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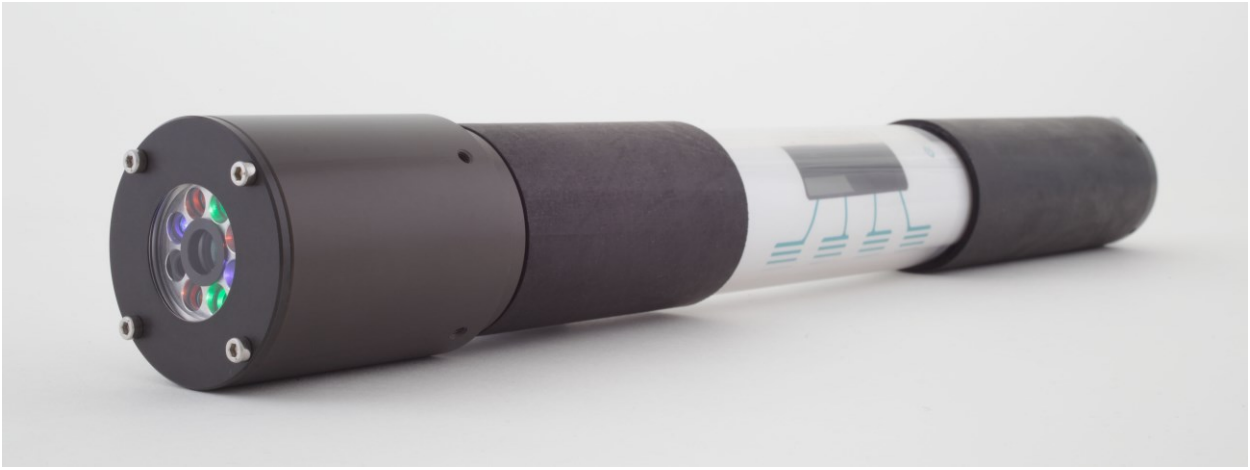
bbe

AlgaeTorch

User Manual

Version 2.12 E1, October 2023



M-186501e

What's new

Firmware

Firmware V 1.0.3:
Integration of AlgaeTorch 100 pressure measurement

Firmware V 1.0.4:
Integration of cell counts and 2-point calibration

Firmware V 1.0.7:
Integration of 2-point turbidity calibration
Integration of correction factor

Firmware V 1.1.0:
Integration of interval measurement

Firmware V 2.1.0:
Integration of GPS

Hardware

Series 03 and up
Delivery of the AlgaeTorch with attachment for shallow water.

Series 04 and up
Integrated GPS module.

Series 04-040 and up
Magnetic switch to start the AlgaeTorch alternatively to the tilt action mechanism.

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.

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General Safety Precautions

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

Only instructed staff should operate this instrument.

Consult appropriate safety manual in case of using hazardous compounds and solutions. Wear gloves, coat and safety goggles.

Electrical connection of the instrument should only be carried out by trained staff.

The connector at the bbe AlgaeTorch (100m version) has to be supplied with grease periodically.

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.

Storage (longer periods)

Clean the instrument before storage.
Store the instrument dry and frost free.

NiMH-Cells show a certain amount of self-discharge. When you store your device for a period of several weeks without operation, please proceed as follows:

1. Generally charge the battery completely (e.g. over night) before you store the device.
2. Get the device out of the stock every two or three months (respectively once a year for devices Series 6 and higher) and:

   a. charge the battery for about 6 hours.
   b. discharge the battery by starting a continuous measurement - let the measurement run until the battery is empty and the device switches off automatically

   Note: only operate the device willingly until automatic switch off when you did the above mentioned firmware-has the following version (or higher):

   - 2.34 (for AlgaeTorch/BenthoTorch 1 = Series 1 to 5)

- 3.05 (for AlgaeTorch/BenthoTorch 2 = Series 6 and higher)

