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bbe

BenthoTorch

User Manual

Version 2.4 E1, October 2014

What's new

Software

PC Software bbe++ supports the BenthoTorch.

Hardware

First version

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 contain "decimal commas", i.e. the European system.

General Safety Precautions

The bbe BenthoTorch is an instrument for determination of the concentration of chlorophyll on surfacees or on the ground of a water body. 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 authorised staff.

Changes to electrical connections and circuits may cause damage to the instrument and lead to loss of warranty.

Cleaning the instrument:

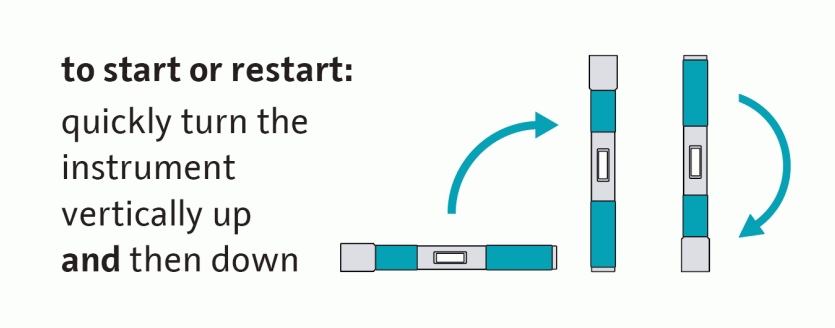
The instrument should be cleaned after use. The use of aggressive cleaning fluids or water at high pressure should be avoided. Neither should any mechanical cleaners or apparatus come into contact with the sensor head or LED display. Attention: in order to obtain exact measurement results, the measuring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

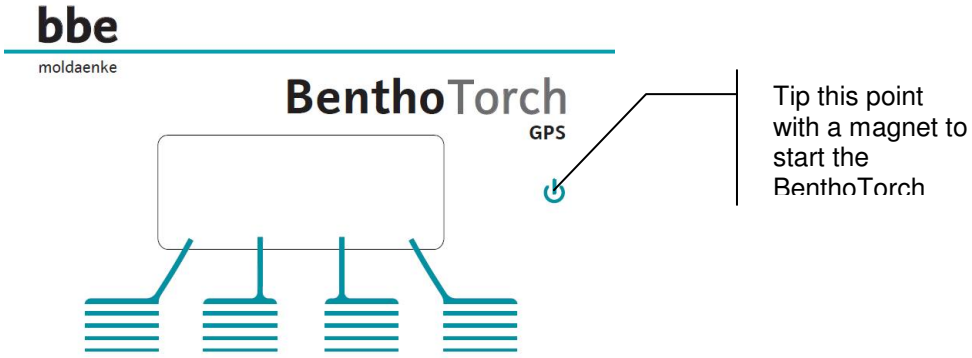
Performing electrical connection may only be carried out by trained personnel. Maintenance, such as e.g. exchanging the rechargeable battery pack, may only be carried out by personnel trained and authorised by bbe Moldaenke. Replacement parts and repair materials must be issued/released by bbe Moldaenke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

Quick start instructions

1. Charge the BenthoTorch by using the power supply connected to the small cable housing of the USB cable
2. Start the BenthoTorch by turning it upside down and back again in one quick movement.

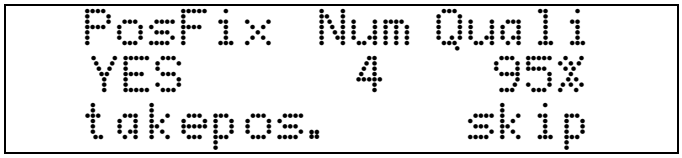


If the BenthoTorch is equipped with a reed contact to switch it on with a magnet, a symbol is printed on the label of the BenthoTorch. Please tip on the symbol with the magnet to switch the BenthoTorch on. The magnetic switch can be used alternatively to the shaking switch.



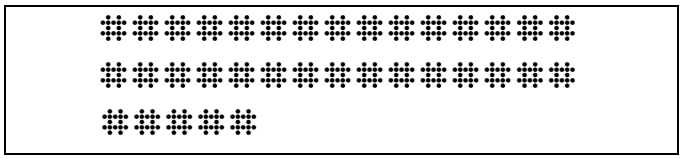
3. Use a wrist strap to secure the instrument
4. Ensure that the connector is closed with the cap
5. Go to “Start measurement”
6. Apply the BenthoTorch to the benthic algae. Ensure that the red foam shadows the algae from the light.

7. If there is an internal GPS module available and activated, the status of the GPS signal is shown. If the given quality criteria are met, the measurement starts automatically, otherwise, the poor positioning information can be used (takepos) or the GPS information can be skipped.

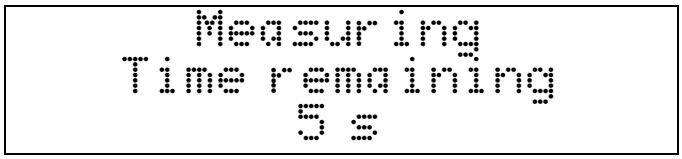


If there is no GPS signal e.g. within buildings only “skip” is available.

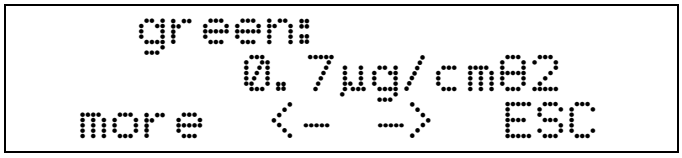
8. During the internal calibration a decreasing number of # is shown

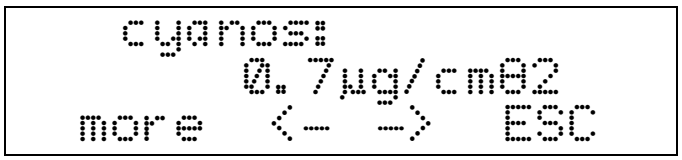


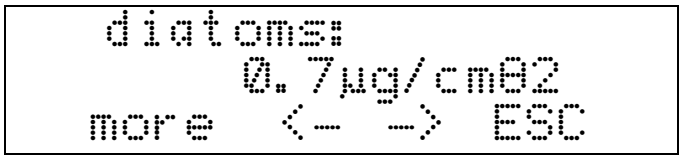
During the measurement the remaining time is displayed:



The end of the measurement is signalled by a short vibration. The result can be read from the display. The results of 3 algae classes are shown alternating.







Press “ESC” to return to the start measurement item.

Operating Principles and Design

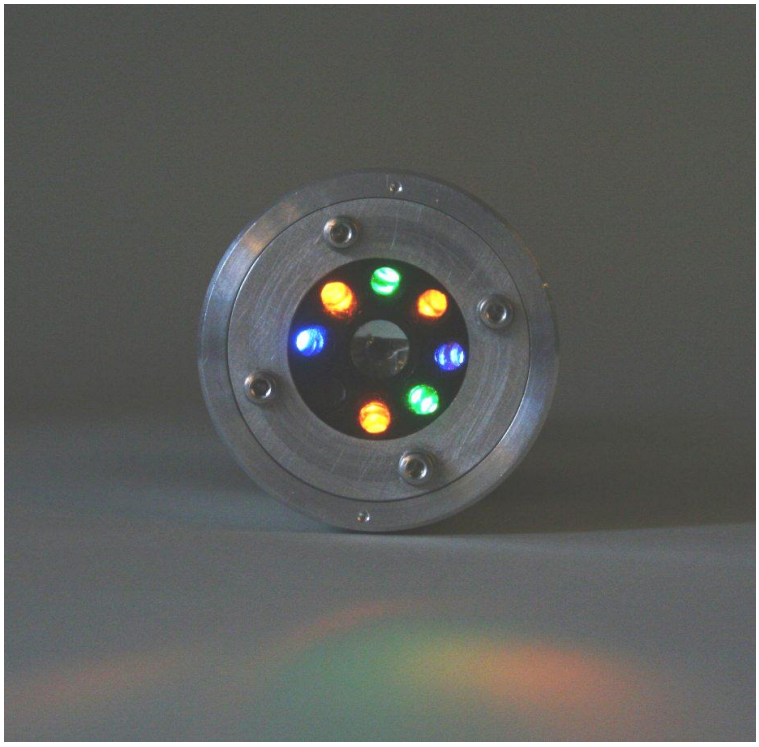
Principles of Operation

FLUORESCENCE OF DIFFERENT ALGAE CLASSES

The BenthoTorch is a fluorometer made for quick and easy measurements of benthic algae including an algae differentiation measurement. The results are separately given for green algae cyanobacteria and diatoms.

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.

The bbe BenthoTorch for algae differentiation uses 7 LEDs for fluorescence excitation. The LEDs emit light at 3 selected wavelengths (470nm, 525nm, 610nm).



There is one additional LED of 700nm (not visible in the picture above), that is used to compensate effects of the background reflection.

BENTHIC ALGAE

Benthic algae are grow in layers on a surface or on the ground of the waterbodies. To measure the chlorophyll concentration of these layers two effects have to be taken in account:

The shadowing of the upper layer of algae:
This shadowing reduces the excitation light in the lower layers and it reduces the fluorescence light on its way to the fluorescence detector.
To compensate this effect a mathematical model is applied in the BenthoTorch.

The reflectance of the background:
The higher the reflectance of the background, the more excitation light passes the algae layer more than one time. This leads to a higher fluorescence signal.

To compensate this effect the reflectance of the background is measured with an additional LED.

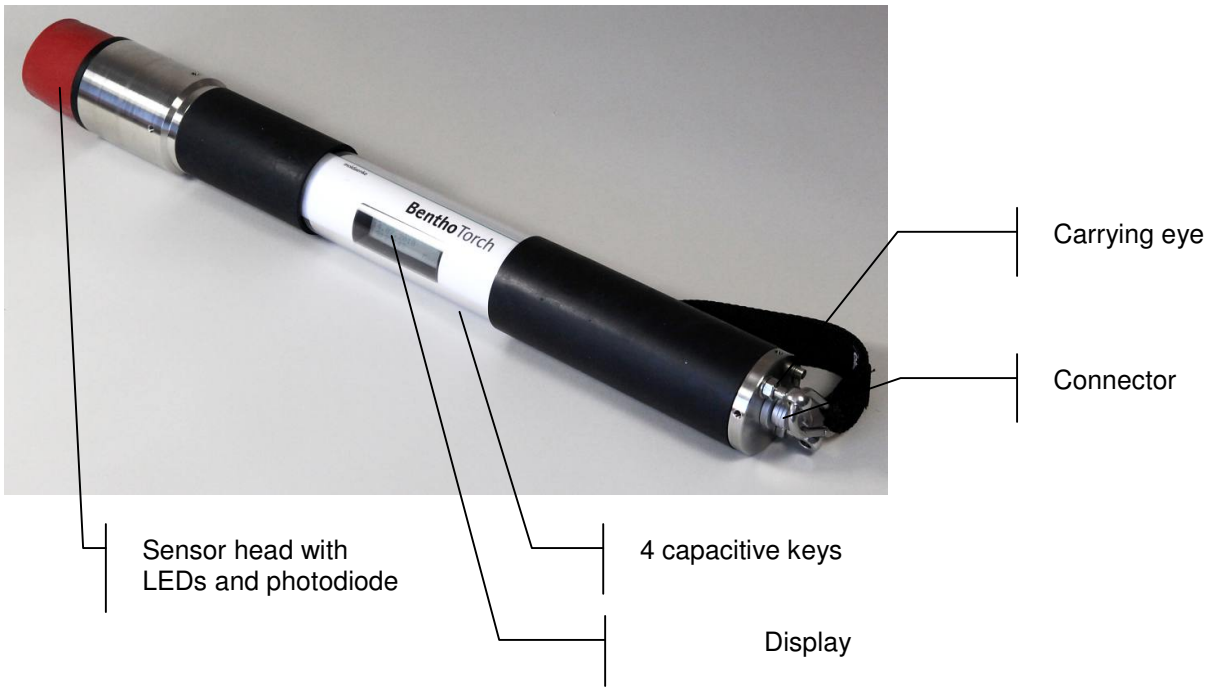
Design

MEASUREMENTS

- Benthic green algae
- Benthic cyanobacteria
- Benthic diatoms

OPERATION

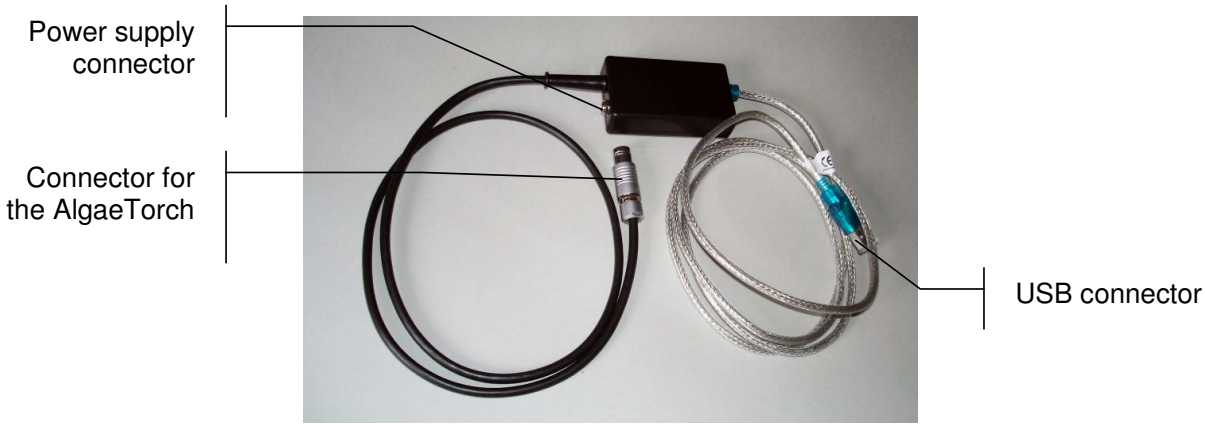
- cable-free operation
- display on the instrument
- datalogger
- internal rechargable batteries
- internal display
- 4 capacitive softkeys
- vibration feedback
- position sensors to start the BenthoTorch
- power-down features



Use of the BenthoTorch

USB connecting cable of the BenthoTorch

The BenthoTorch comes with a connecting cable. This cable has two functions: connecting the Torch to a PC and connecting a power supply to the torch.



Power supply of the BenthoTorch

The BenthoTorch comes with a power supply to charge the BenthoTorch and use it continuously. The power supply comes with different country-specific mains plugs. Choose the connector for your country and click in onto the power supply as shown below.

Use of the BenthoTorch with the powersupply

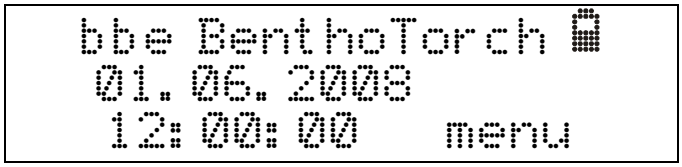
- Connect the small end of the cable to the box of the “connecting cable” of the BenthoTorch.
- Connect the power supply to the mains.
- If the internal battery is not fully charged, charging will start (see below, page 14)

When using the power supply, the BenthoTorch will not switch off completely, but the display illumination will be turned off after some minutes if the touch keys have not been used.

Charging the BenthoTorch with the powersupply

- Connect the small end of the cable to the box of the “connecting cable” of the BenthoTorch.
- Connect the power supply to the mains.

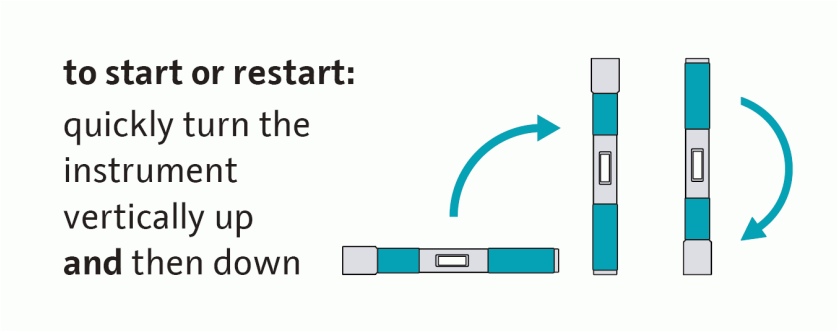
The BenthoTorch will start up and show the charging process by moving bars in the battery symbol.



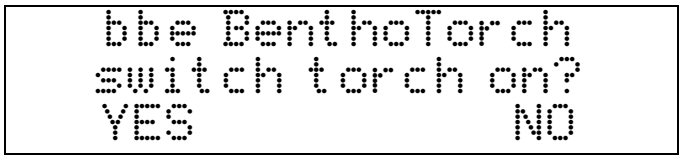
When the internal battery is charged completely, the battery symbol will be completely filled and it will stop moving.

Starting the BenthoTorch

The BenthoTorch is equipped with a position sensor. To switch it on, turn the BenthoTorch upside down and back again in one quick movement.

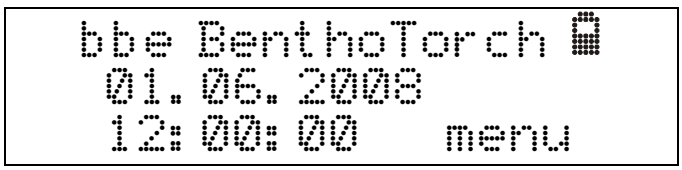


The BenthoTorch then switches on. Please confirm the start of the instrument by touching the corresponding left key. Do not touch any key during the turning procedure.



The confirmation is done in order to avoid unwanted starts, for example during transport.

After confirmation, a start-up message with the current time and the status of the internal battery appears:



Press the right key to enter the main menu.

Automatic Power-Down

If the BenthoTorch is being used without a power supply, it switches off automatically after 5 minutes without any operation. It then has to be re-started as described above.

Operation Modes

Three operation modes can be used with the BenthoTorch.

- **Single mode:**
  after starting, one measurement is carried out. The end of the measurement is indicated by a vibration. Afterwards the result is displayed.

- **Continuous mode:**
  The BenthoTorch operates continuously with the given parameters Measuring Time. The measurements are executed directly one after the other.
  To interrupt the auto-mode measurement, turn the Algae Torch upside down and back again as described in the "Starting the BenthoTorch" section.

- **Interval mode:**
  The BenthoTorch operates continuously with the given parameters Measuring Time and Interval. If the interval is longer than the measuring time, the BenthoTorch switches off between the measurements.
  To interrupt the auto-mode measurement, turn the Algae Torch upside down and back again as described in the "Starting the BenthoTorch" section.

- Under water measurements (divers)
  - Activate the interval mode and use a long interval time
  - Start the measurement before diving. The first measurement will be taken on air. After that the BethoTorch will enter the standby mode
  - Use the magnetic bar to start the BenthoTorch again. It will conduct one measurement and enter the standby afterwards
  - Repeat this procedure for all measurement sites

Operation of the BenthoTorch by Capacitive Touch Keys

The BenthoTorch is equipped with 4 capacitive keys with vibration feedback. The keys are located below the display. To actuate a key, just touch the marked area. The actuation is reconfirmed by the BenthoTorch via a short palpable vibration.

The current function of each key is shown on the display.

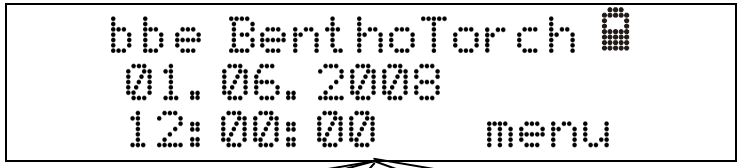
During the start-up of the instrument the keys are calibrated. So please do not touch the keys during the switch-on procedure.

During submersion the keys are deactivated. This is recognised by detecting more than one key pressed at the same time. The keys are reactivated when the keys are dry again.

Storing the BenthoTorch

The best way to store the BenthoTorch is in the original case. The cable and the accessories can also be stored in this case.

Structure of the Internal Software



Start measurement

Data

- View
- Send
- Delete

Power-down

Settings

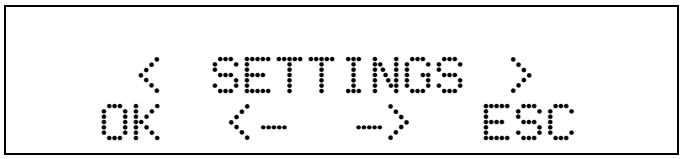
- Mode
- Measuring time
- Interval
- AutoPowerDown
- Clock
  - Time
  - Date
  - Sync GPS time
  - UTC time shift
  - Dayli. saving
- Display
  - Brightness
  - Contrast
- Software version

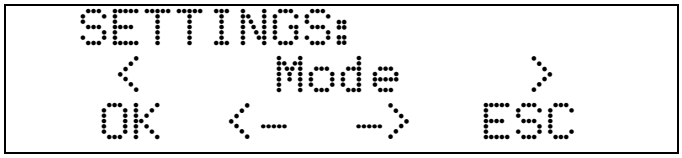
Calibration

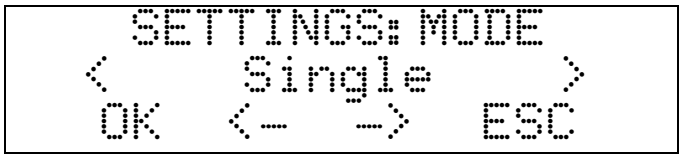
- Offset
- Background
  - Black / grey / white
- Fingerprints
  - Green algase (high / low)
  - Cyano (high / low)
  - Diatoms (high / low)
- Internal Temp.
- Voltage
  - Show
  - calibrate
- Factory settings
- Correction factor

NAVIGATION WITHIN THE SOFTWARE

The software is structured in menus with different layers. For an overview, please see above.





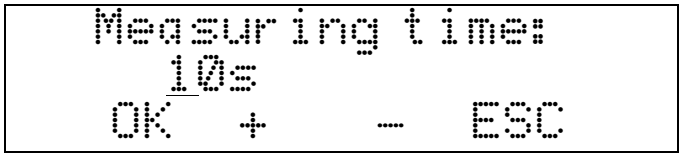


Functions of the keys:

OK: To choose the item shown and enterthe submenu
ESC: To discarde the changes and leave the menu
<- ->: To navigate within the same menu level.

ENTERING SETTINGS

To change the settings of the BenthoTorch, choose the parameter in the SETTINGS menu:



The underlined number is currently changeable by using the + and – keys.

OK: Confirms the underlined number and moves the cursor one position to the right. If the last number is underlined, OK confirms the new setting and returns to the SETTINGS menu.
+ / -: Changes the currently underlined number
ESC: Cancels the input and returns to the SETTINGS menu.

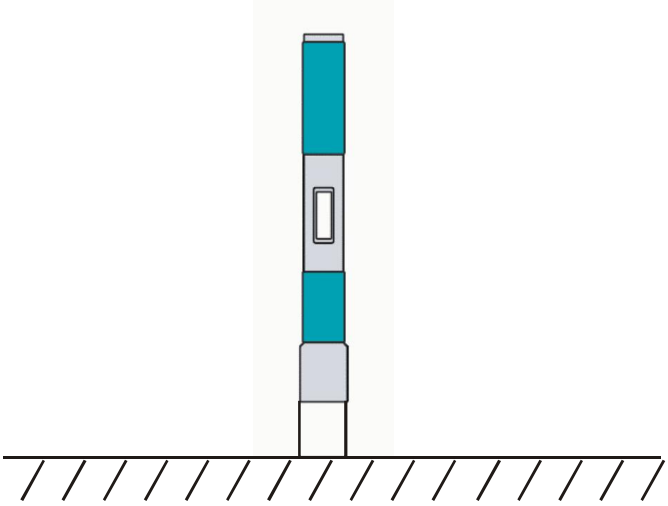
Operating the bbe BenthoTorch

Measuring Procedure

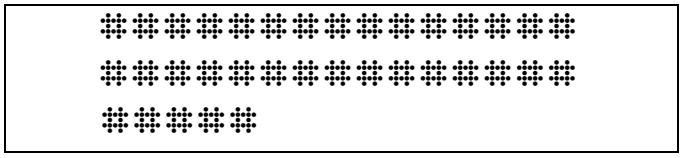
The BenthoTorch was calibrated before delivery with the bbe standard algae types.

SINGLE MEASUREMENT

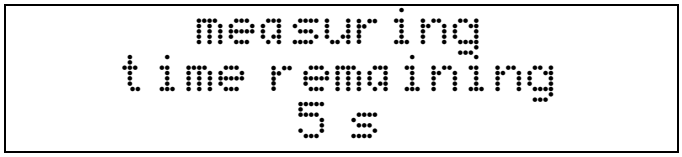
- Start the BenthoTorch
- Use a wrist strap to secure the instrument
- Ensure that the connector is closed with the cap
- Go to “Start measurement”
- Apply the BenthoTorch in to the benthic algae. Ensure that the red foam shadows the algae from the light.
- Replicate the measurement on one stone and average to reduce the effect of patchiness



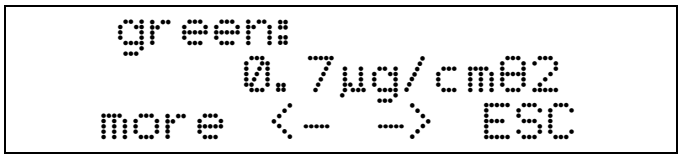
- During the internal calibration a decreasing number of # is shown

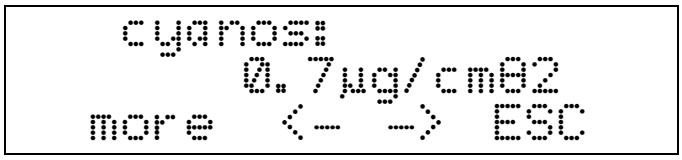


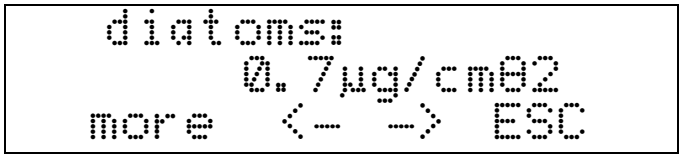
- During the measurement the remaining time is displayed:



- The end of the measurement is signalled by a short vibration. The result can be read from the display. The results of 3 algae classes are shown alternating.







- More switches between the following items:
- Automatic alternating of the tree algae classes
- Display of the concentration of cyanobacteria
- Display of the concentration of green algae
- Display of the concentration of diatom
- Display of the time / date of the measurement.
- Use the arrow keys to display data of another point in time.
- Press “ESC” to return to the start measurement item.

INTERVAL / CONTINUOUS MEASUREMENT

- Start the BenthoTorch
- Use a carrying cable/rope to secure the instrument
- Ensure that the connector is closed with the cap / dummy connector
- Do not exceed the maximum depth (10 m / 100 m).
- Use the continuous mode (settings -> mode -> continuous)
- Adjust measuring time and interval
- Go to “Start -> Start continuous measurement”
- Apply the BenthoTorch in to the benthic algae. Ensure that the red foam shadows the algae from the light.
- To stop the BenthoTorch, turn it upside down and back between two measurements when the BenthoTorch switches off because of the selected measuring interval. If the measuring interval is 0 s, use the exit key between two measurements:
- To read the data, go to “Data -> view”

Reference method for chlorophyll-a measurement for validation of the bbe BenthoTorch

SUBSTRATE USED FOR REFERENCE

For test purposes, substrata used are exposed, flat materials which are non-fluorescent in visible light and easy to scrape:

a. Black PVC plates (4x6cm)
b. Gray PVC plates (4,5x7,5cm)
c. Glass microscopic slides darkened on one side to omit the “double sidedness problem”.

MEASUREMENT BY BBE BT

The samples are measured directly on site with the BT. Each plate is measured a few times (around 5) to “cover” the whole area. If the biofilm shows high patchiness, more measurements for a more representative average value are performed. It is important to remember that the measurement area of the BT is only 1cm², in a circle.

SCRAPING AND TRANSPORT

It is better to scrape the samples directly “at site”. If such a possibility does not exist, the samples are transported to the laboratory. For this, the samples are stored in a foil bag with a piece of a moist sponge and filled with air to prevent damage to the biofilm. The closed bags are then stored safely in an isolated box with ice packs to keep the samples cool.

At the laboratory, the flat plates are scraped with the blade of a cutter knife to remove the whole biofilm from the substratum without damaging it. The sample is put into 25-50ml of water. The volume of the water sample (V_p) and the area scraped (A_{scr}) should be noted for subsequent calculation.

Optionally, to create a homogenous sample, the solution is exposed to an ultrasonic bath for 5 minutes and stirred afterwards.

EXTRACTION AND MEASUREMENT OF CHLOROPHYLL-A(DIN 38 412-L16)

Materials und Methods:

- Chemicals:
    - 90% ethanol
    - HCl 3M
- Materials/Instruments:
    - Glass fiber filters (Whatman GF/F)
    - Vacuum filtration apparatus
    - Vacuum pump
    - Brown glass bottles (around 50ml for extraction)
    - Pipette 10ml
    - Spectrophotometer (LKB Biochrom 4050 Ultrospec II UV/Vis Spectrophotometer)
    - Cuvette for a spectrophotometer (1cm)
    - Syringe and syringe filter (0,45µm)

Extraction:

Using the vacuum filtration apparatus, the sample is filtrated over a GF/F filter with a vacuum of around 400mbar. The filter is put into a brown glass bottle with 10ml (V_E) of 90% ethanol making sure the whole filter is covered with ethanol. The bottle is closed tight and incubated for 12 to 24h in darkness at room temperature.

Spectrophotometric measurement:

After incubation, approximately 3ml of the extract is filtrated with a syringe filter into a cuvette. The sample is measured with a spectrophotometer first at a wavelength of 665nm and then at 750nm both against the offset of reference 90% ethanol solution. The second measurement at 750nm is used for the compensation of the sample's turbidity.

In the second step, 3M HCl (30µl for 10ml of extraction volume) is added to the filtrated extract and the solution is shaken. The solution is incubated for 10 minutes in darkness. This converts the chlorophyll-a to pheophytin-a. After this process, the extract is measured again in the spectrophotometer at 665nm and 750nm over the 90% ethanol reference sample also treated with 3M HCl.

