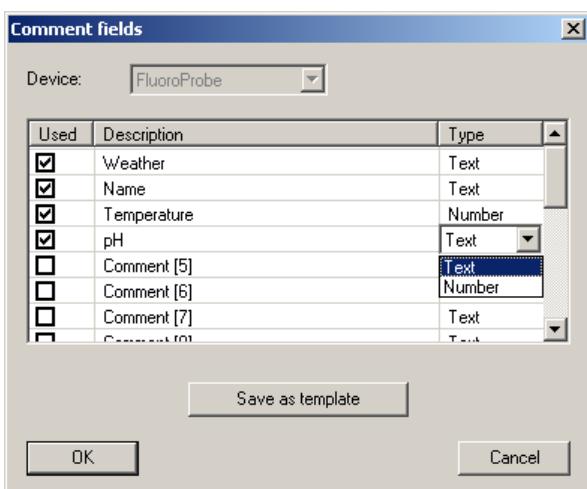


11. The new view is now available in the "File" menu.



#### Comment Fields

For each type of instrument, special comments can be defined. These comment fields can be used at the beginning of the measurement. The comments names and types can be defined within this dialog.



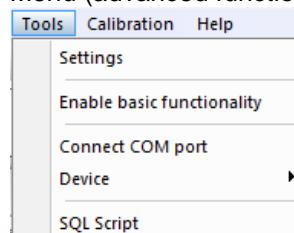
Type of instrument:	the type of instrument is defined in the settings “TOOLS → SETTINGS → ACCESS”.
Used:	if tagged, the comment can be used at the start of the measurement, otherwise the comment is hidden.
Description:	name of the comment
Type:	“Text” allows entry of text, “Number” allows digits only; this is relevant for the way the comments are sorted in a list view.
Template:	stores the comment definition to transfer it to a new database; the transfer is done when opening a new database.

### 1. ... 2. ... 3. ...

Shows all the currently opened windows.

## TOOLS

### Menu (advanced functionality)



### Menu (basic functionality)

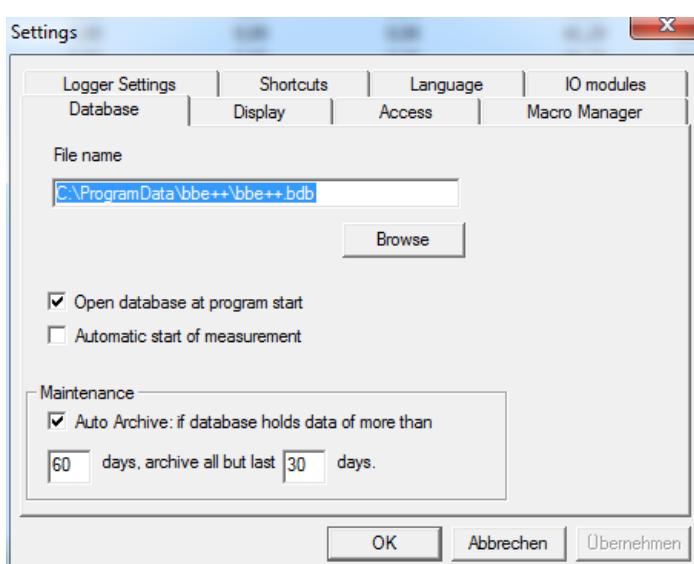


## Settings

Here, all the preferences for the general functionality of bbe++ can be set.

## DATABASE

The ‘Database’ tab shows the currently used database. The checkbox can be used to open this database after starting bbe++. We recommend you to store all the data in the same database.



### *Automatic start of measurement*

For continuously working instruments (AOA or PhycoProbe / AlgaeTorch) the software can be configurated to start the measurement directly after starting the software. The feature can be used to ensure, that the measurement starts again after a power fail.

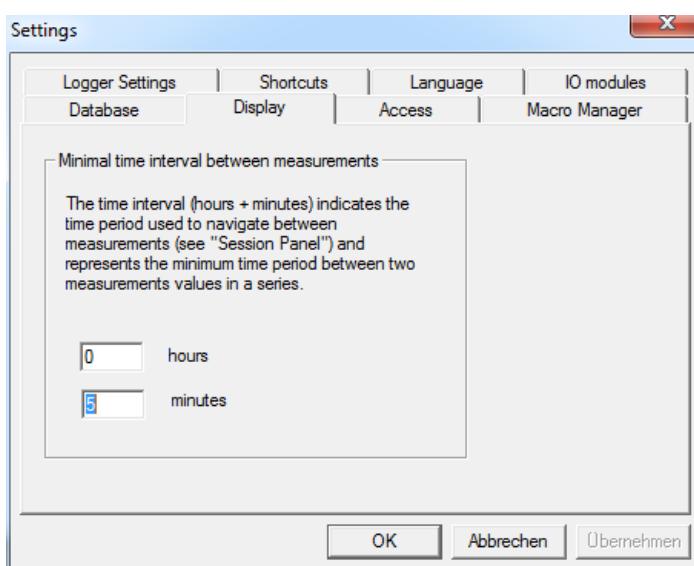
### *Auto Archive*

If there are many datasets in the database, navigation in the database becomes slow. The “Auto Archive” function automatically archives older data in the database. If there are data older than – in the example – 60 days, the auto-archive function is started. Only datasets that are a maximum of 30 days old remain in the database.

The archived data is written in a database similar to an exported database. The name corresponds to the date of the first dataset in this database.

### DISPLAY

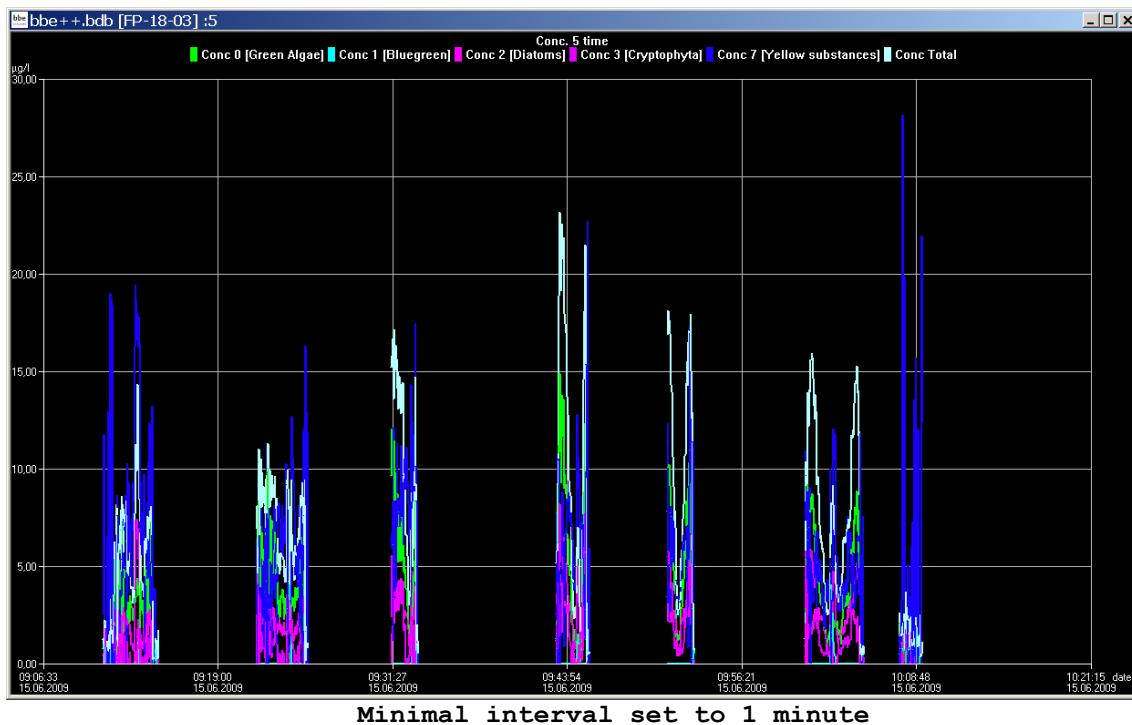
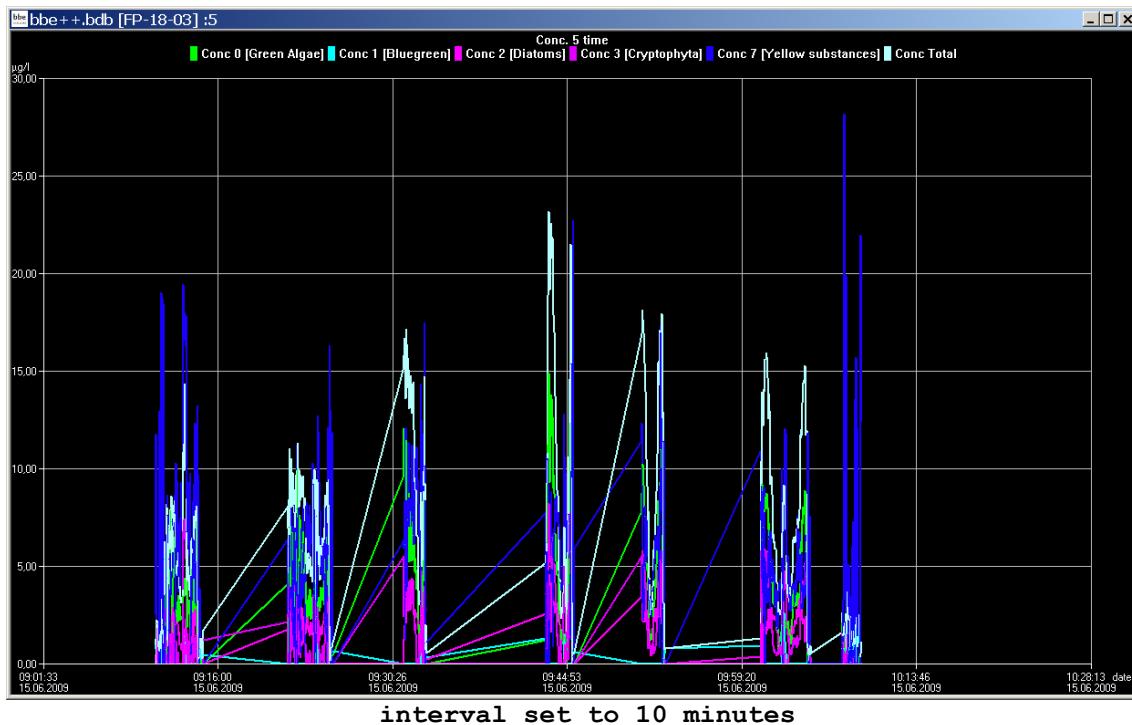
Enter the time period which defines the maximum interval between two measurements of the same series. The setting is used for the “Next measurement” button in the toolbar.



Next and previous measurement buttons in the toolbar.



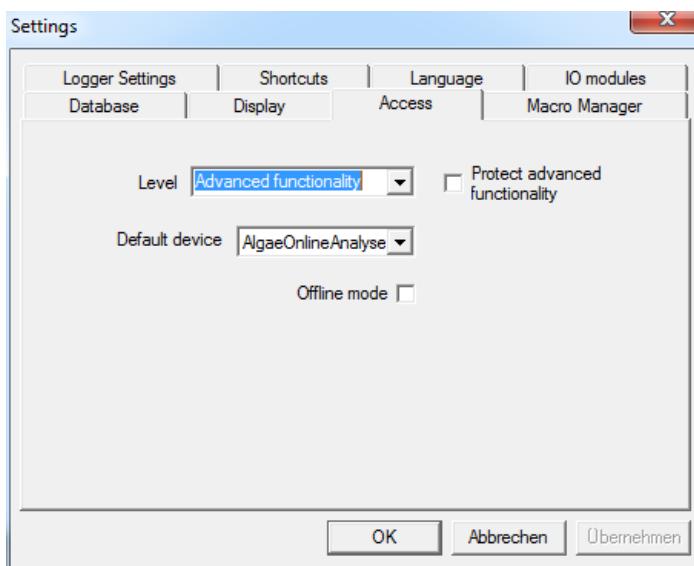
Furthermore, this setting is used to control the drawing of lines between two dots. If the interval between two measurements is shorter than the given interval, a line is drawn – otherwise not:



## ACCESS

Depending on the access level selected, the software shows more or fewer options. The main difference is the number of items shown in the menus and the number of parameters shown.

If an instrument with editable parameters is connected, the same setting is maintained for editing.

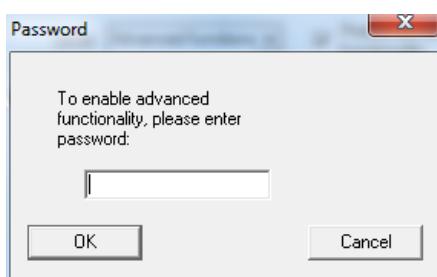


#### User-levels:

<b>Level</b>	<b>Access</b>
Basic functionality	<ul style="list-style-type: none"> <li>• Just basic operation of the instrument</li> <li>• Measurements with pre-defined parameters only</li> </ul>
Advanced functionality	<ul style="list-style-type: none"> <li>• All menus accessible / all parameters customizable</li> </ul>

The “Advanced functionality” level can be password-protected. As soon as the checkbox is ticked, a password can be entered. Afterwards the password is required to enter the Advanced functionality level.

**Please note:**  
**The “Advanced functionality” level remains until “Basic functionality” level is chosen again.  
 Even when restarting the software, the “Advanced functionality” level and a given password will still be valid.**



#### Default Device

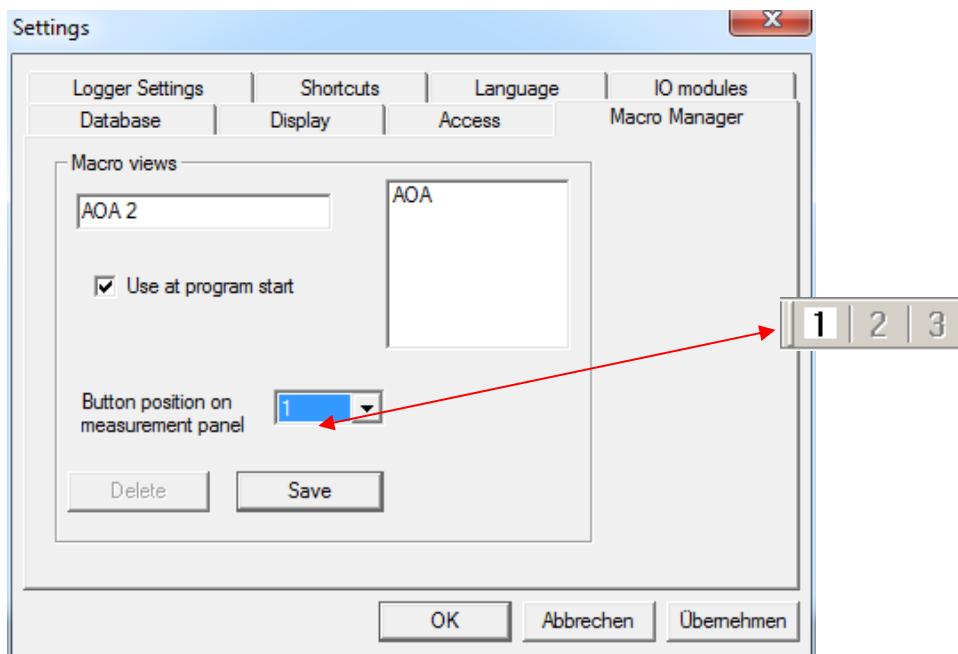
The bbe++ software is able to control different types bbe instruments, but only one type at one time. The type of instrument is entered here. Various settings within the bbe++ software can only be made for the default type instrument. To make entries for an other type of instrument, the default type has to be changed before.

#### Offline Mode:

Choose the offline mode to display data of different type of instruments. If the offline mode is active, no measurement is possible.

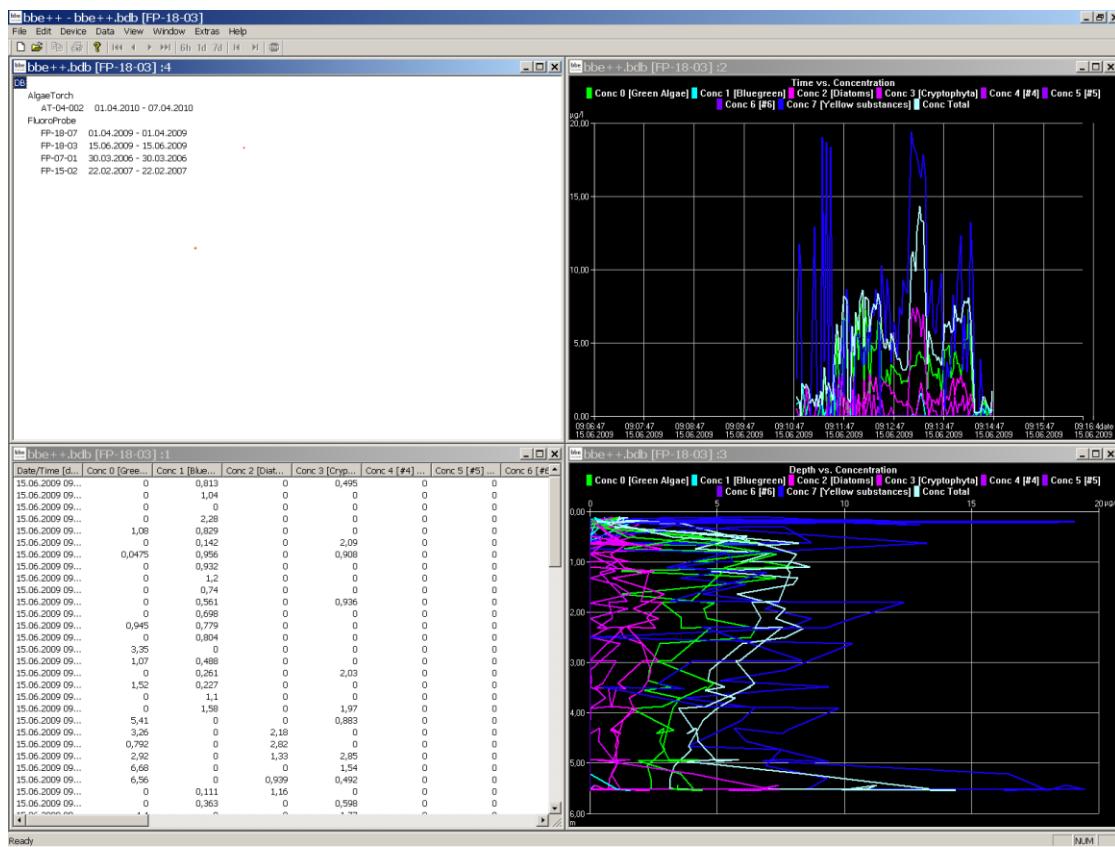
## MACRO MANAGER

The bbe++ software provides the option to store the arrangement of the view windows. One of the stored views can be used as the default view automatically displayed after starting bbe++.