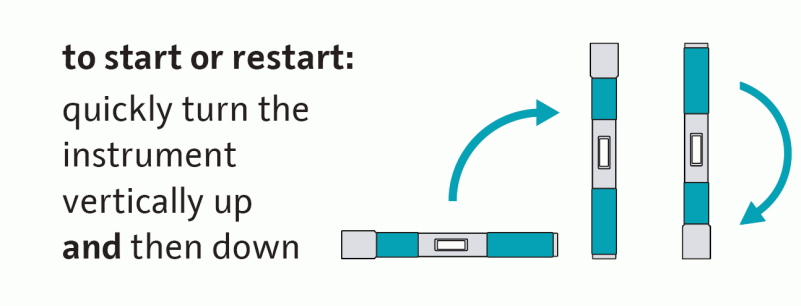
c. charge the battery completely before you store the device

Please note: After this procedure all earlier measuring results in the internal storage of the Torch will be overwritten! We recommend to download your results to a bbe++ database before doing the procedure above.

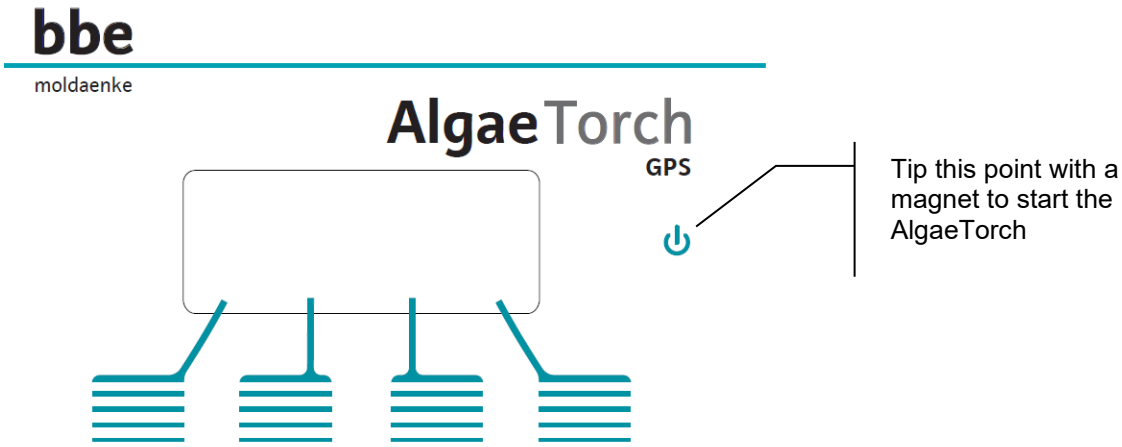
Quick start instructions

To use the AlgaeTorch instrument immediately, please refer to the following two pages. If more detailed information is required, please go to chapter ”Use of the AlgaeTorch”.

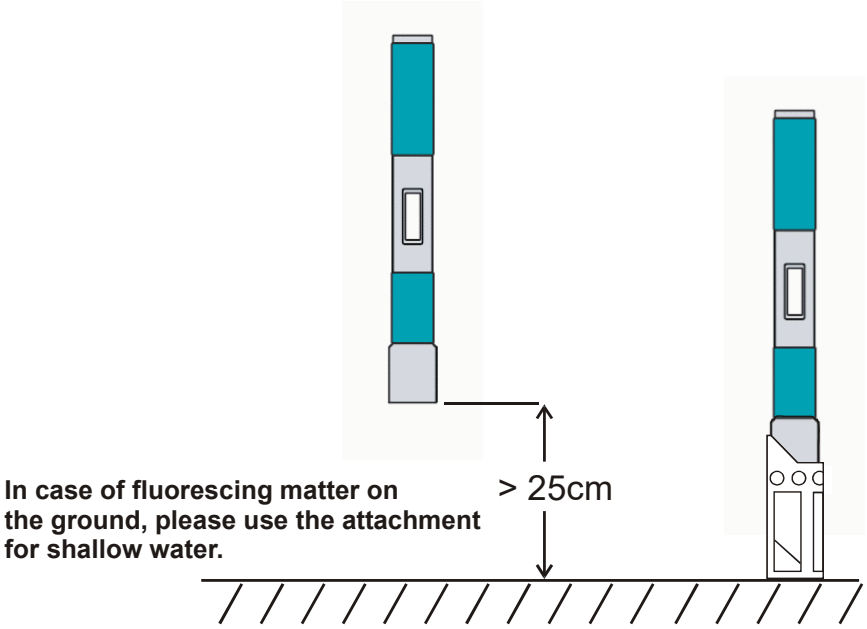
1. Charge the AlgaeTorch by using the power supply connected to the small cable housing of the USB cable.
2. Start the AlgaeTorch by turning it upside down and back again in one quick movement.