Calculation of the chlorophyll-a concentration:

The concentration of chlorophyll in µg/L can be calculated from a formula:

Equation 1

$$\left[\mathrm{CHL}\ \frac{\mu g}{L}\right] = 29{,}6 \cdot \left((A_{v665} - A_{v750}) - (A_{n665} - A_{n750})\right) \cdot \frac{V_E}{V_p \cdot d}$$

$\left[\mathrm{CHL}\ \frac{\mu g}{L}\right]$	'Chlorophyll concentration in µg/L'
A_{v665}	'Absorbtion at 665nm before acidification'
A_{v750}	'Absorbtion at 750nm before acidification'
A_{n665}	'Absorbtion at 665nm after acidification'
A_{n750}	'Absorbtion at 750nm after acidification'
V_E	'Extract volume'
V_p	'Sample volume'
d	'Cuvette wideness in cm, typical 1cm'

The concentration of phaeophytin in µg/L can be calculated from a formula:

Equation 2

$$\left[\mathrm{PHAEO}\ \frac{\mu g}{L}\right] = 20{,}8\ \left(\frac{\mu g \cdot cm}{L}\right) \cdot (A_{n665} - A_{n750}) \cdot \frac{V_E}{V_p \cdot d} - \left[\mathrm{CHL}\ \frac{\mu g}{L}\right]$$

$\left[\mathrm{PHAEO}\ \frac{\mu g}{L}\right]$	'Phaeophytin concentration in µg/L'

Recalculation to concentration in µg/cm²

Equation 3

$$\left[\text{CHL}\ \frac{\mu g}{cm^2}\right] = \frac{\left[\text{CHL}\ \frac{\mu g}{L}\right] \cdot V_P}{A_{scr}}$$

$\left[\text{CHL}\ \frac{\mu g}{cm^2}\right]$ ‘Chlorophyll concentration in µg/cm²’

A_{scr} ‘Area scraped in cm²’

Shorter:

$$\left[\text{CHL}\ \frac{\mu g}{cm^2}\right] = 29{,}6 \cdot \left((A_{v665} - A_{v750}) - (A_{n665} - A_{n750})\right) \cdot \frac{V_E}{A_{scr} \cdot d}$$

$$\left[\text{PHAEO}\ \frac{\mu g}{cm^2}\right] = 20{,}8\ \left(\frac{\mu g \cdot cm}{L}\right) \cdot (A_{n665} - A_{n750}) \cdot \frac{V_E}{A_{scr} \cdot d} - \left[\text{CHL}\ \frac{\mu g}{cm^2}\right]$$

Data Menu / view data

The data menu contains the commands for data handling.

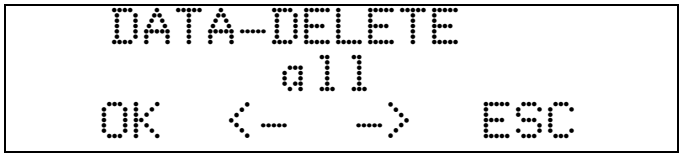
DATA -> VIEW

To view the measured data go to “data -> view”:

The display shows the date and time of the latest result.
For details please see the single measurement section on page 19.

DATA -> DELETE

Deletes all data from the memory of the BenthoTorch.



OK:
Deletes all data from the memory.

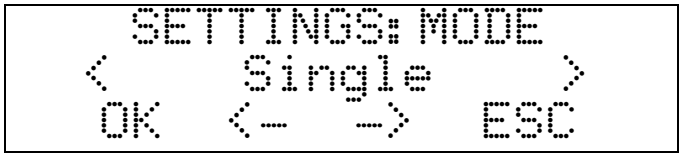
Settings Menu

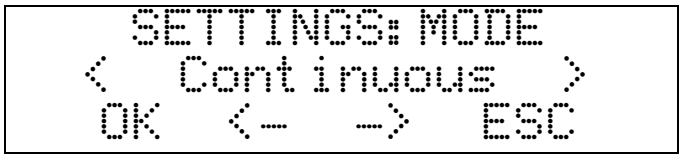
OVERVIEW

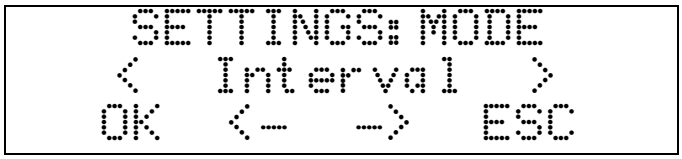
Mode	Single, continuous or interval measurements
Measuring duration	Set the duration of a single measurement (default = 10s)
Measuring interval	Set the interval between two measurements in interval mode
Clock -> time	Set time
Clock -> date	Set date
Clock -> Sync GPS time	Sets time / date received from the GPS satellite.
Clock -> UTC time shift	Set the time zone
Clock -> Dayli. saving	Toogle between summer and winter setting
Display -> Contrast	Set the contrast of the display
Display -> Brightness	Set the brightness of the display
Software Version	Displays the software version

MODE

Changes between single, continuous and interval measurement.



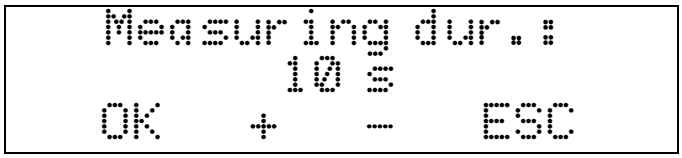




- Single: One single measurement is performed after starting.
- Continuous: The BenthoTorch performs one measurement directly after the other.
- Interval: Performs one measurement after the other with the given measuring interval.

MEASURING DURATION

Sets the duration of a single measurement (default = 10s)

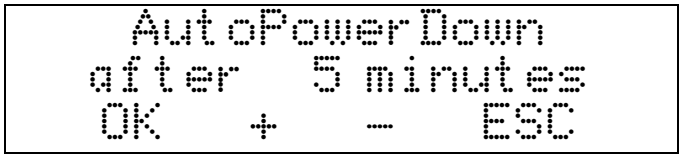


MEASURING INTERVAL

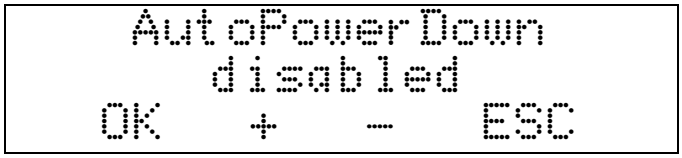
Sets the interval between two measurements in interval mode

AUTOPOWERDOWN

Sets the time after which the BenthoTorch is automatically turned off, when not operated. It is also possible to disable this function. In this case the BenthoTorch will not be switched off. There are several predefined period available by using the + and – keys.



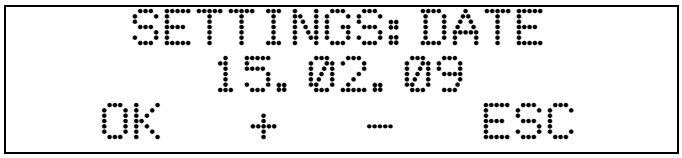
One additional option is to disable the power down:



The option shall be disabled in during continuous operation.

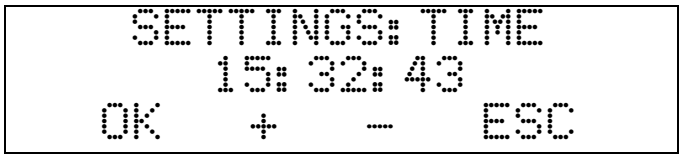
CLOCK -> DATE

Sets the date



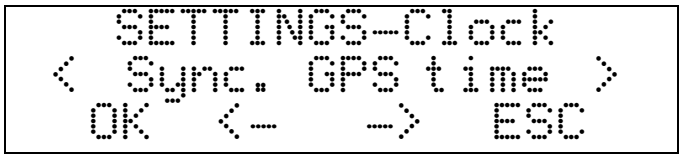
CLOCK -> TIME

Sets the time

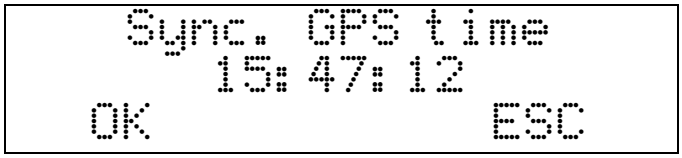


CLOCK -> SYNC. GPS TIME

Sets time / date according to the time / date received from the GPS satellite. This function requires a GPS receiver within the BenthoTorch and the signal quality needs to be sufficient.

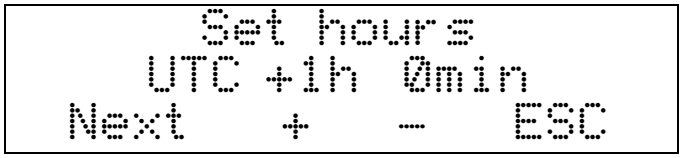


Click OK to synchronise the time settings of the BethoTorch with the satellite settings.



CLOCK -> UTC TIME SHIFT

Sets the time zone

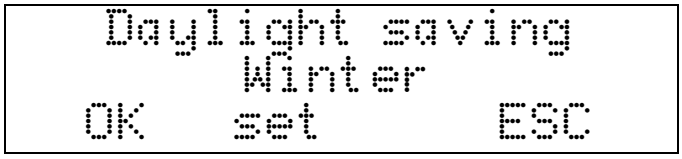


Next	Go to the setting of minutes
+	Increase the setting of the hour
-	Decrease the setting of the hour
Esc	Discard entries

Set the hours first, click next, set the minutes and click OK.

CLOCK -> DAYLIGHT SAVING

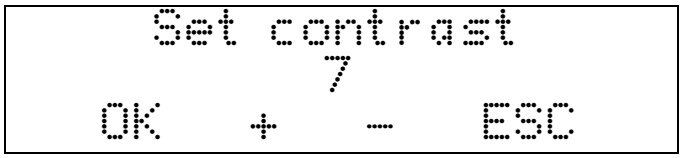
Toogle between summer and winter setting



Set	Toggle to summer

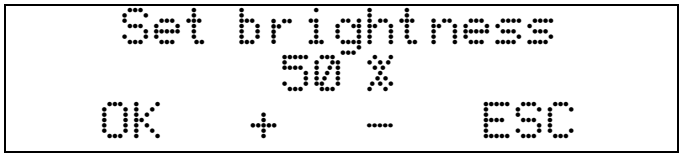
DISPLAY -> CONTRAST

Sets the contrast of the display (0-16). The result can directly be seen on the display.



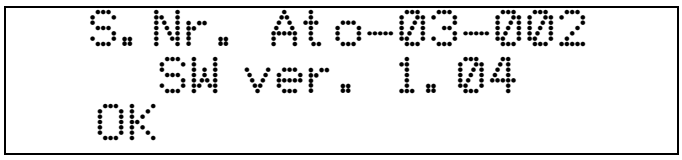
DISPLAY -> BRIGHTNESS

Sets the brightness of the display. The result can directly be seen on the display. The brighter the display, the more power consumption by the display.



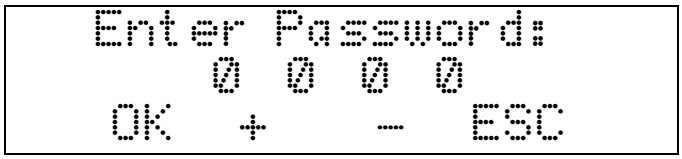
SOFTWARE VERSION

Displays the software version and serial number. This is useful information to help bbe service answer specific questions.



Calibration Menu

The calibration menu is password-protected to prevent it from unintentional changes



The default password is 1234.

General considerations

The calibration of the BenthoTorch includes 3 steps:

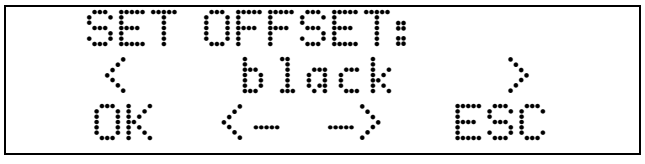
Calibration of the offset:
This is the signal of a black surface without any fluorescing material. This is the signal triggered by the coloured LED´s on the black surface.

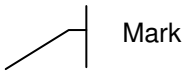
Calibration of the reflectance:
To calibrate the reflectance the measurements with a black, a grey and a with surface have to be conducted. This is the signal triggered by the nearly invisible 700nm LED.

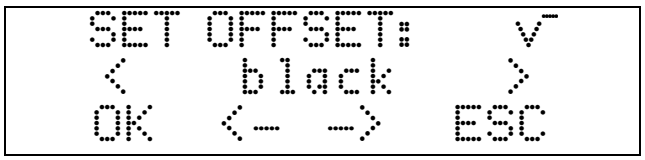
Calibration of the fingerprints:
This calibration has to be conducted with a low and a high concentration of each algae class.

The calibration of the BenthoTorch requires a calibration of all backgrounds and fingerprints at once, because all dependencies have to be recalculated. Only the offset can be recalibrated seperately.

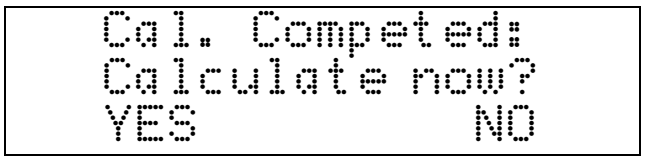
The procedure is as follows:
3 Offset calibrations and 3x2 algae calibrations are conducted. After each calibrating the parameter is marked in the menu. As long as the new calibration has not been calculated, the measurements can be repeated if required. Each single calibration measurement, that has been conducted, is marked in the display.







When all calibrations are done, the all calibration parameter can be calculated at once:



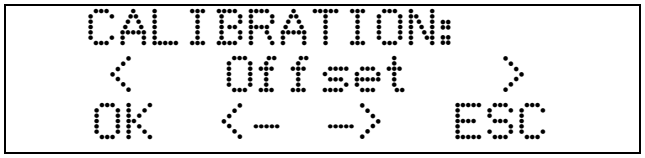
For each calibrations a single calibration plate with a cavity of 100µl is delivered together with the instrument. Do not use the calibration plates for offset and reflectivity with algae to prevent wrong calibrations.

Offset calibration procedures

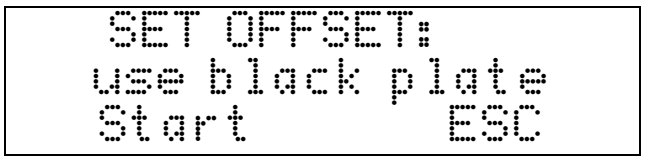
The offset is the detected fluorescence signal without any fluorescing matter. This is calibrated with a black calibration plate delivered together with the instrument.

Black calibration plate

1. Put the BenthoTorch on the black calibration plate containing 100µl of destilled water. Do not reuse an algae calibration plate to avoid contaminations.
2. Got to calibration -> offset



3. Touch the OK key to start.



4. After the measurement the results are shown, please confirm it.

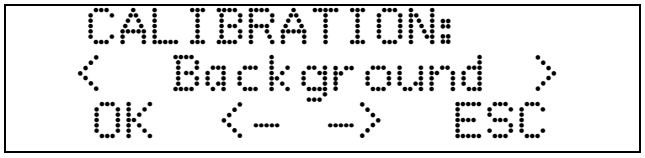
Reflectance calibration procedures

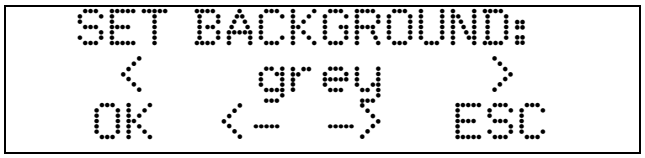
The reflectance has to be calibrated by using plates with a defined level of reflectance. This calibration is performed using a black, a grey and a white calibration plate. The measurement of the black plate is the offset measurement, described above.

Please note:
The grey and the white plate are made for reflectance measurements only.

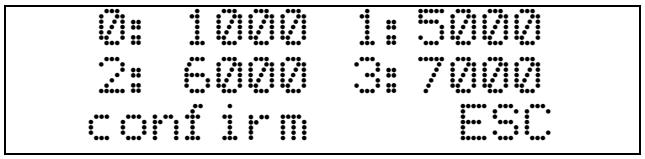
For the calibration procedures using the calibration plates, please remove the red foam from the BethoTorch.

1. Put the BenthoTorch on the grey calibration without water.
2. Got to calibration -> background -> gray

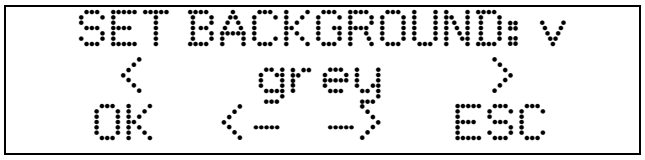




3. Touch the OK key to start.



4. After the measurement the results are shown, please confirm it.



5. After confirming the background calibration is marked.
6. Repeat with the white plate

Fingerprint calibration procedures

To calibrate the fingerprints of the algae classes 2 concentration for each algae class are required. A low concentration and a high concentration.

Recommendations:

Low concentration: about 1 µg/cm²
High concentration: about 6 µg/cm²

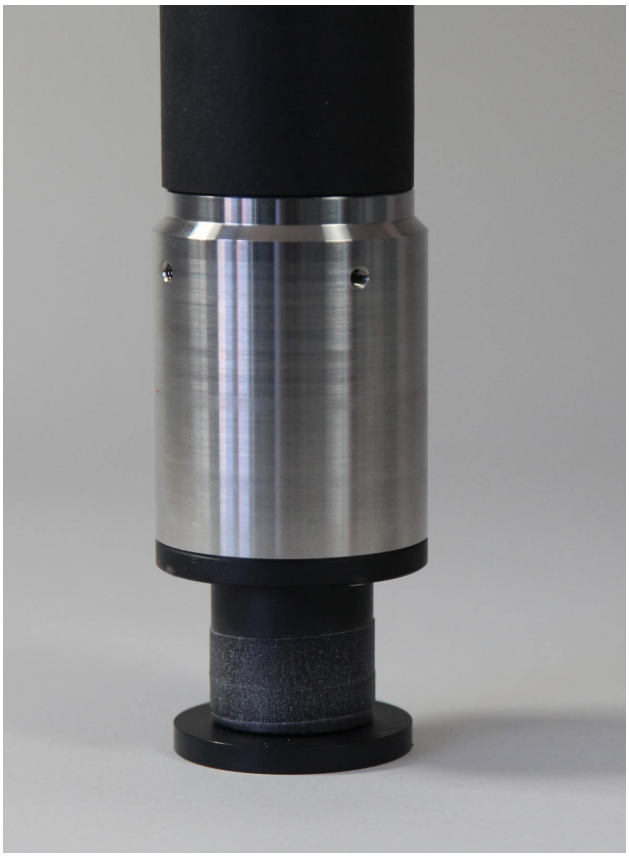
The algae have to be applied in 6 calibration plates. The volume of the cavity in the calibration plate is 100µl. The area of the cavity is 1 cm². Please refer to the following table to get the required concentration of the algae solution for application.

Number of the plate	Concentration plate	Concentration solution
Plate 1	1 µg/cm² diatoms	10000 µg/l
Plate 2	6 µg/cm² diatoms	60000 µg/l
Plate 3	1 µg/cm² cyanobacteria	10000 µg/l
Plate 4	6 µg/cm² cyanobacteria	60000 µg/l
Plate 5	1 µg/cm² green algae	10000 µg/l
Plate 6	6 µg/cm² green algae	60000 µg/l

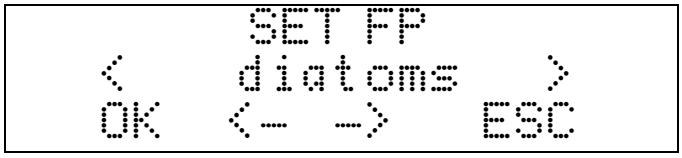
To get a increase the concentration of the algae solution it can be centrifuged with about 2000 rpm for about 20min.

1. Apply 100µl of the first calibration solution to the first calibration plate

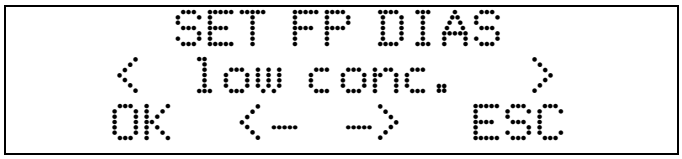
2. Put the BenthoTorch on the calibration plate



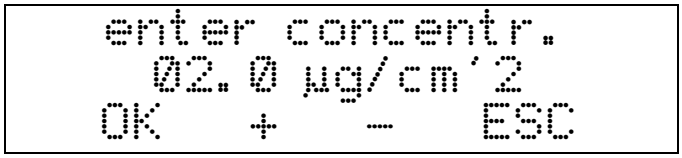
3. Go to calibration -> Fingerprint -> diatoms
4. Touch the OK key to choose diatoms.



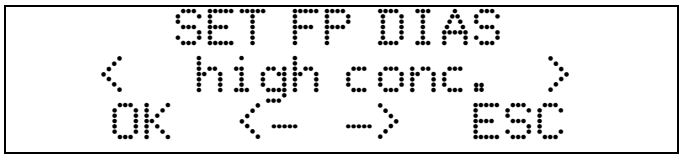
5. Select low concentration



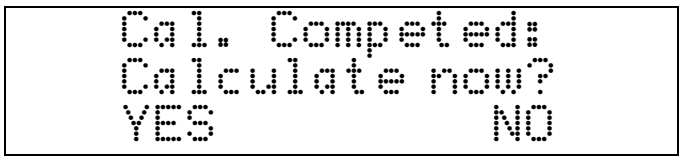
6. Enter the concentration



7. Touch the OK key to start the measurement.
8. After the measurement the results are shown, please confirm it.
9. After confirming the concentration is marked.
10. Repeat with the high concentration3



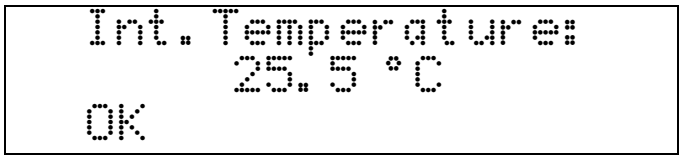
11. Repeat with the other algae classes
12. When all calibrations are done, the all calibration parameter can be calculated at once:



Internal Temperature

The internal temperature of the BenthoTorch can be shown.

SHOW INTERNAL TEMPERATURE:

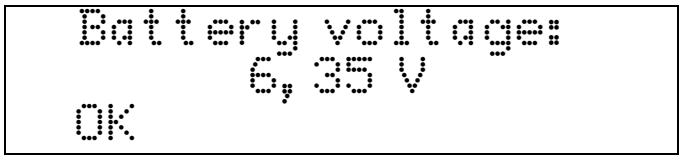


Shows the internal temperature.

Voltage

The voltage of the internal rechargeable battery can be shown and calibrated.

SHOW VOLTAGE:



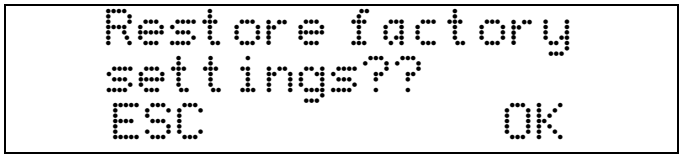
Shows the measured depth with the current calibration.

CALIBRATE VOLTAGE:

Calibration of the voltage shall only done by the bbe service.

Factory settings

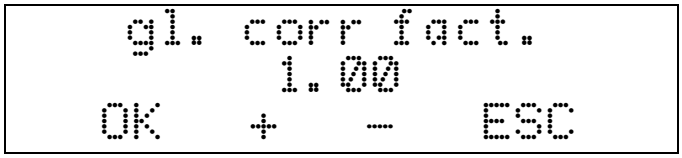
To reset the instrument to the factory settings including the factory calibration, please use this menu.



Choose OK to reset the settings to the original values.

Correction factor

The determination of chlorophyll depends on the method of analysis. Even if a lab obtains consistent results – for example by diluting – the variation from one lab to another can be enormous. To fit the total chlorophyll concentration to your method, this factor can be used. The default setting is 1. To obtain a result which is 10% higher, choose 1.1.



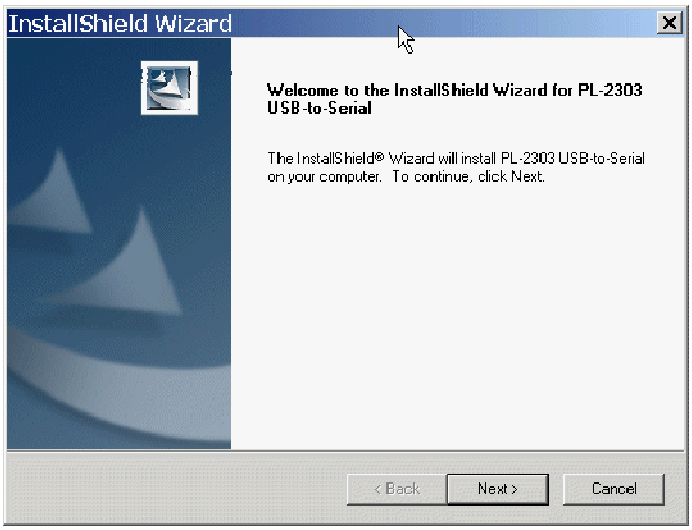
Connecting the bbe AlgaeTorch / BenthoTorch / AlgaeLabAnalyzer via USB to a PC

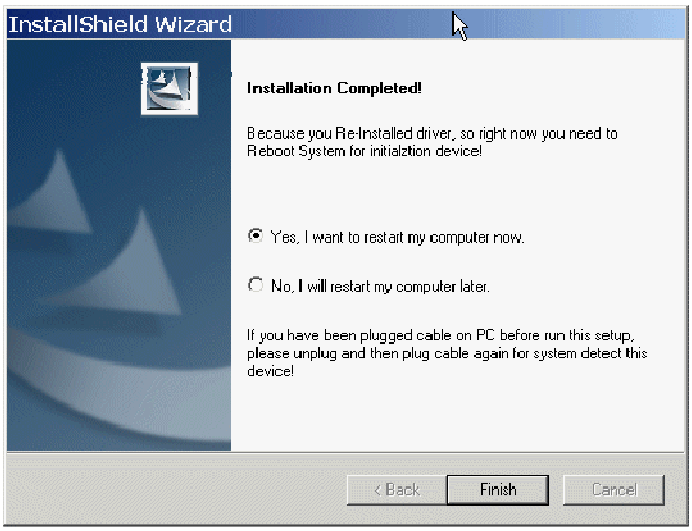
To connect the bbe AlgaeTorch, BenthoTorch or AlgaeLabAnalyser to a PC a USB driver has to be installed first.

Hint:
Older versions of the converter do not work with Windows 8 and up. Please contact the bbe service.

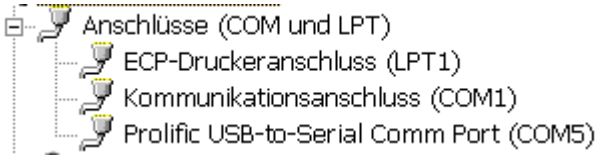
USB DRIVER SET-UP

Please insert the bbe CD again. Then, start the application PL2303_Prolific_DriverInstaller.exe in the folder **<CD-Drive>:\driver\PL2303_Prolific_DriverInstaller**





Please restart the PC. After that you will find the USB COM port in the system configuration (in this case COM5):



This port is used in the PC software to communicate with the Instrument.

bbe++ Software

The bbe++ software is delivered together with bbe instruments. It provides the following functions:

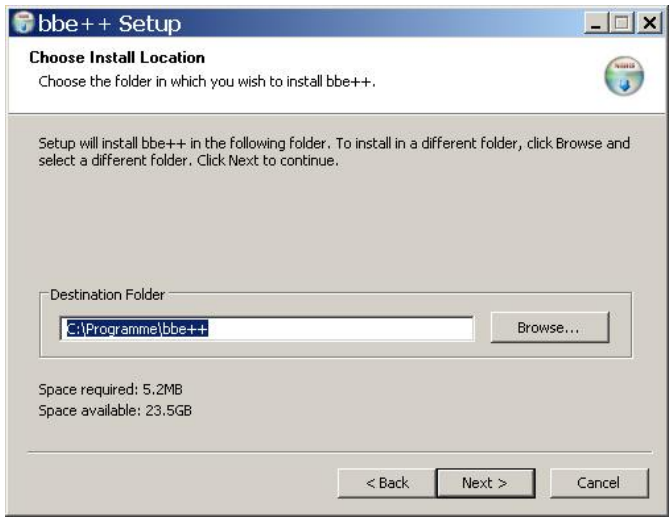
- operation, control and calibration of bbe instruments
- data analysis and display in tables and diagrams
- export in different formats

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.

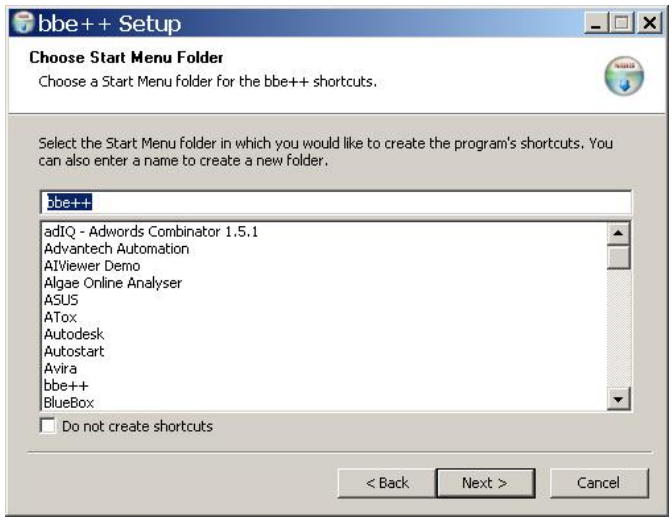
Software Set-Up

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 >”

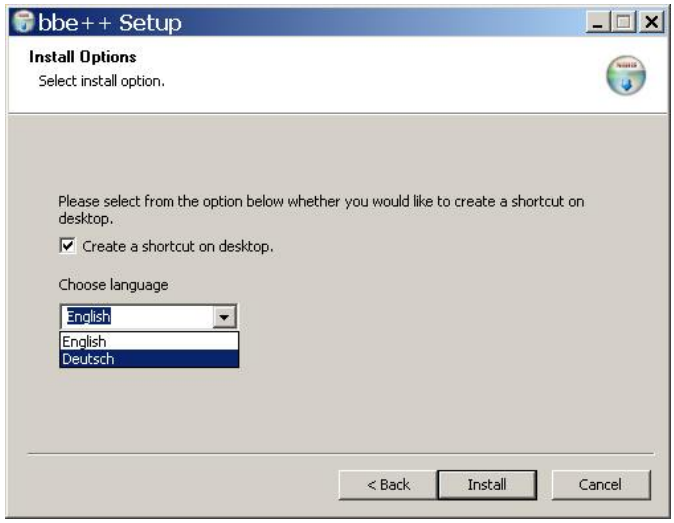
Choose the destination folder and click “NEXT >”



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”.