To generate a new view macro:

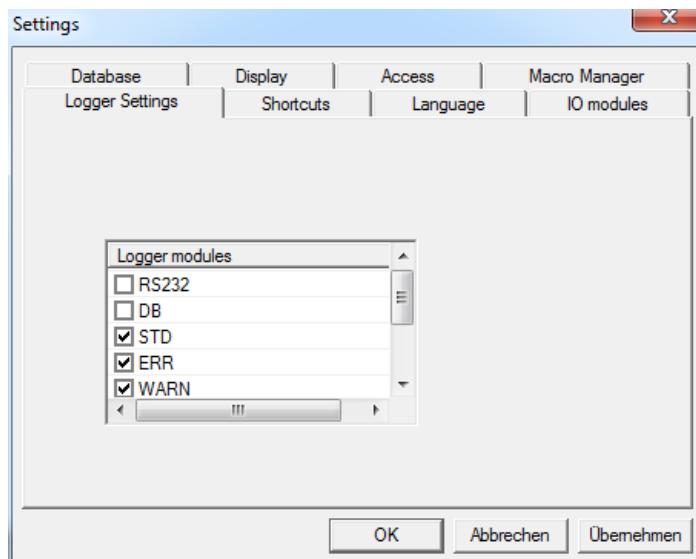
1. Arrange the windows.
2. Enter the name of the new view.
3. Check the "Use at program start" box as required.
4. Confirm.



## LOGGER SETTINGS

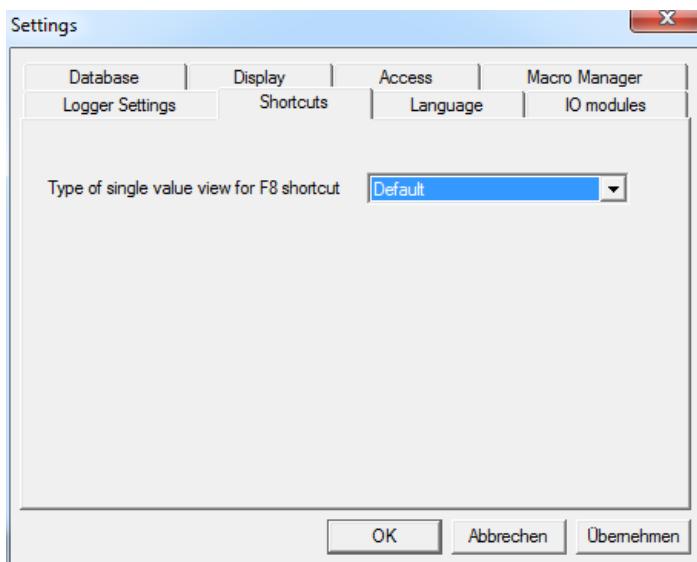
The logger settings are used in case of problems with the bbe++ software. Please ask the bbe service for advice.

Depending on the checked options more or less information is stored in the file "error.log" in the program folder of bbe++ software.



## SHORTCUTS

With the F8 key, one single view can be retrieved. Please enter the single view macro to be used for this.

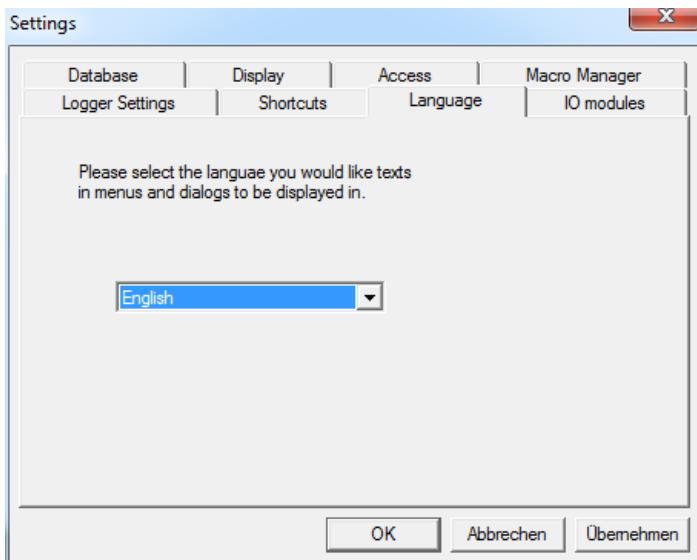


Date/Time [date]	Green Algae [ $\mu\text{g/l}$ ]
26.06.2007 12:19:31	0,00
Bluegreen [ $\mu\text{g/l}$ ]	Diatoms [ $\mu\text{g/l}$ ]
0,77	0,00
Cryptophyta [ $\mu\text{g/l}$ ]	Yellow substances [ $\mu\text{g/l}$ ]
0,00	0,00
Total conc. [ $\mu\text{g/l}$ ]	Transmission [%]
0,77	98,22
Depth [m]	Temp. Sample [ $^{\circ}\text{C}$ ]
0,11	21,61

F8 shows the selected macro

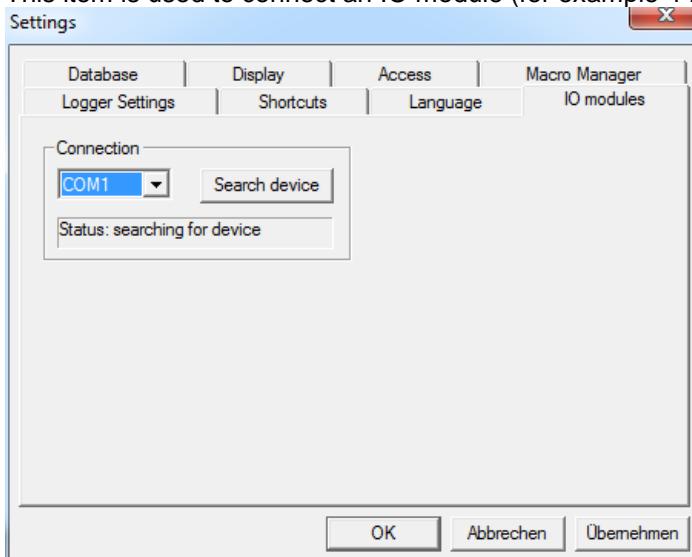
#### LANGUAGE

This tab shows a list of the available languages of the bbe++ software. To change the language, choose the language you wish and click "OK". The bbe++ software must be restarted for the changes to take effect.



## IO MODULS

This item is used to connect an IO module (for example 4-20mA or relay outputs) to the PC.



- the COM port can either be chosen from the drop down box or the software can search all COM ports for the selected instrument.
- once an instrument has been found the COM port is stored for the next use.
- To configurate the devices goto Tools -> device -> .... This item is not available for all instruments.

## Enable advanced/basic functionality

Change between advanced and basic functionality. See also Tools -> Settings -> Access.

## Connect COM port



This item is used to connect an instrument to the PC.

### **Please note:**

- bbe++ is looking for an instrument of the selected type only (Tools → Settings → Access).
- the COM port can either be chosen from the drop down box or the software can search all COM ports for the selected instrument.
- once an instrument has been found the COM port is stored for the next use.

## Device

The “Device” submenu varies depending on the selected type of instrument. Each type has its own submenu.

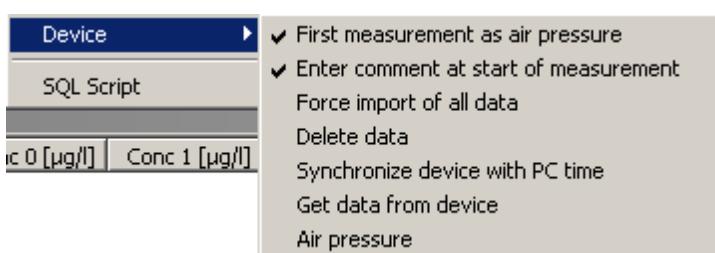
### DEMO MODE

To switch the bbe++ software to the demo mode select PhycoProbe (Tools -> Settings -> Access) and disconnect all instruments. Click on “DEMO mode” in the device submenu. Now, the software can be operated as if a PhycoProbe were connected. Some procedures such as calibrations are limited in function.

To reset the demo mode, please restart bbe++.



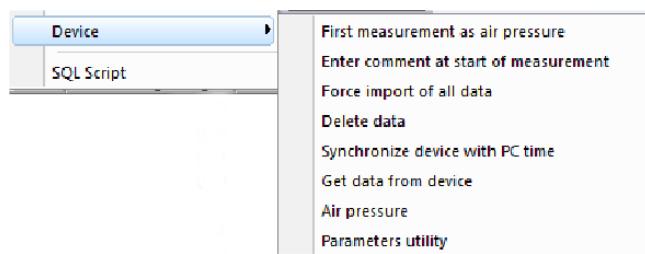
Once the DEMO mode is selected, the submenu changes to the PhycoProbe entries:



## SQL Script

This function can be used to run an SQL script on the database to reorganise it or to do some special calculations. The SQL script is provided by bbe Moldaenke as the case arises.

## PHYCOPROBE SUBMENU



### *First measurement as air pressure:*

Check to use the result of the first measurement as air pressure. This applies only when you start the measurement by bbe++ (not when using the AutoStartPlug).  
assa

### *Enter comment at start of measurement:*

Check to enter one or more comments when starting the measurement procedure.

### *Force import of all data*

The import starts with the latest data. If there are data already in the database, the import stops. The software does not look for older, not-imported data to reduce the importing time.

If older data are to be imported, this flag has to be activated. If activated, all data from the PhycoProbe are imported. Datasets already in the database are skipped.

### *Delete data*

Deletes all data in the PhycoProbe.

### *Synchronize device with PC time*

To set the clock of the PhycoProbe, synchronise it with the clock of the PC by activating "Synchronize with PC".

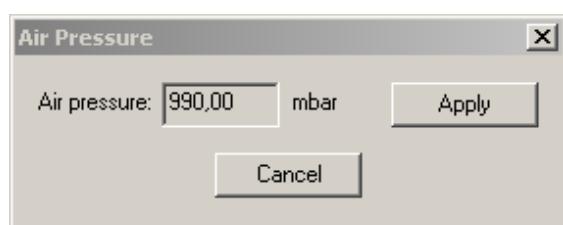
### *Get data from device*

Imports parameters and the latest data that have not been imported yet. The import starts with the latest data. If there are data already in the database, the import stops. The software does not look for older, not-imported data to reduce the importing time.

The import options described here refer to the maximum 1,754 data sets stored in the memory of the PhycoProbe. Further data can be downloaded from the PhycoProbe using the USB adapter.

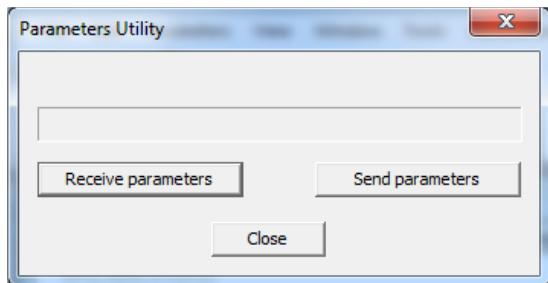
### *Air pressure*

Measures and stores the current air pressure. This reading is used to define the pressure at the surface of the water. Please note: 100mBar change in the air pressure leads to a misreading in depth of about 1m.

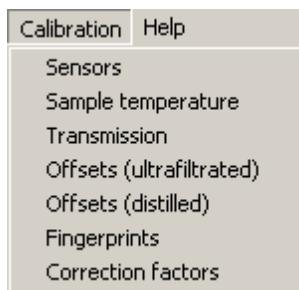


### *Parameters utility*

Receiving the complete parameters set from the PhycoProbe and sending a Parameters file to the instrument. This is supplied by the bbe service in most of the cases.



## CALIBRATION



### Sensors

Please use the "Sensor" item to calibrate the temperature sensors and the pressure sensor. The following window shows the actual data measured by the PhycoProbe. To calibrate, just enter the correct value and press the corresponding "Apply" button. The actual value should then be correct (does not work in DEMO mode).

Sensor	actual value	req. value	Apply
temp. fluor.	24,51 °C	<input type="text"/>	Apply
temp. LEDs	23,89 °C	<input type="text"/>	Apply
pressure	1,06 bar	<input type="text"/>	Apply
batt. voltage	11,65 V	<input type="text"/>	Apply
sample temp.	25,21 °C	<input type="text"/>	Apply

### TEMP. FLUOR./TEMP. LEDs

Internal temperature sensors. This calibration should only be performed by trained personnel.

### PRESSURE

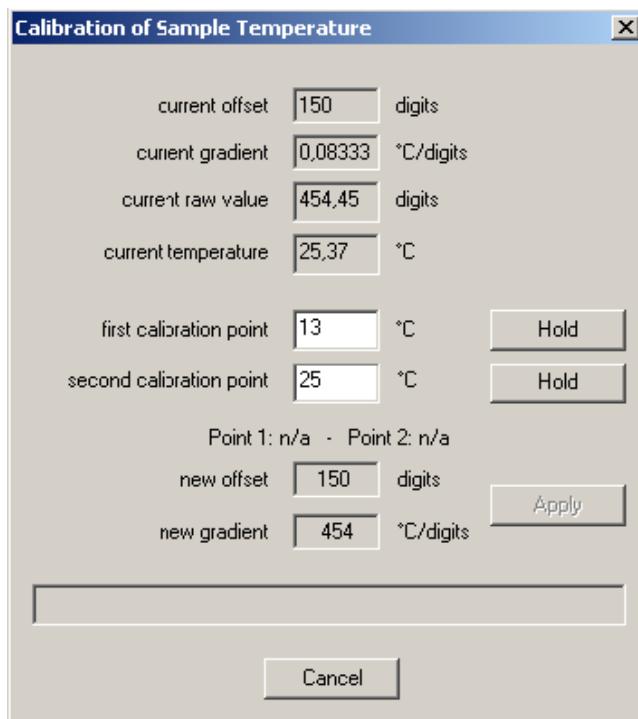
Calibration of the pressure sensor. If other pressure sensors are used at the same time, the pressure sensor of the PhycoProbe can be adapted to other sensors by entering the result of this sensor and pressing "Apply".

**BATTERY VOLTAGE**

Calibrates the measurement of the power supply voltage.

**SAMPLE TEMPERATURE**

The sample temperature can be calibrated by a two-point calibration. To do so, two different containers with water at two different temperatures are needed. Both temperatures should cover the common range of the samples. The difference must be more than 10°C.



For calibration, the PhycoProbe has to be submerged in the first container or canister and the temperature of this canister has to be entered in the field "First calibration point". If the current temperature display is stable, the value can be stored by clicking the corresponding "Hold" button. During the calibration measurement the PhycoProbe has to be moved permanently. This procedure has to be repeated with the second temperature.

Afterwards the resulting new offset and gradient are displayed. The results can be written to the PhycoProbe by using the "Apply" button. Using "Cancel" means all results are not saved and the previous settings are used.

**START**

Starts the calibration.; 10 measurements are taken and averaged.

**CANCEL**

Cancels the calibration.

**APPLY**

Sends the results of either the offset or of the gradient calibration to the PhycoProbe

**MEASUREMENT**

The number of measurements is counted during the calibration.

**OLD OFFSET / GRADIENT:**

Offset / gradient before calibration

NEW OFFSET / GRADIENT

Offset / gradient after calibration

Offsets (filtrated / distilled)

The offset is the signal without algae that has to be subtracted during the measurement.

If the PhycoProbe has the capability to detect yellow substances (all probes from Series 7 and later and all updated probes), two offsets have to be calibrated.

1. The offset in distilled water. This water has to be free of algae **and** free of yellow substances. This offset is used when the determination of yellow substances is switched on. The concentration of yellow substances is determined during the measurement.
2. The offset in ultra-filtrated water. This water has to be free of algae. This offset is used when the determination of yellow substances is switched off. The concentration of yellow substances is "in" the offset and so filtrated sample water has to be used for the offset.

Please submerge the PhycoProbe into the type of water and start the calibration.

Calibration of offsets (ultrafiltrated water)							<input type="button" value="X"/>
Measurement <input type="text" value="0"/>							<input type="button" value="Start"/>
700	525	570	610	590	470	UV LED	
Old offset	<input type="text" value="0"/> digits						
Det. 2	<input type="text" value="0"/> digits						
New offset	<input type="text" value="0"/> digits						
Det. 2	<input type="text" value="0"/> digits						
							<input type="button" value="Apply"/>
							<input type="button" value="More"/>

Calibration of offsets (ultrafiltrated water)							<input type="button" value="X"/>
Measurement <input type="text" value="10"/>							<input type="button" value="Start"/>
700	525	570	610	590	470	UV LED	
Old offset	<input type="text" value="3,30582E"/>	<input type="text" value="2,502017"/>	<input type="text" value="0,70618E"/>	<input type="text" value="0,173554"/>	<input type="text" value="0,933393"/>	<input type="text" value="12,43542"/>	<input type="text" value="36,99124"/> digits
Det. 2	<input type="text" value="18,4577E"/>	<input type="text" value="2,077405"/>	<input type="text" value="0,119632"/>	<input type="text" value="0,354863"/>	<input type="text" value="0,461183"/>	<input type="text" value="9,263645"/>	<input type="text" value="28,46132"/> digits
New offset	<input type="text" value="50,16724"/>	<input type="text" value="0,286243"/>	<input type="text" value="-0,70328"/>	<input type="text" value="-0,74076"/>	<input type="text" value="-0,789911"/>	<input type="text" value="0,540433"/>	<input type="text" value="2,208527"/> digits
Det. 2	<input type="text" value="0,422987"/>	<input type="text" value="51,56672"/>	<input type="text" value="0,323627"/>	<input type="text" value="119,6561"/>	<input type="text" value="18,98941"/>	<input type="text" value="0,54713E"/>	<input type="text" value="0,37694C"/> digits
							<input type="button" value="Apply"/>
							<input type="button" value="More"/>

MEASUREMENT

The number of measurements is counted during the calibration.

OLD

Offset before the calibration

NEW

Offset after the calibration

START

Starts the calibration; 10 measurements are taken and averaged.

CANCEL

Cancels the calibration.

APPLY

Sends the results of the calibration to the PhycoProbe.