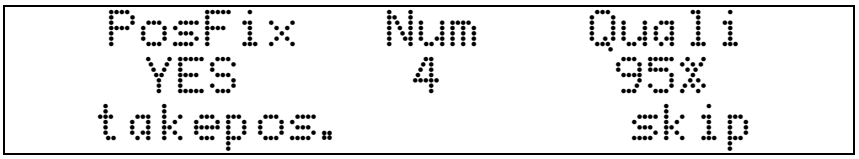
If the AlgaeTorch is equipped with a reed switch to switch it on with a magnet, a symbol is printed on the label of the AlgaeTorch. Please tip on the symbol with the magnet to switch the AlgaeTorch on. The magnetic switch can be used alternatively to the tilt mechanism (described above).



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. Dip the AlgaeTorch in the water. Ensure a sufficient distance from the water bed and that no fluorescent material such as leaves are nearby. This may influence the measurement. Please use the attachment for shallow water in this case. Move the AlgaeTorch slightly to avoid air bubbles at the front window. These air bubbles might influence the measuring results.
7. In the lab, please use the bbe calibration vessel.

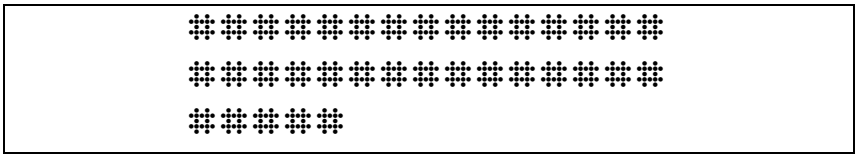


8. If there is an internal GPS module available and activated, the status of the GPS signal is shown. If the given quality criteria are met, the measurement starts automatically, otherwise, the poor positioning information can be used (takepos) or the GPS information can be skipped.

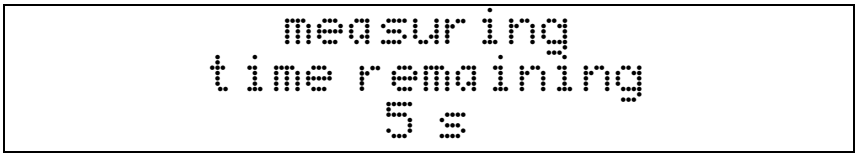


If there is no GPS signal e.g. within buildings, only “skip” is available.

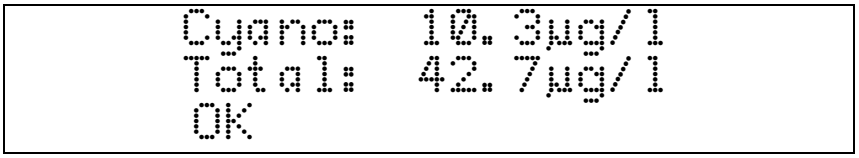
9. During the internal calibration a decreasing number of # is shown.