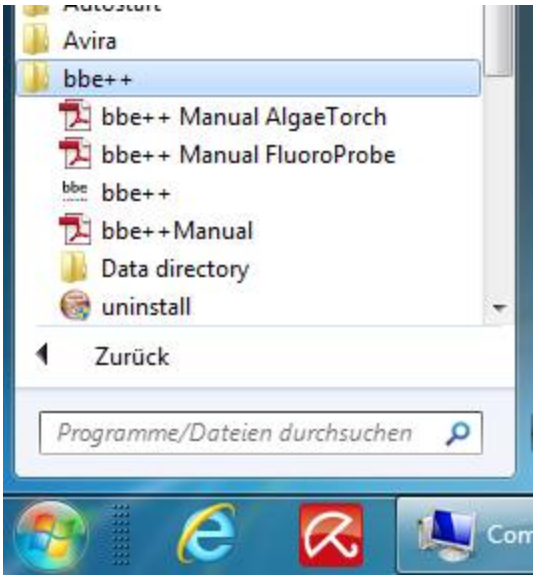
DESKTOP ICON OF THE BBE++ SOFTWARE

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

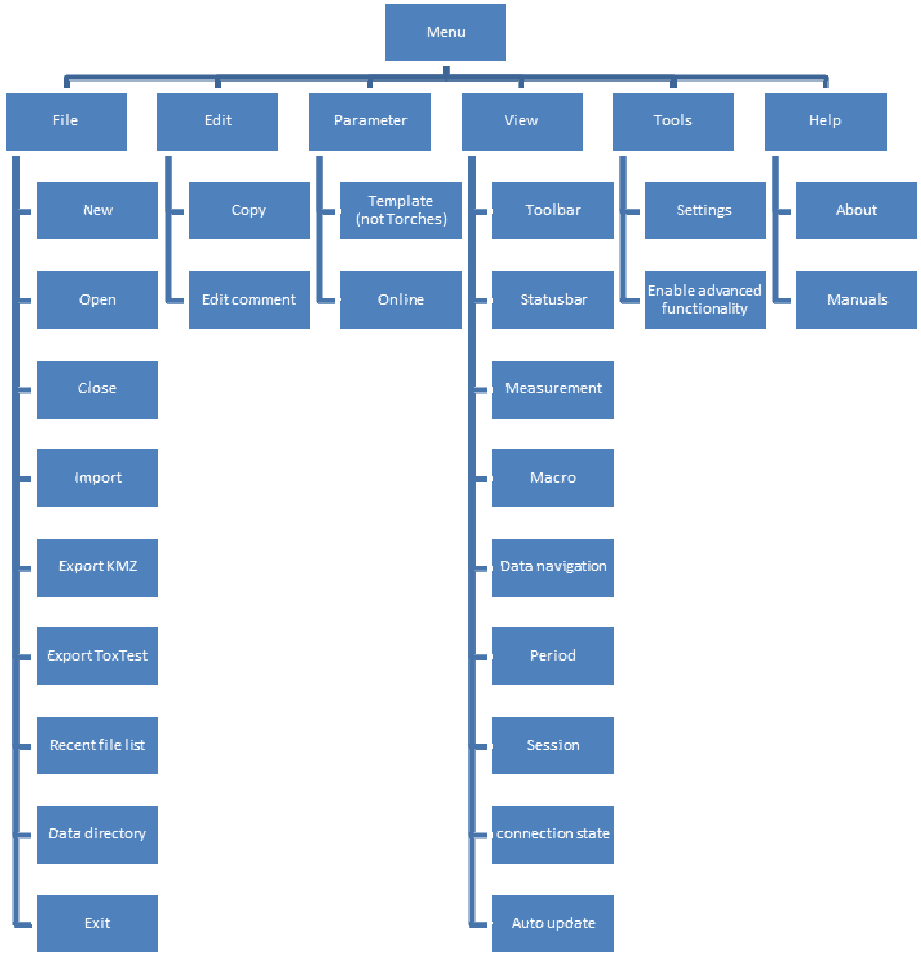
Updates of the bbe++ software and manuals can be downloaded from the bbe website http://www.bbe-moldaenke.de after registration.

Structure of the software

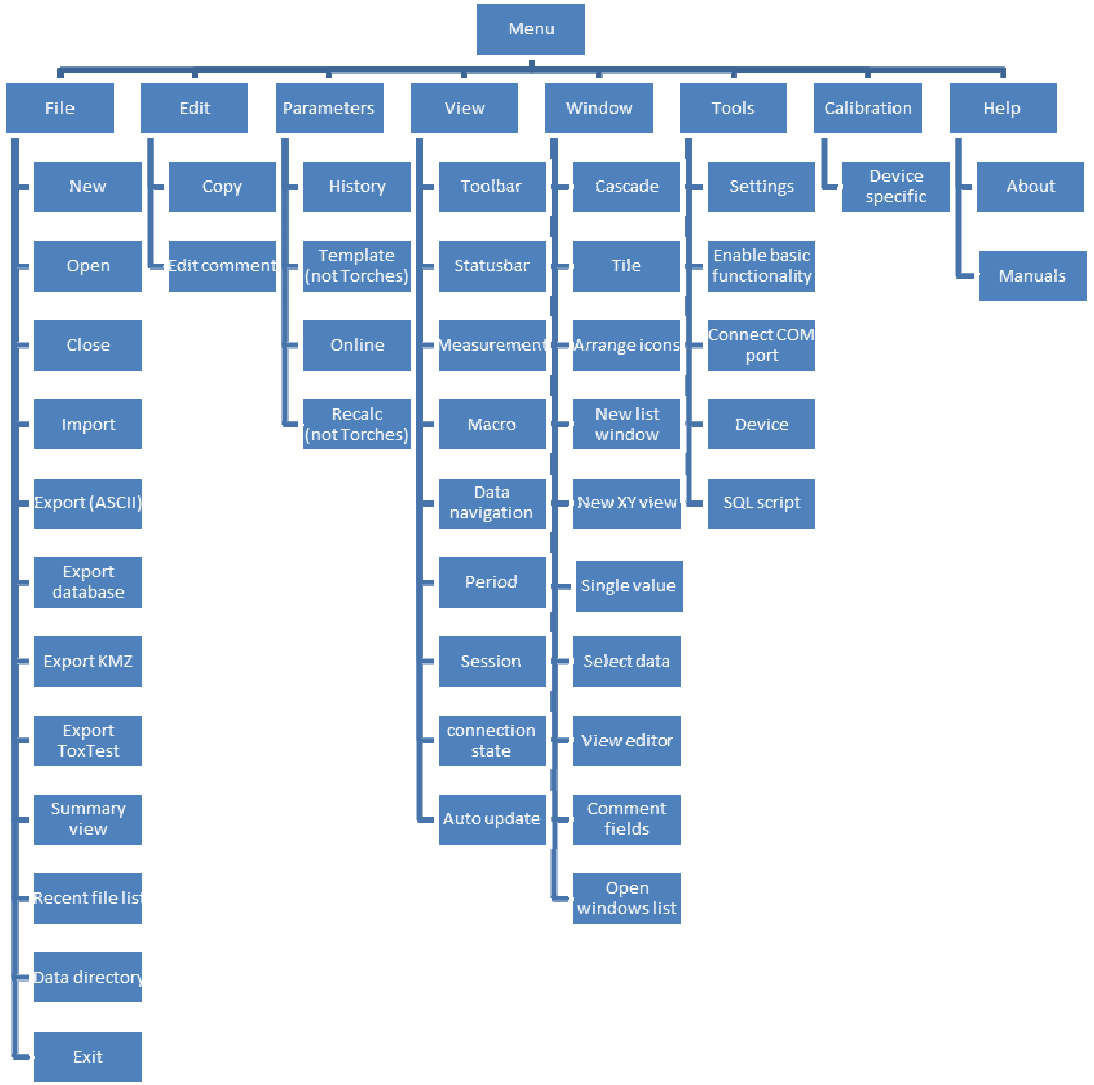
The following menus are available in the bbe++ software. Whether a menu is displayed, depends on the access level set.

- 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.

Menu structure (“Basic functionality”)



Menu structure (”Advanced functionality”)



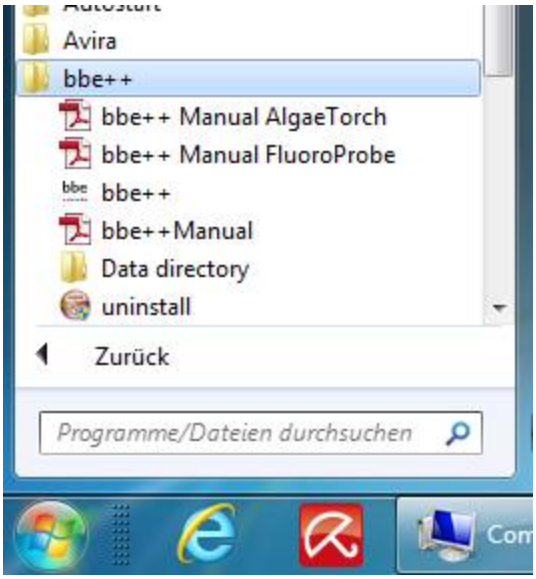
General considerations for storing and displaying data and parameters in bbe++

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 start menu 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.

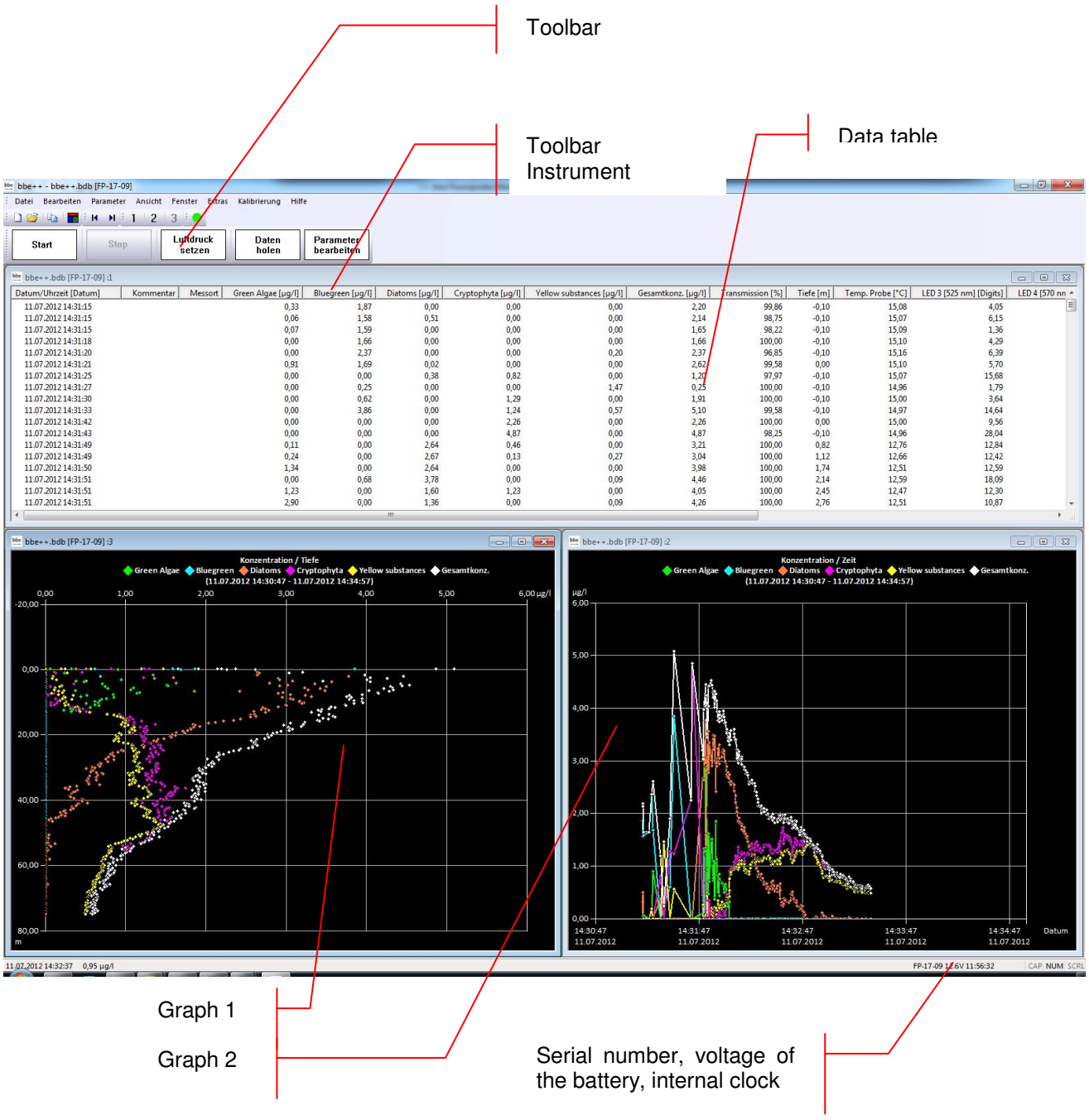
SIMULTANEOUS DISPLAY OF DATA OF DIFFERENT TYPES OF INSTRUMENTS

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.

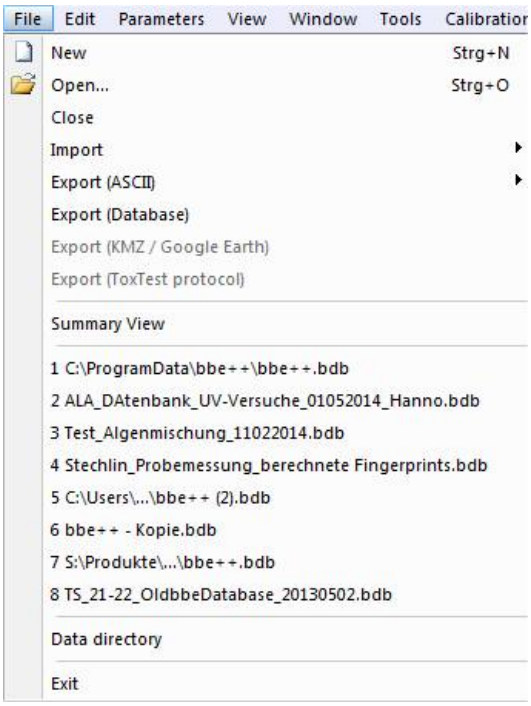
SERIAL NUMBER, VOLTAGE OF THE BATTERY, INTERNAL CLOCK

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

The Menus

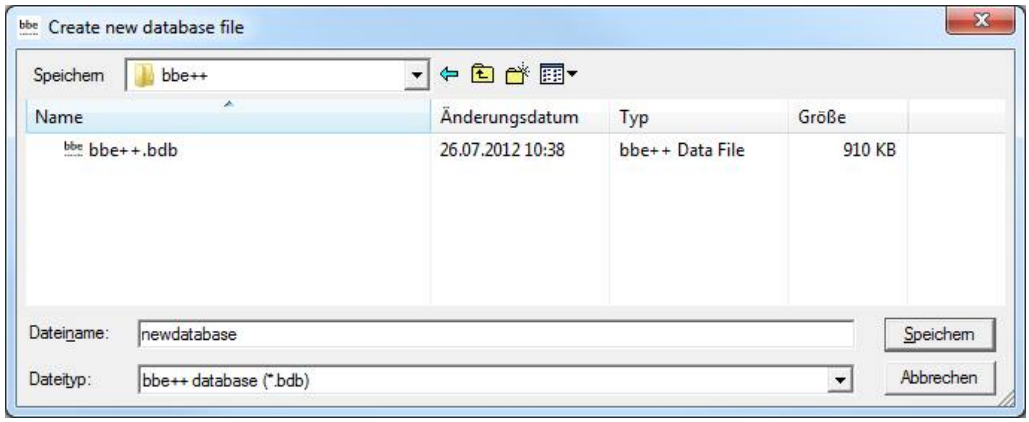
FILE MENU

The File Menu contains all the input/output functions.

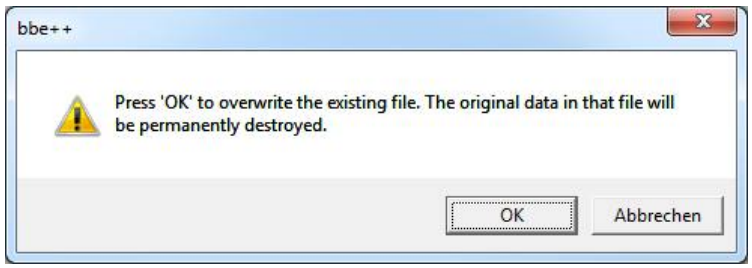


New

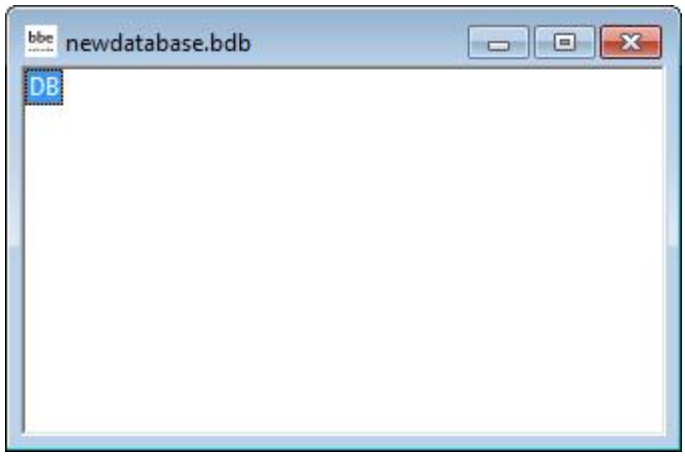
Creates a new database file for data and parameters.



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



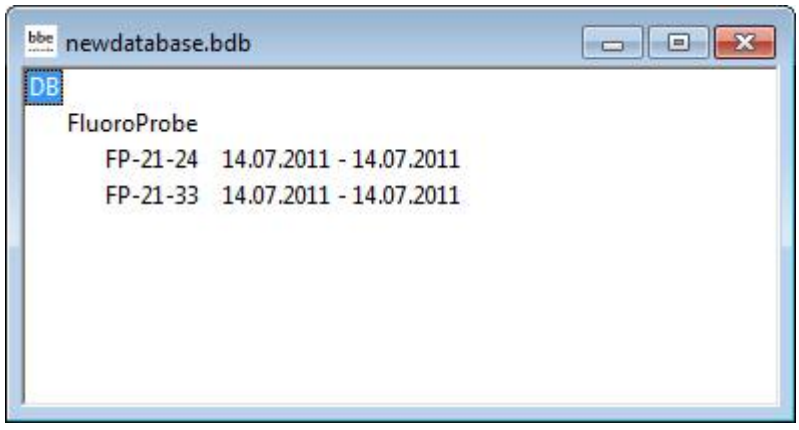
The new and empty database is displayed.



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 FluoroProbes.

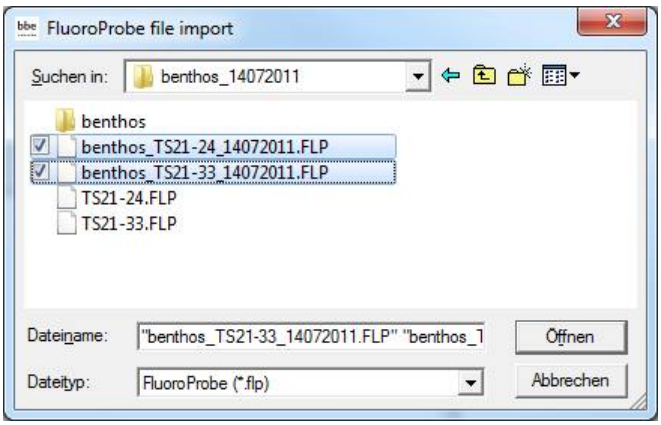


Close

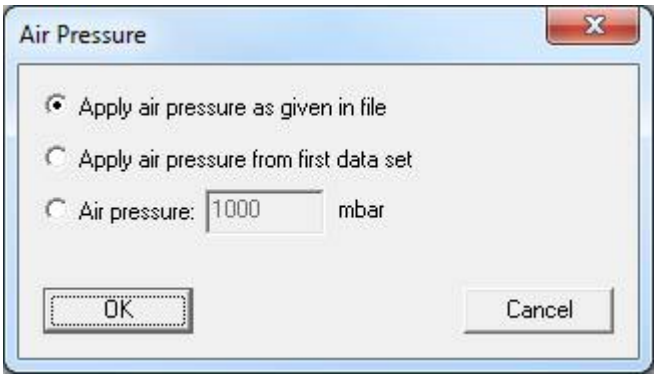
Closes the active database.

Import (FluoroProbe / AlgaeTorch / BenthoTorch)

This function is used to import *.FLP files into the database. These files can be results transferred from the FluoroProbe to a USB stick or files generated by the first version of the FluoroProbe 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.
FluoroProbe only: Afterwards choose how to apply the air pressure and hence the calculation of depth.



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

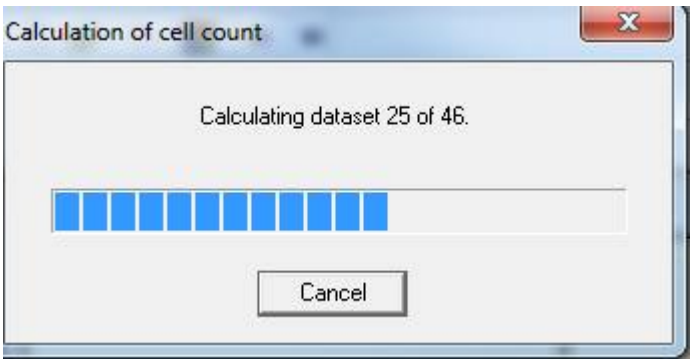
Air pressure was measured at the beginning of the measurement. This value is used.

AIR PRESSURE FROM FIRST DATA SET (FLUOROPROBE 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 FluoroProbe-manual).

AIR PRESSURE (FLUOROPROBE AND ALGAETORCH 100 ONLY)

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

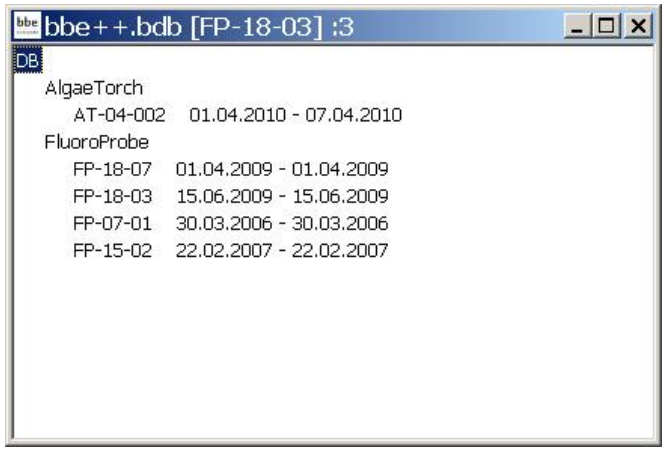
This item is used to export geo data from instruments with GPS receiver to be displayed in Google Earth.

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:

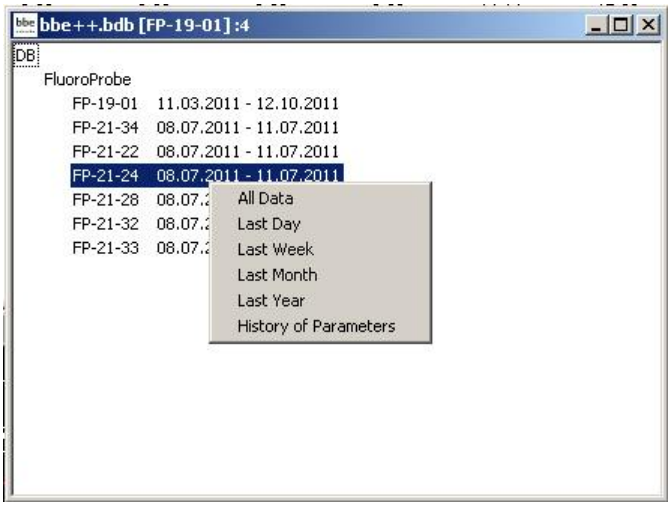


The database bbe++.bdb above contains data of two types of instruments: AlgaeTorch and FluoroProbe.
The serial numbers and the point in time of the first measurement and the last measurement stored in the database are shown below the heading with the name of the instrument.
The header of the window (bbe++.bdb [FP-18-03] :3 has the following meaning:

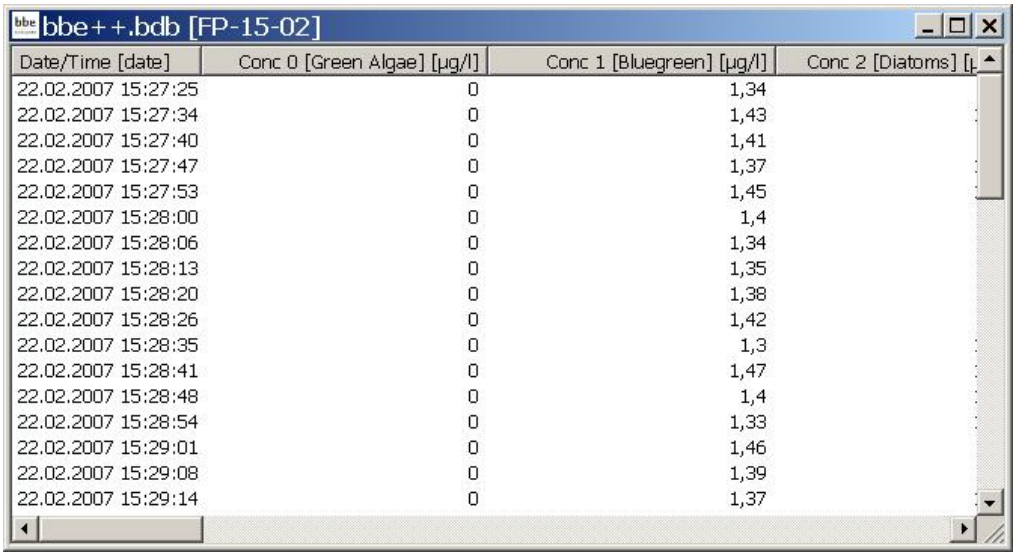
- the name of the database bbe++.bdb

- 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] [µg/l]	Conc 1 [Bluegreen] [µg/l]	Conc 2 [Diatoms] [µ
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

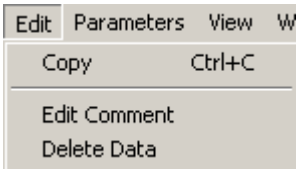
Opens the explorer with the current data directory to copy or rename the data base. This is the same function as in the start menu up to Windows 7.

Exit

Terminates the program.

EDIT MENU

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

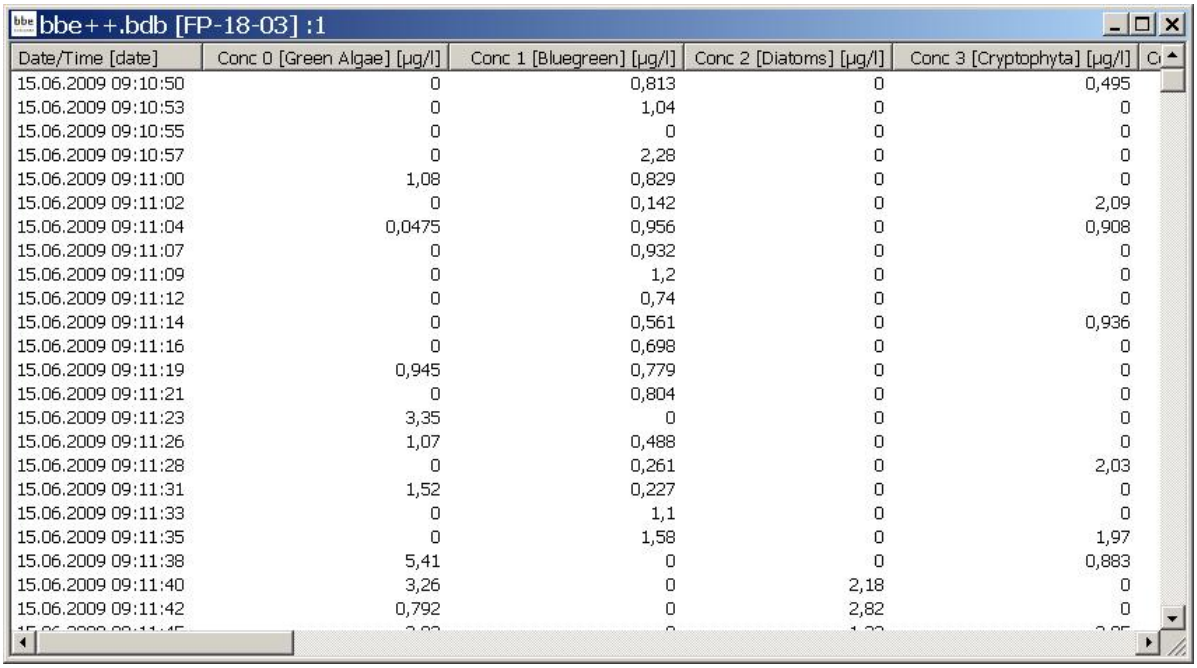


Copy

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.