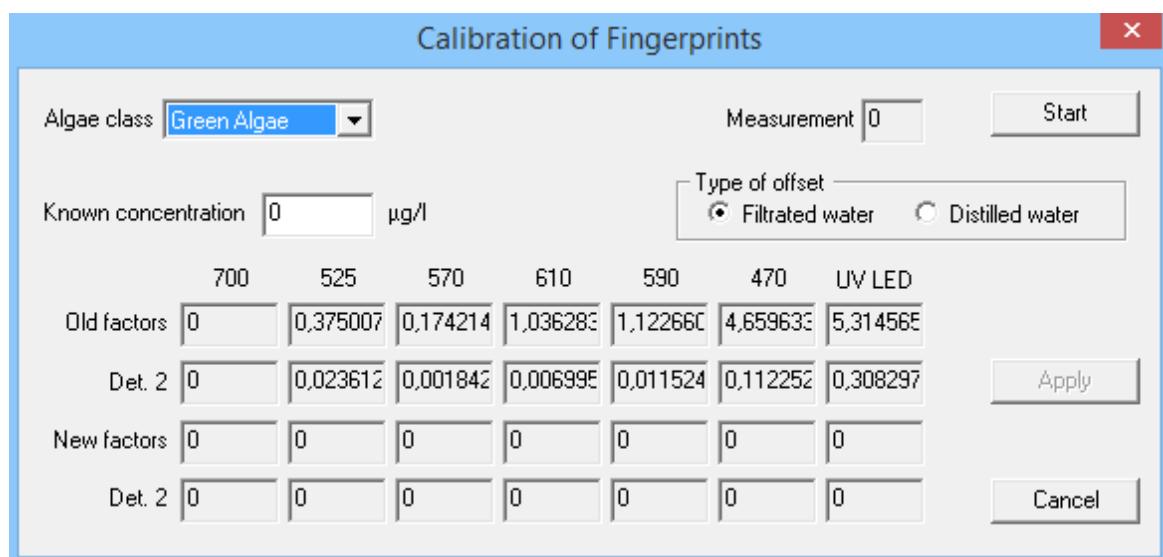
Fingerprints

The calibration of the fingerprints is necessary to obtain the specific spectra of the algae divisions. To recalibrate an existing algae class, choose the "Fingerprints" item.

For calibration of a new algae division, please do the following first:

- obtain parameters from the "Probe" menu
- enter a new name in the "Parameter of fit" page
- send the new name to the probe (press "Send" button)

After choosing the "Fingerprint" item, the following window appears:



Please enter the algae class you want to calibrate by pressing the algae class dropdown button and enter the concentration of the calibrating algae solution from which you wish to calibrate the bbe PhycoProbe.

NOTE: the concentration of yellow substances is not given in µg/l, but in relative units, which means that the indicated concentration is relative to the content in the water used for the calibration.

Depending on whether the algae used for the calibration are diluted with distilled water (e.g. without any other fluorescent matter) or in filtrated sample water, click the corresponding box. The PhycoProbe software will choose either the offset of distilled water or the offset of ultra-filtrated sample water.

ALGAE CLASS

Please enter the name of the algae class to be calibrated.

CONCENTRATION

Please enter the concentration of chlorophyll-a in the solution.

START

Starts the calibration; 10 measurements are taken and averaged.

CANCEL

Cancels the calibration.

APPLY

Sends the results of the calibration to the probe.

MEASUREMENT

The number of measurements is counted during the calibration.

TYPE OF OFFSET

Choose the type of dilution water of the algae solution.

OLD FACTOR

Factors of the fingerprint before the calibration.

NEW FACTOR

Factors of the fingerprint after the calibration.

Calibration solution for the „ultra filtrated water offset and the yellow substances

In the lab, the calibration of the yellow substances can be easily done with tap water. In cases of very small chlorophyll-a concentration, it is recommended to use ultrafiltered sample of the water (from the water to be examined). For this the following equipment is needed:

**Type of filter:**Nitrocellulose filter, pore size 0.45 µm, diameter 47mm (for example: Sartorius Stedim)

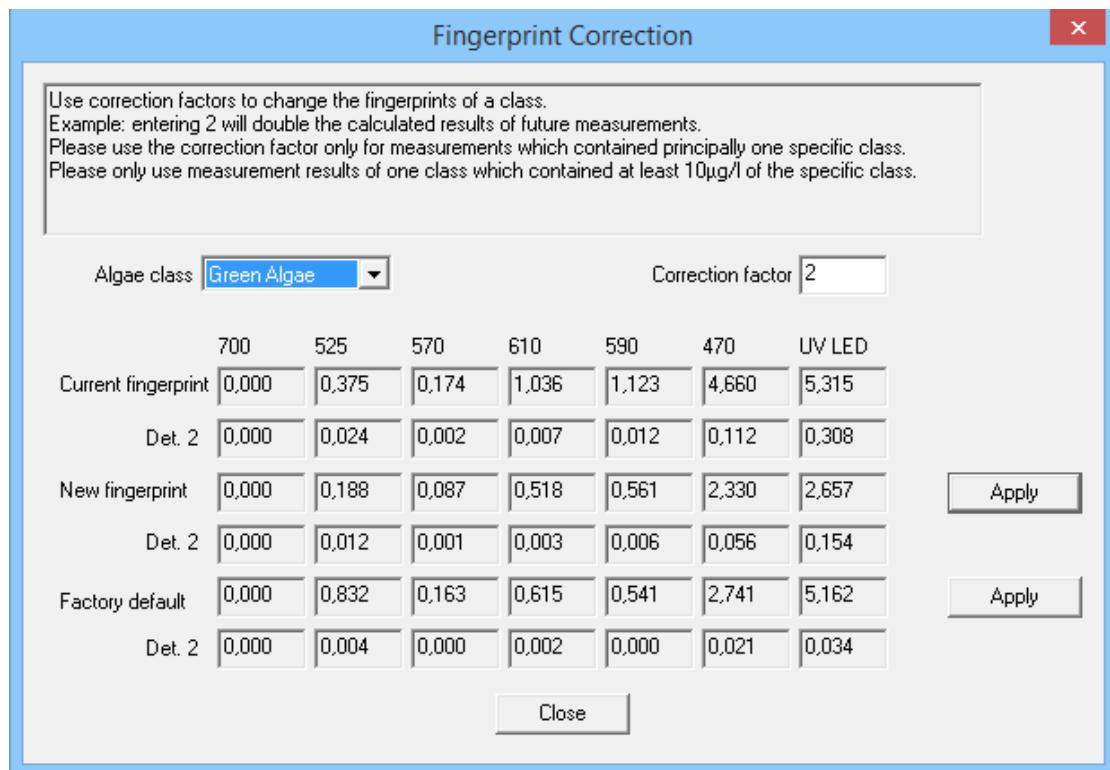
**Vessels:** Depending on the sample volume flask with 5 L content

Negative pressure of 800mbar. The volume of the sample is determined by the instrument to be calibrated, BBE. For an ALA be about 100ml, requires approximately 5L filtrate for an AOA / AlgaeGuard / A-Tox sensor / AlgaeTorch about 1L and for an immersion probe.

TURBIDITY

The PhycoProbe measures the turbidity by scattering at 700nm. It is shown while the calibration of the fingerprints and is an indicator for air bubbles in the calibration solution indicated by a high turbidity value.

## Correction factor



## Correction of a fingerprint/apply new fingerprint

This item allows the correction of a specific fingerprint with a factor. If one algae class is under- or overestimated compared to the reference value, the fingerprint can be changed automatically. Entering for example the factor 2 will double the result for the chosen algae class. After entering the number, the new fingerprint will be displayed. Use the "Apply" button to send it to the sensor.

## Factory settings / apply factory defaults

This option can be used to reset a specific fingerprint to the factory settings. This feature is only available in sensors with internal software of 1.96 or higher. Otherwise, this option is greyed out.

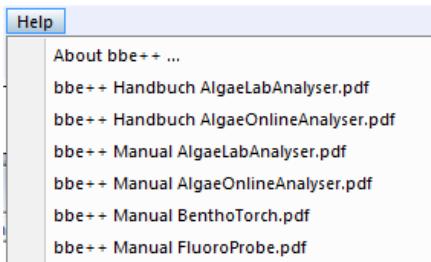
## Storage of the results of calibration measurements

Measurements performed during the calibration procedures are stored in the database as well:

A comment with the type of calibration and the given concentration is added. The datasets of a calibration contain raw data only neither concentrations nor activity results.

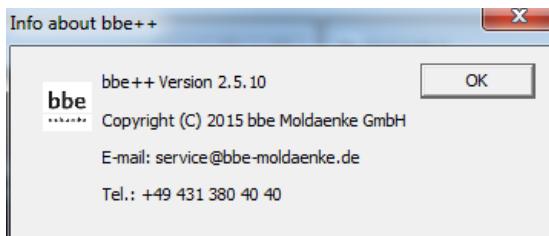
Date/Time [date]	Depth [m]	Total conc. [µg/l]	Comment	Conc 1 [µg/l]	Conc 2 [µg/l]	Conc 3 [µg/l]	Conc 4 [µg/l]	Conc 8 [µg/l]	Transmission [%]	Temp. Sample [°C]	Trans. 700 nm [digits]	LED 3 [digits]	LED 4 [digits]
27.02.2017 14:42:48	-0,10	2,20		0,33	1,87	0,00	0,00	0,00	99,86	15,08	352,40	4,05	0,93
27.02.2017 14:42:50	-0,10	2,14		0,06	1,58	0,51	0,00	0,00	98,75	15,07	348,49	6,15	1,57
27.02.2017 14:42:50	-0,10	1,65		0,07	1,59	0,00	0,00	0,00	98,22	15,09	346,61	1,36	5,34
27.02.2017 14:42:53	-0,10	1,66		0,00	1,66	0,00	0,00	0,00	100,00	15,10	354,22	4,29	4,01
30.03.2017 12:01:56	--	--	Calibration Green Algae 100,00 µg/l	--	--	--	--	--	--	15,08	352,40	4,05	0,93
30.03.2017 12:27:16	--	--	Calibration Bluegreen 50,00 µg/l	--	--	--	--	--	--	15,08	352,40	4,05	0,93

## Help



### About ...

Displays the start-up screen.



For further questions, please contact our service. Please let us know the Software version you are using and the serial number of your instrument.

New version can be downloaded from <http://www.bbe-moldaenke.de/>.

### bbe++ manuals ...

List of currently installed bbe++ manuals. Depending on the selection made during the installation, there may be manuals in different languages and for different instruments.

To make further manual available, please store the PDF files in the following folder:

Windows XP:

C:\Programme\bbe++\

Windows Vista or Windows 7:

C:\Programme (x86)\bbe++\)

## The Views

---

### TABLE VIEWS

A table view is opened by “WINDOW → NEW TABLE VIEW → TABLE VIEW NAME”.

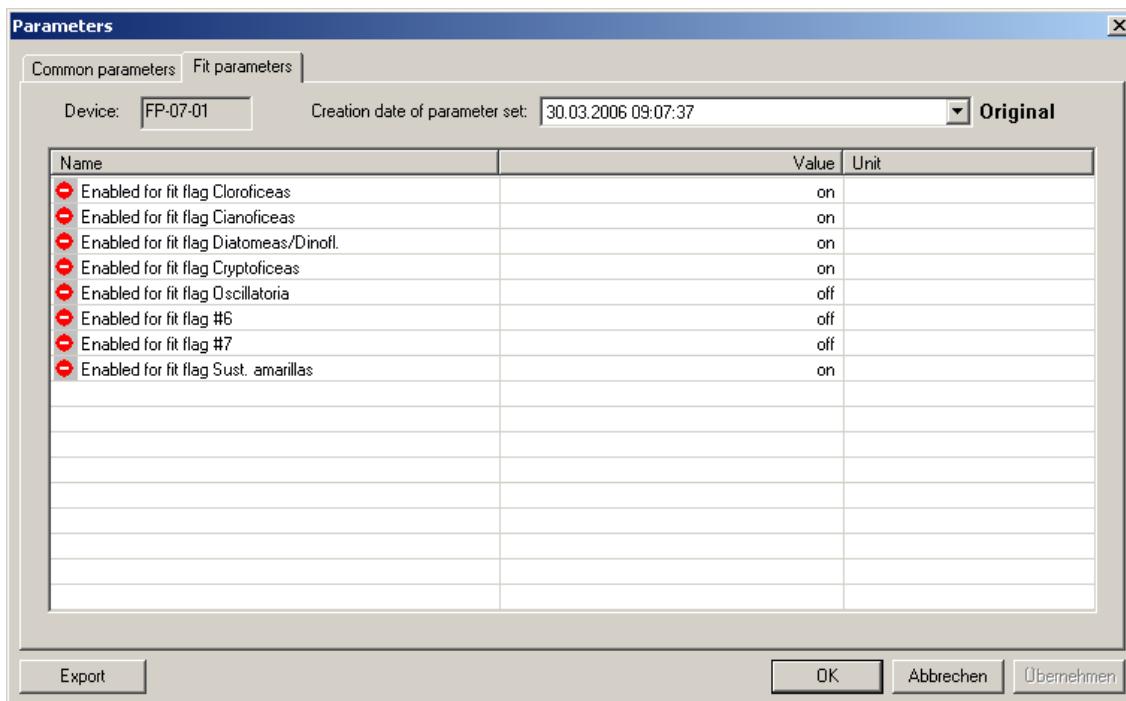
Date/Time [date]	Conc 0 [Green Algae] [µg/l]	Conc 1 [Bluegreen] [µg/l]	Conc 2 [Diatoms] [µg/l]	Conc 3 [Cryptophyta] [µg/l]	Conc 4 [Chlorophyll a] [µg/l]
15.06.2009 09:10:50	0	0,813	0	0,495	
15.06.2009 09:10:53	0	1,04	0	0	
15.06.2009 09:10:55	0	0	0	0	
15.06.2009 09:10:57	0	2,28	0	0	
15.06.2009 09:11:00	1,08	0,829	0	0	
15.06.2009 09:11:02	0	0,142	0	2,09	
15.06.2009 09:11:04	0,0475	0,956	0	0,908	
15.06.2009 09:11:07	0	0,932	0	0	
15.06.2009 09:11:09	0	1,2	0	0	
15.06.2009 09:11:12	0	0,74	0	0	
15.06.2009 09:11:14	0	0,561	0	0,936	
15.06.2009 09:11:16	0	0,698	0	0	
15.06.2009 09:11:19	0,945	0,779	0	0	
15.06.2009 09:11:21	0	0,804	0	0	
15.06.2009 09:11:23	3,35	0	0	0	
15.06.2009 09:11:26	1,07	0,488	0	0	
15.06.2009 09:11:28	0	0,261	0	2,03	
15.06.2009 09:11:31	1,52	0,227	0	0	
15.06.2009 09:11:33	0	1,1	0	0	
15.06.2009 09:11:35	0	1,58	0	1,97	
15.06.2009 09:11:38	5,41	0	0	0,883	
15.06.2009 09:11:40	3,26	0	2,18	0	
15.06.2009 09:11:42	0,792	0	2,82	0	
15.06.2009 09:11:45	2,92	0	1,33	2,85	
15.06.2009 09:11:47	6,68	0	0	1,54	
15.06.2009 09:11:50	6,56	0	0,939	0,492	
15.06.2009 09:11:52	0	0,111	1,16	0	
15.06.2009 09:11:54	0	0,363	0	0,598	

Within the list view, the right mouse button offers detailed information about the selected data set.

Date/Time [date]	Comment	Comment [1]
14.10.2015 14:53:58		<ul style="list-style-type: none"> <li>History of Parameters</li> <li>Edit Comment</li> <li>Delete Data</li> <li>Data Fields Selection</li> </ul>

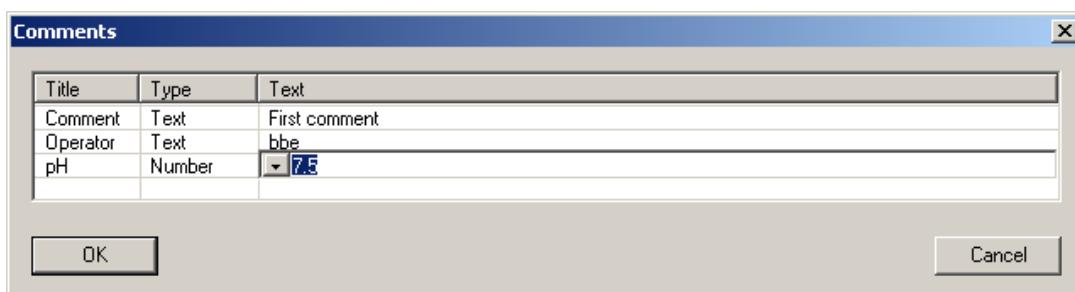
## History of Parameters

HISTORY OF PARAMETERS shows the corresponding parameters for the given instrument and time. For details, see the description of the data menu.



## Edit comment

EDIT COMMENTS allows the user to change the comments of a specific data set retrospectively.



The dropdown list contains previously entered comments (if applicable).

### Delete data

To delete data rows from the data base, mark one or more row by clicking on the row.  
Hold the Ctrl. key while clicking to add more rows to the selection.

14.10.2015 16:53:58
14.10.2015 17:03:58
14.10.2015 17:12:58
14.10.2015 17:53:58
14.10.2015 18:03:58
14.10.2015 18:12:58
14.10.2015 18:53:58
14.10.2015 19:03:58
14.10.2015 19:12:58
14.10.2015 19:53:58
14.10.2015 20:03:58
14.10.2015 20:12:58
14.10.2015 20:53:58
14.10.2015 21:03:58
14.10.2015 21:12:58
14.10.2015 21:53:58
14.10.2015 22:03:58

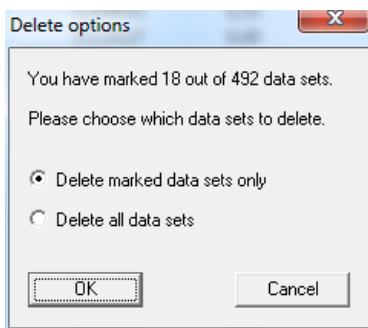
Hold the Shift. key while clicking to expand the.