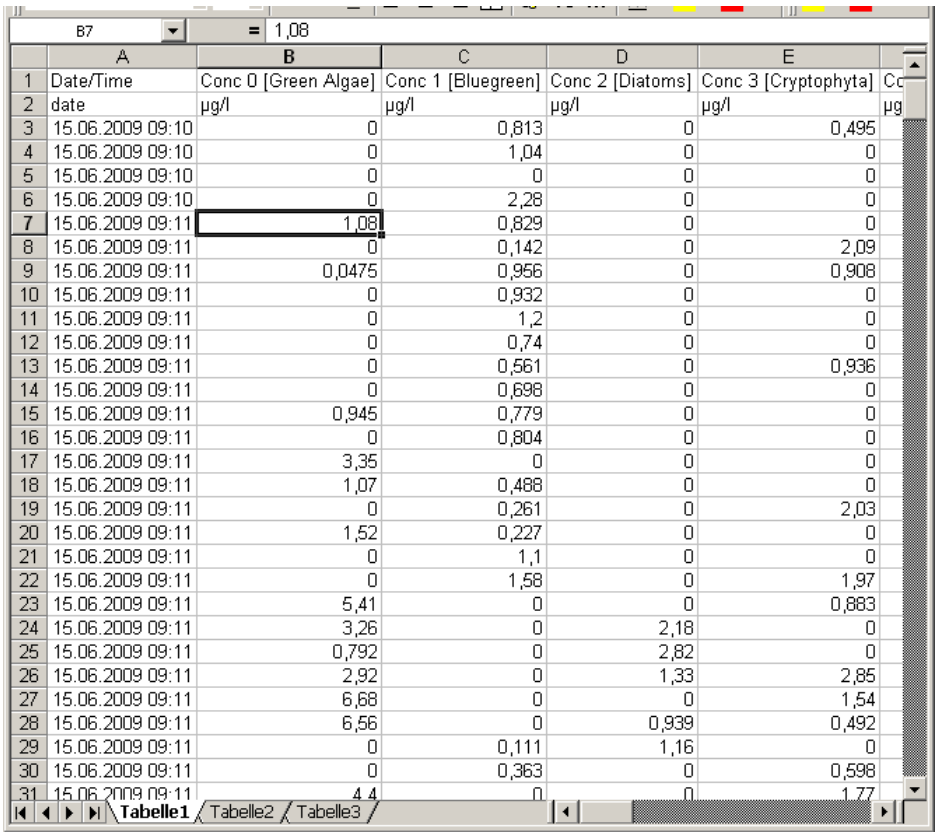
HOW TO COPY DATA TO EXCEL:

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] [µg/l]	Conc 1 [Bluegreen] [µg/l]	Conc 2 [Diatoms] [µg/l]	Conc 3 [Cryptophyta] [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

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



B7 = 1,08

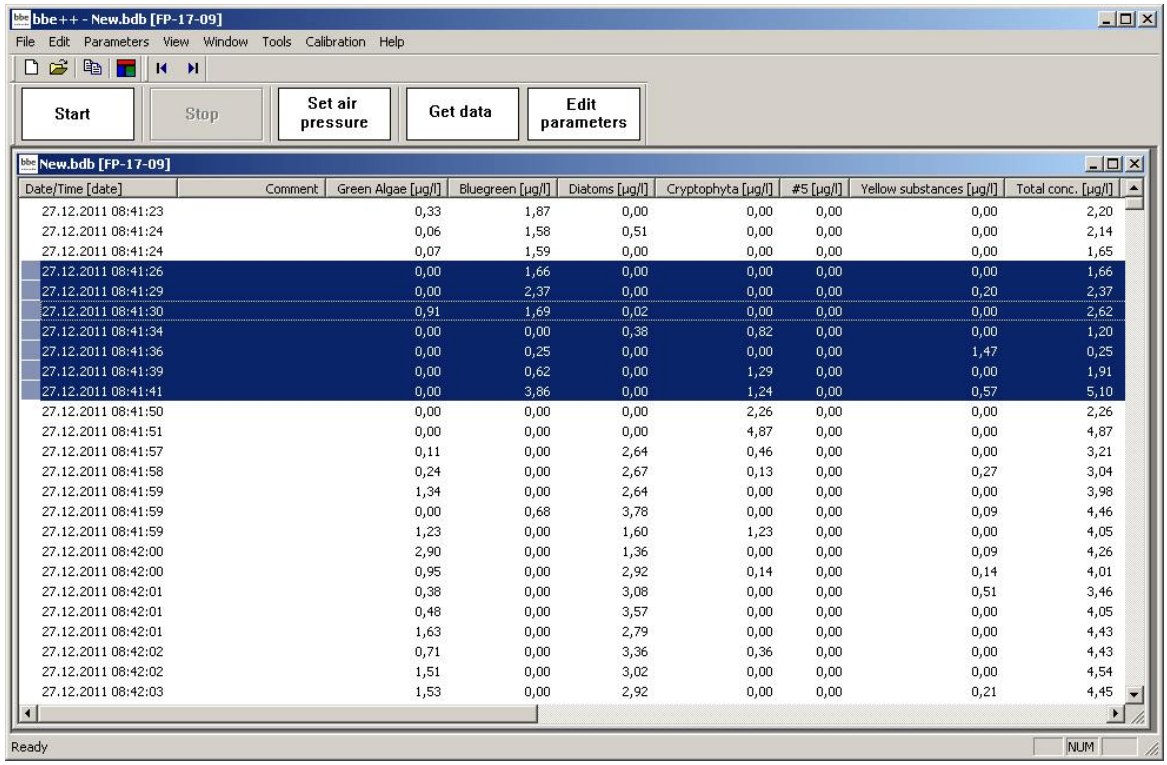
	A	B	C	D	E
1	Date/Time	Conc 0 [Green Algae]	Conc 1 [Bluegreen]	Conc 2 [Diatoms]	Conc 3 [Cryptophyta]
2	date	µg/l	µg/l	µg/l	µg/l
3	15.06.2009 09:10	0	0,813	0	0,495
4	15.06.2009 09:10	0	1,04	0	0
5	15.06.2009 09:10	0	0	0	0
6	15.06.2009 09:10	0	2,28	0	0
7	15.06.2009 09:11	1,08	0,829	0	0
8	15.06.2009 09:11	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

Tabelle1 / Tabelle2 / Tabelle3

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

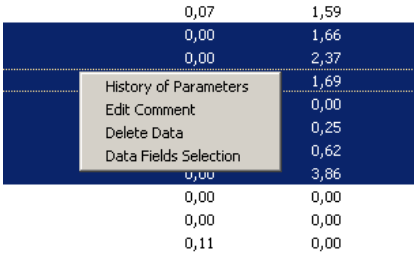
Edit Comment – advanced functionality only

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.

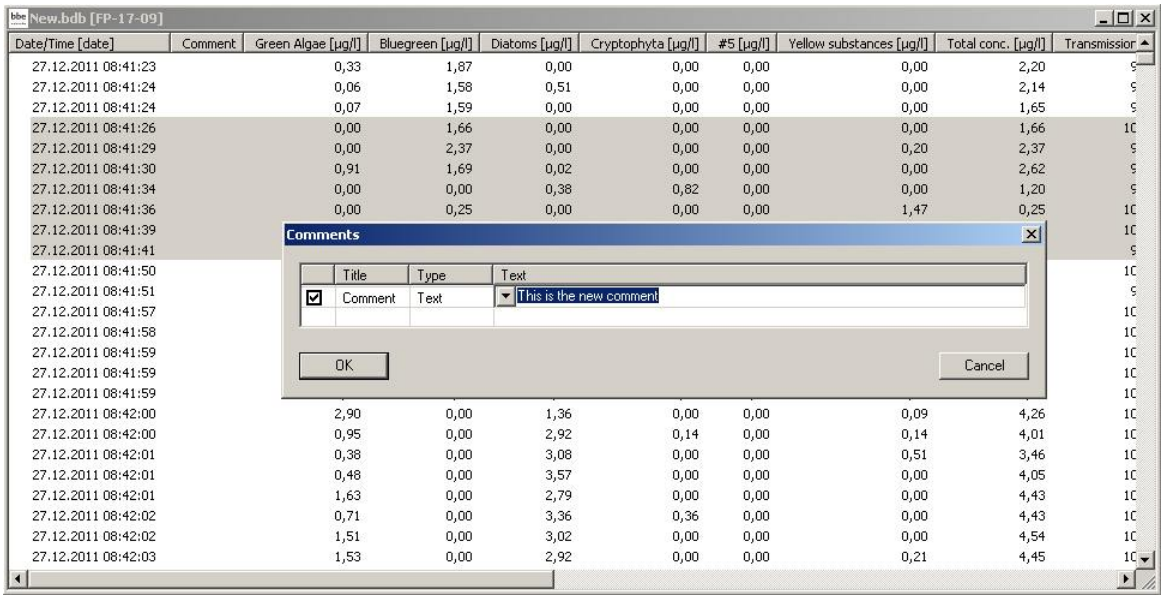


Date/Time [date]	Comment	Green Algae [µg/l]	Bluegreen [µg/l]	Diatoms [µg/l]	Cryptophyta [µg/l]	#5 [µg/l]	Yellow substances [µg/l]	Total conc. [µg/l]
27.12.2011 08:41:23		0,33	1,87	0,00	0,00	0,00	0,00	2,20
27.12.2011 08:41:24		0,06	1,58	0,51	0,00	0,00	0,00	2,14
27.12.2011 08:41:24		0,07	1,59	0,00	0,00	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

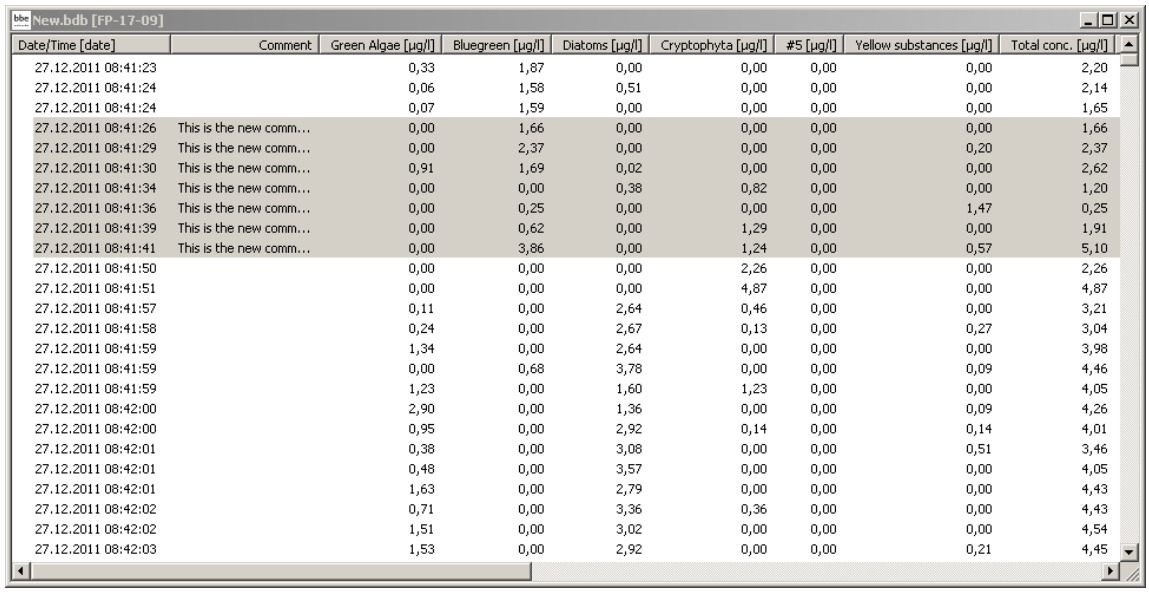
Go to Edit → Edit comments or use right click on the marked datasets:



Enter the new comment for the selected data:



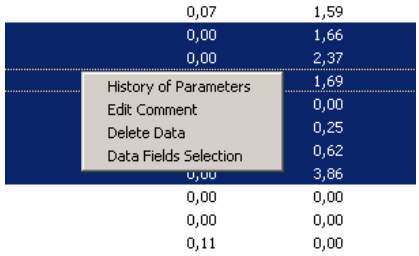
Click OK:



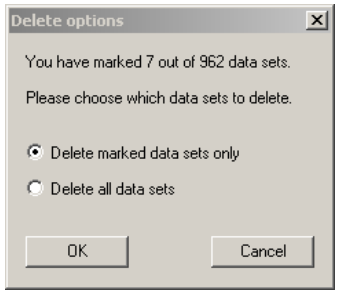
Delete Data – advanced functionality only

To delete data, mark the datasets as described above.

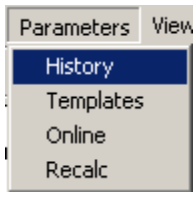
Go to "EDIT → DELETE DATA" or use right click on the marked datasets:



Click OK to delete the data.



PARAMETERS MENU



This menu contains commands to:

- display parameters of datasets stored in the database (History)

The following items are not available for AlgaeTorch and BethoTorch:

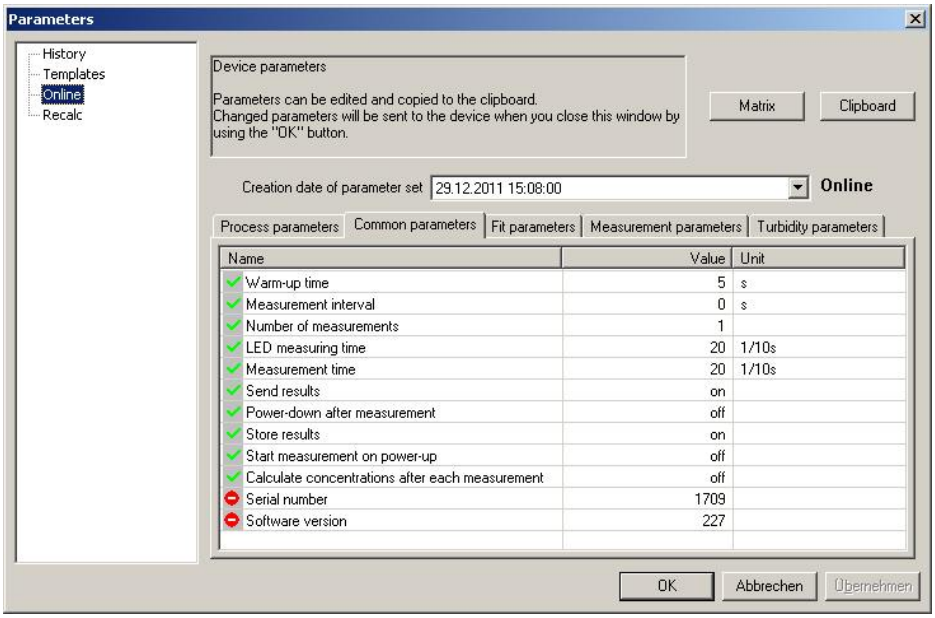
- apply a user-defined selection of parameters to an instrument (Template)
- display and change parameters in the instruments (online)
- recalculate the datasets in the database with another set of calibration parameters (Recalc)

Each selection in the menu leads to one tab of the Parameters window.

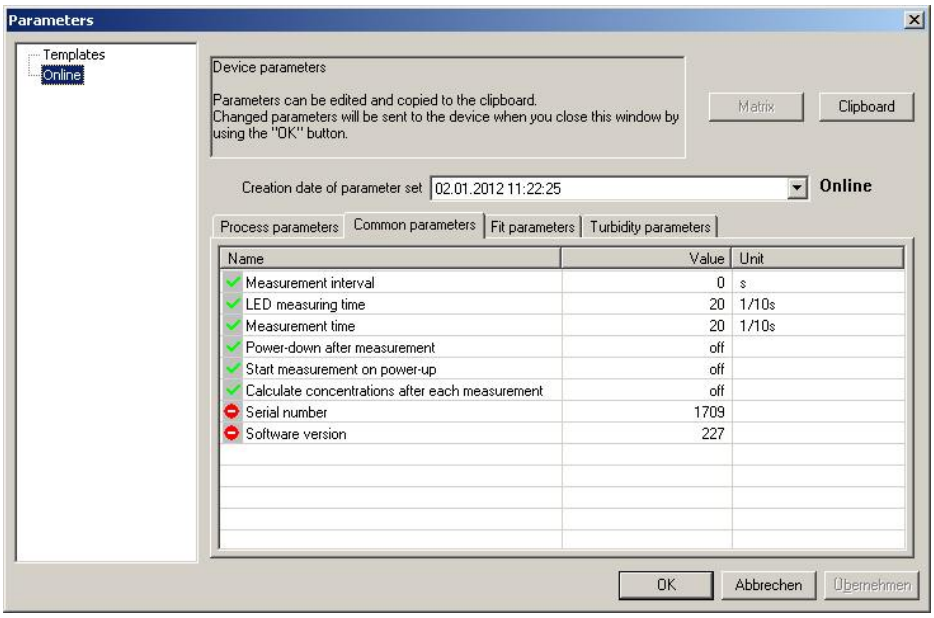
> ***Please note:***
> ***Only parameters of the current type of instrument are shown.***
> ***It depends on the user level, whether a parameter is shown or not. The higher the user level, the more parameters are shown.***

For example of parameter listings for user levels, please see the examples below.

Access level “advanced functionality”:

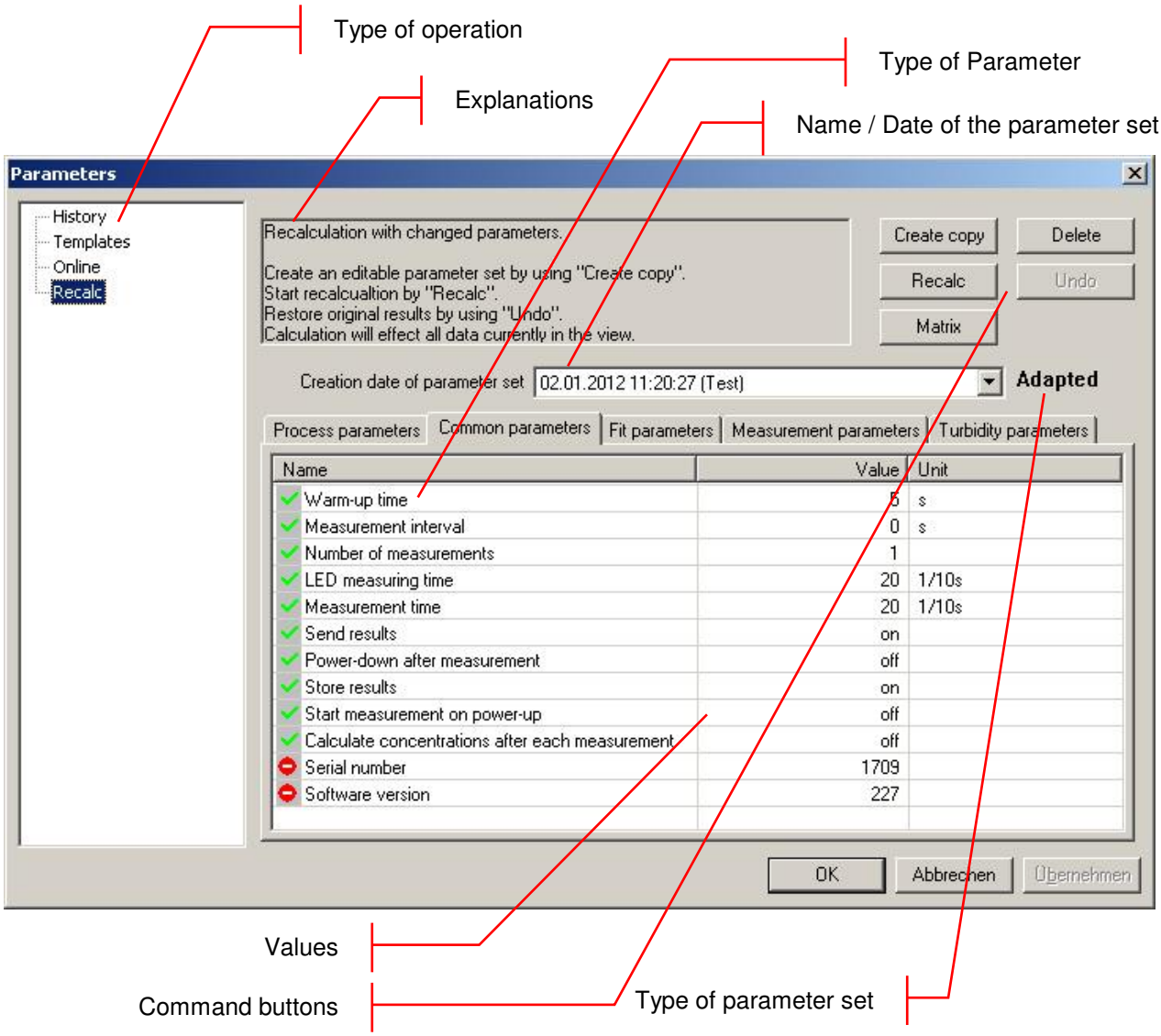


Access level “User”:



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.

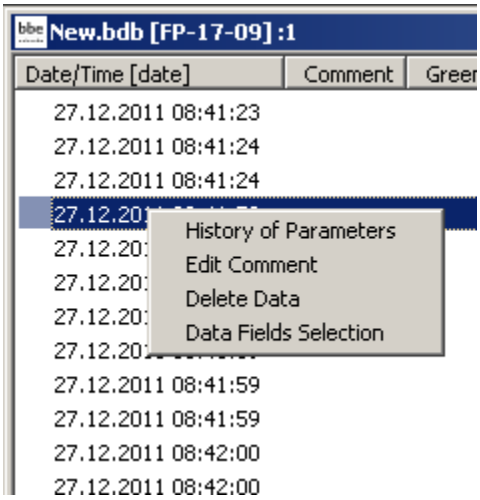
TYPE OF PARAMETER SET

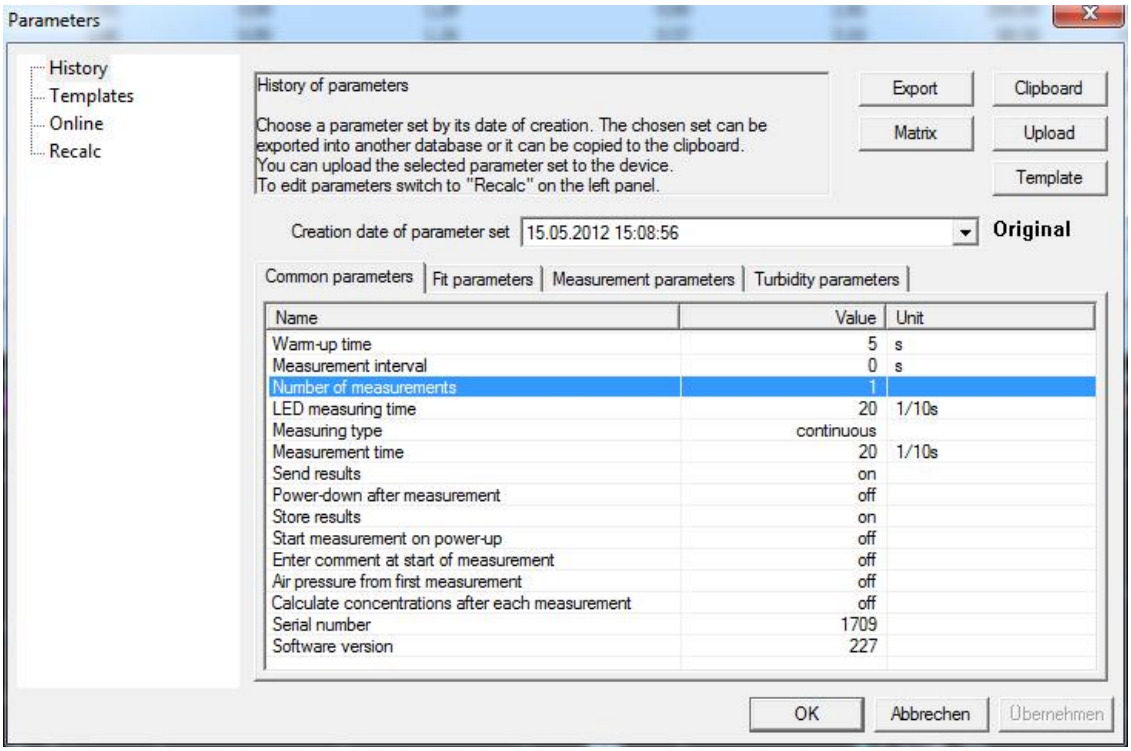
Indicates the type of parameter set:
Original: this parameter set has been used originally for a measurement, it cannot be deleted.
Adapted: this is a parameter set has been adapted by the user, it can be used to recalculate the datasets.

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

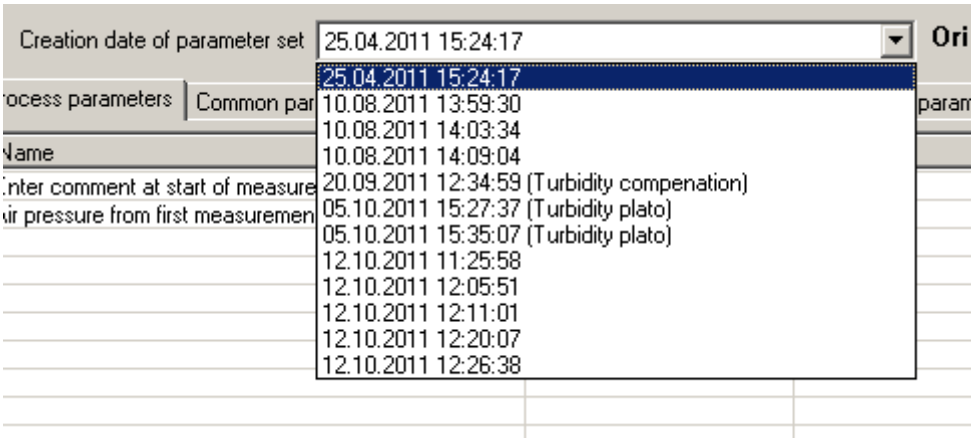
History – advanced functionality only

Displays the parameters of the active dataset.
The history is also available on the Context Menu in table view:



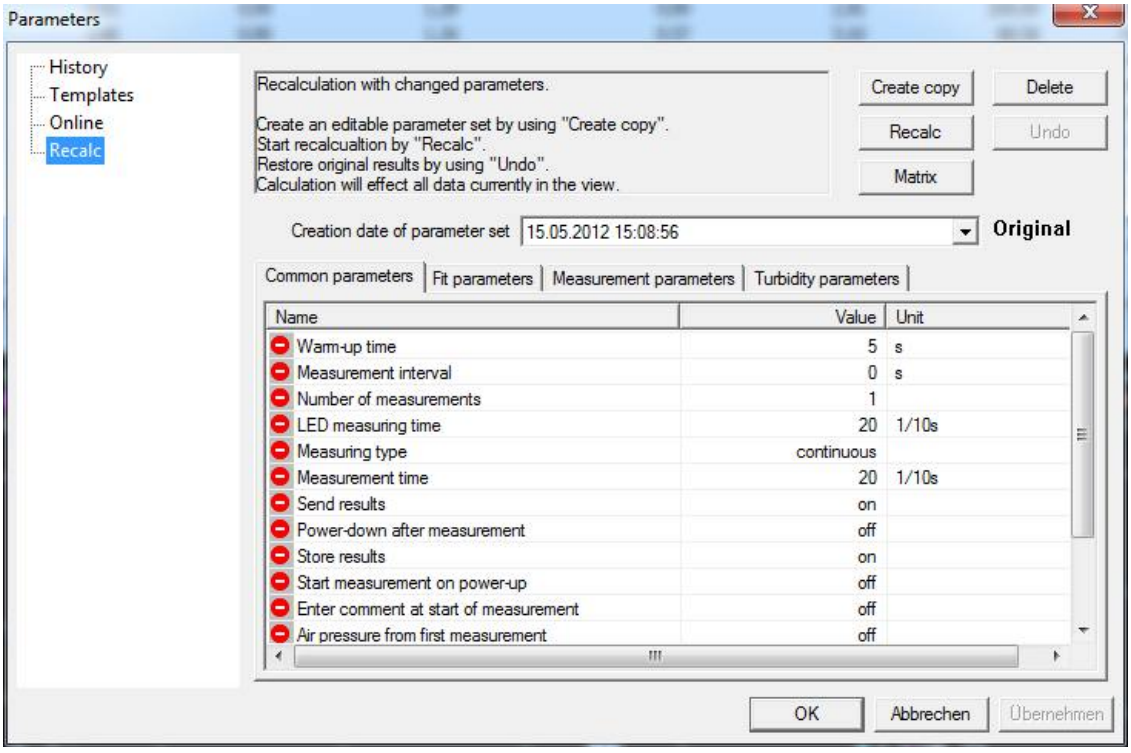


All parameter sets in the database can be displayed. To choose one parameter set, select the date from the drop-down box:



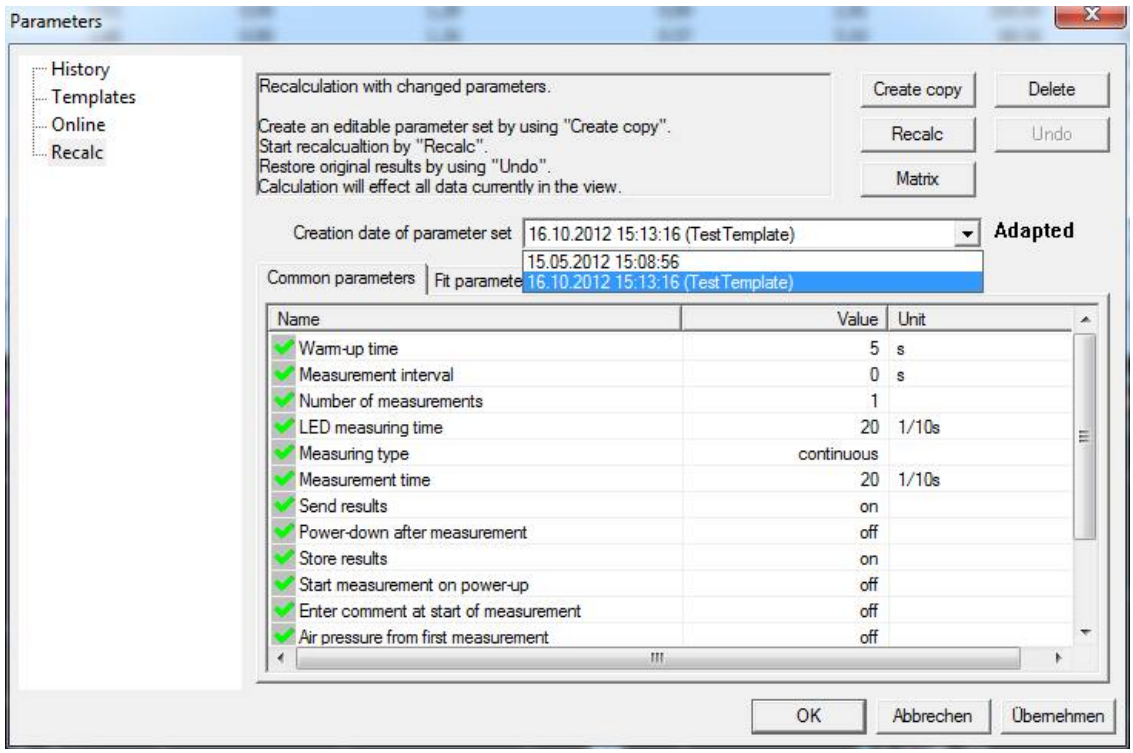
Recalc – advanced functionality only

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

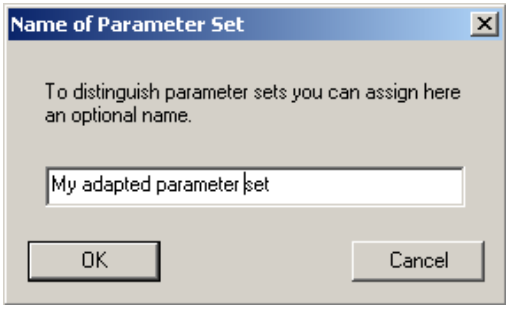


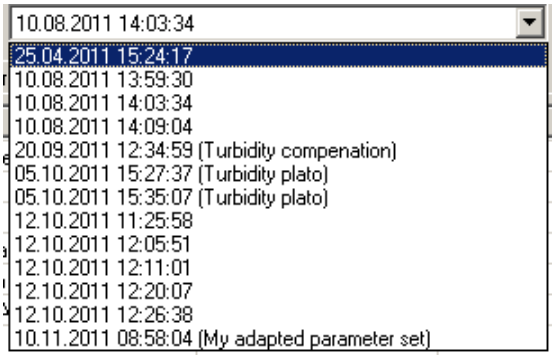
To change the settings and recalculate the results, the following steps have to be executed:

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".

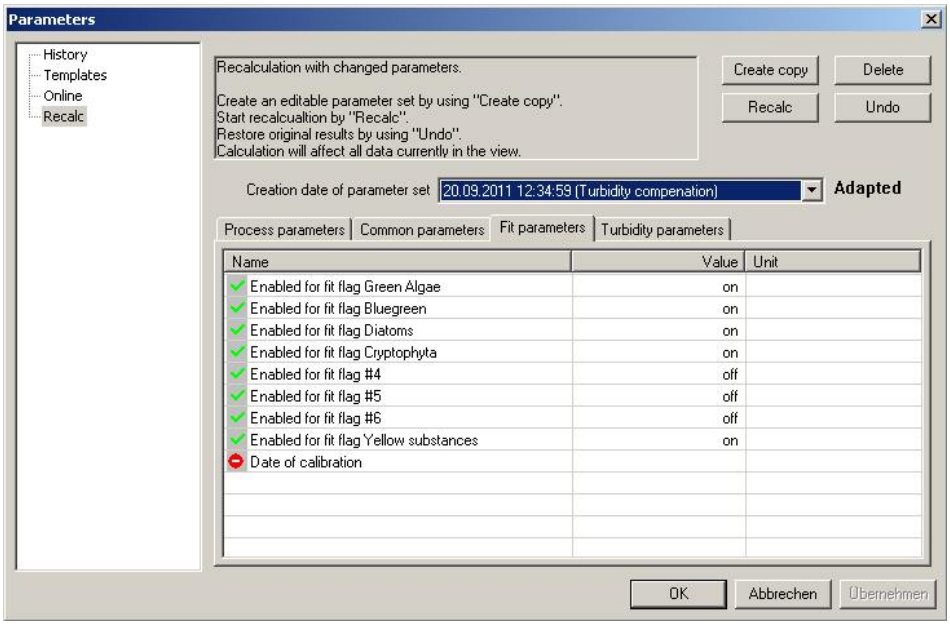


4. To create a new parameter set (not in the BenthoTorch), select one, click "CREATE COPY" and enter a name for this parameter set.