14.10.2015 16:03:58
14.10.2015 16:12:58
14.10.2015 16:53:58
14.10.2015 17:03:58
14.10.2015 17:12:58
14.10.2015 17:53:58
14.10.2015 18:03:58
14.10.2015 18:12:58
14.10.2015 18:53:58
14.10.2015 19:03:58
14.10.2015 19:12:58
14.10.2015 19:53:58
14.10.2015 20:03:58
14.10.2015 20:12:58
14.10.2015 20:53:58
14.10.2015 21:03:58
14.10.2015 21:12:58
14.10.2015 21:53:58
14.10.2015 22:03:58
14.10.2015 22:12:58
14.10.2015 22:53:58
14.10.2015 23:03:58
14.10.2015 23:12:58
14.10.2015 23:53:58

Select “Delete Data”

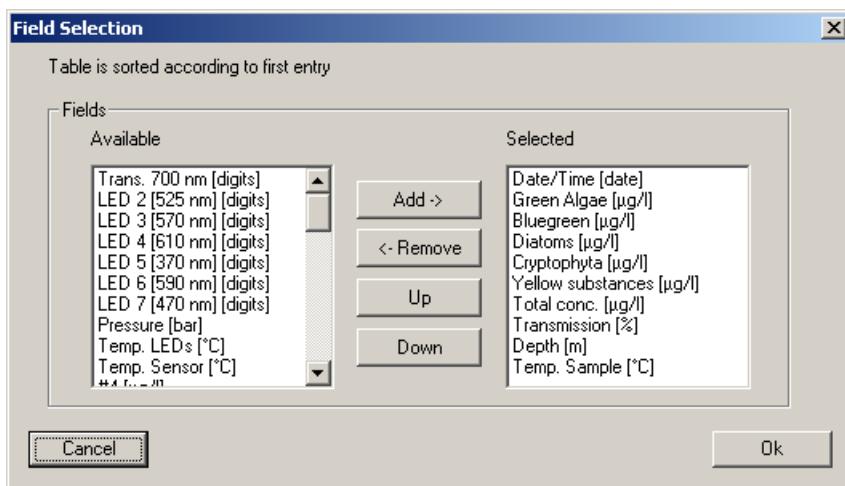
14.10.2015 17:12:58
14.10.2015 17:53:58
14.10.2015 18:03:58
14.10.2015 18:12:58
14.10.2015 18:53:58
14.10.2015 19:03:58
14.10.2015 19:12:58
14.10.2015 19:53:58
14.10.2015 20:03:58
14.10.2015 20:12:58
14.10.2015 20:53:58
14.10.2015 21:03:58
14.10.2015 21:12:58
14.10.2015 21:53:58
14.10.2015 22:03:58
14.10.2015 22:12:58
14.10.2015 22:53:58
14.10.2015 23:03:58
14.10.2015 23:12:58
14.10.2015 23:53:58

All data or the selected only can be deleted. Click OK to delete.



## Data Fields Selection

To add or remove columns from the list view use "Data fields selection". The dialog is similar to the dialog of the View Editor.



Please select or deselect the columns. The list view is updated immediately.

## Sorting of the list view

The list view is sorted by date/time. It can be sorted by any other column by clicking on the header of the column. Clicking twice leads to the reversed order.

Sorted by time/date ascending:

Date/Time [date]	Green Algae [ $\mu\text{g/l}$ ]
26.06.2007 10:04:14	0,00
26.06.2007 10:04:29	0,00
26.06.2007 10:04:45	0,00
26.06.2007 10:05:00	0,00
26.06.2007 10:05:16	0,00
26.06.2007 10:05:32	9,48
26.06.2007 10:05:47	0,00
26.06.2007 10:06:03	0,00
26.06.2007 10:06:19	0,00

Sorted by time/date descending:

Date/Time [date]	Green Algae [ $\mu\text{g/l}$ ]
26.06.2007 12:19:30	0,00
26.06.2007 12:19:14	0,00
26.06.2007 12:18:59	0,00
26.06.2007 12:18:44	0,00
26.06.2007 12:18:29	0,00
26.06.2007 12:18:13	0,00
26.06.2007 12:17:58	0,00
26.06.2007 12:17:43	0,00
26.06.2007 12:17:28	0,00

Sorted by green algae descending:

Date/Time [date]	Green Algae [ $\mu\text{g/l}$ ]
26.06.2007 10:05:32	9,48
26.06.2007 10:09:42	2,97
26.06.2007 11:20:26	2,89
26.06.2007 11:28:16	1,98
26.06.2007 10:16:14	1,31
26.06.2007 11:08:26	1,24
26.06.2007 11:55:09	0,32
26.06.2007 10:17:48	0,13
26.06.2007 11:30:53	0,12

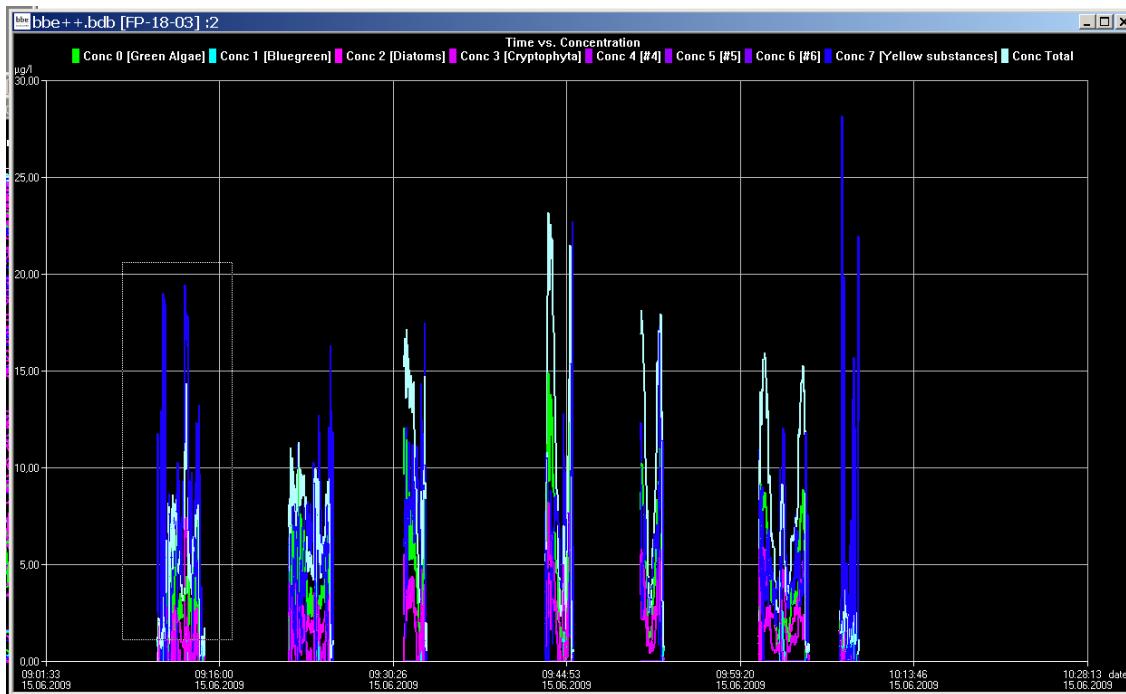
## XY GRAPH VIEWS

Features of the XY graph view:

1. Select data of interest
2. Scaling of the axes (right click)
3. Display of the corresponding parameters (right click)
4. Editing a XY view, to change colours the type of graph.
5. Navigation within the data

### Select data of interest

Please click and draw the mouse to select the required data.



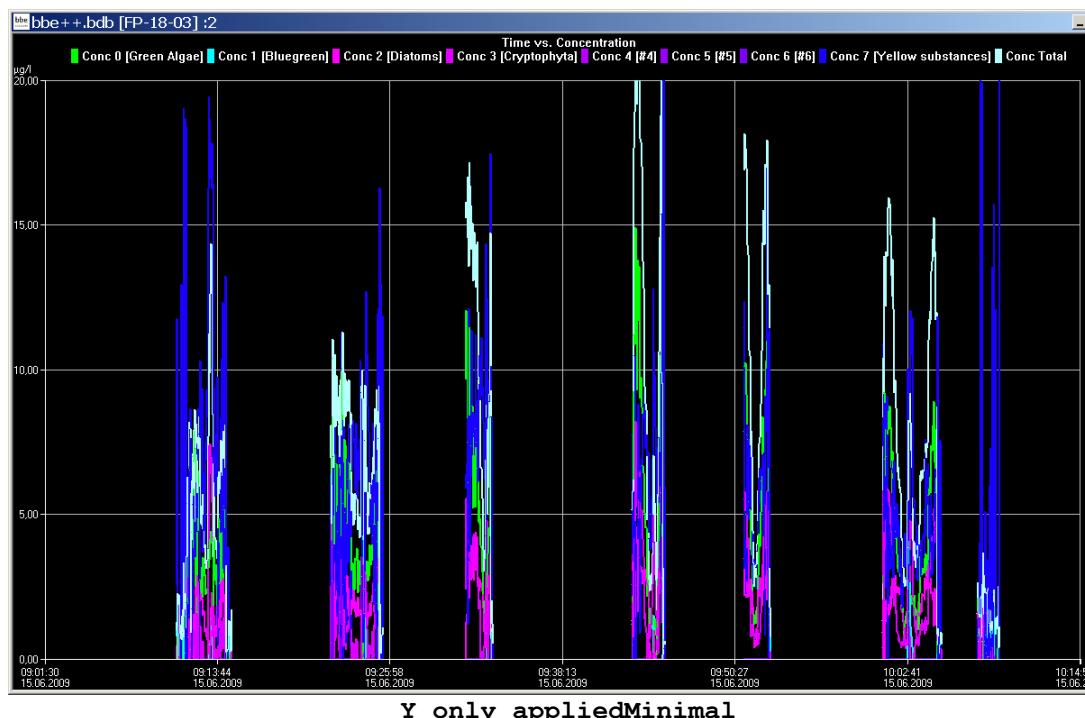
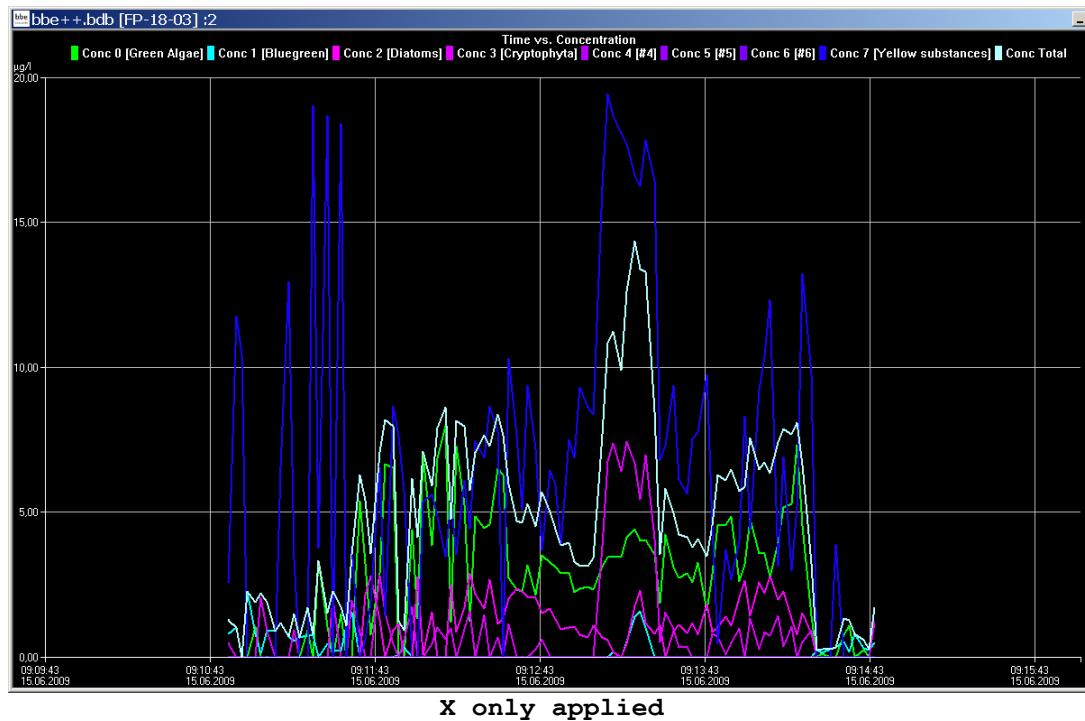
A pop-up window is shown to choose the axis to which the selection is to be applied.

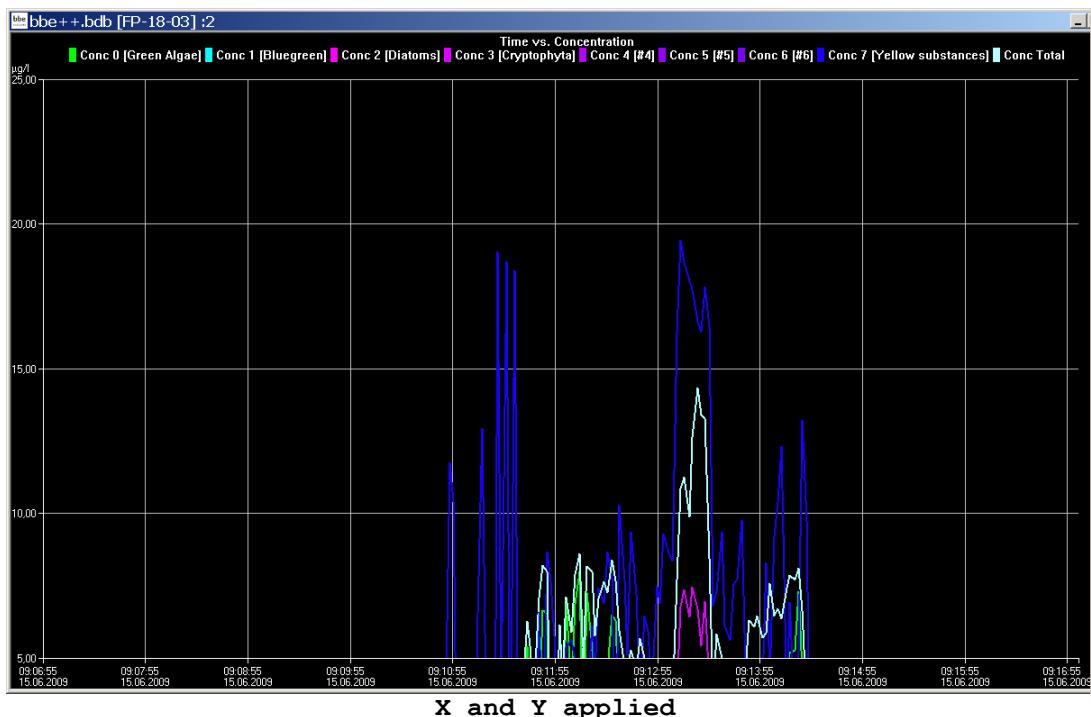


X only  
Y only  
X and Y

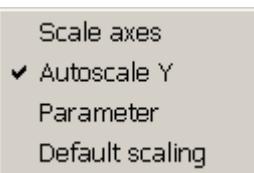
X only  
Y only  
X and Y

only the selection on the horizontal axis is applied.  
only the selection on the vertical axis is applied.  
the selection on the horizontal and the vertical axis is applied.





### Right-click menu



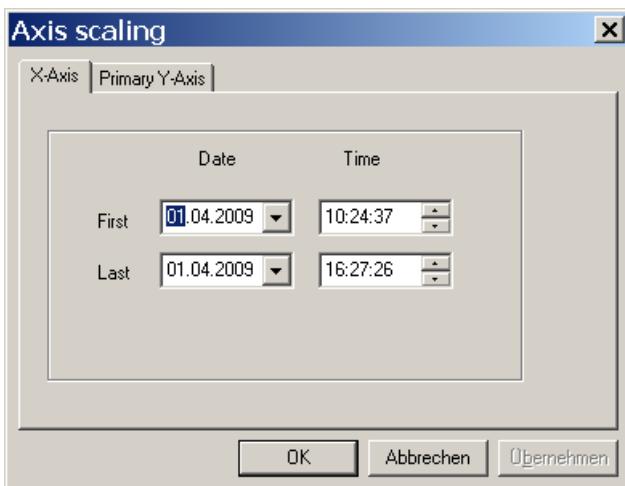
#### Features:

- adjust the scaling .
- activate and deactivate of the autoscaling feature.
- show the parameters of a single data-set.
- return to the default scaling.

#### Scaling of the axis

By default, scaling is done automatically. This means, all datasets of the selected period are displayed. To have a closer look at the data, it is sometimes useful to change the scaling. In the right-click menu, there is a "Scale axis" option:

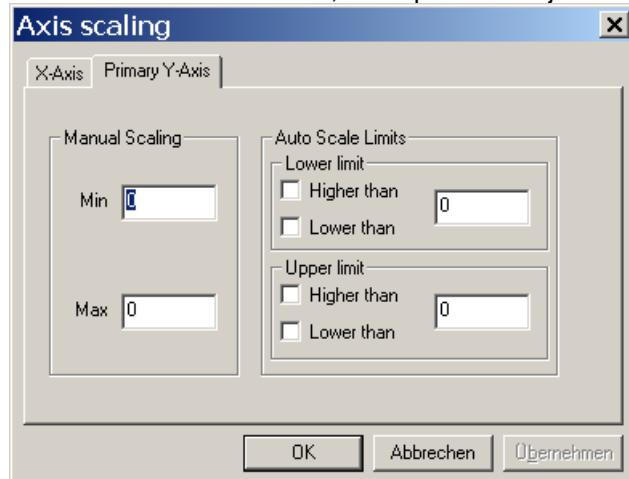
In case of a time axis, the scaling tab of this axis is as follows:



The first and last point in time have to be entered.

**Hint:** For more information on scaling an axis please see the "window" section in this manual.

In case of a “non-time axis”, more possible adjustments are available:



Manual scaling: enter fixed values for the minimum and the maximum of this axis - enter 0 for both to disable this feature.

Auto scale limits these settings are used to obtain a nice looking graph in two special situations:

- data sets with very low noise:

In the auto-scaling mode, the graph looks as if there are extreme variations, but the range is very small due to the auto-scaling. In this case, it is better to use the options:

lower limit: lower than and

upper limit: higher than

This leads to a minimum span in the graph.

- data sets with outliers:

In this case, it is difficult to analyse the data because the auto scaling generates a high span value. To prevent this, please use the

lower limit: higher than for outliers with low values and

upper limit: lower than for outliers with high values

This leads to an optimised span in the graph.

### Autoscaling

Enables the auto-scaling feature. The axis will be scaled so that all selected data are visible.

Parameters

Show the parameters of the data-set

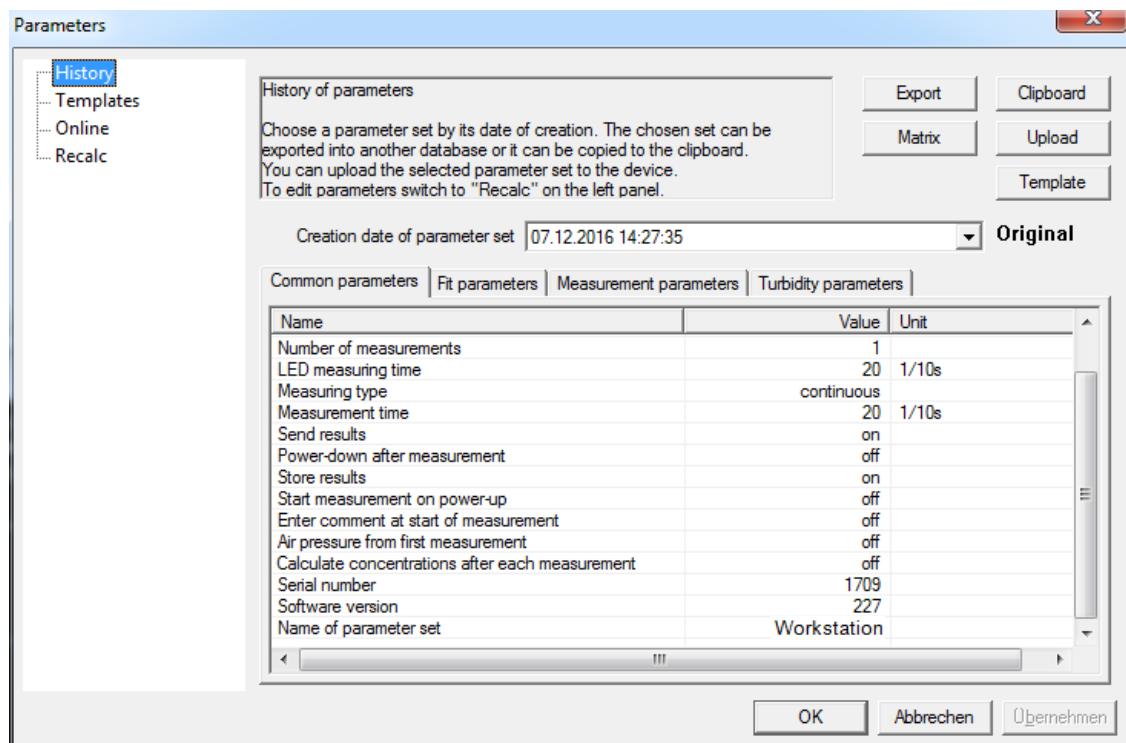
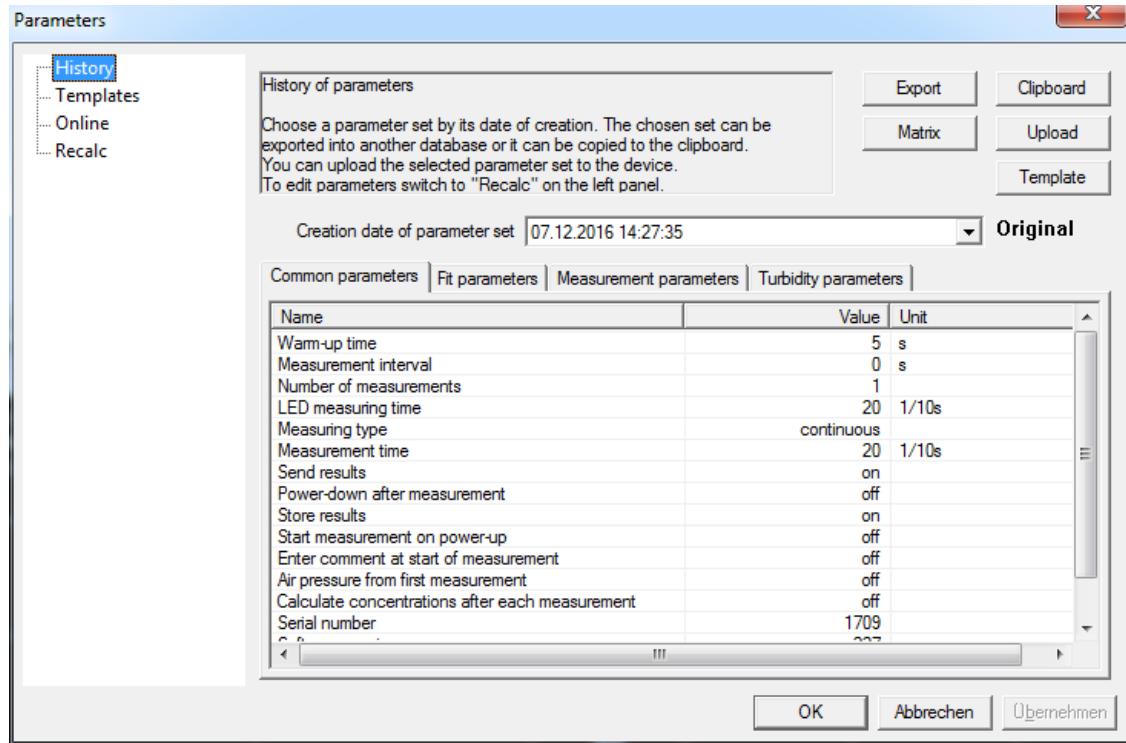
Default scaling

Click here to undo all the changes in the scaling options.

# Parameters

## Common parameters

This section contains parameters to control the measuring procedure. Parameters as measuring interval or measuring duration are located in this section.



### Warm-up time

During the warm-up time, the LEDs are on but the measurement has not yet started.

### Measurement interval

This is the interval between the start of one measurement to the start of the next measurement. For online measurements without external power supply, the interval can be set to save energy. In this case, please use the power-down option.

### Number of measurements

Performs a given number of measurements and stops afterwards. Only valid if continuous measurement is set to autostop.

### LED measuring duration

Duration of the LED brightness measurement. Only valid for PhycoProbes up to series 17.

### Measuring type

Select between continuous, single and autostop (after a number of measurements given in "number of measurements").

### Measurement time

Duration of a single measurement. The longer the time, the more stable the results are.

### Send results

If set, the results of each measurement will be send to the PC directly after the measurement. Please disable for maximum measuring frequency.

In case 'Send results' is set to 'off', please be aware that you will not receive results directly during measurement to bbe++ even when you started the measurement by way of bbe++. In this case, please download the data from the PhycoProbe later by use of the USB adapter and import the flp file in question to bbe++.

### Power-down after measurement

If set, the PhycoProbe switches off after each measurement to save power. This makes it possible to collect data from some days or weeks depending on the measuring frequency.

### Store results

If set, the results will be stored in the internal data logger

### Start measurement on power-up

If set, the PhycoProbe starts a measurement after starting. This is set when using the PhycoProbe as a stand-alone unit without any PC.

### Enter comment

If set, a comment can be entered when starting the measurement.

### Air pressure from first measurement

If set, the air pressure reading for the calculation of the depth is taken from the first dataset. If not set, it has to be measured separately.

### Calculate concentration after each measurement

If set, the PhycoProbe calculates the chlorophyll concentration of each algae class. This can be used if the instrument is operated at a PLC system without Windows.

If not set, the concentration is calculated in bbe++. This is faster.

### Serial number

Shows the serial number of the PhycoProbe.

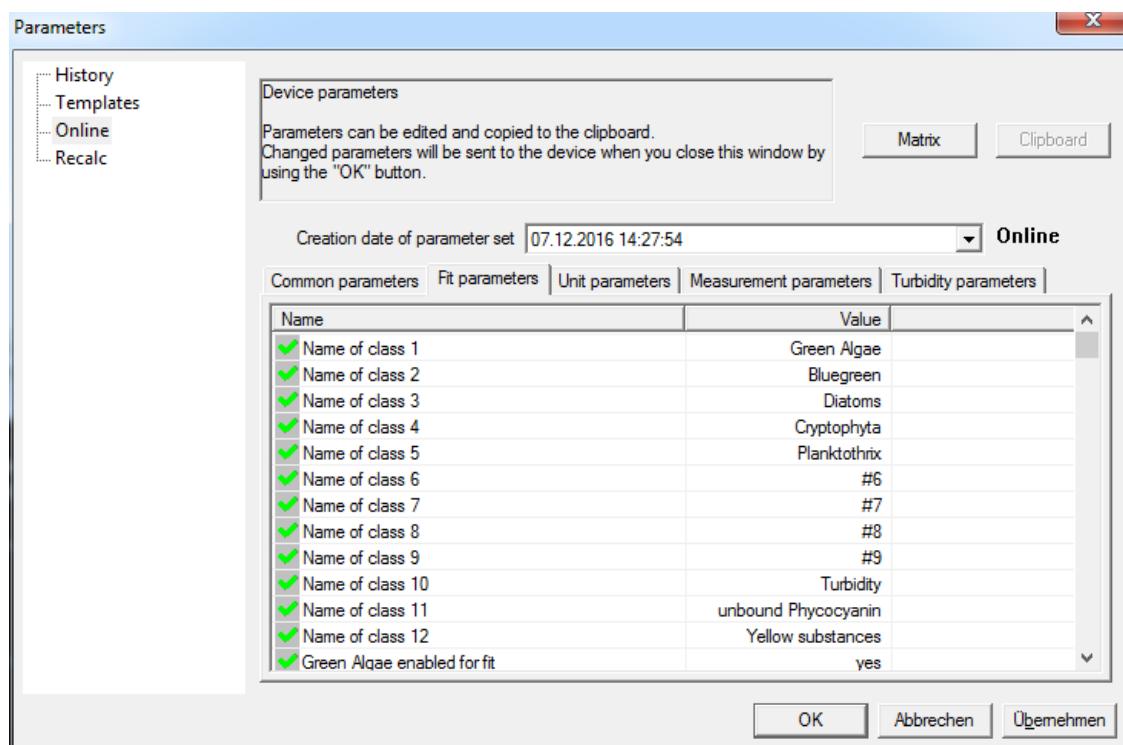
## Software version

Shows the software version of the firmware.

## Name of parameter set

Shows the name of the current parameter set. This is only available if there are more than one parameter sets stored in the PhycoProbe.

## Fit parameters

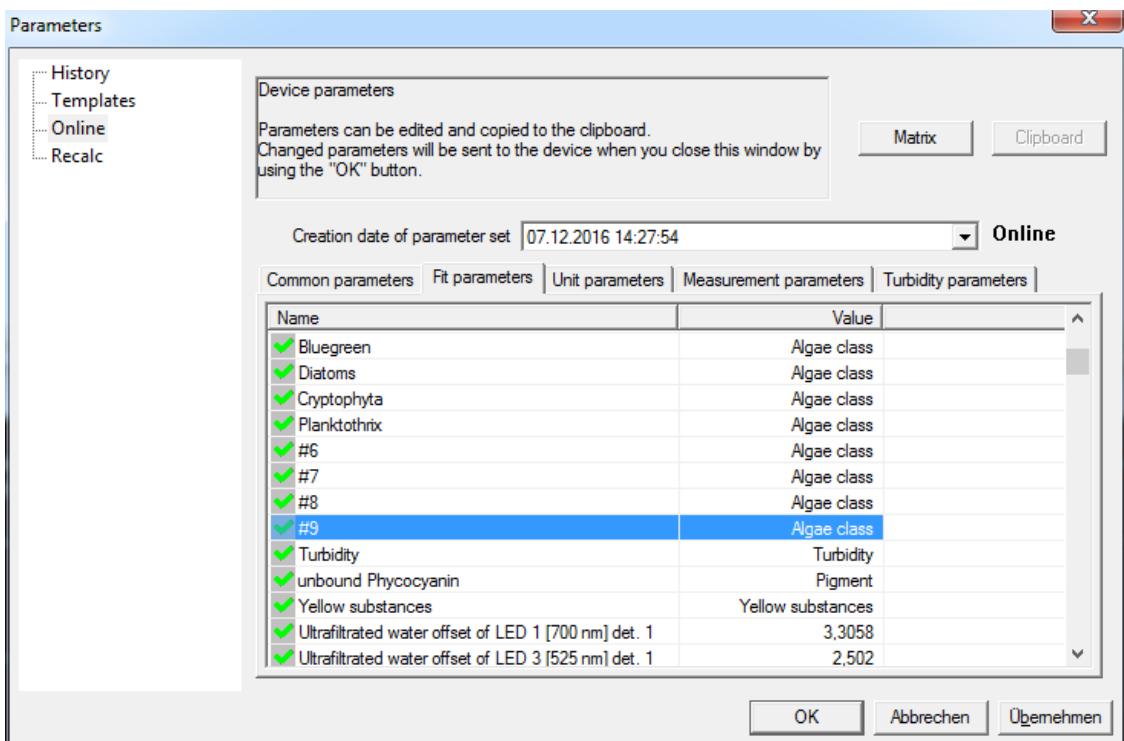


## Name

The names of the algae classes can be entered here.

## Enabled for fit flag

Each algae class can be enabled / disabled. There are 12 possible classes that can be used, but please note that the used classes should be characterised with a unique fingerprint to omit cross talking and therefore wrong differentiation.

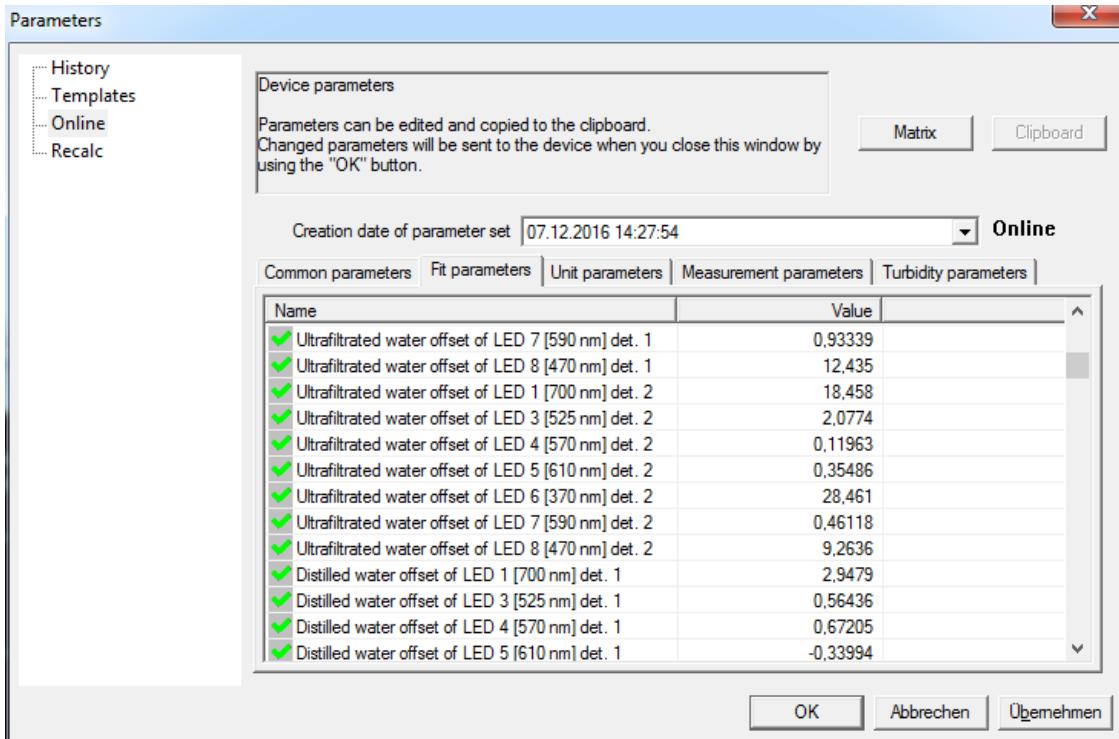


### Class type: Algae class / Yellow Substances / Pigment / Turbidity

The classes will be treated differently depending on their set type. All components marked as algae class will be added to create the total chlorophyll concentration. If set to yellow substances (on), the measured concentration is not added to the total algae concentration and the displayed unit is r.u. Finally while calibrating yellow substances 10 measurements are averaged to calculate the fingerprint.

### Ultra-filtrated water offsets

Displays the results of the offset calibration of ultra-filtrated sample water.

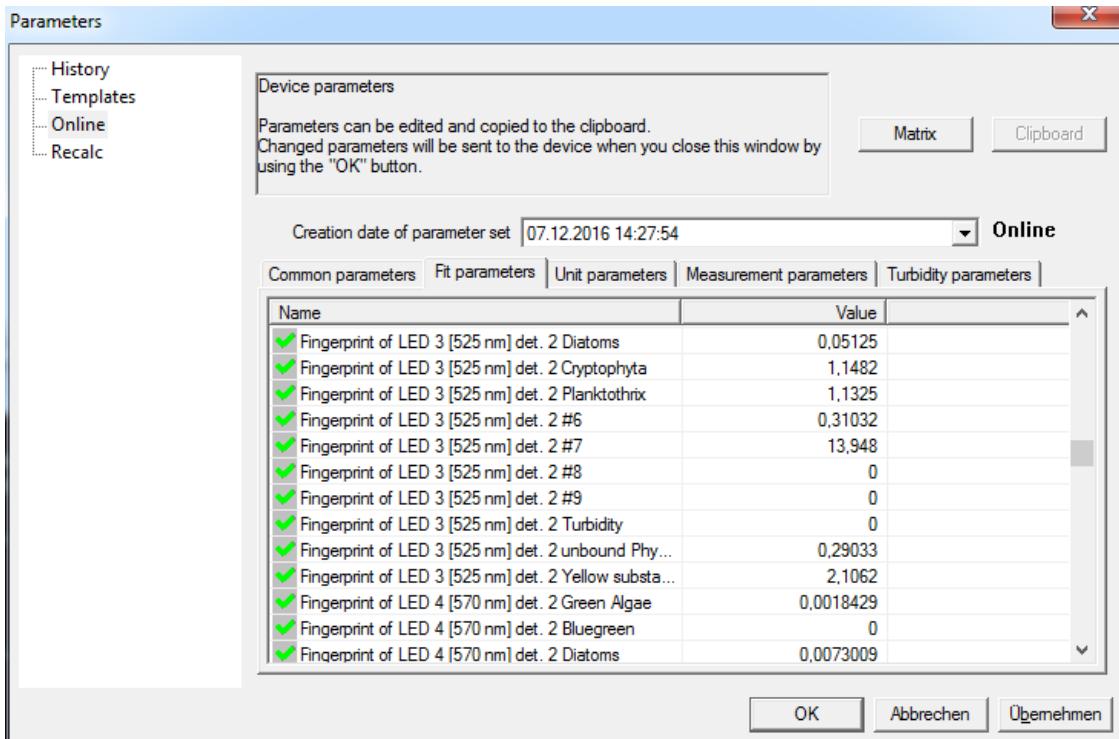


### Distilled water offsets

Displays the results of the offset calibration of distilled water.