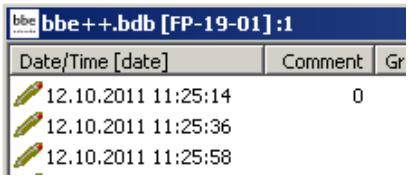




5. Select the new parameter set and edit the settings as described in the "Template" section. Please note the number and type of parameters shown depends on the user-level. Only the parameters marked with the green symbol can be changed.



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:



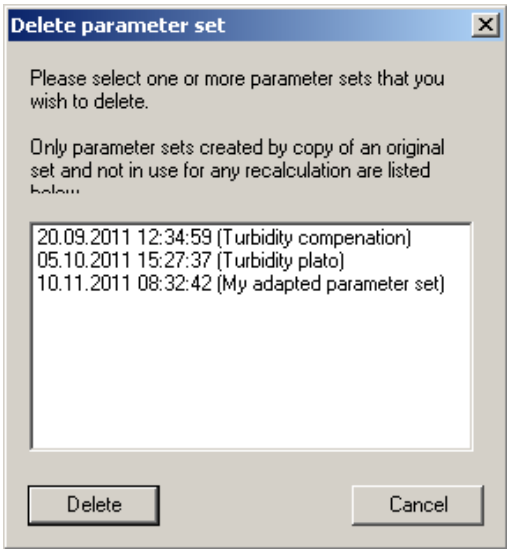
RESTORE DATA WITH ORIGINAL PARAMETERS

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.

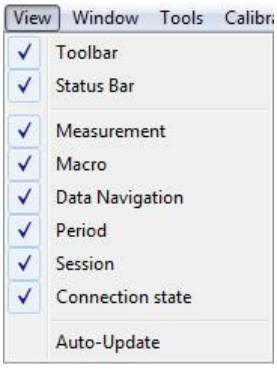
DELETE ADAPTED PARAMETER SETS

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



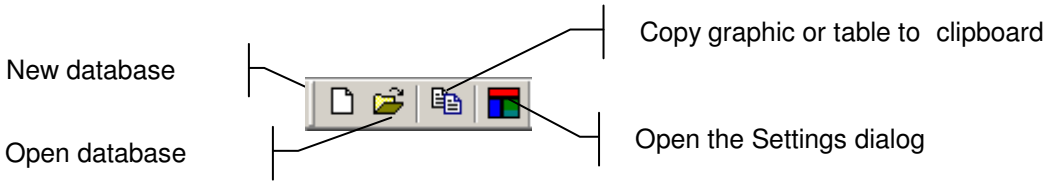
Select the parameter sets to be deleted and click "DELETE".

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 FluoroProbe 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

This is not a button, but an indicator only.

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.

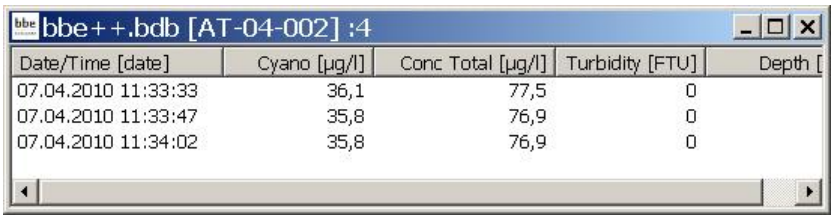
Window – Advanced functionality only

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

New Table Window

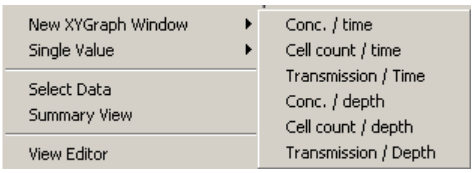
Opens a new window and displays the data according to the selected window type.

(See below)
Please see the list window “Concentration” of an AlgaeTorch as an example.

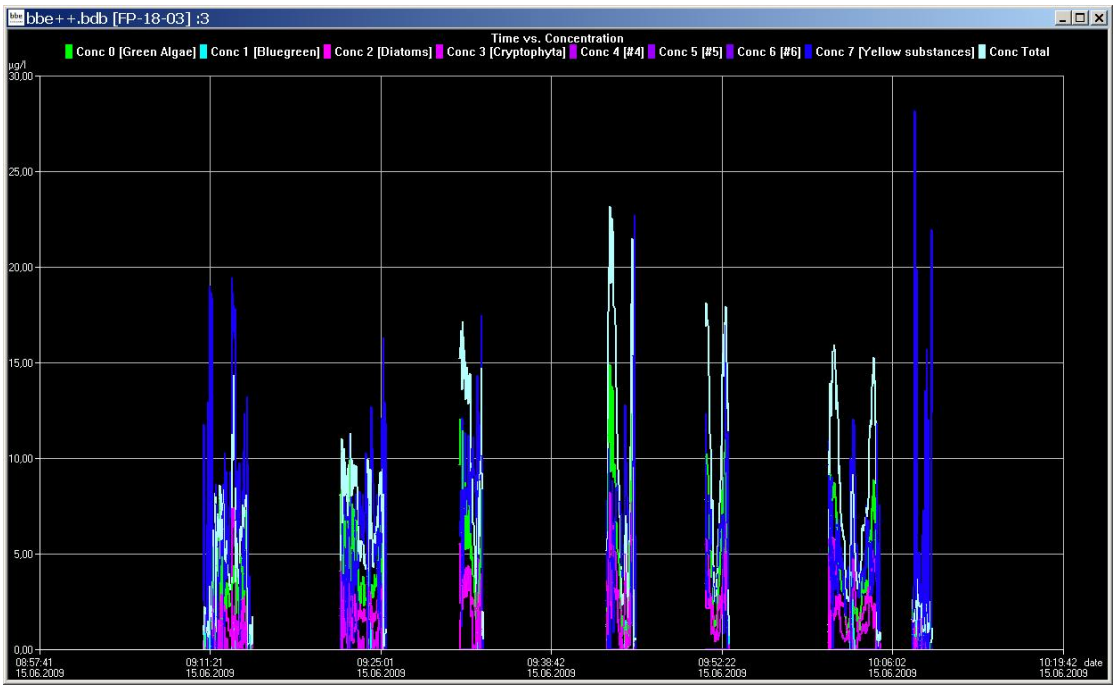


New XYGraph Window

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

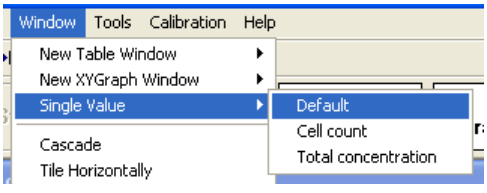


There are some view types pre-defined for each instrument. It is also possible to add new window types by using the view editor.
The following diagram shows the development of different algae classes measured with the bbe FluoroProbe.

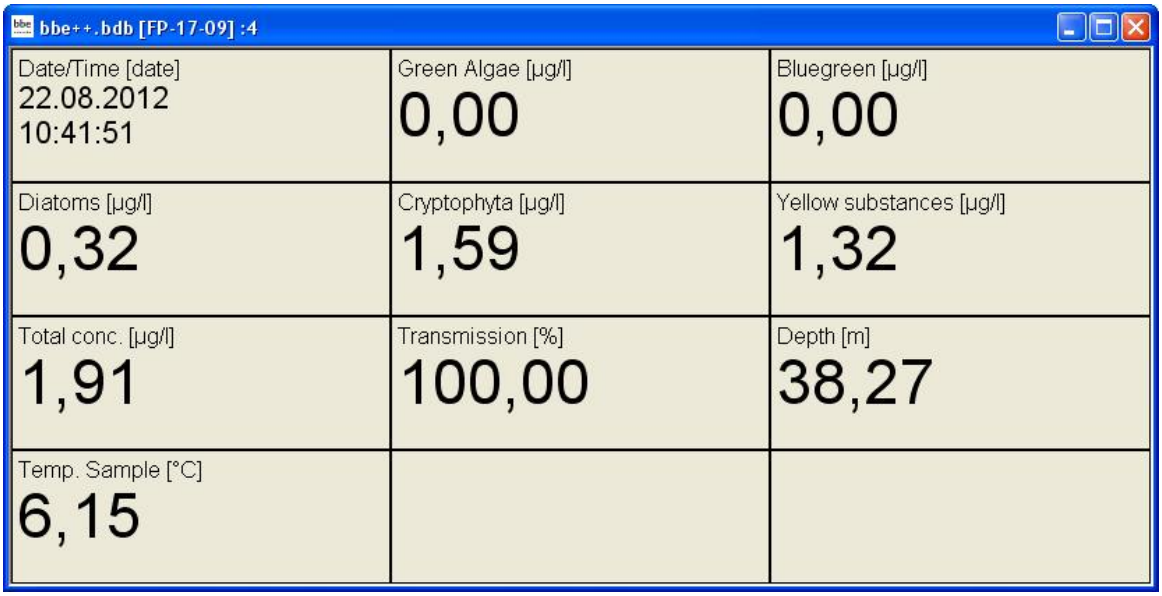


New Single Value View

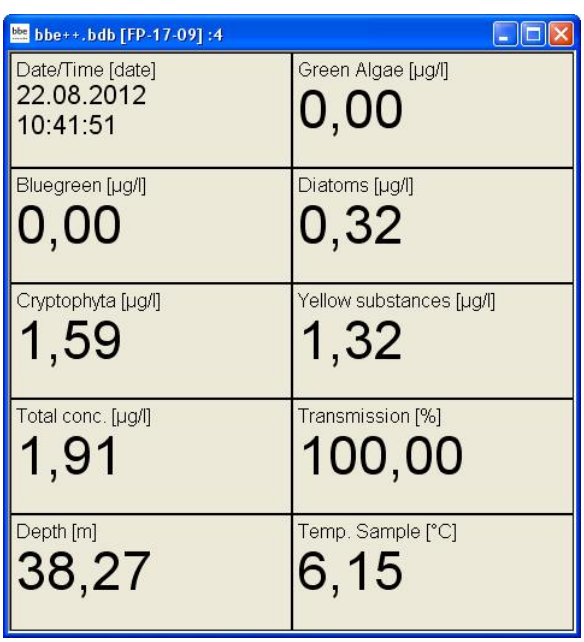
Opens a new window and displays the data of one data-set according to the selected window type.

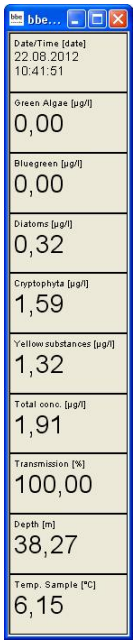


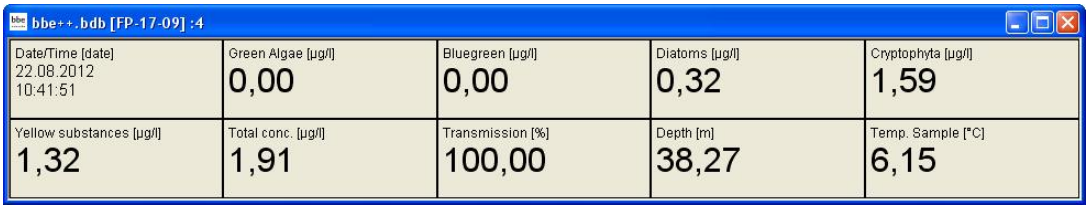
The data-set is shown in larger digits to help the user read the display even in bright sunlight. The latest data-set is shown.



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







Cascade

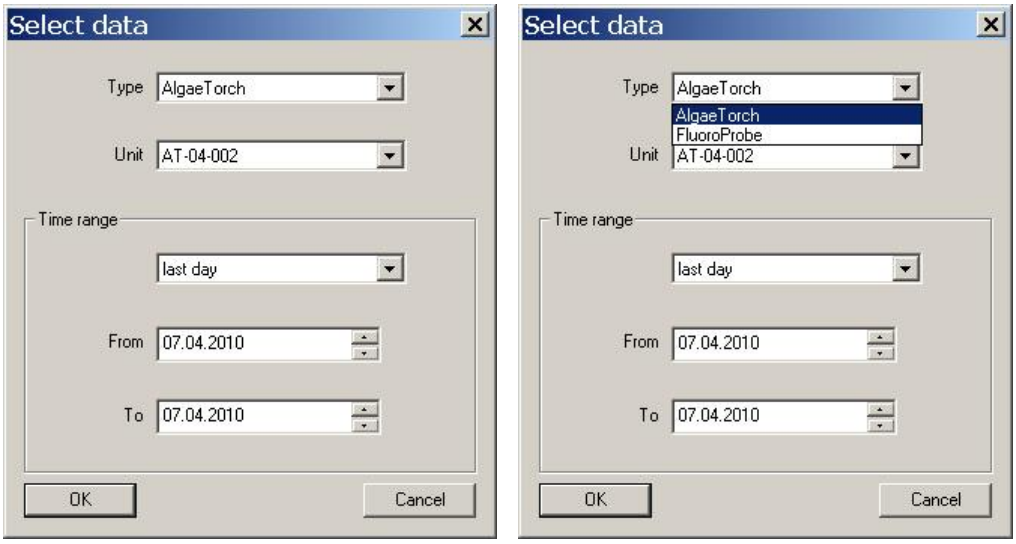
Arranges the windows one behind the other.

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.

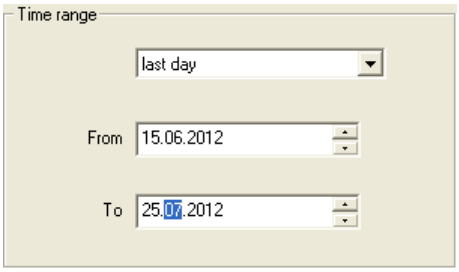


Type: shows the types of instruments available in this database.
Unit: shows the serial numbers of the type of instruments chosen above available in this database.

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.

bbe++.bdb [FP-15-02]

Date/Time [date]	Conc 0 [Green Algae] [µg/l]	Conc 1 [Bluegreen] [µg/l]	Conc 2 [Diatoms] [µ
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

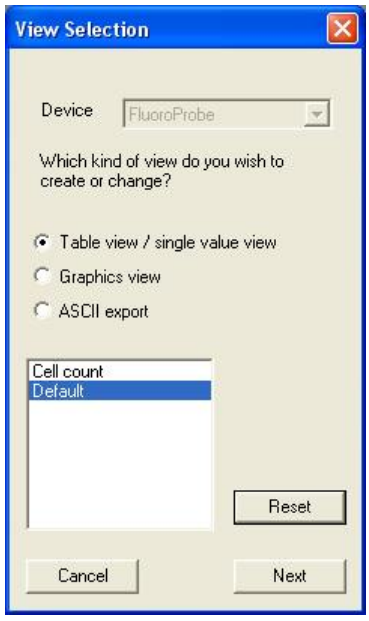
The View Editor is used to generate your own table or graphic window type as well as a template for the export to text files. The View Editor is an assistant that leads through the whole process.
When starting the View Editor, the current view is selected automatically to be edited or used as a template 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.

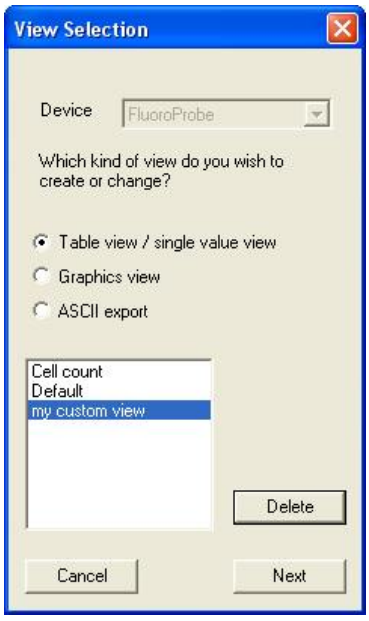
GENERATING AND EDITING A TABLE VIEW WINDOW

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:





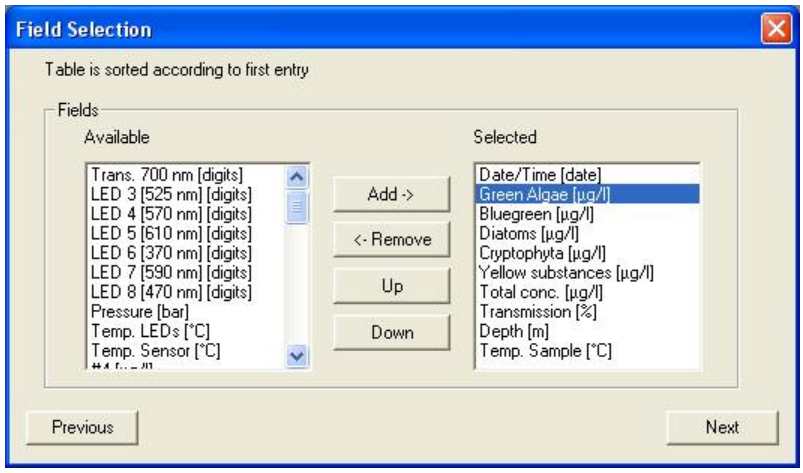
2. Choose the type of instrument the view is to be used for (in the example “FluoroProbe”).

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.

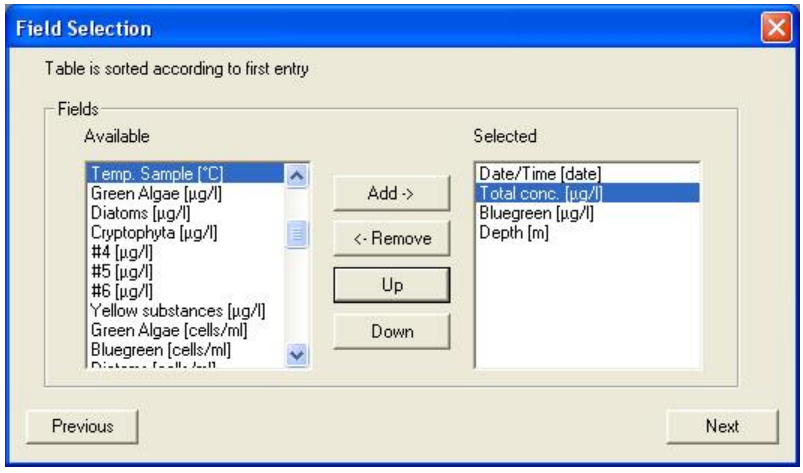
   In case of a pre-defined view, the view can be reset to the original status (“RESET”).
   In case of a user-defined view, the view can be deleted (choose a custom view and click “DELETE”).
5. Click “NEXT”.

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.



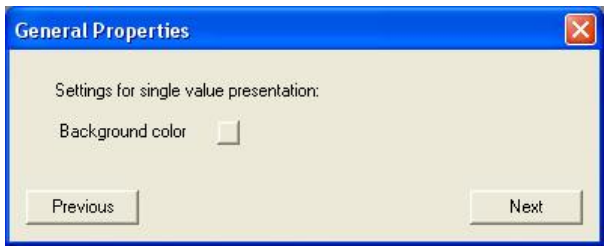
6. Click on “Green Algae [µg/l]” and “← REMOVE” to remove the concentration of green algae from the view.
7. Repeat with all entries but “Date/Time (date)”; “Bluegreen [µg/l]”, “Total conc. [µg/l]” and “Depth [m]”.
8. Click on “Total conc. [µg/l]” and ”UP” to change the order.



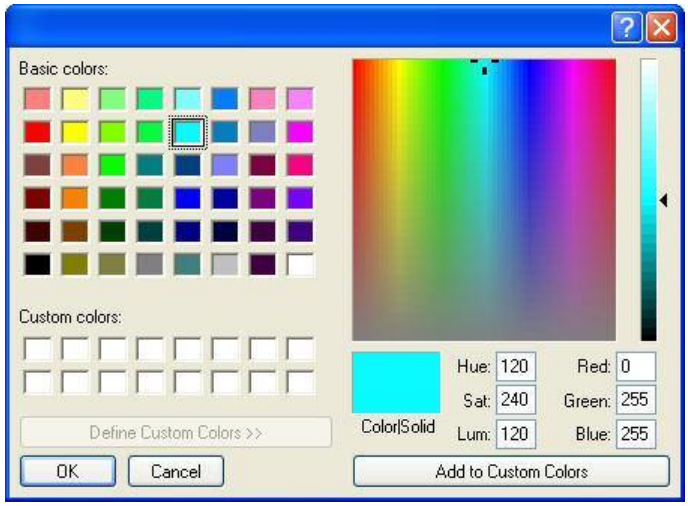
9. Click “Next”.

General Properties

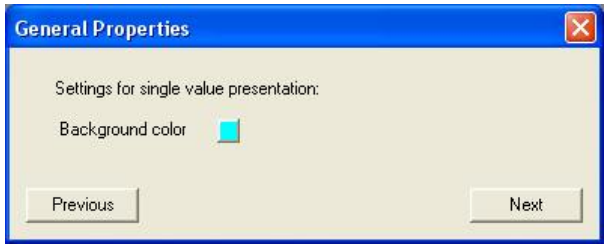
The General Properties page allows the user to change the background color of a “Single value” view.



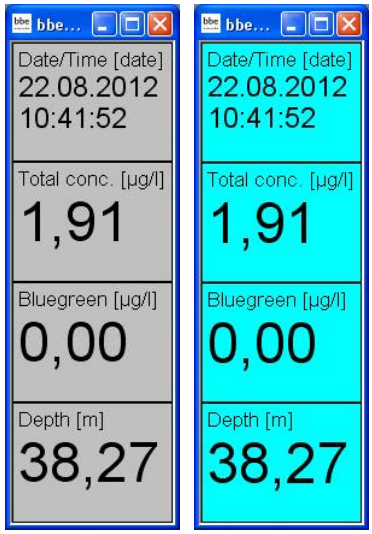
10. Click on the color picker box behind „Background color“ and choose a new color.



The chosen color is now shown in the color picker box

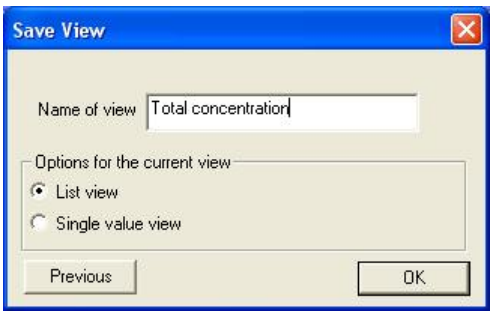


Example of a change in background color:

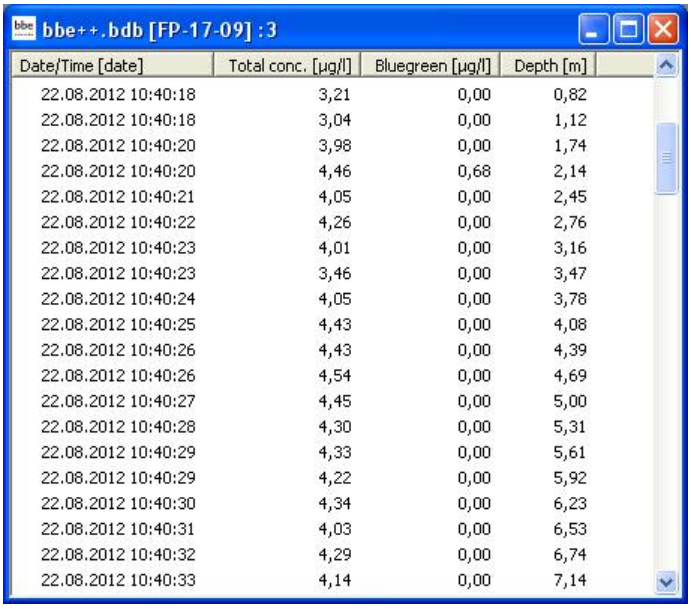


Save View

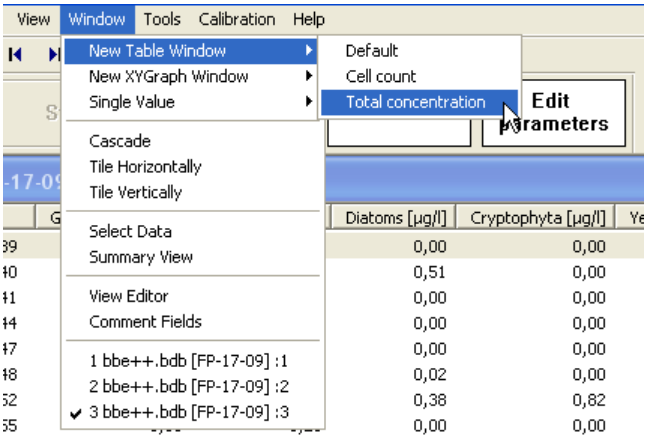
11. Enter a name for the view.



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



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

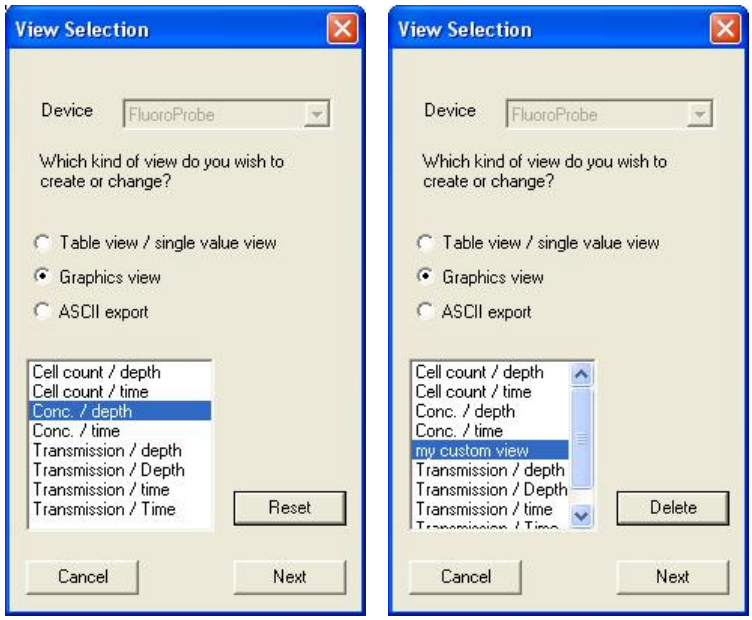


GENERATING AND EDITING A GRAPHIC VIEW WINDOW

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:

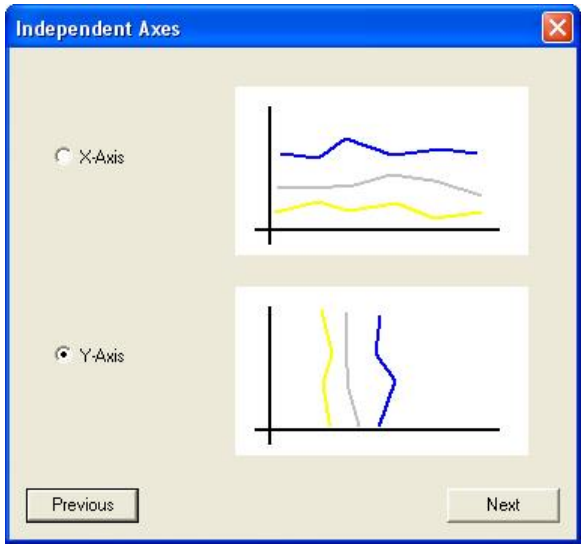


2. Choose the type of instrument the view is to be used for (in the example “FluoroProbe”).
3. Choose the type of view that is to be generated or edited (in the example “Graphics view”).
4. Choose one existing view to edit or as a template for a new one (in the example “Conc. / depth”).

   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”.

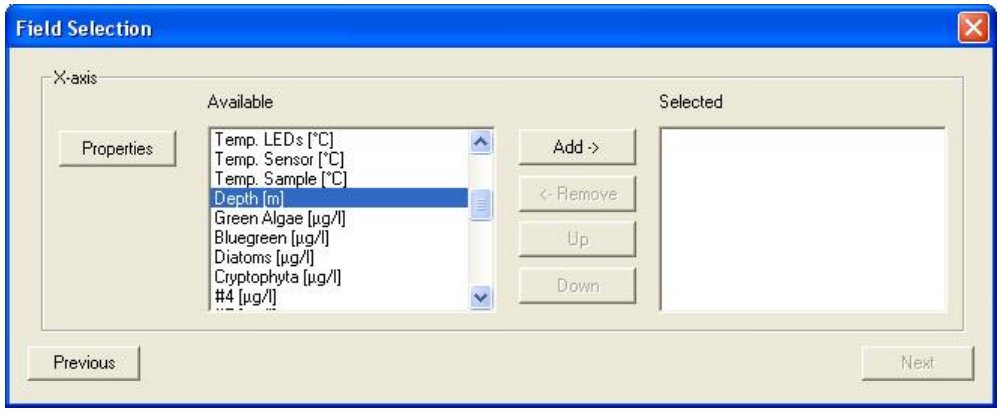
Independent Axis

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

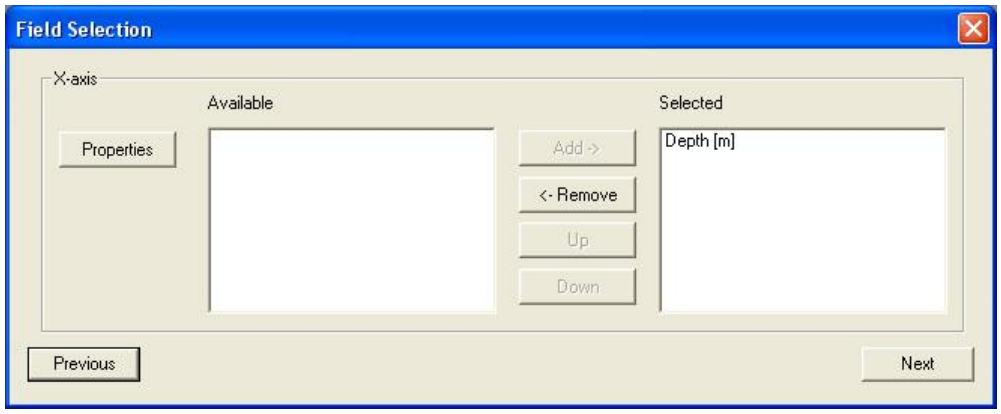


Field Configuration

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



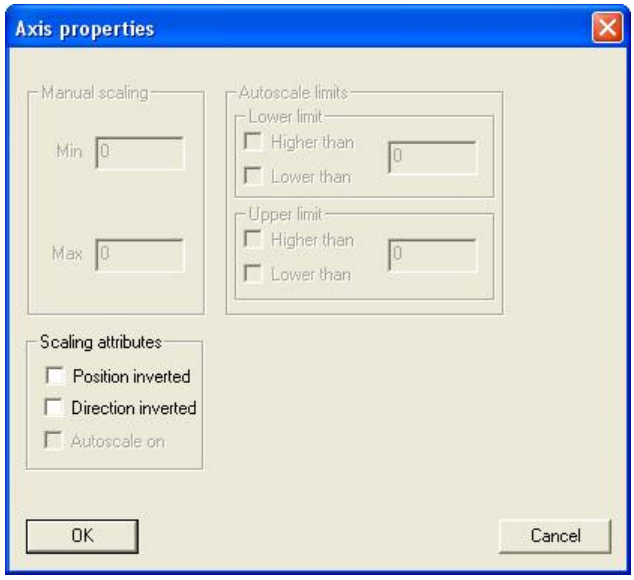
8. After choosing one entry all other entries vanish. Removing the entry by clicking “←REMOVE” brings back all available entries.