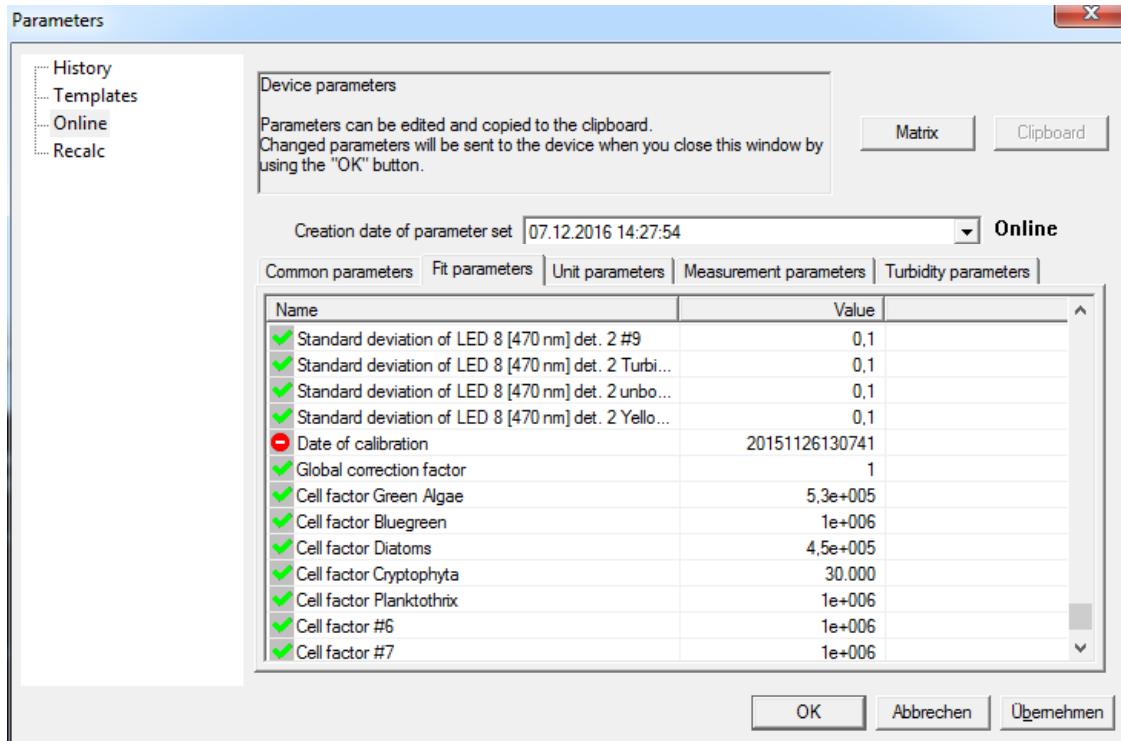
### Fingerprints

Displays the results of the algae class calibrations.



### Standard deviations

Standard deviations of the fingerprints of each algae class. This standard deviation refers to variations within one specific algae class. The greater the standard deviation, the less important the measured value for this algae class



### Date of calibration

Date of the last calibration at bbe Moldaenke.

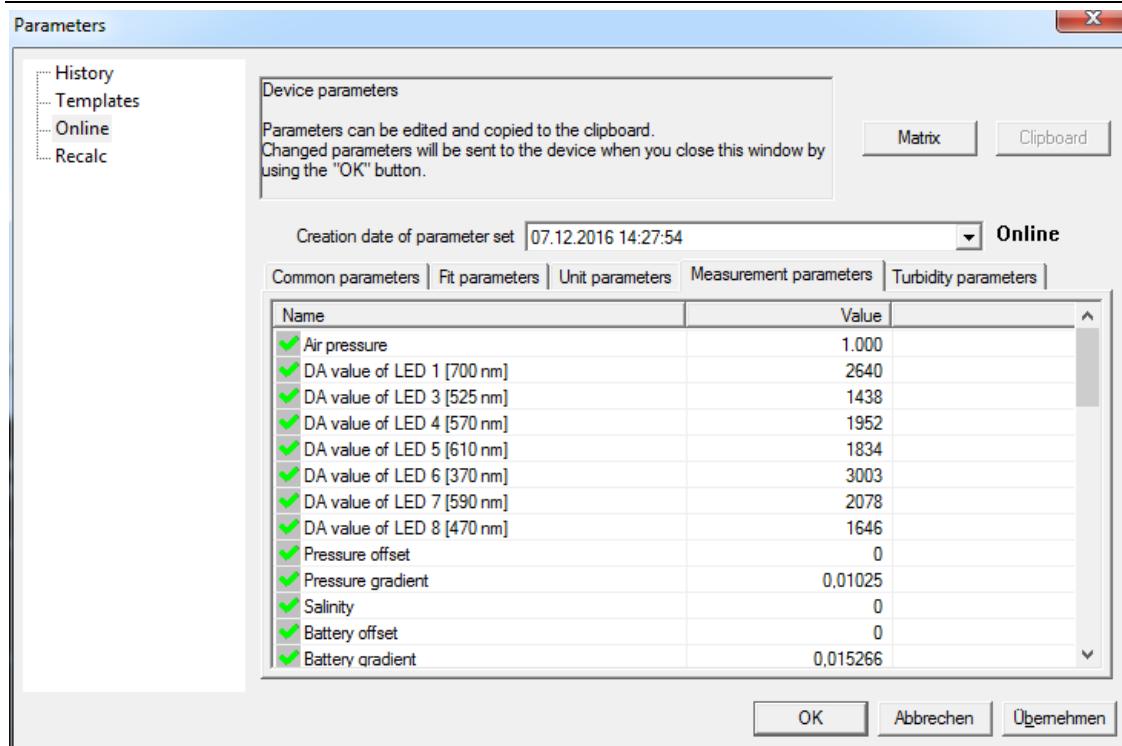
### Global correction factor

Set to 1 by default. All algae concentrations are multiplied by this factor.

### Cell factors

Factor to convert the concentration of the algae classes to cell counts.

## Measurement parameters



### Air pressure

Displays the air pressure. This parameter is set when clicking the "Set air pressure" button before starting the measurement. The parameter is used to calculate the depth.

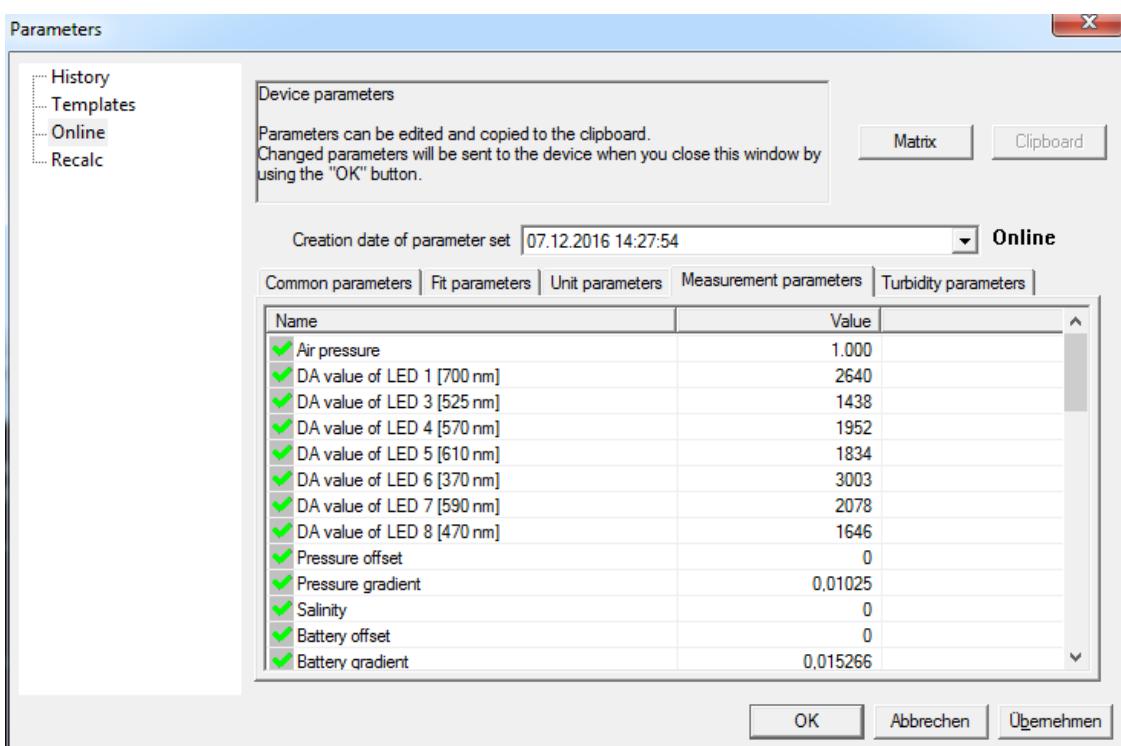
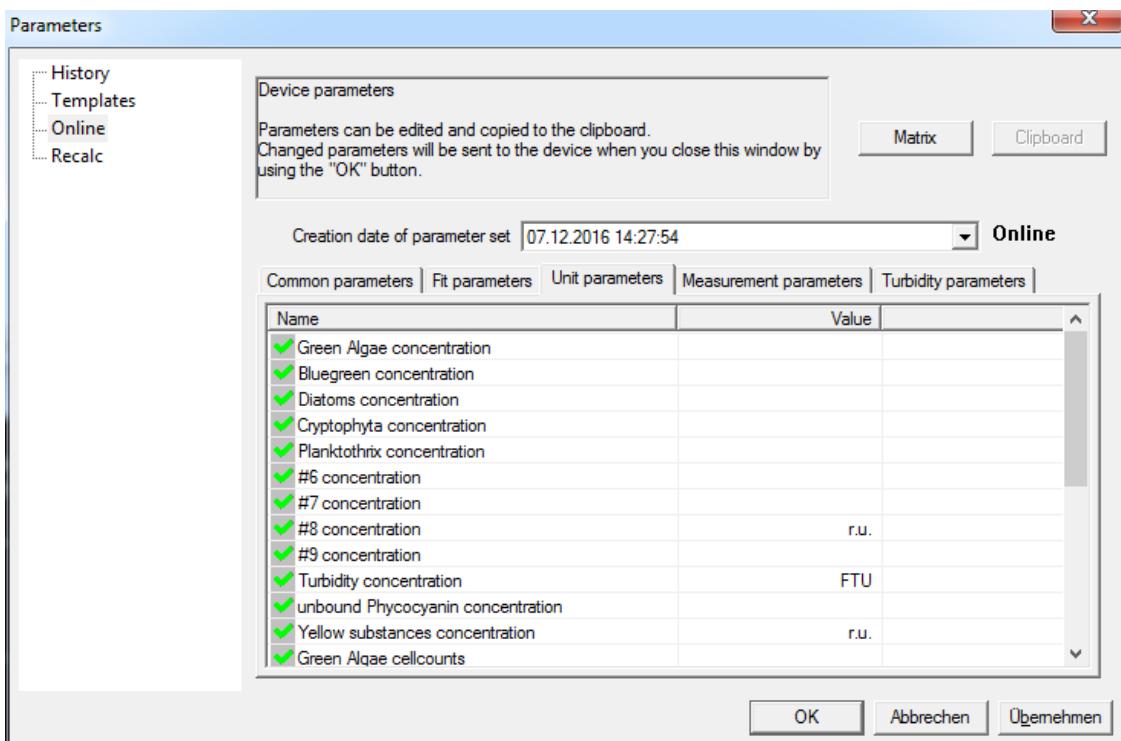
### DA values

Current settings of the LED controller.

### Offsets and gradients of transmission, pressure, temperatures and voltage

Displays the results of the calibrations of the measurands.

New tab for unit parameters: Here the algae class specific unit could be changed if differing from standard µg/L.

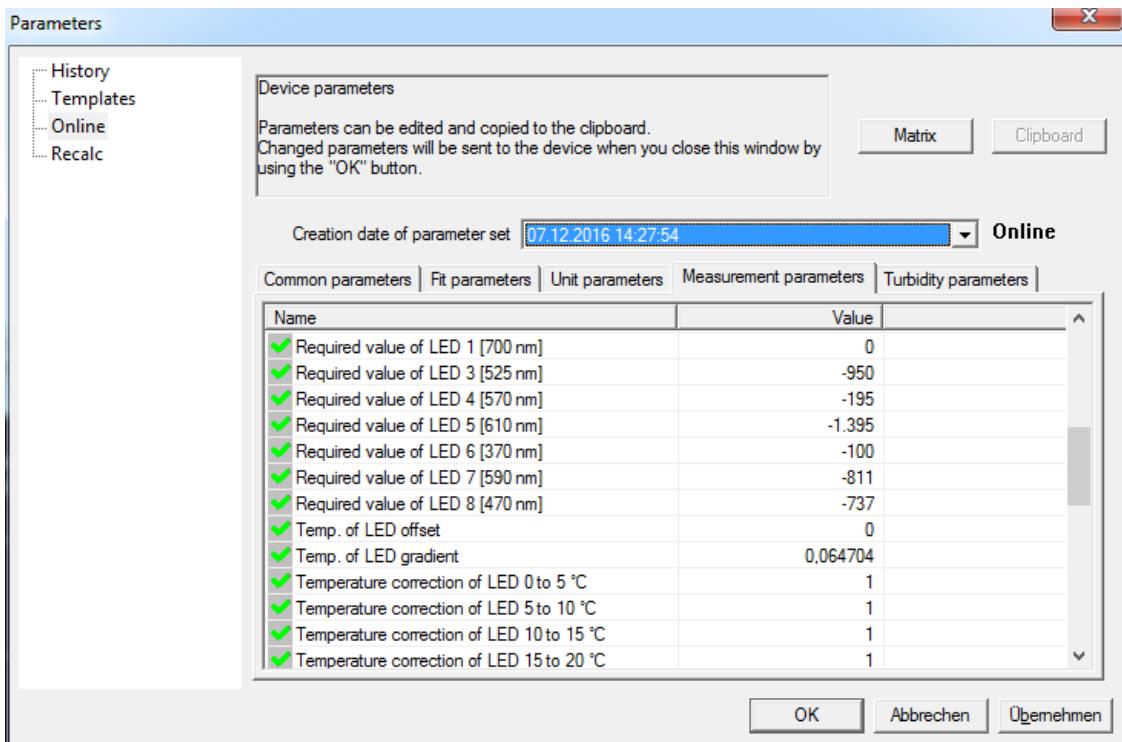


## Salinity

Enter the salinity of the water to enhance the calculation of the depth.

## Required values of the LEDs

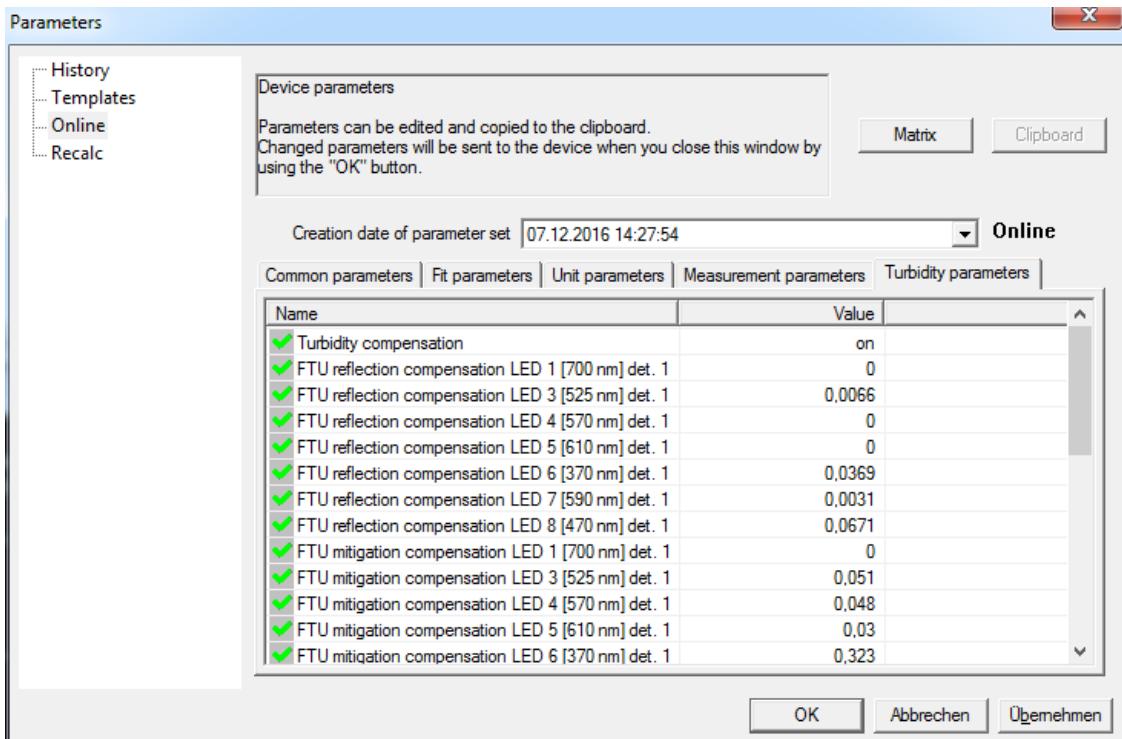
Values for the basic calibration of the PhycoProbe



## Temperature correction

Temperature correction factors for the given temperature ranges.

## Turbidity parameters



Turbidity compensation

Setting to activate and deactivate the turbidity compensation.

FTU reflection/mitigation compensation

Factors to adjust the turbidity compensation that consider light scattering effects as well as inner filtering effects

# bbe PhycoProbe Procedures

---

## Measuring Procedure

The PhycoProbe was calibrated before delivery with the bbe standard algae types and yellow substances. In case of the presence of algae types that have not been calibrated or in case of different types of yellow substances, the PhycoProbe needs to be calibrated to these special needs first. This is most important if only low concentrations of algae (< 10µg/l) are present.

### MEASURING PROCEDURE WITH CONNECTED PC

- connect the bbe PhycoProbe and the PC with the measuring cable / RS485 to USB converter cable, making sure that the connector has been greased sufficiently and the internal rechargeable battery is charged.
- start the PC software and choose the COM port the PhycoProbe is connected to (tools -> connect com port -> search device).
- calibrate the offsets and/or the fingerprint of yellow substances especially in case of low concentrations of chlorophyll (<10µg/l) (calibration menu).
- set the air pressure by using this item in tools -> device -> air pressure
- start the measurement (Start button in the tool bar).
- after starting the measurement, it takes about 30s until the first result appears.
- submerge the PhycoProbe when the first value appears.

### MEASURING PROCEDURE WITH AUTO START PLUG

- connect the bbe PhycoProbe and the PC with the measuring cable / RS485 to USB converter-cable, making sure that the connector has been greased sufficiently and the internal battery is charged.
- start the PC software and choose the COM port the PhycoProbe is connected to (tools -> connect com port -> search device).
- calibrate the offsets and/or the fingerprint of yellow substances especially in case of low concentrations of chlorophyll (<10µg/l). See chapter calibration for details.
- choose the menu item “Parameter -> online”
- set “Measurement on power-up” to “on” on the *Common Parameters* page, set the desired measuring time / interval.
- for long-term measurements, choose also “Power down after measurement” to save energy.
- click on “OK” to sync this setting with the PhycoProbe
- disconnect the measuring cable
- to start the measurement, connect the autostart plug, the measurement starts immediately after connection.
- to stop the measurement, disconnect the autostart plug.
- to obtain the data from the PhycoProbe, connect the USB cable with the USB stick attached to the PhycoProbe, all previously unsaved data files will be copied to the USB stick and can then be transferred to bbe++.

## DATA STORAGE

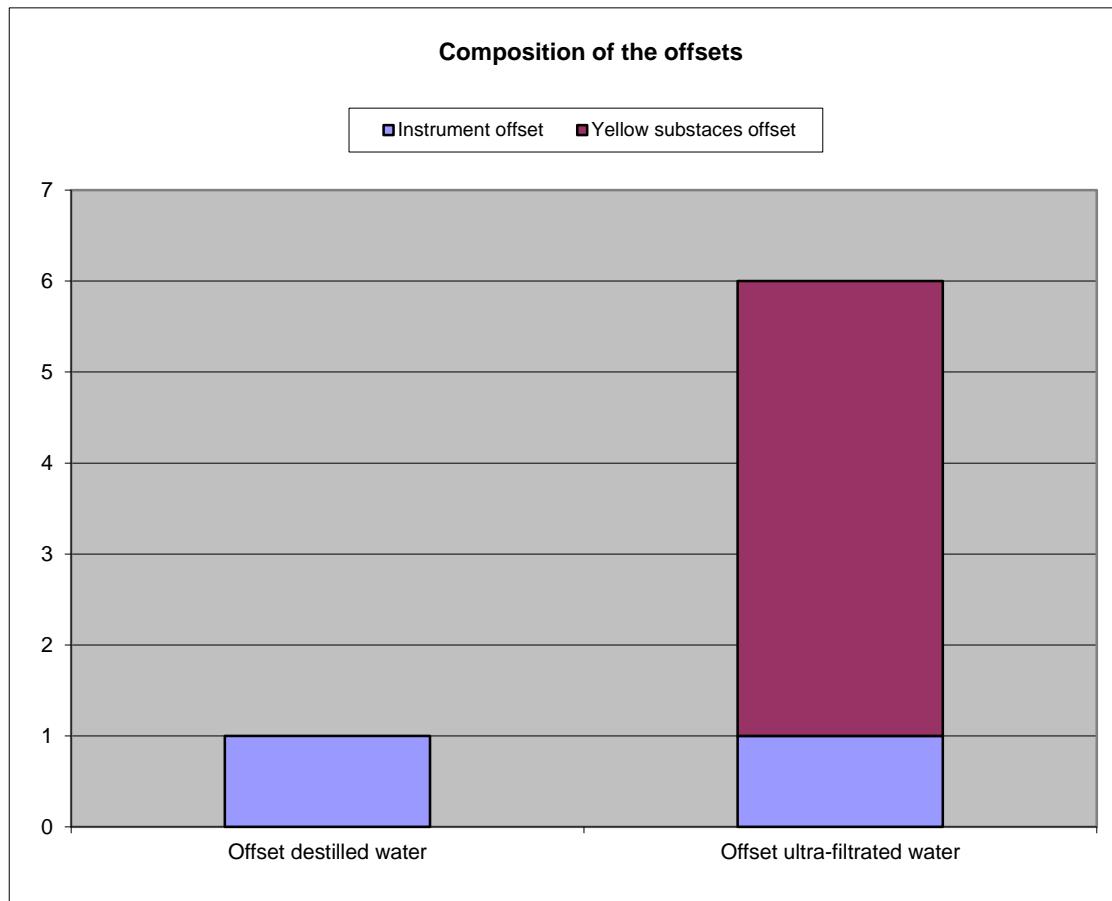
The measuring results are stored in files in the PhycoProbe. Starting the measurement starts a new file. The maximum file size is 1,754 datasets. If this number is exceeded, the PhycoProbe automatically opens a new file. Once the data files are downloaded via USB, they are deleted from the PhycoProbe.

## OFFSETS

The following are possibilities to deal with the offset:

1. The offsets are most important if the concentration of chlorophyll is low, for example lower than 10µg/l. In these cases, the fingerprint of the yellow substances should be recalibrated by using ultra-filtrated sample water (see below).

2. In case of stable concentrations of yellow substances, the results of the chlorophyll measurement may become more stable if the yellow substances are deactivated. In this case, the offset "ultra-filtrated water" is used for the calculation. Please calibrate this offset before choosing this option.



## Calibration procedures

### CALIBRATION OF THE OFFSETS:

- for the calibration of the offsets, please use ultra-filtrated sample water and distilled water.
- be sure that the PhycoProbe and its windows are clean.
- avoid artificial light during the calibration, especially fluorescent lamps!
- a calibration cylinder from bbe is recommended.
- be sure that the calibration cylinder is clean as even small amounts of algae might disturb the calibration considerably. bbe recommends the use of a dedicated container/canister to calibrate the offsets.
- remove air bubbles by moving the PhycoProbe around
- submerge the PhycoProbe in the distilled sample water and use "Device -> PhycoProbe -> Calibration -> Offsets (distilled).
- apply the values after the calibration.
- submerge the PhycoProbe in the ultra-filtrated sample water and use "Calibration -> Offsets (ultra-filtrated).
- apply the values after the calibration.

**CALIBRATION OF THE ALGAE FINGERPRINTS:**

- do an offset calibration first.
- for the calibration of the algae fingerprints, please use pure solutions of the algae division with a known chlorophyll concentration. The concentration should be in the range of 50-100µg/l.
- avoid artificial light during the calibration, especially fluorescent lamps!
- a calibration cylinder from bbe is recommended.
- submerge the PhycoProbe in the solution.
- choose "Device -> PhycoProbe -> Calibration -> Fingerprints" in the software, choose the algae class and enter the concentration.
- choose the type of dilution water used for the calibration.
- start the calibration.
- apply the values after the calibration.
- repeat the procedure with all algae classes activated in the PhycoProbe.

**CALIBRATION OF THE YELLOW SUBSTANCES:**

- do an offset calibration first (see procedure above).
- for the calibration of the yellow substances, please use ultra-filtrated sample water.
- avoid artificial light during the calibration, especially fluorescent lamps!
- a calibration cylinder from bbe is recommended.
- submerge the PhycoProbe in the filtrated sample water.
- choose "Device -> PhycoProbe -> Calibration -> Fingerprints" in the software, choose yellow substances and enter 1 r.u. as the concentration and start the calibration.
- apply the values after the calibration.

**CALIBRATION OF PIGMENTS (PHYCOCYANIN):**

- start with calibrating the offsets
- for calibration of the pigment fingerprints start with a solution of the pigments standard. The used calibration concentration should range between 100 and 200µg/L
- fill the calibration solution into the calibration tank
- navigate to the menu 'calibration' -> 'fingerprints' in bbe++; choose the right pigment class (e.g. phycocyanin) and enter the right concentration
- choose the right calibration medium (choose between tap water and distilled water)
- start the calibration
- accept the new values after the calibration stops automatically

**CALIBRATION OF TURBIDITY FINGERPRINTS:**

- start off from a offset calibration (if not yet performed)
- for the calibration of the turbidity use a clean solution of turbidity standard in distilled water; use a known concentration in a range from 50 to 80 FTU
- fill the solution into the calibration tank
- navigate to the menu 'calibration' -> 'fingerprints' in bbe++; choose the turbidity fingerprint (beneath the algae classes) and fill in the right turbidity value (same as concentration)
- choose as calibration medium 'distilled water' unless you did otherwise and used tap water
- start the calibration
- accept the new values after the calibration stopped automatically

**Calibration of the total chlorophyll concentration:**

The assumption for this type of calibration is that the composition of the algae classes detected by the PhycoProbe matches the composition of the reference method used, however the total chlorophyll concentration is different. Proceed as follows:

## 1. In the Probe

- connect the PhycoProbe to the PC
- choose the menu item “Device -> PhycoProbe -> Edit parameters”
- choose “Parameters of measurement”
- change the global correction factor.
- apply the values.

## 2. In data files

- choose the access level “Service” as a minimum
- load a data file
- choose “Data -> Parameters -> Recalc data with changed parameter”
- change the global correction factor by following the “Recalc data with changed parameters” procedure.

### CALIBRATION BY FACTORS:

The assumption for this type of calibration is that there is a number of results of the bbe PhycoProbe and of a reference method that show a certain factor for one algae class. It is highly recommended to use only measurements where this algae class is dominant and the concentration is at least 10µg/l.

- choose “Device -> PhycoProbe -> Calibrations -> Correction factors” in the software
- choose the algae class and enter the determined factor.
- apply the values.

### CALIBRATION OF FINGERPRINTS WITH SUBSEQUENT WET-CHEMICAL ANALYSIS:

In case of calibrating the bbe PhycoProbe with a reference solution where the concentration is determined subsequently, the following steps have to be carried out:

- do a fingerprint calibration as described above, but enter 1 for the concentration of the reference solution.
- do a wet-chemical analysis.
- use the “Calibration by factor” feature to adapt the calibration to the result of the subsequent wet-chemical analysis.

Attention: until the last step has been carried out, the bbe PhycoProbe is not ready for use.

### Recalculation of data with changed algae classes or parameter settings

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The bbe++ software provides the possibility to recalculate the data with parameter settings different from those that were active during the measurement.

Possible applications are:

- refitting the algae classes with different/new classes
- recalculating the depth measurement

To do this, follow the instruction for recalculation:

- create a copy of the current parameters
- change the corresponding parameter, for example the algae classes used for the fit.
- click “OK” to start a recalculation
- use the “Restore data with original parameters” feature to return to the old values.

Please note: The recalculation is valid for the selected data sets only.

## Storing the PhycoProbe

---

The best way to store the PhycoProbe is in the original box from **bbe** (utility case). Please store the PhycoProbe in a dry state using the protection cap.

# Operating Principles

## Principles of Operation

Due to the fact that algae of the same division contain a similar quantity and quality of photosynthetic pigments, their fluorescence excitation spectrum (with a fixed emission wavelength at 680nm) is significant. Thus, it is possible to differentiate divisions of algae by their fluorescence excitation spectrum. In addition to this, other fluorescing matter (for example, yellow substances) is detected to enhance the accuracy. In addition to the 680nm detector, the bbe PhycoProbe contains a second detector at 650nm excitation. This detector is used to determine free cyanobacterial pigments like phycocyanine.

The bbe PhycoProbe uses 6 LEDs for fluorescence excitation for algae differentiation an additional LED at 700nm is for the turbidity determination by scattering. The LEDs emit light at 6 selected wavelengths (370nm, 470nm, 525nm, 570nm, 590nm and 610nm). The turbidity then can be used for correcting reflection and inner filtering effects as well.

### DETERMINATION OF DIFFERENT ALGAE

The division of *chlorophyceae* (green algae) shows a broad maximum of fluorescence at the 470nm LED, which is caused by chlorophyll-a and -b. The *cyanophyceae* (blue-green algae) have their maximum at 610nm due to the photosynthetic antenna pigment *phycocyanin*. *Cyanophyceae* also contain chlorophyll-a if there is low intensity at 470nm. This is due to the masking effect of the *phycocyanin*. Furthermore, the high peak at the 525nm region for the *bacillariophyceae* originates from *xanthophyll fucoxanthin* and for the *dinophyceae* from *peridin*. The maxima at 470nm are caused by chlorophyll-a and -c. In our last analysed group, *cryptophyceae*, a significant maximum can be found at 570nm, which originates from *phycoerythrin*.

The different divisions of algae are first measured separately to calibrate the instrument. The measured spectra, or fingerprints, are then stored in the PhycoProbe.

During the measurement, the spectrum of the sample is loaded into the storage device of the instrument or sent to an external computer. The computer calculates the content of the different divisions of algae in the sample from the sample spectrum and the spectra of the separately measured algae divisions.

The concentration of every algae division is given in µg chlorophyll-a/l.

### DETERMINATION OF YELLOW SUBSTANCES

Yellow substances may fluoresce.

The UV LED (370nm) is used to measure yellow substances in the water. At 370nm it is possible to differentiate between algae (low signal) and yellow substances (high signal). The result of this measurement is given in relative units and not in weight/volume, because very different substances are detected. The result is mainly used to obtain a more accurate determination of algae classes – but it is also possible to determine the variations of the yellow substances.

### DETERMINATION OF FREE ALGAL PIGMENTS (PHYCOCYANINE)

Additionally, to the functionality of the FP a detection of unbound phycocyanin was implemented. This was achieved adding a second detector. The detection wavelength was adjusted to the emission spectrum of phycocyanin. Phycocyanin is an algae pigment that is found in the light-harvesting complex of cyanobacteria. It is an accessory pigment to chlorophyll. In theory when cell lysis the water soluble pigment can detach from photosystem an leaves the cell. This effect can be observed in changing fluorescence emission spectrum from 700nm (chlorophyll fluorescence) to 650nm (unbound Phycocyanin fluorescence) and therefore can be used as indicator for cell lysis and therefore also reflects the release of blue-green algae contents like toxins (for example microcystin) as well as flavours and odorous substances (T&O).

## DATA ANALYSIS

### Offset

The LEDs in the bbe fluorometer are switched on one after the other at high frequency. The fluorescence signal for each LED is taken and averaged during a given measuring time. The fluorescence values for each of the LEDs are given at the end. The concentration of the algae has to be calculated from these values.

The first step is to subtract the signal that does not come from the algae. This type of signal is also called offset. There are two types of offsets:

1. the signal from the bbe fluorometer itself, from the electronics and the optical system
2. the signal from fluorescent substances in the water that are not algae.

The first signal is determined by a measurement with distilled water – water without any fluorescent substance. The second signal can be determined by a measurement in ultra-filtrated sample water. This water only contains fluorescent substances that are not algae. Ultra-filtration is here understood as filtration with a 'mesh size' of 0.2 µm.

In the case of a varying concentration of these substances in the water, the subtraction fails. This is why the determination of yellow substances has been integrated into the bbe fluorometer. Yellow substances are treated as one algae class. Varying concentrations can be detected – assuming the fingerprint of the calibrated yellow substances matches the yellow substances in the sample.

The first signal only depends on the instrument and only varies within a relatively small range. So there is no need to calibrate these settings. The second signal depends on the sample, so there may be a need to calibrate this.

### Algae classes

After subtracting the offset from the measured fluorescence signals, the remaining signals have to be assigned to the different algae classes. A statistical calculation procedure in the software finds the best combination of concentrations of algae classes for the measured pattern of signals.

**The total chlorophyll concentration is the sum of all detected concentrations of algae classes.**

**The signal can only be assigned to algae classes that are calibrated and activated in the instrument. Algae classes in the sample that are not part of the calibration will lead to miscalculations.**

The different algae classes used for the statistical fit need to have significantly different fluorescence spectra such as the spectra calibrated by bbe in the bbe fluorometer. In case of queries, please ask **bbe Service**.

## Additionally Measured Parameters and their Calculation

### PRESSURE

The pressure is measured with an integrated sensor. The depth of the PhycoProbe is calculated from the pressure.

#### CALCULATION OF THE PRESSURE FROM THE SENSOR SIGNAL

pressure [bar] = slope [bar/digit]\* (signal [digit] – offset [digit])

#### CALCULATION OF THE DEPTH FROM THE PRESSURE

depth [m] = (pressure [bar] - air-pressure [bar]) \* 10 [m/bar]

## WATER TEMPERATURE (OPTION)

The water temperature is measured with a sensor either next to the transmission window of the probe or on the back side of the PhycoProbe..

### CALCULATION OF THE WATER TEMPERATURE FROM THE SENSOR SIGNAL:

water temperature [°C] = slope [°C/ digit]\* (signal [digit] – offset [digit])

## TRANSMISSION

The turbidity of the water is determined by measuring the scattering of the light of a 700nm LED. It sits at 90° to the sensors together with the excitation LEDs. Distilled water equals a reading of zero for the scattering. The unit of the scattering are FTU.

### CALCULATION OF THE TURBIDITY FROM THE SENSOR SIGNAL

turbidity [FTU] = slope [FTU/digit]\* (signal [digit] – offset [digit])

### COMPENSATION OF THE CHLOROPHYLL CONCENTRATION BY THE TRANSMISSION

First step of the compensation is to estimate the turbidity from the transmission readings:

$$\text{Turbidity} = a * \text{transmission}^2 - b * \text{transmission} + c$$

The estimation is based on measurements using clay as a model for turbidity. The coefficients a, b and c are the same for all PhycoProbes.

The turbidity is used to compensate two effects:

1. The higher offset due to additional reflexion on the particles
2. The change of the signal (raw value) due to the mitigation of the light.

The offset is compensated by adding the turbidity multiplied with a factor that depends on the PhycoProbe and a factor which is independent from the PhycoProbe. **The factor which depends on the PhycoProbe is calculated from the fingerprints.** The correction is done separately for each LED.

$$\text{Offset cor.} = \text{Offset} + \text{Turbidity} * \text{Factor}_{\text{PhycoProbe}}(\text{LED}) * \text{Factor}_{\text{Reflexion}}(\text{LED}) +$$

$$\text{Raw value cor.} = \text{Raw val.} * (1 + \text{Turbidity} * \text{Factor}_{\text{mitigation}}(\text{LED}))$$

**After doing the correction, the calculation of the chlorophyll concentrations is done as normal.**

## TEMPERATURE

There is a very low drift of temperature in the PhycoProbe. It can be compensated by a measurement of the internal temperatures. For this, the input of temperature correction factors is possible. A correction factor is defined for each temperature range. The compensation takes place, if the factor is different from 1. The temperature is measured by an internal sensor – not by the water temperature sensor.

### COMPENSATION OF THE CHLOROPHYLL CONCENTRATION BY THE TEMPERATURE

$$\text{real chlorophyll conc.} [\mu\text{g/l}] = \text{detected chlorophyll conc.} [\mu\text{g/l}] * \text{correction factor (temp)}$$

### BRIGHTNESS OF THE LEDs

The fluorescence signal depends directly on the brightness of the excitation light (LED). The brightness is measured internally. At the beginning of the measurement the LEDs are regulated to a default value. During the measurement, a frequent control measurement takes place.

## PhycoProbe Workstation 25 (Options)

### General Considerations

To use the PhycoProbe in the lab, a desktop/benchtop workstation adapter for the PhycoProbe is available. Instead of submersing the PhycoProbe, a cuvette is used to measure the sample. The Workstation 25 adapter is available in two versions

1. standard version
2. with integrated stirrer



PhycoProbe on a Workstation 25 with integrated stirrer

### Workstation 25 Standard Version

#### PARTS LIST

- PhycoProbe workstation
- light shield
- cuvette

#### SET-UP

- dismount the light shield from the PhycoProbe by unscrewing the 8 screws.
- put the PhycoProbe on the workstation as shown above
- connect the cable to the PhycoProbe and to the power supply delivered with the PhycoProbe
- connect the converter cable delivered with the PhycoProbe to the power supply as shown on page 17

- connect the converter cable to the PC
- start the PC and the bbe++ software
- measurement of low concentrations might need a recalibration of both offsets (see also page 110) and the fingerprint for yellow substances (see also page 111)

## PARAMETER SETTINGS

To perform measurements with the Workstation 25 kit, the common parameters can be changed slightly. The screenshot below shows the recommended settings:

'Measurement interval'	'1/10s'	200	
'PhycoProbe power-down flag'		Off	

### Warm-up:

The warm-up time is used to adapt the algae to the light conditions. The brighter the light during the storage, the longer the warm-up time.