9. Click on „PROPERTIES“

Axis Properties - first axis

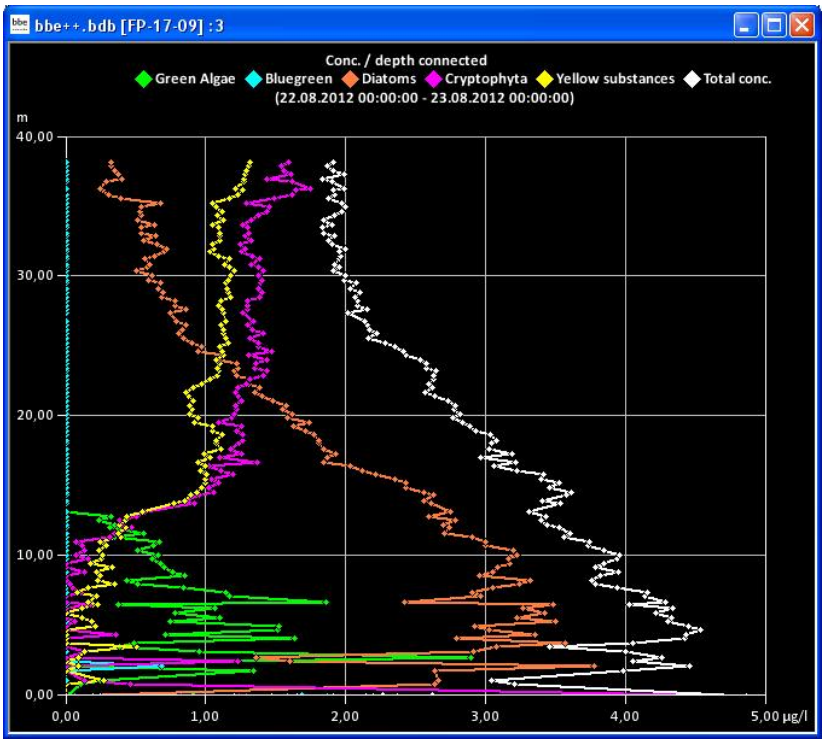
Some properties can be set for each axis. For the first axis, this is the position and the direction.

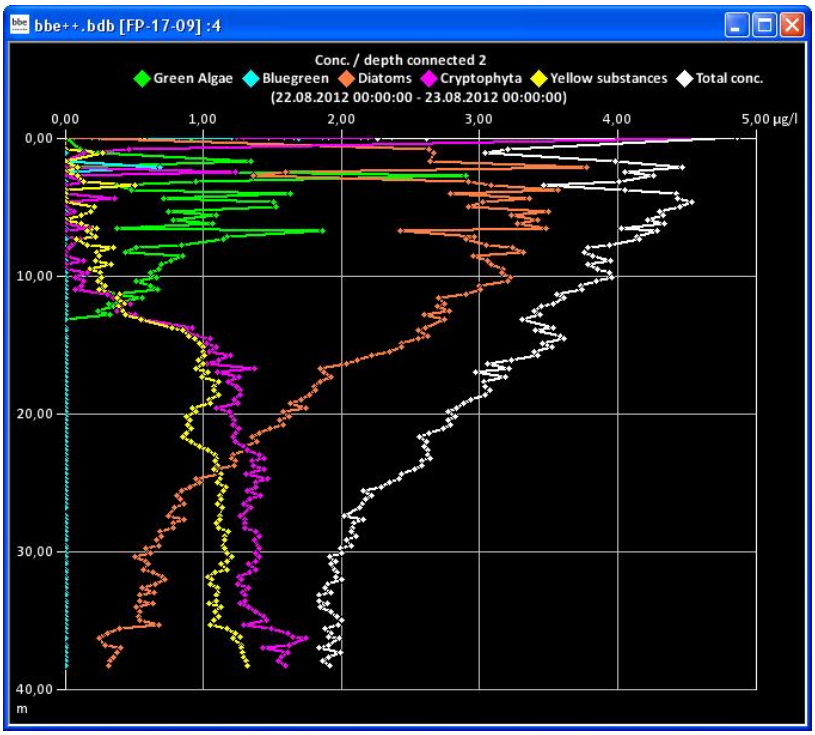


Normally the first axis is on the lower or left side of the graph. The direction is normally defined as:

X-Axis: left side → low values right side → high values
Y-Axis: bottom → low values top → high values

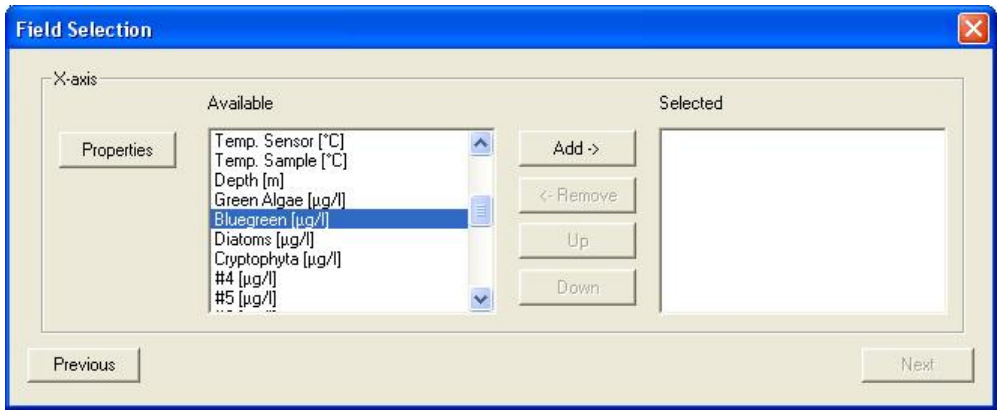
To display e.g. chlorophyll concentration versus depth, it is easier to use the top position of the X-axis and to invert the direction of the Y-axis for the depth. Please see the following example: the first picture shows the standard settings, the second one with a direction-inverted Y-axis and inverted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



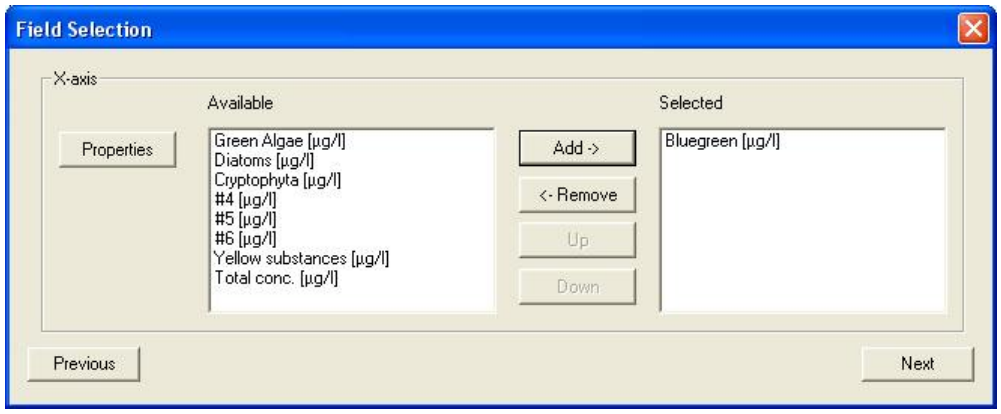


10. Click “OK” to confirm the settings.
11. Click “NEXT”.
12. Now the data and settings for the other axis can be selected.

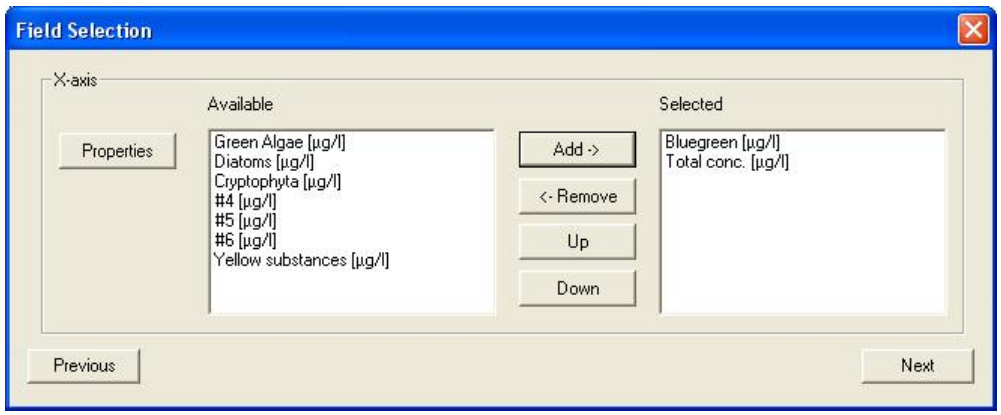
Field Configuration - second axis



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

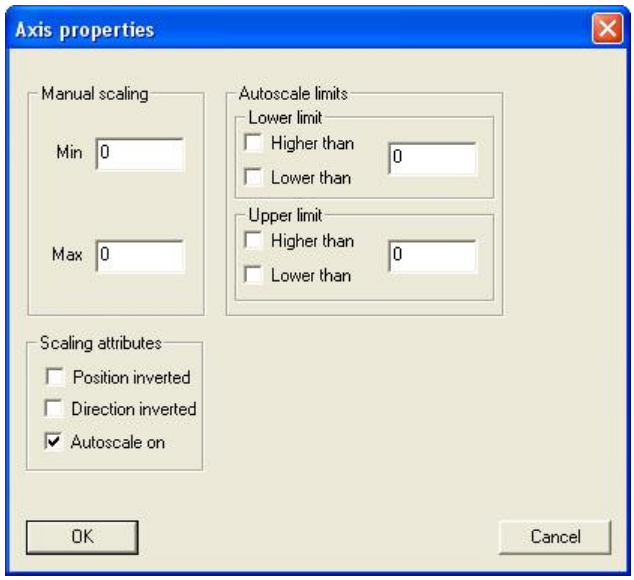


14. For example, “Total chlorophyll concentration” and “Bluegreen” have to be selected here.



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 outliners:

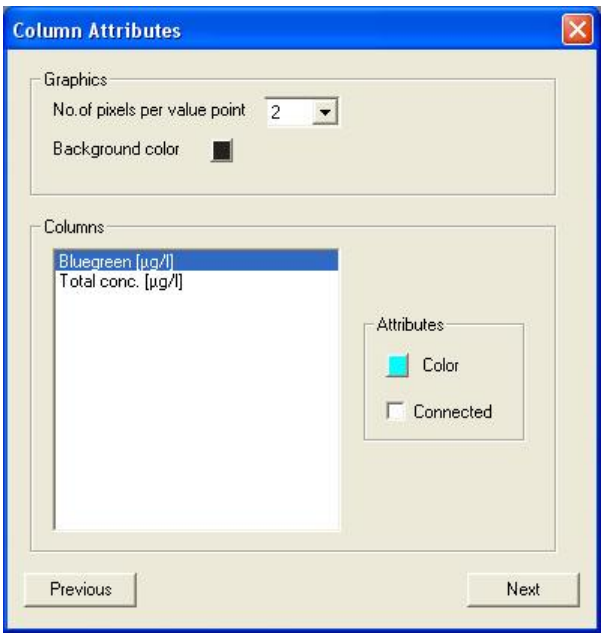
  In this case, it is difficult to analyze the data because the auto-scaling generates a high span value. To prevent this, please use:
  lower limit: higher than for outliners with low values and
  upper limit: lower than for outliners with high values
  This leads to an optimized span in the graph.

15. Click “Next”

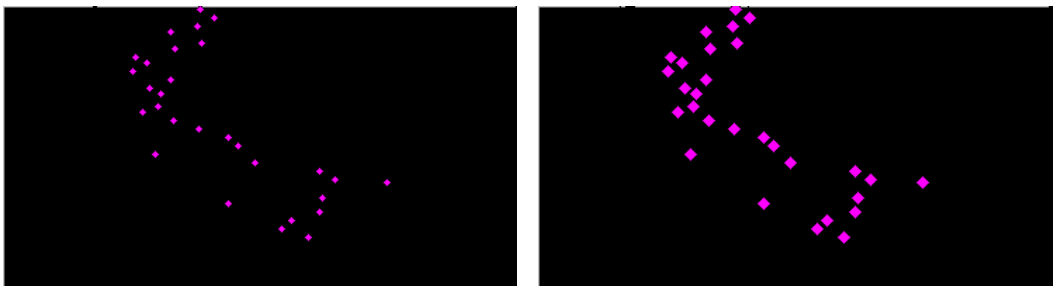
Attributes

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

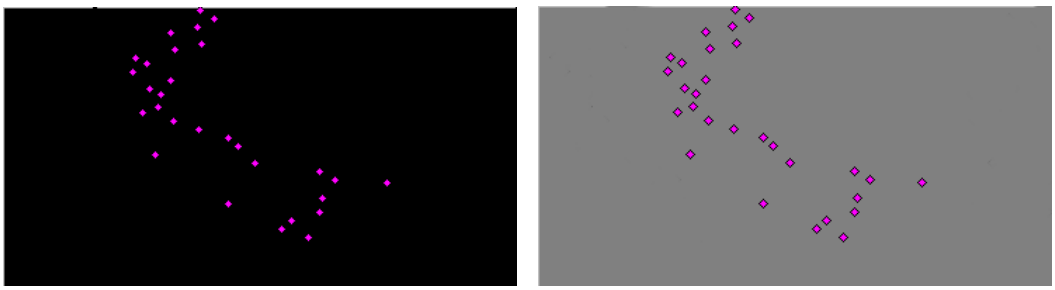
16. Set the value in the attributes window according to your needs.



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:

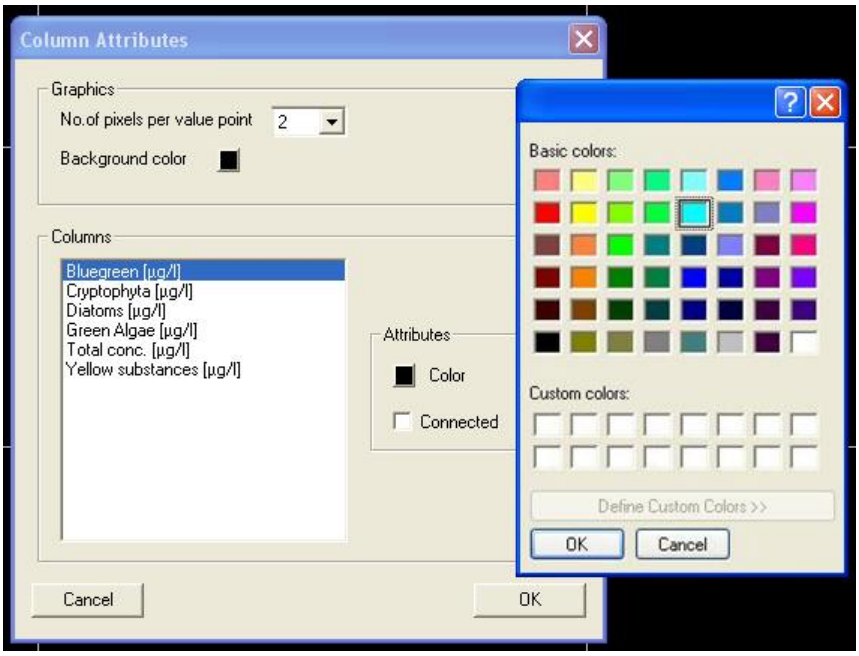


Different background colors:



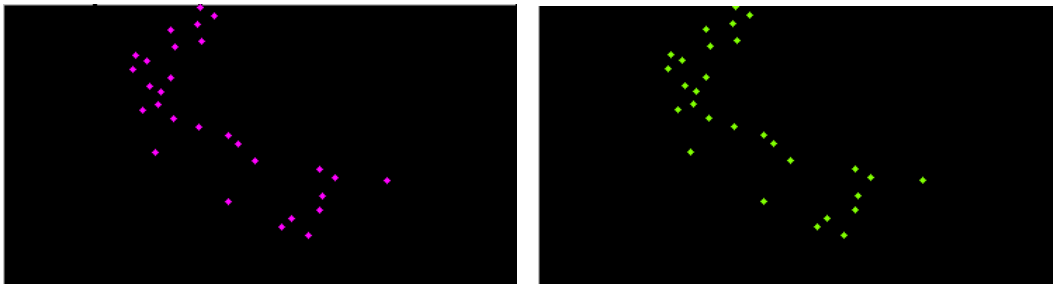
Column Attributes

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.

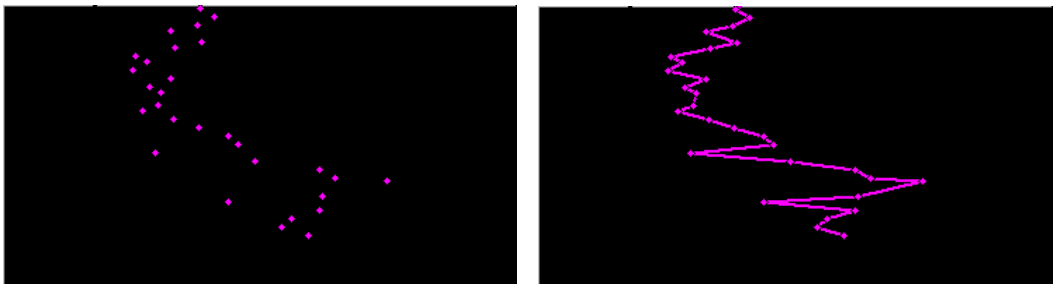


Hint: The data points are not connected if the time of measurement differs more than the given value in "TOOLS → SETTINGS → DISPLAY".

Different dot colors:



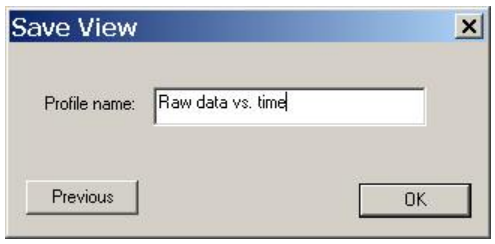
Unconnected dots / connected dots:



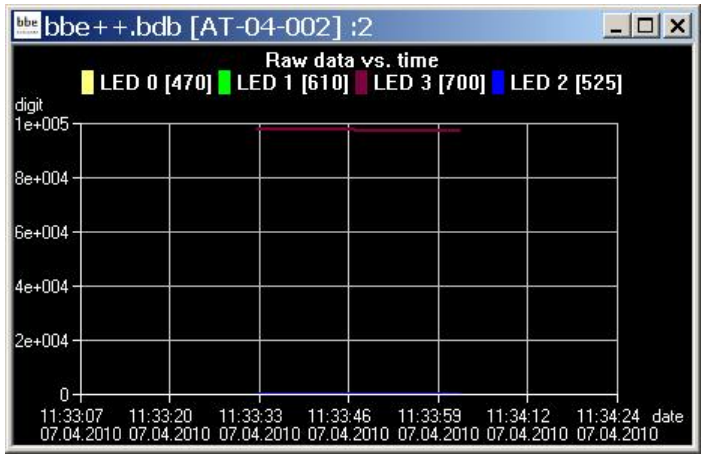
17. Click "Next"

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.



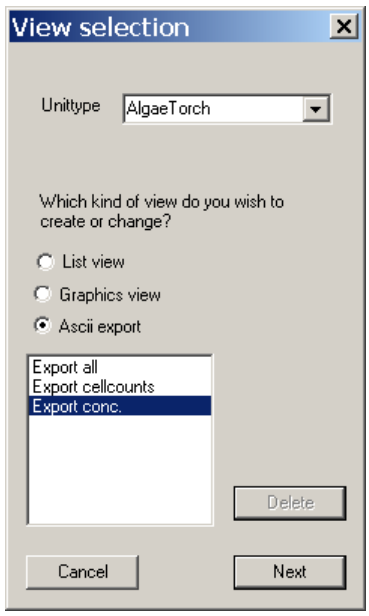
19. The current data is shown using the new view after clicking “OK”.



GENERATING AND EDITING AN ASCII EXPORT

View Selection

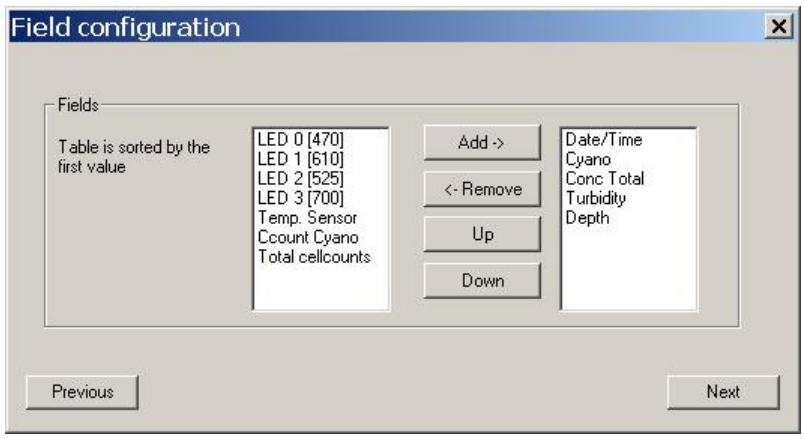
1. Open the view editor:



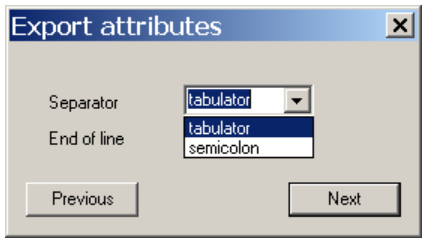
2. Choose the type of instrument the export is to be used for (in the example “AlgaeTorch”)
3. Choose the type of export that is to be generated or edited (in the example “ASCII export”)
4. Choose one existing view to edit or as a template for a new view. The delete button is used to delete a view. It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

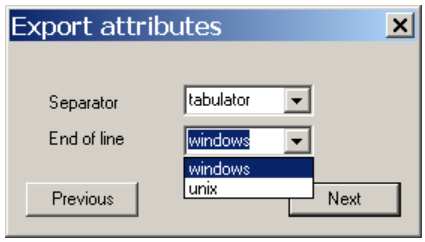
Field Configuration

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”.

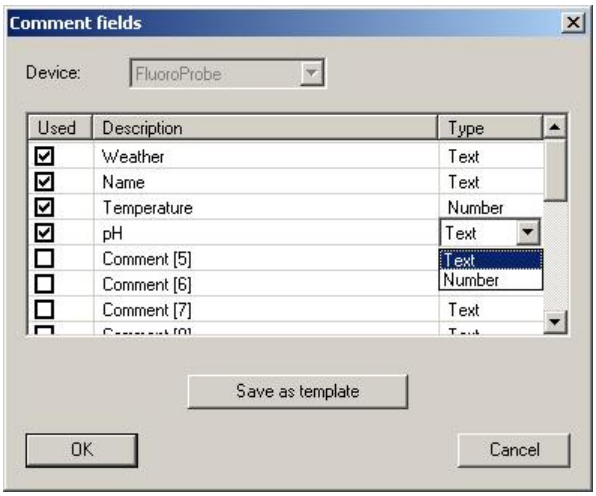
Save View

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.



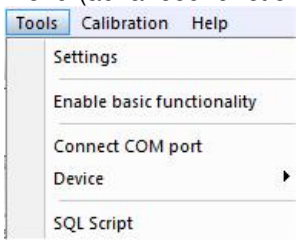
Type of instrument:	the type of instrument is defined in the settings "TOOLS → SETTINGS → ACCESS".
Used:	if tagged, the comment can be used at the start of the measurement, otherwise the comment is hidden.
Description:	name of the comment
Type:	"Text" allows entry of text, "Number" allows digits only; 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. ...

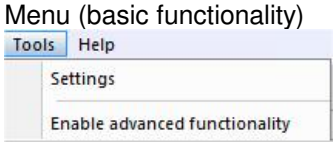
Shows all the currently opened windows.

TOOLS

Menu (advanced functionality)



Menu (basic functionality)

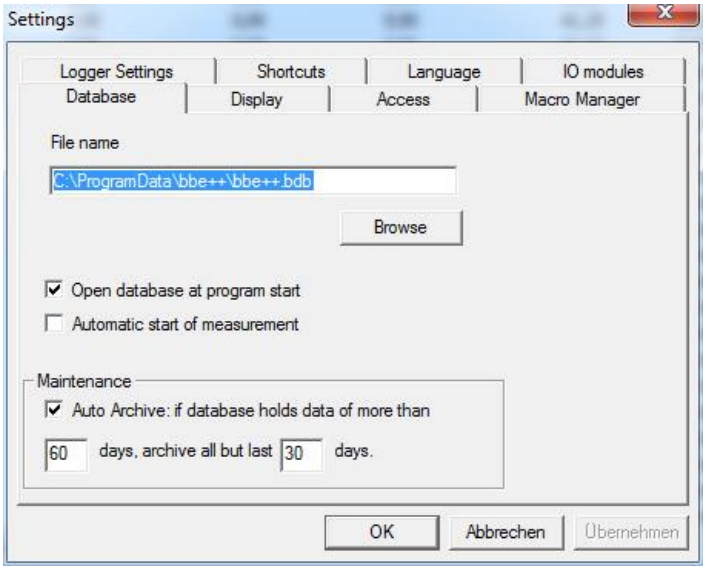


Settings

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

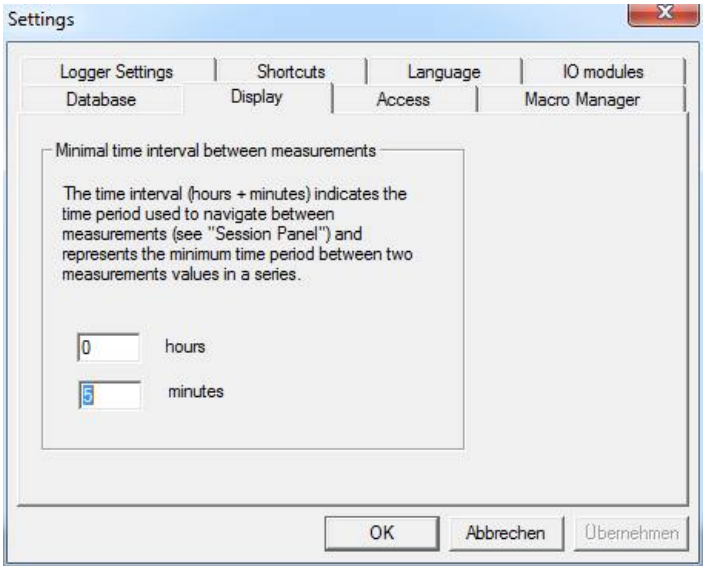
For continuously working instruments (AOA or FluoroProbe / AlgaeTorch) the software can be configurated to start the measurement directly after starting the software. The feature can be used to ensure, that the measurement starts again after a power fail.

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.

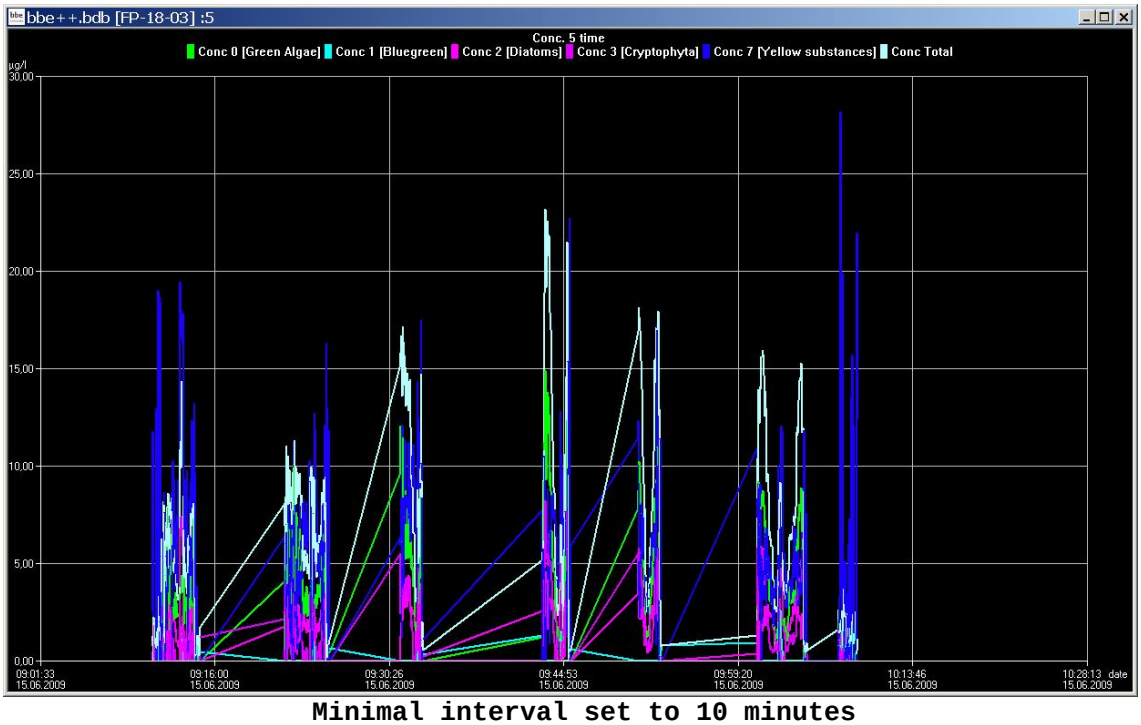
DISPLAY

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.