### Measuring duration

When compared to the use of the PhycoProbe as a diving probe, the measurement duration is extended to enhance the sensitivity.

### Number

Number is set to 1 to conduct one measurement and stop afterwards.

### Parameter sets

PhycoProbes with a firmware version 2.65 and up can handle more than one parameter set inside of the instrument. In this case, the parameter sets are available in the parameter menu.

Older versions came with a CD containing an additional parameter set. This is available as a \*.PRM file. To load it go to Tools -> device -> parameter utility.

## PERFORMING MEASUREMENTS

- remove the light shield
- fill the sample in the cuvette and put it in the mount
- replace the light shield
- start the measurement by clicking "Device -> PhycoProbe -> Start measurement"

## Workstation 25 Stirrer Version

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### PARTS LIST

- PhycoProbe workstation
- light shield
- control unit
- stirrer cable
- cuvette
- magnetic stirrer

### SET-UP

- dismount the light shield from the PhycoProbe by unscrewing the 8 screws.
- put the PhycoProbe on the workstation as shown below
- connect the cable to the PhycoProbe and to the control unit
- connect the converter cable delivered with the PhycoProbe to the control unit.

- connect the converter cable to the PC
- connect the stirrer to the control unit
- connect the control unit to the mains and switch it on
- start the PC and the PhycoProbe software
- put a cuvette with water and the magnetic stirrer on the workstation and adjust the stirring speed as desired
- measurement of low concentrations might need a recalibration of both offsets (see also page 111) and the fingerprint for yellow substances (see also page 112).





### PARAMETER SETTINGS

Use the parameter settings as shown above (page 120).

### PERFORMING MEASUREMENTS

- remove the light shield
- fill the sample into the cuvette with the magnetic stirrer disk and put it on the workstation
- adjust stirring speed if necessary
- replace the light shield
- start the measurement by clicking "Device -> PhycoProbe -> Start measurement"

## PhycoProbe HydroWiper (Option)

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### General Considerations

The HydroWiper can be used optionally to clean all three windows of the PhycoProbe.

- It is powered autonomously
- The cleaning interval can be set
- The exchangeable battery lasts about half a year
- The brushes are exchangeable as well

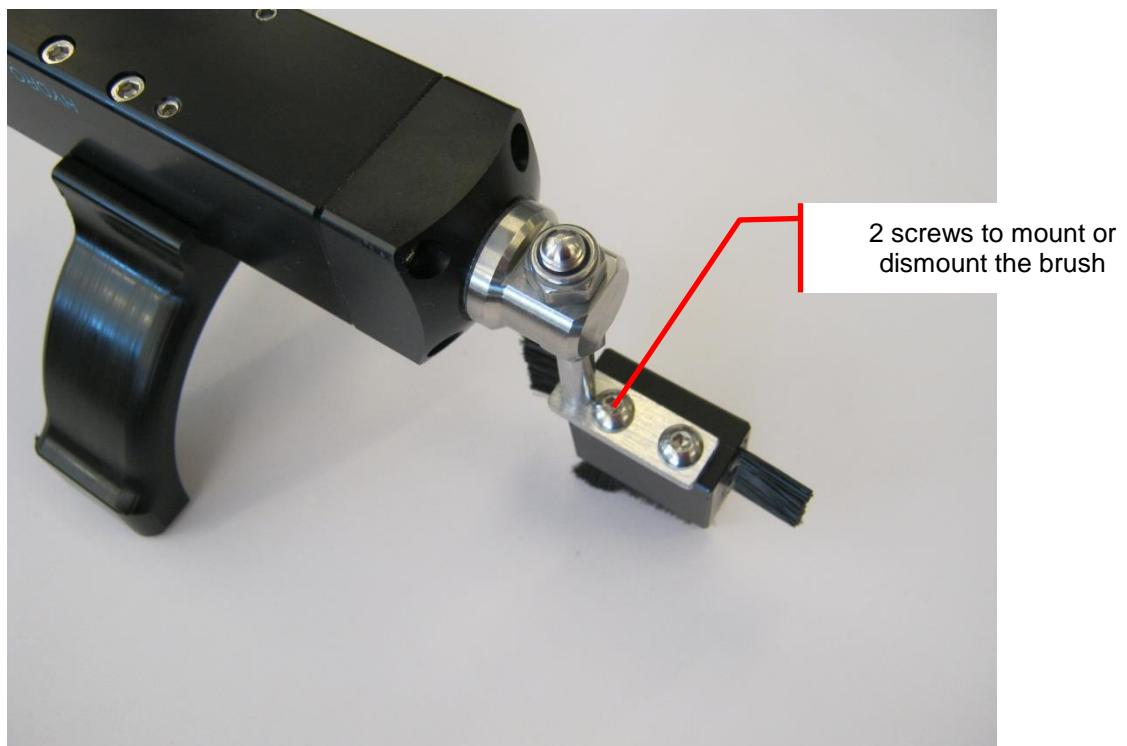
### Mounting

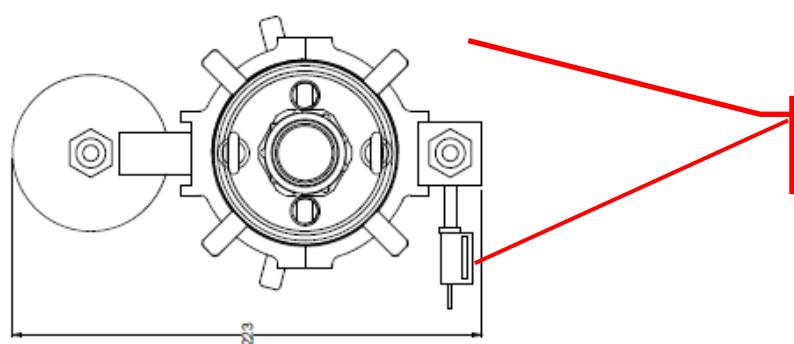
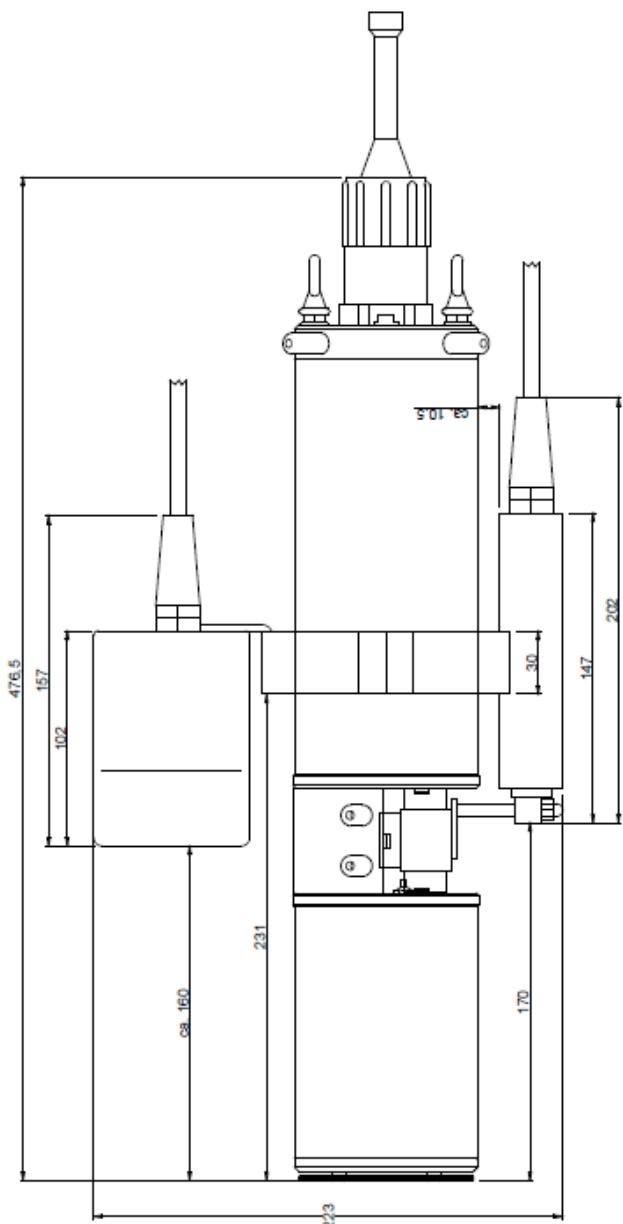
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The HydroWiper comes with all its accessories and a separate manual.

To mount the wiper, please dismount the black screen of the PhycoProbe and mount the HydroWiper with 4 screws according to the drawing below.

To exchange the brush set dismount the 2 screws shown on the picture.



MOUNTING SCHEME

2 screws on each side to  
mount the HydroWiper

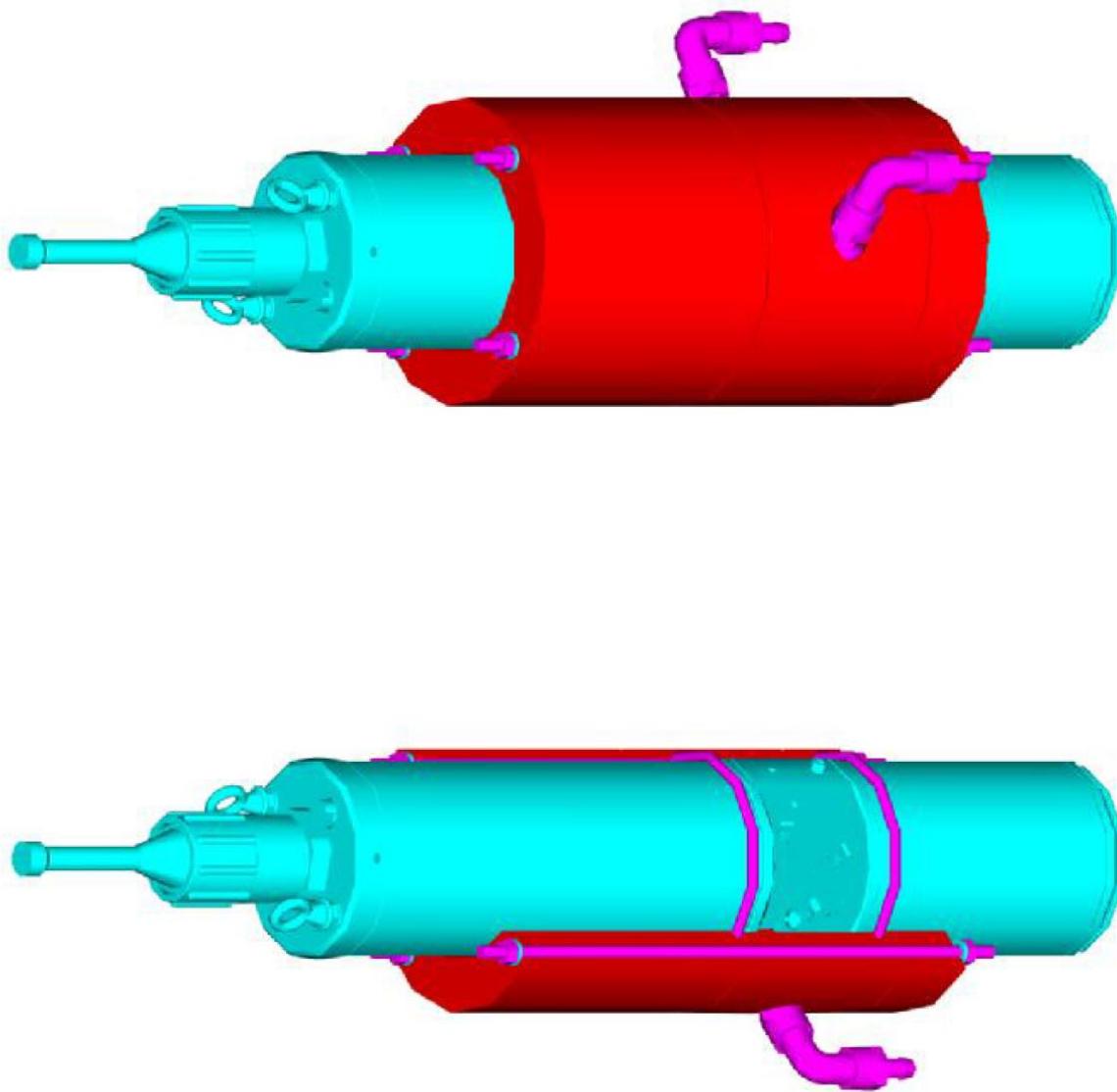
## PhycoProbe Flow-Through Unit (Option)

### General Considerations

The Flow-Through Unit is designed to provide the PhycoProbe with a defined flow of water. Especially if there are a couple of instruments which analyse the same water.

The Flow-Through Unit can be used underwater or in a monitoring station. Please note that it is not equipped with a cleaning device, so that the PhycoProbe has to be cleaned regularly.

The Flow-Through Unit has to be mounted horizontally to make sure, that no air remains inside.



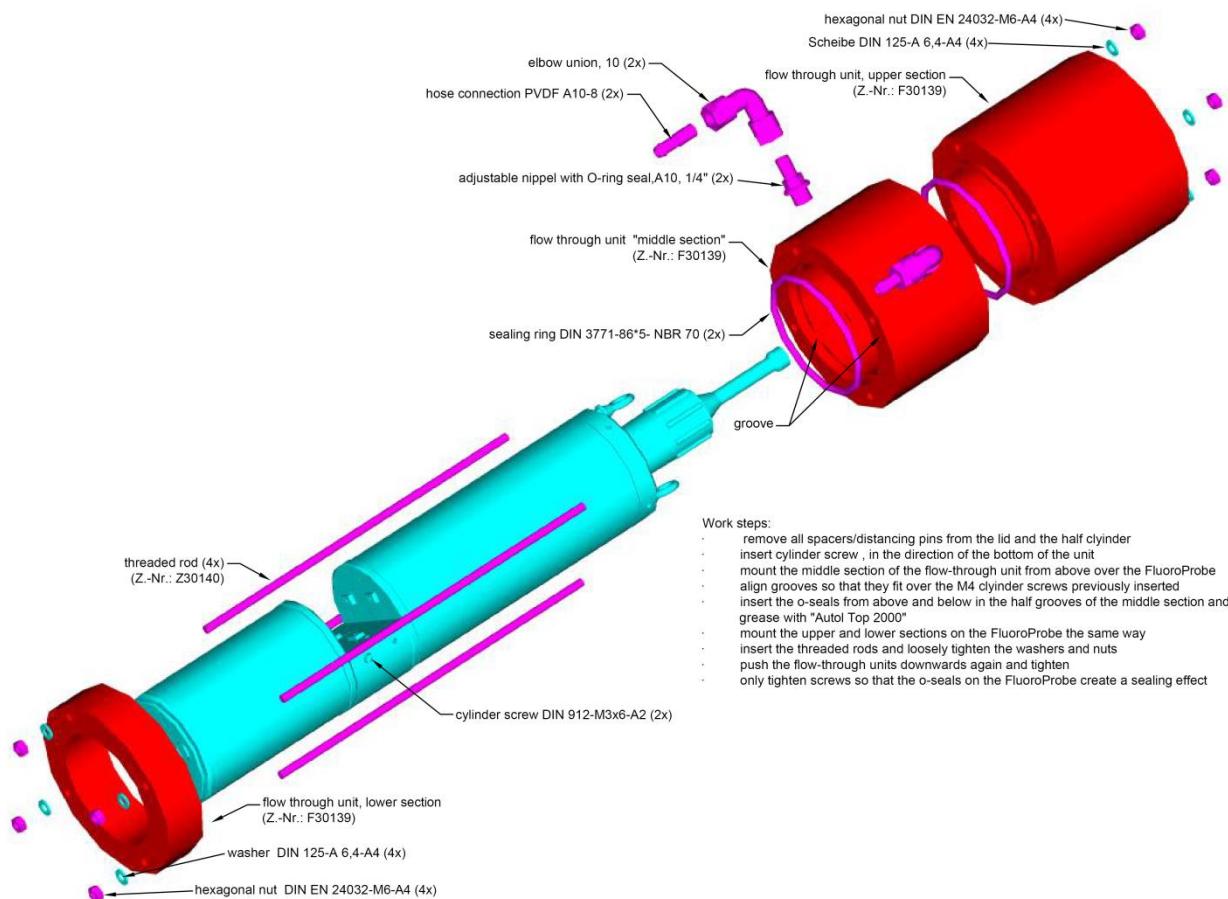
bbe PhycoProbe with Flow-Through Unit

## Flow-Through Unit

### PARTS LIST

- a three-section Flow-Through Unit with 2 hose connections
- 2 sealing rings
- 2 threaded rods with nuts and washers

### SET-UP



### MAINTENANCE

It is strongly recommended to clean the windows of the PhycoProbe regularly. The cleaning interval depends on the concentration of algae and particles in the water as well as on the temperature.

## Troubleshooting

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Please call us:

Tel.: +49 431 380 40-40 (Service)

Tel.: +49 431 380 40-0

Fax: +49 431 380 40-10

Or send an email to:

e-mail: bbe@bbe-moldaenke.de

www.bbe-moldaenke.de

We will gladly help you.

### Instrument Does Not Start

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- check the power-up procedure (see page 11), do the LEDs indicate sufficient power supply?
- rechargeable battery is empty
- power supplier is not connected
- charger and power supply mismatched.
- PhycoProbe has been used via modem. The PhycoProbe attempts to find a modem for about 1 minute. Please wait for a connection.

### PC Does Not Recognise the PhycoProbe

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- wrong COM port is being used
- one cable is disconnected
- COM port is used by other software (mouse pad/IR interface), please refer the manual of the PC
- a virus scanner is used that delays the data; deactivate the virus scanner and try again.
- the RS232 port – especially of some low-power laptops - does not provide enough power for the RS232 to RS485 converter, try again with a desktop PC or a USB to RS232 converter.
- Update the driver for the USB to RS485 converter (<http://www.ftdichip.com/Drivers/D2XX.htm>).

### Problems in Detecting Low Concentrations

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- please use the screen
- recalibrate the offsets in ultra-filtrated sample water
- recalibrate the yellow substance fingerprint

### Problems in Detecting Algae Classes

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- recalibrate the offsets in ultra-filtrated sample water
- try to measure with deactivated yellow substances, in case of constant concentration of yellow substances.
- you may have another type of algae in the water. In this case, you have to calibrate a new algae class and use this one instead of the one calibrated by **bbe**
- did you calibrate an algae fingerprint and use the wrong dilution water?
- if you are certain that one type of algae is not in the water, please disable this type of algae

## Data and Tables

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### Technical Data

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Weight	7.3 kg
Size (H x Ø)	540 x 140 mm
Maximum depth	100 m
Maximum depth (PP1000)	1000 m
Temperature range (working)	-2 – 35 °C
Temperature range (storage)	0 – 50 °C
Measuring range	0-200 µg Chl-a/l
Data capacity	512 MB