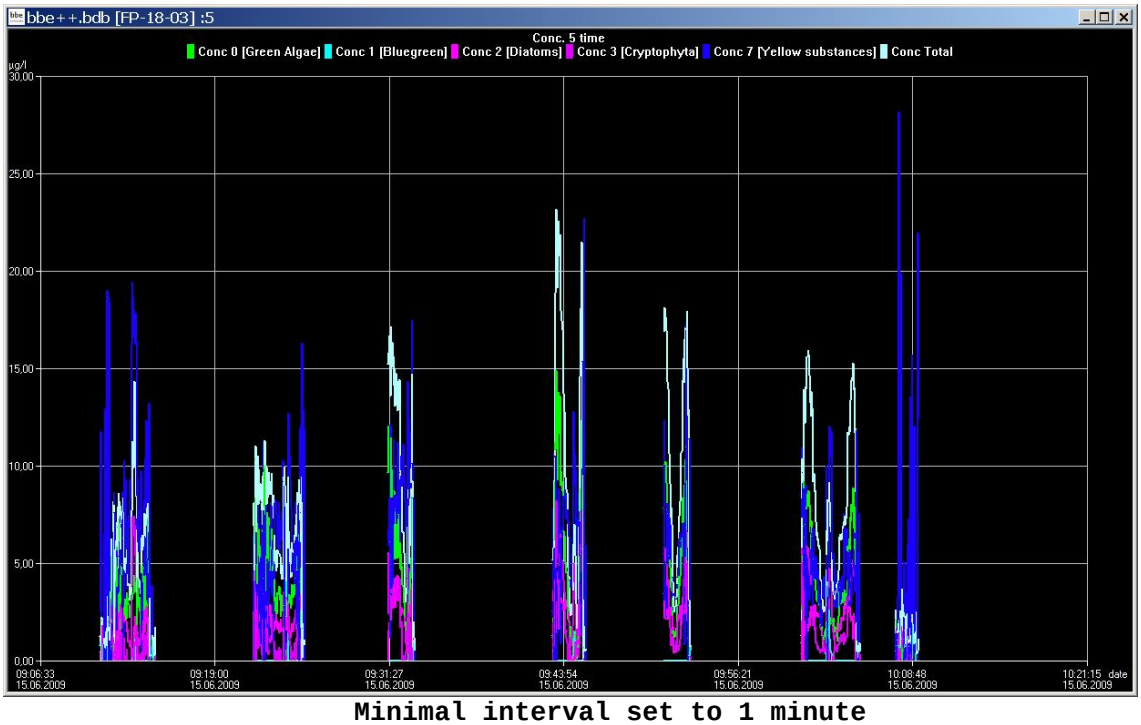


Next and previous measurement buttons in the toolbar.

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:



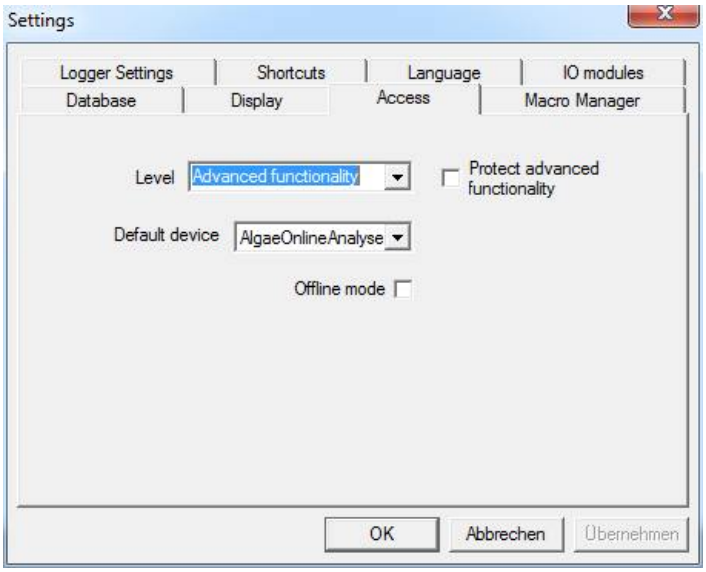
Minimal interval set to 10 minutes



Minimal interval set to 1 minute

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:

Level	Access
Basic functionality	• Just basic operation of the instrument • Measurements with pre-defined parameters only
Advanced functionality	• All menus accessible / all parameters customizable

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

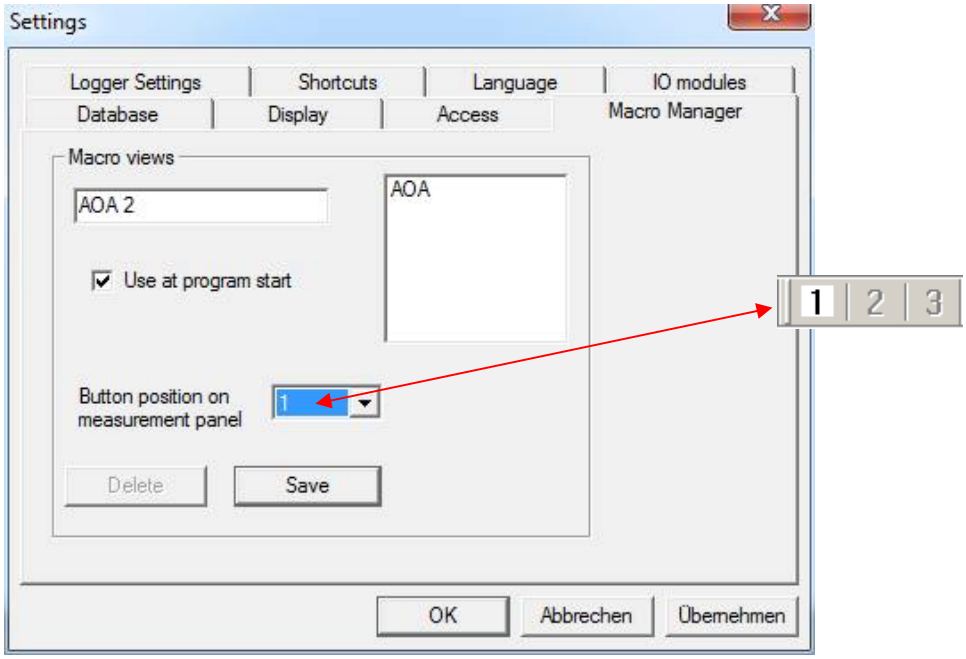
The bbe++ software is able to control different types bbe instruments, but only one type at one time. The type of instrument is entered here. Various settings within the bbe++ software can only be made for the default type instrument. To make entries for an other type of instrument, the default type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

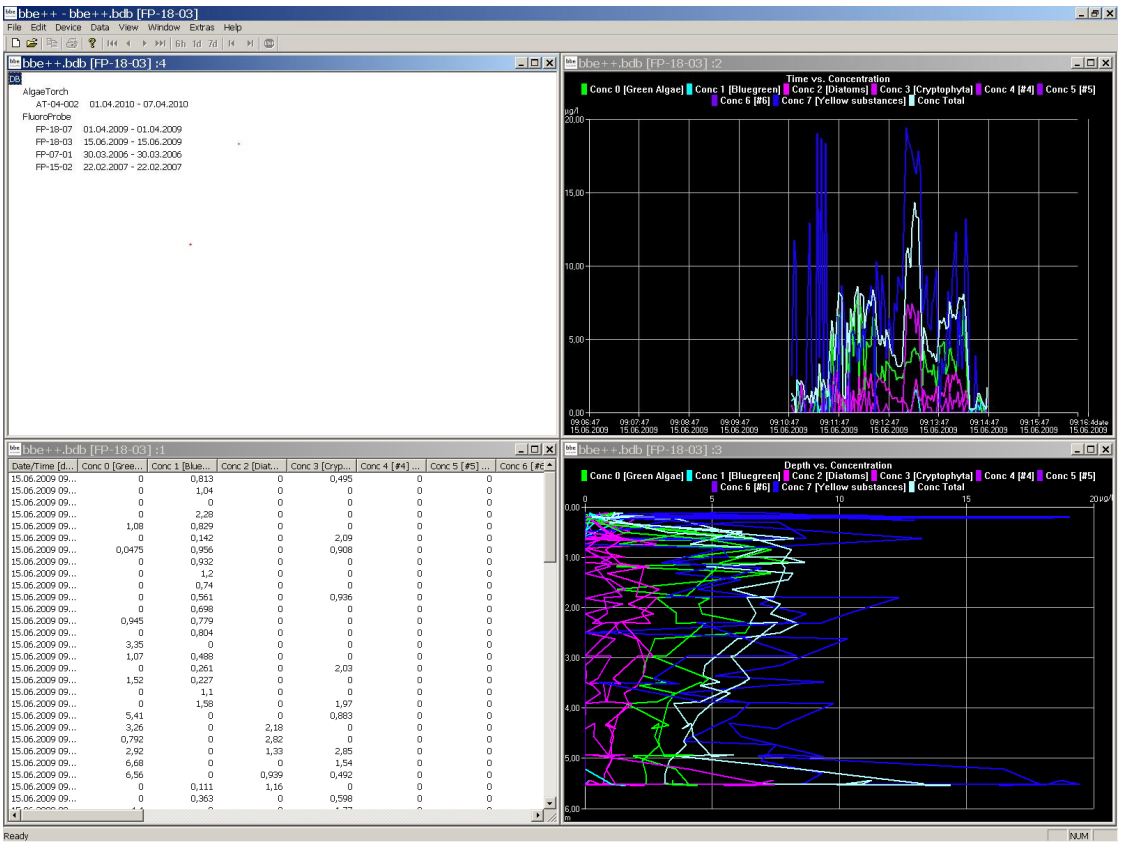
MACRO MANAGER

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++.



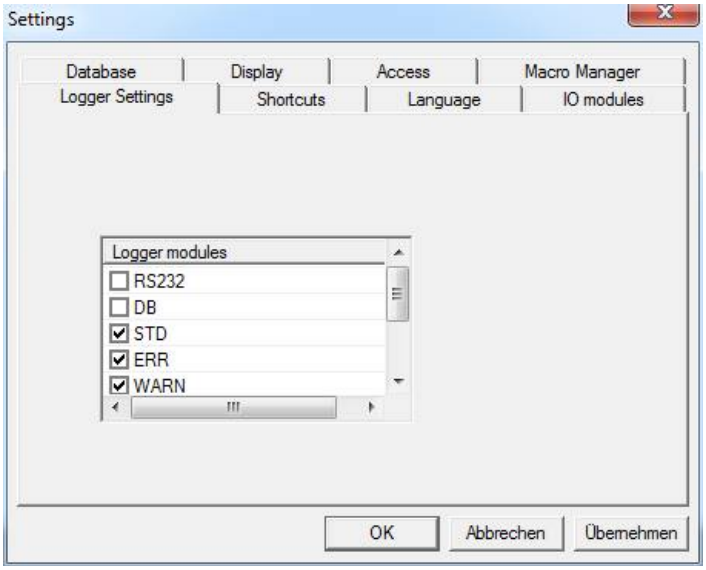
To generate a new view macro:

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



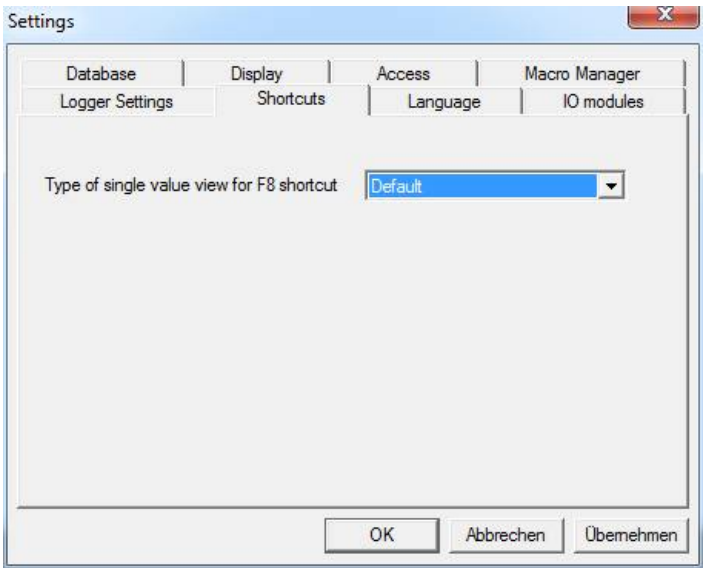
LOGGER SETTINGS

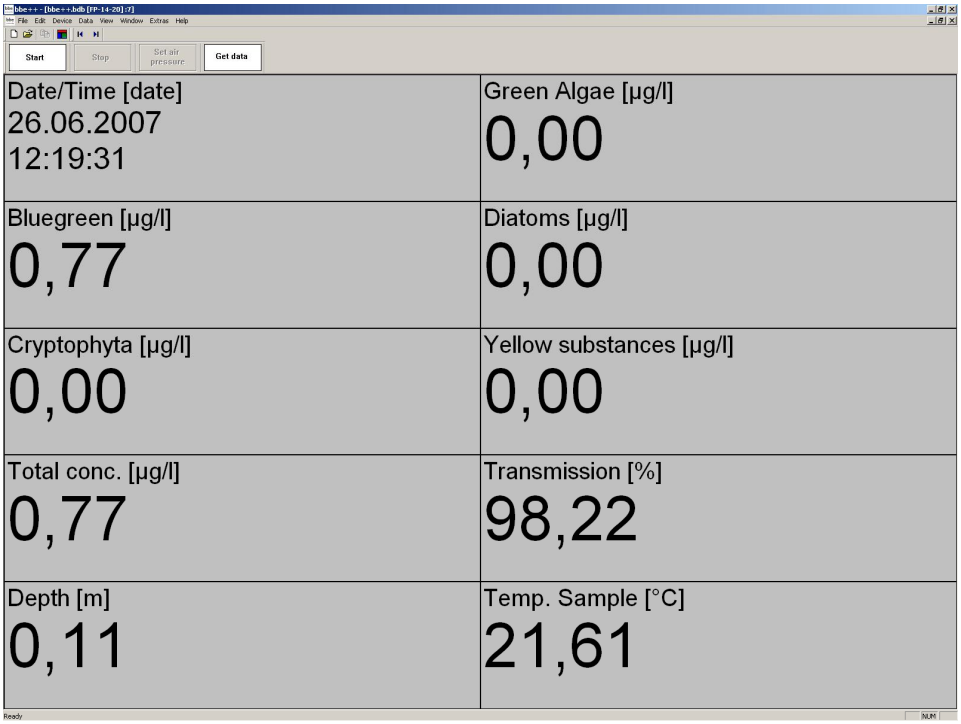
The logger settings are used in case of problems with the bbe++ software. Please ask the bbe service for advice.
Depending on the checked options more or less information is stored in the file “error.log” in the program folder of bbe++ software.



SHORTCUTS

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

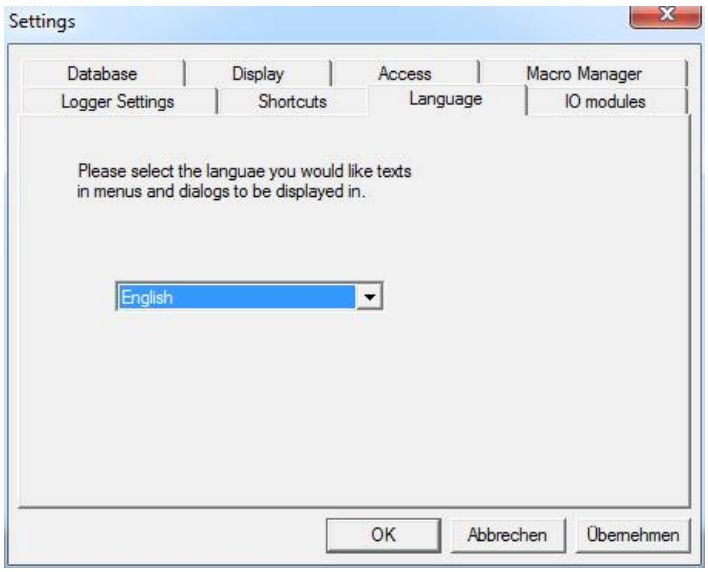




F8 shows the selected macro

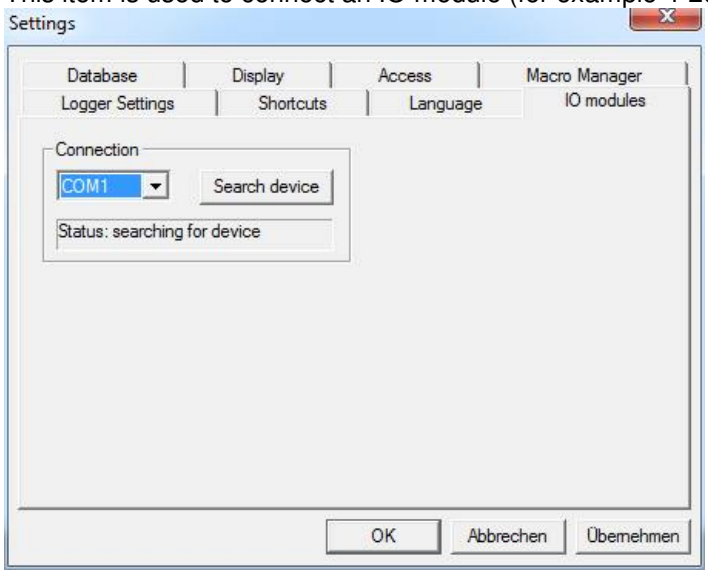
LANGUAGE

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.

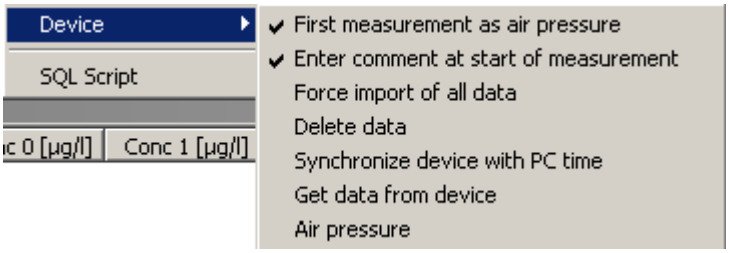
Device

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

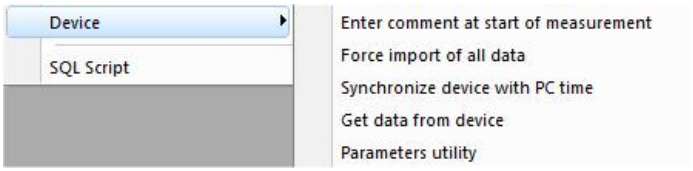
DEMOMODE

To switch the bbe++ software to the demo mode select FluoroProbe (Tools -> Settings -> Access) and disconnect all instruments. Click on "DEMO mode" in the device submenu. Now, the software can be operated as if a FluoroProbe 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 FluoroProbe entries:



ALGAETORCH / BENTHOTORCH SUBMENU



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 FluoroProbe are imported. Datasets already in the database are skipped.

Synchronize device with PC time

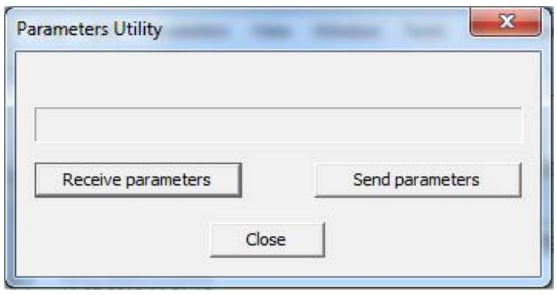
To set the clock of the FluoroProbe, synchronise it with the clock of the PC by activating “Synchronize with PC”.

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.

Parameters utility

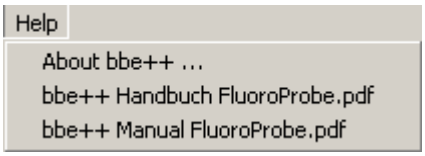
Receiving the complete parameters set from the AlgaeTorch / BenthoTorch and sending a Parameters file to the instrument. This is supplied by the bbe service in most of the cases.



SQL Script

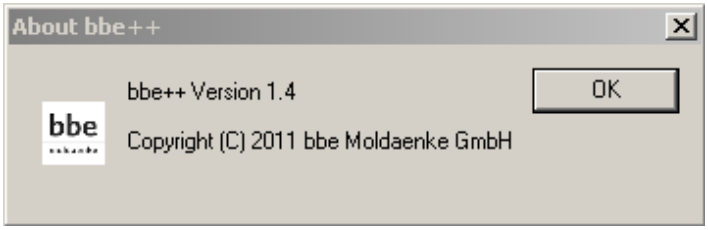
This function can be used to run an SQL script on the database to reorganise it or to do some special calculations. The SQL script is provided by bbe Moldaenke as the case arises.

HELP



About …

Displays the start-up screen.



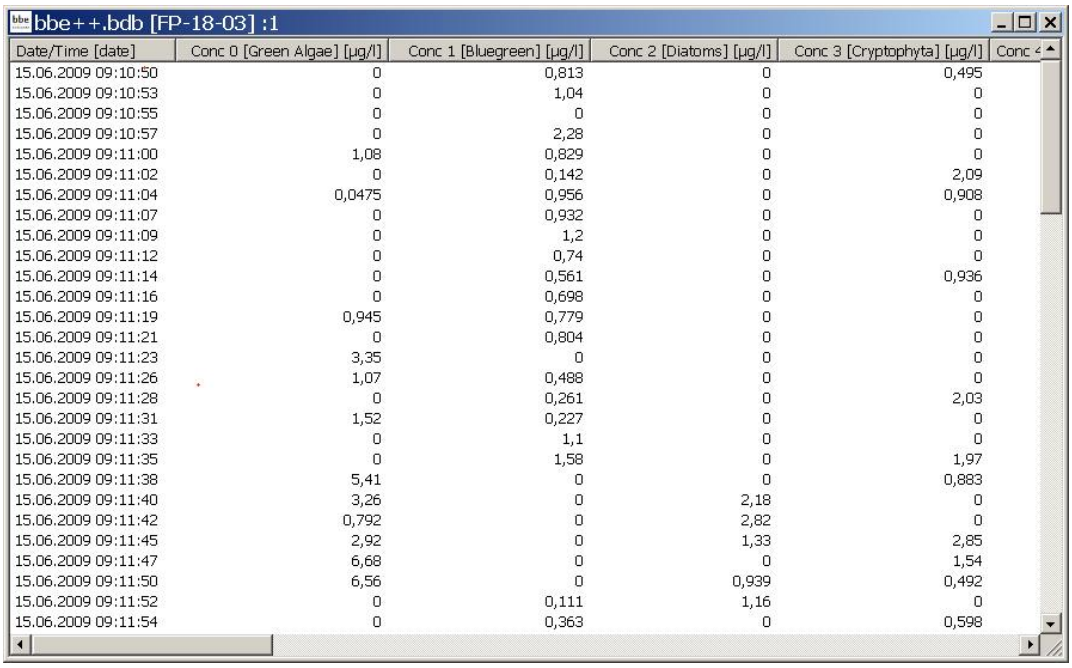
bbe++ manuals …

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.

The Views

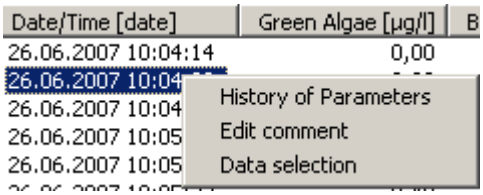
TABLE VIEWS

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



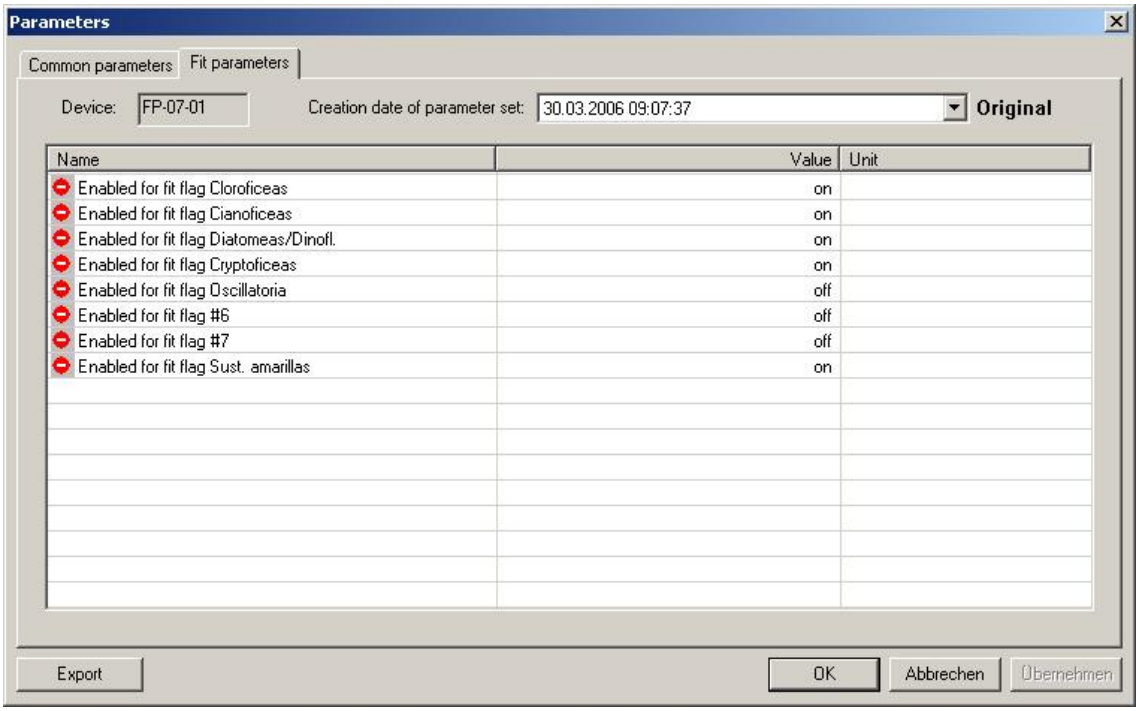
Date/Time [date]	Conc 0 [Green Algae] [µg/l]	Conc 1 [Bluegreen] [µg/l]	Conc 2 [Diatoms] [µg/l]	Conc 3 [Cryptophyta] [µg/l]	Conc 4
15.06.2009 09:10:50	0	0,813	0	0,495	
15.06.2009 09:10:53	0	1,04	0	0	
15.06.2009 09:10:55	0	0	0	0	
15.06.2009 09:10:57	0	2,28	0	0	
15.06.2009 09:11:00	1,08	0,829	0	0	
15.06.2009 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.



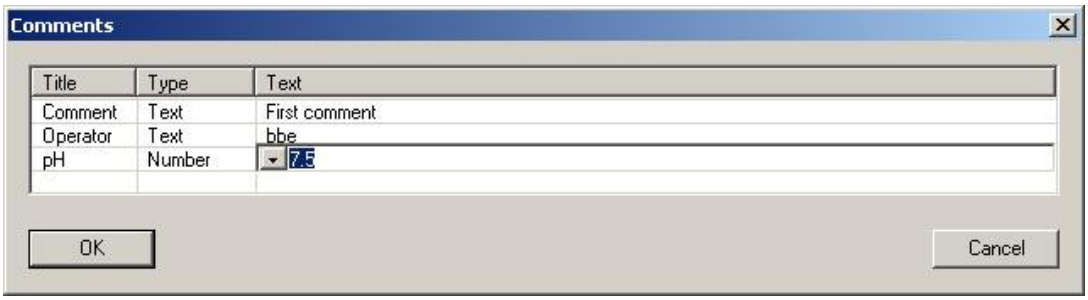
History of Parameters

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



Edit comment

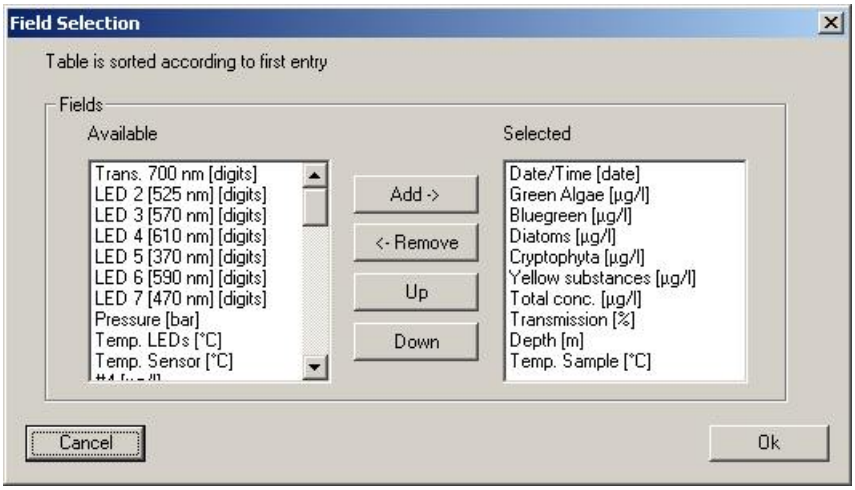
EDIT COMMENTS allows the user to change the comments of a specific data set retrospectively.



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

Data selection

To add or remove columns from the list view use “Data 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 [µg/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 [µg/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 [µg/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

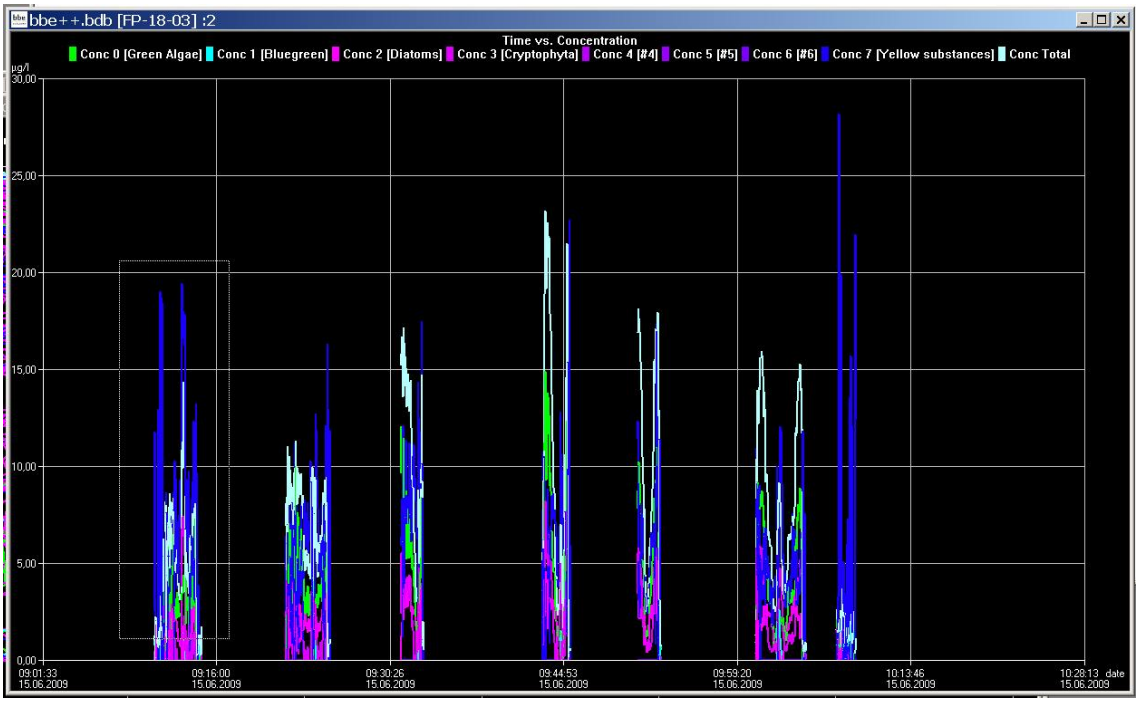
XY GRAPH VIEWS

Features of the XY graph view:

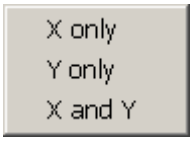
9. Select data of interest
10. Scaling of the axes (right click)
11. Display of the corresponding parameters (right click)
12. Editing a XY view, to change colours the type of graph.
13. Navigation within the data

Select data of interest

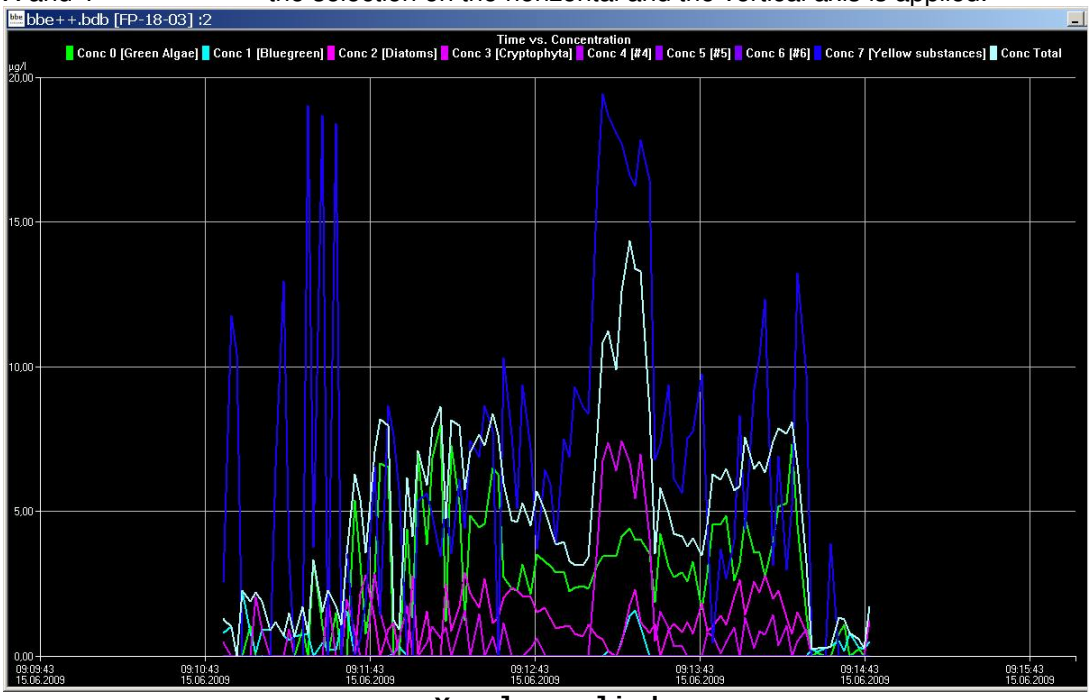
Please click and draw the mouse to select the required data.



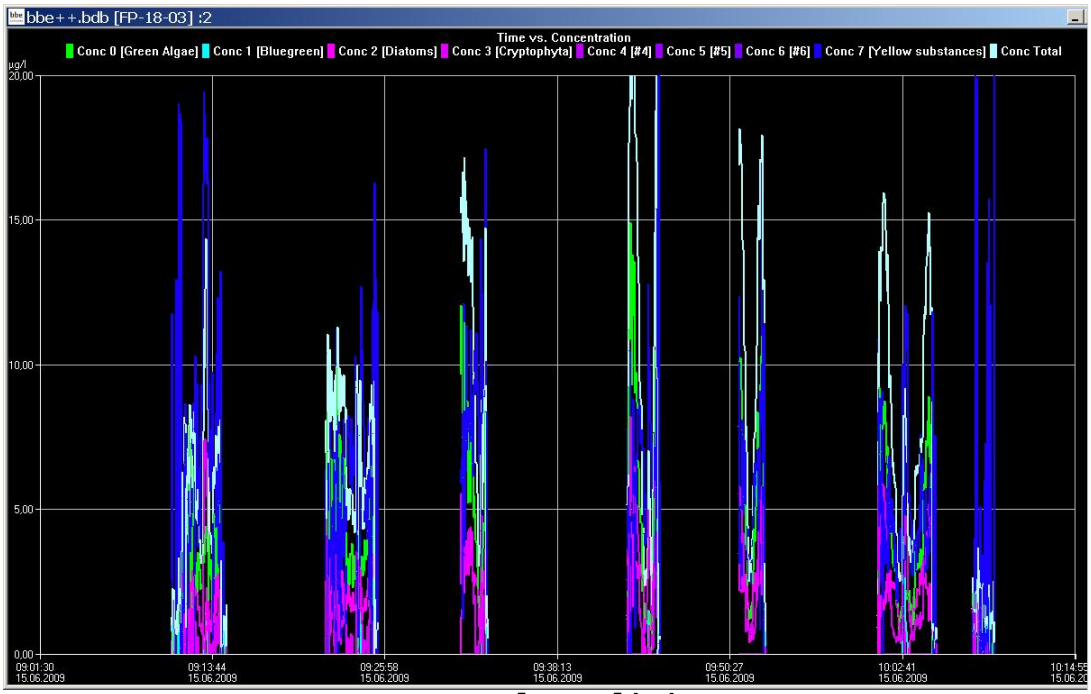
A pop-up window is shown to choose the axis to which the selection is to be applied.



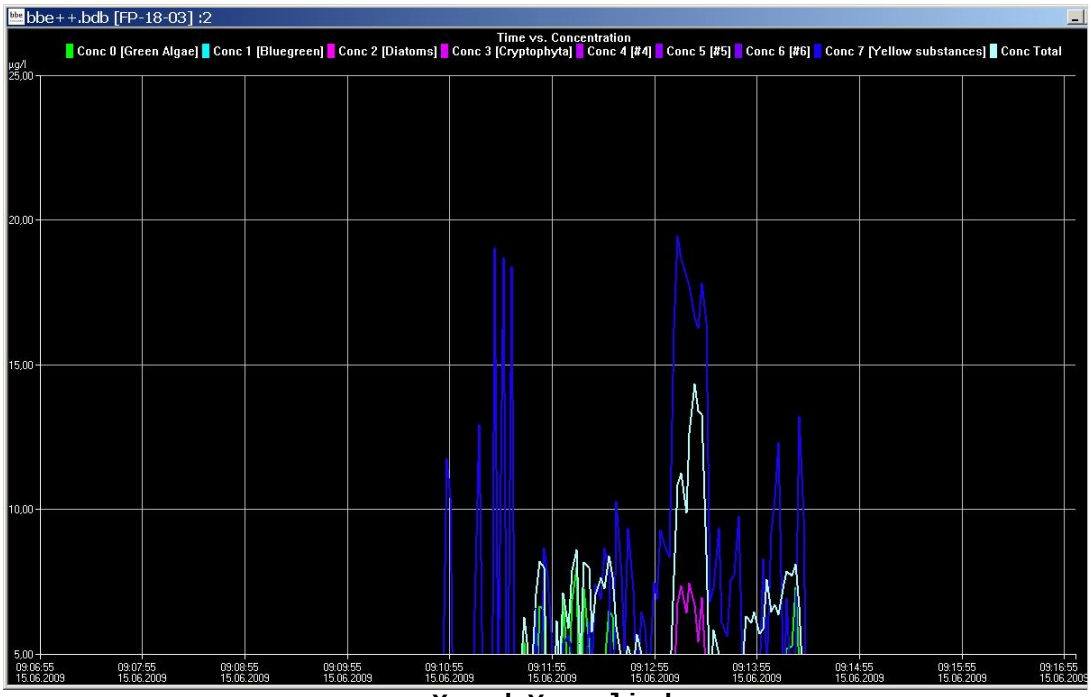
X only	only the selection on the horizontal axis is applied.
Y only	only the selection on the vertical axis is applied.
X and Y	the selection on the horizontal and the vertical axis is applied.



X only applied

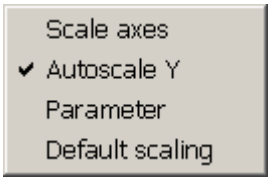


Y only applied



X and Y applied

Right-click menu

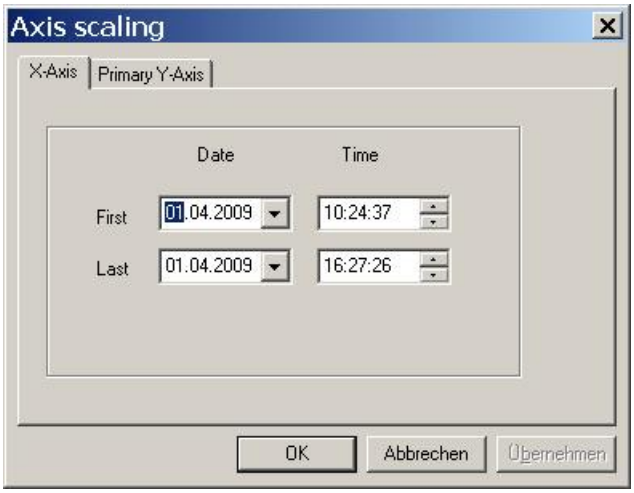


Features:

- 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

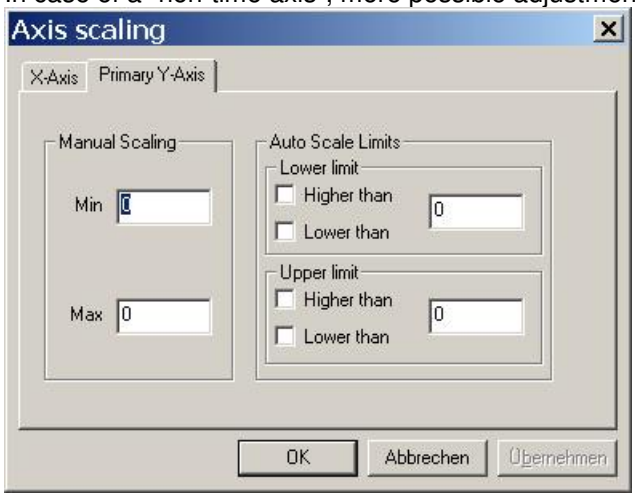
By default, scaling is done automatically. This means, all datasets of the selected period are displayed. To have a closer look at the data, it is sometimes useful to change the scaling. In the right-click menu, there is a “Scale axis” option:
In case of a time axis, the scaling tab of this axis is as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

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 outliners with low values and
upper limit: lower than for outliners 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

Access Level	Name	Dimension	Meaning
User	Serial number		Serial number of the hardware
User	Software version (major)		
User	Software version (minor)		
User	LED warmup time	s	Time to warm up the LEDs before a measurement takes place
User	Measurement time	s	Duration of one measurement
User	Measurement interval	s	
User	Cellcountmode		Switches between “µg Chl A/l” and “cells/l”
	Display brightness| TRENNER |%		
	Display contrast| TRENNER |digits		
	Daylight saving| TRENNER |		
	UTC time shift| TRENNER |min		
	Use GPS| TRENNER |		
	GPS minimum accuracy| TRENNER |%		
	Use GPS| TRENNER |		
Service	Wavelength LED0	nm	For information only
Service	Wavelength LED1	nm	For information only
Service	Wavelength LED2	nm	For information only
Service	Wavelength LED3	nm	For information only
Service	Measuring type		Switches between single, continuous and interval measurement
Service	Fingerprint LED 0 Cyanos	digits/µg/cm²	Result of the calibration of cyanos
Service	Fingerprint LED 1 Cyanos	digits/µg/cm²	Result of the calibration of cyanos
Service	Fingerprint LED 2 Cyanos	digits/µg/cm²	Result of the calibration of cyanos
Service	Fingerprint LED 3 Cyanos	digits/µg/cm²	Result of the calibration of cyanos
Service	Fingerprint LED 0 green algae	digits/µg/cm²	Result of the calibration of green algae
Service	Fingerprint LED 1 green algae	digits/µg/cm²	Result of the calibration of green algae
Service	Fingerprint LED 2 green algae	digits/µg/cm²	Result of the calibration of green algae
Service	Fingerprint LED 3 green algae	digits/µg/cm²	Result of the calibration of green algae
Service	Fingerprint LED 0 Diatoms	digits/µg/cm²	Result of the calibration of Diatoms
Service	Fingerprint LED 1 Diatoms	digits/µg/cm²	Result of the calibration of Diatoms
Service	Fingerprint LED 2 Diatoms	digits/µg/cm²	Result of the calibration of Diatoms
Service	Fingerprint LED 3 Diatoms	digits/µg/cm²	Result of the calibration of Diatoms
Service	Offset LED 0	digits	Signal of pure water
Service	Offset LED 1	digits	Signal of pure water
Service	Offset LED 2	digits	Signal of pure water
Service	Offset LED 3	digits	Signal of pure water
Service	Cellcount factor Cyanos	cells/µg/cm²	Factor to convert µg/l in cells /l
Service	Cellcount factor green algae	cells/µg/cm²	Factor to convert µg/l in cells /l
Service	Cellcount factor Diatoms	cells/µg/cm²	Factor to convert µg/l in cells /l
Service	Global correction factor	1/100	Factor to adapt the results to a local reference method
	Time to Auto Power-Downminutes		

Expert	req. val. LED 0 [nm]	digits	For brightness control
Expert	req. val. LED 1 [nm]	digits	For brightness control
Expert	req. val. LED 2 [nm]	digits	For brightness control
Expert	req. val. LED 3 [nm]	digits	For brightness control
Expert	Name algae class 0		
Expert	Name algae class 1		
Expert	Name algae class 2		

The GPS module

THE GPS MODULE OF THE BBE ALGAETORCH AND BBE BENTHOTORCH

GENERAL REMARKS

The bbe AlgaeTorch and bbe BenthoTorch are equipped with a GPS module that allows the user to determine the position of each measurement. The position data are stored additionally with each dataset within the instrument.

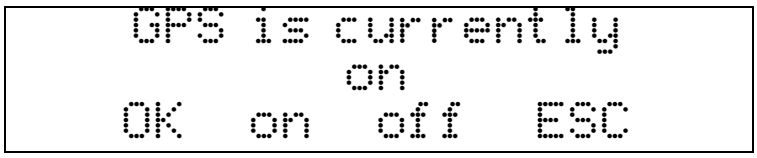
For data evaluation, the results can be read from the instruments display or transferred to the bbe++ PC software. bbe++ offers an export of the data to Google Earth to display the chlorophyll results on a map.

The GPS module is made for outdoor operation. Within buildings, the satellite signals cannot be detected. For this case, the GPS module can be deactivated.

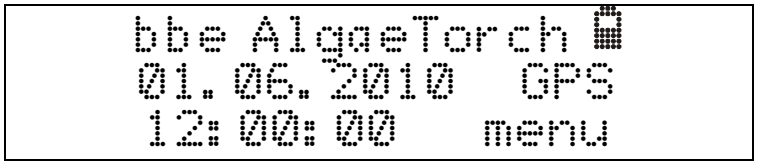
Please note:
After starting the Algae- or BenthoTorch especially after a longer time or after transporting the instrument, it takes some minutes to obtain the correct position.

ACTVATING AND DEACTIVATING

To deactivate the GPS module (it is activated by default), go to “Settings -> GPS -> GPS mode”, to deactivate the GPS.

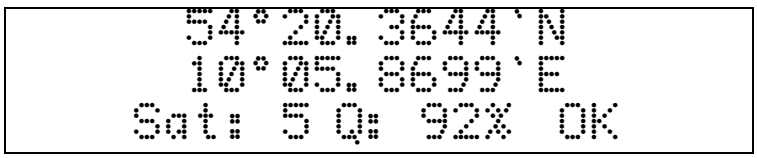


If the GPS is activated and the position has been found, this is indicated on the display:



POSITION (SETTINGS -> GPS -> POSITION)

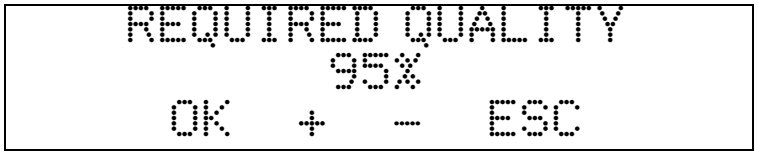
This screen is only available if the signal quality is sufficient.



Sat: Shows the number of satellites from which the GPS module receives signals.
Quality: Shows the quality and hence the precision of the position.

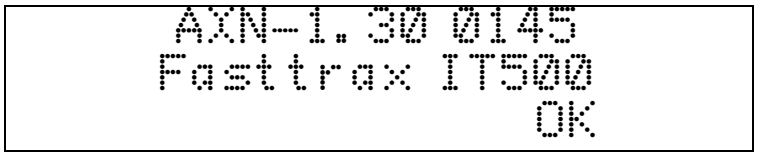
REQUIRED QUALITY (SETTINGS -> GPS -> REQUIRED QUALITY)

The quality of the GPS signal is so much the better the more satellites are available and the better the satellites are distributed. The quality is calculated. The required quality is the quality of the GPS signal that leads to an instant automatic start of the measurement. If the quality is insufficient, the GPS measurement can be skipped.



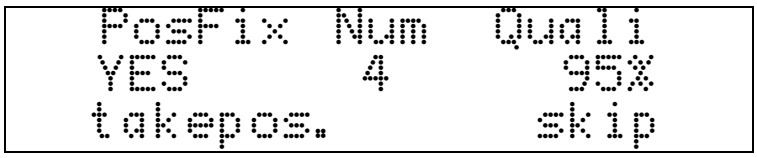
95% is the standard quality value.

VERSION (SETTINGS -> GPS -> VERSION)



STARTING THE MEASUREMENT

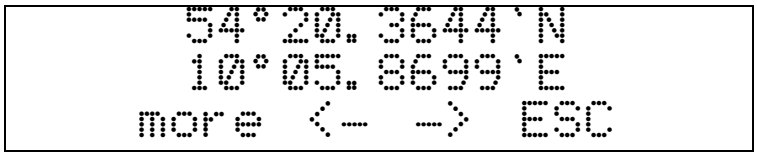
If the GPS module activated, the status of the GPS signal is shown after starting the measurement. If the given quality criteria are met, the measurement starts automatically, otherwise, the poor positioning information can be used (takepos) or the GPS information can be skipped.



In case there is no GPS signal e.g. within buildings, only “skip” is available.

DATA EVALUATION WITHIN THE TORCH:

To view the measured data go to “Data -> View”:
The display shows the date and time of the latest result. Touch “more” as long as longitude / latitude can be read:



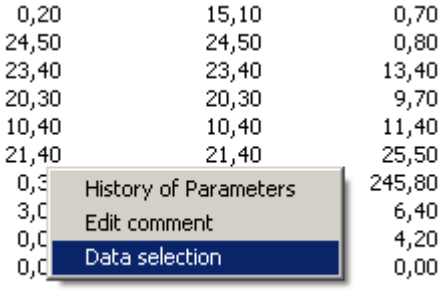
DATA EVALUATION WITHIN BBE++

After importing the data to bbe++ go to “Window -> New list window -> Default” to display results and position:

bbe++.bdb [AT-04-033] :1

Date/Time [date]	Cyano [µg/l]	Total Conc. [µg/l]	Turbidity [FTU]	Longitude [°]	Latitude [°]
20.12.2010 08:54:43	6,40	10,70	6,00	--	--
20.12.2010 09:23:55	-2708,00	-8,00	4261,70	--	--
20.12.2010 09:24:37	-2044,00	-3,00	4245,30	--	--
20.12.2010 09:25:38	-3077,00	-1,00	4196,20	--	--
20.12.2010 09:26:40	2010,40	-178,00	4118,80	--	--
20.12.2010 09:27:18	-1491,00	-3,00	4135,10	--	--
20.12.2010 09:31:36	6,70	11,30	11,40	--	--
20.12.2010 09:33:48	0,00	0,00	1,00	--	--
20.12.2010 09:37:59	0,00	5,30	1,30	--	--
20.12.2010 09:38:18	0,00	5,20	2,60	--	--
20.12.2010 09:38:37	0,00	5,60	2,10	--	--
20.12.2010 09:42:55	0,00	14,50	2,80	--	--
20.12.2010 09:43:14	0,00	14,10	3,10	--	--
20.12.2010 09:43:33	0,10	14,70	0,70	--	--
20.12.2010 09:48:36	22,70	22,80	1,70	--	--
20.12.2010 09:48:55	23,10	23,10	0,30	--	--
20.12.2010 09:49:14	22,60	22,70	1,00	--	--
20.12.2010 09:49:31	23,40	23,40	0,00	--	--
20.12.2010 10:14:45	24,60	24,60	1,10	--	--
20.12.2010 10:15:04	24,60	24,60	1,80	--	--
20.12.2010 10:15:23	0,30	15,40	1,20	--	--
20.12.2010 10:15:42	0,30	15,40	0,90	--	--
20.12.2010 10:16:01	0,20	15,10	0,70	--	--
20.12.2010 10:16:20	24,50	24,50	0,80	--	--
20.12.2010 10:18:51	23,40	23,40	13,40	10,097515	54,338005
20.12.2010 10:19:21	20,30	20,30	9,70	10,097541	54,337993
20.12.2010 14:32:57	10,40	10,40	11,40	--	--
20.12.2010 14:34:33	21,40	21,40	25,50	10,097478	54,338200
20.12.2010 15:02:41	0,30	0,40	245,80	10,097188	54,338271
20.12.2010 15:04:33	3,00	3,00	6,40	10,097101	54,338401
20.12.2010 15:05:25	0,00	0,00	4,20	10,097105	54,338140
20.12.2010 15:06:43	0,00	0,00	0,00	10,097833	54,339408

If the longitude / latitude columns are not available, use the right mouse button “-> Data selection” to add these columns.

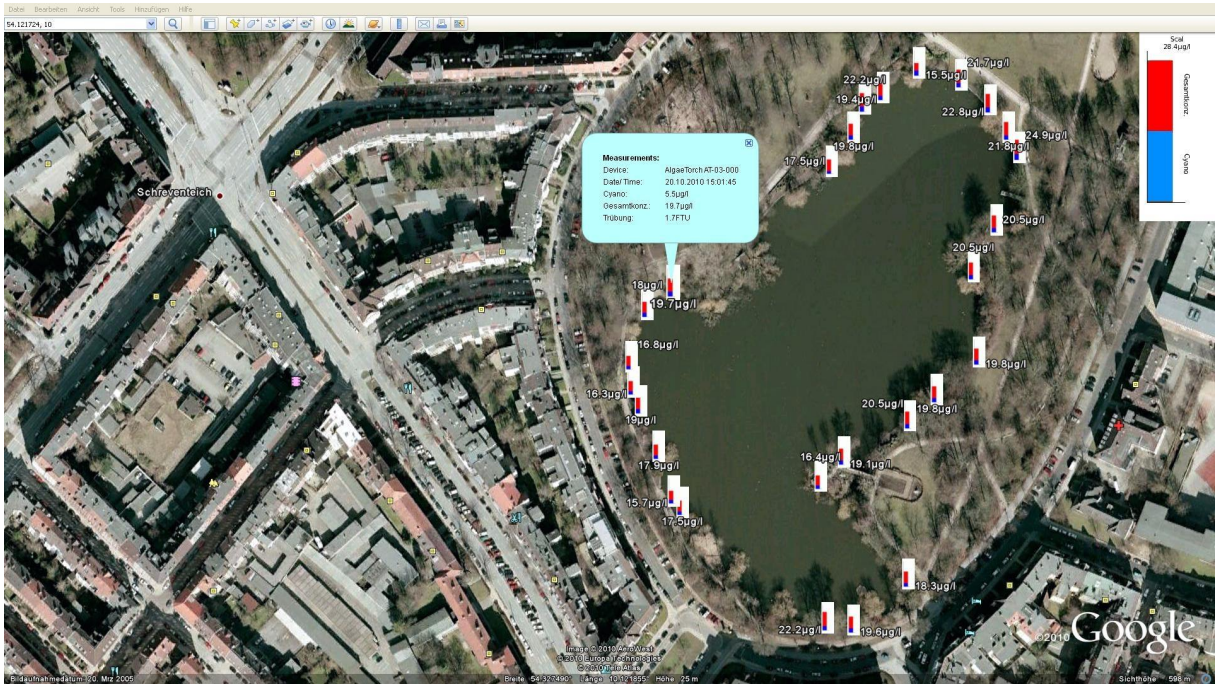


DATA EXPORT TO GOOGLE EARTH

To display the data with Google Earth, execute the following steps:

- Activate the GPS measurement within the Algae/BenthoTorch
- Conduct the measurements
- Transfer the data to bbe++ on your PC
- Select the data you want to display
- Go to File -> Export (KMZ) and create a KMZ file
- Download and install Google Earth (http://www.google.de/intl/en/earth/index.html)
- Go to File -> Open within Google Earth and open your *.KMZ to display it

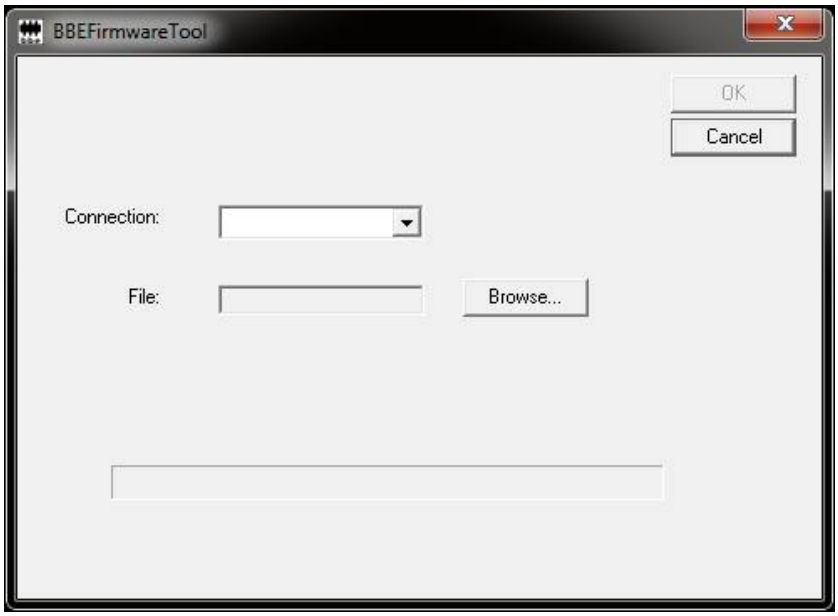
Example of data display using Google Earth:


Measurements:
Device: AlgaeTorch AT-03-000
Date/ Time: 20.10.2010 15:01:45
Cyano: 5.5µg/l
Gesamtkonz.: 19.7µg/l
Trübung: 1.7FTU
Schreventeich
Google

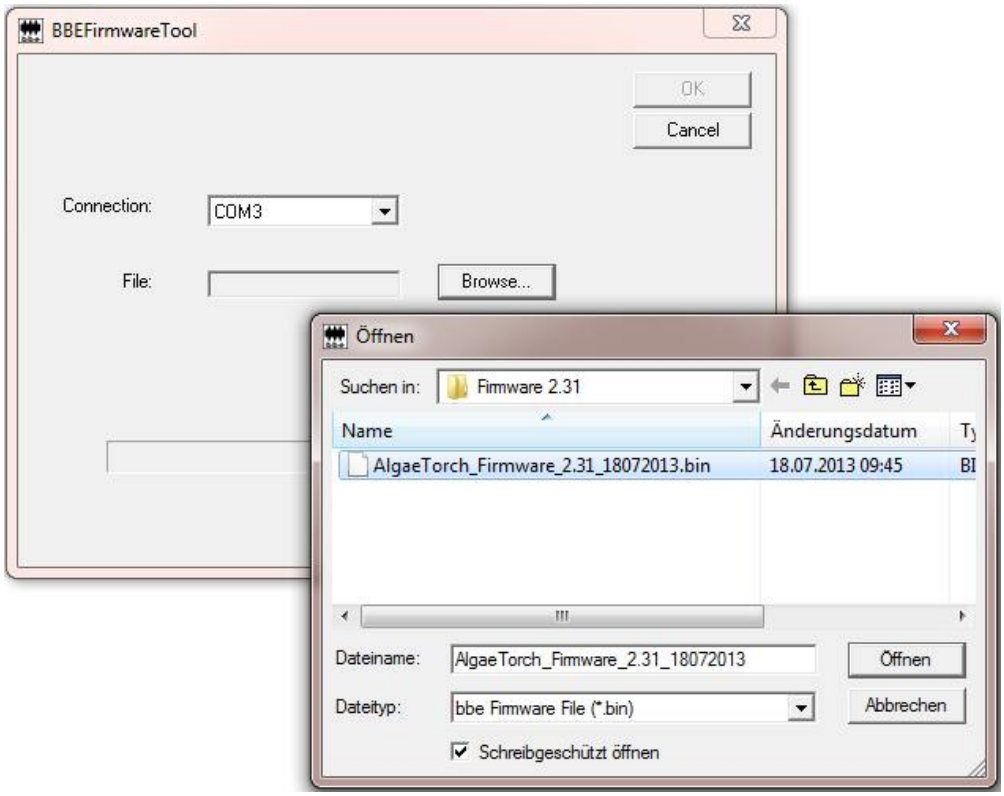
Update of the firmware

To update the internal software,the following steps are necessary:

1. Get the Software “BBEFirmwareTool.exe” from bbe service
2. Get the latest firmware version from bbe service
3. Charge the AlgaeTorch resp. BenthoTorch
4. Connect the AlgaeTorch/BenthoTorch to a PC
5. Start BBEFirmwareTool.exe:



6. Choose the COMport
7. Select the firmware update file from your PC



8. Click OK. The software starts checking the device, its current software version and the status of the internal battery. If everything is fine, the firmware update starts. Afterwards the AlgaeTorch/BenthoTorch reboots.
9. The version of the current firmware can be checked at the device display in the settings menu (Settings -> SW version).

Troubleshooting

Instrument Does Not Start

- rechargeable battery is empty
- power supply is not connected
- timing problem when turning the BenthoTorch. Try again a bit more slowly or quickly. Use the magnetic switch, if available.

Results vary

- Replicate and average the measurements on one stone to reduce the effects of patchiness.

ROYAL Eijkelkamp
Meet the difference

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Data and Tables

Technical Data

Measurands	concentration of green algae [µg Chl-a/cm^2], concentration of cyanobacteria [µg Chl-a/cm^2], concentration of diatoms [µg Chl-a/cm^2], GPS co-ordinates
Measuring range	0 - 15 µg Chl-a/cm²
Resolution	0.1 µg Chl-a/cm²
Weight	1.3 kg
Size (H x ∅)	530 x 60mm
Power supply	110/230 V – 50/60 Hz – 12 V DC
Power input	10 W
Protection class	IP 68
Depth range	10 m
Temperature range (working)	-2 - 35°C
Temperature range (storage)	0 - 50°C
Interface	USB data port
Data capacity	1000 datasets
Accessories	hard plastic carrying case, mains unit, manual, software, hand loop
Options	telescopic rod, nylon shoulder bag, SDI-12 with bbe converter

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