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:



Operating Principles and Design

Principles of Operation

FLUORESCENCE

The AlgaeTorch is a fluorometer made for quick and easy total chlorophyll and cyanobacteria measurements.

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

TURBIDITY

An additional LED is used optionally for turbidity measurements based on the reflected light of any particles in the water.

The turbidity measurement is based on backscattering. The calibration is done with Formazin.

The results are shown in FTU (Formazin turbidity units). This result is also used to perform a turbidity compensation of the chlorophyll measurement. Consequently, the chlorophyll measurement in turbid water is enhanced by the turbidity measurement.

GPS MODULE

The AlgaeTorch is equipped with a global positioning system module to determine the exact position of the measurement. In single-mode the longitude and latitude are stored together with the measurement results and

can be transferred to a PC for further evaluation. In interval- or continuous-mode the GPS data will not be stored in memory.

The bbe++ software contains a feature to export the data to a so-called *.KMZ file to display the data in Google Maps.

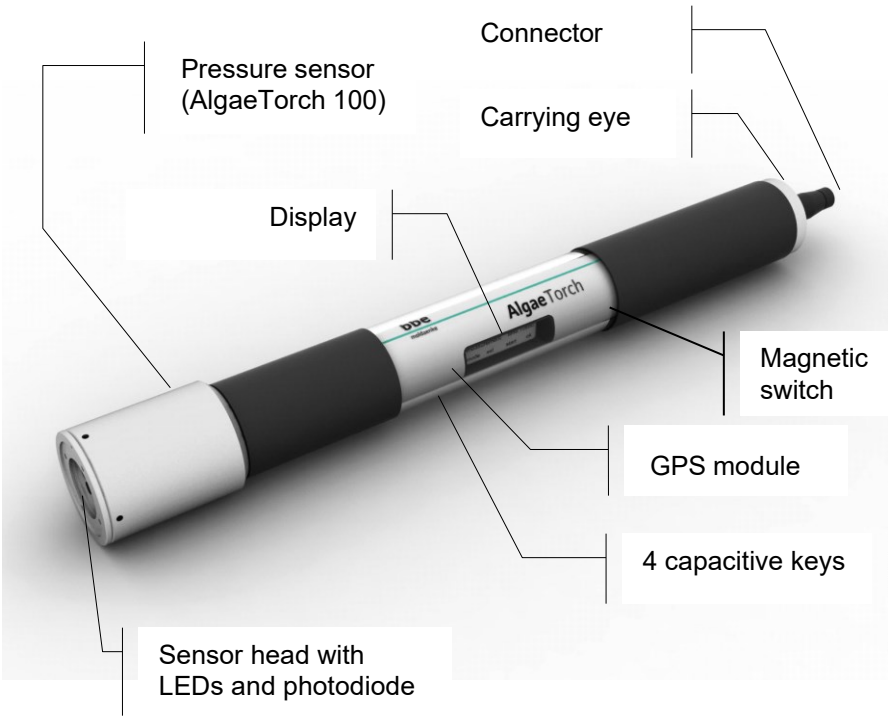
Design

MEASUREMENTS

- total chlorophyll
- cyanobacteria
- pressure sensor (AlgaeTorch 100)
- turbidity sensor

OPERATION

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



Versions

10 M VERSION

This version is made for use in shallow water. It is rated down to 10 m. **For underwater operation, please ensure that the cap of the connector is closed.** It is watertight as rated only in this configuration.

100 M VERSION

This version is made for use in shallow water and deeper water down to 100m. It is equipped with an underwater connector so that data can also be read out from below the surface. Additionally it is equipped with a pressure sensor.

ATTACHMENT FOR SHALLOW WATER

To prevent fluorescence readings influenced from benthic algae or seaweed the AlgaeTorch is delivered with an attachment for shallow water. Please use this attachment when measuring near the river or lake bed.

To fasten the shallow water attachment, please use a so-called knurled screw, which you will find in the accessories for the AlgaeTorch.

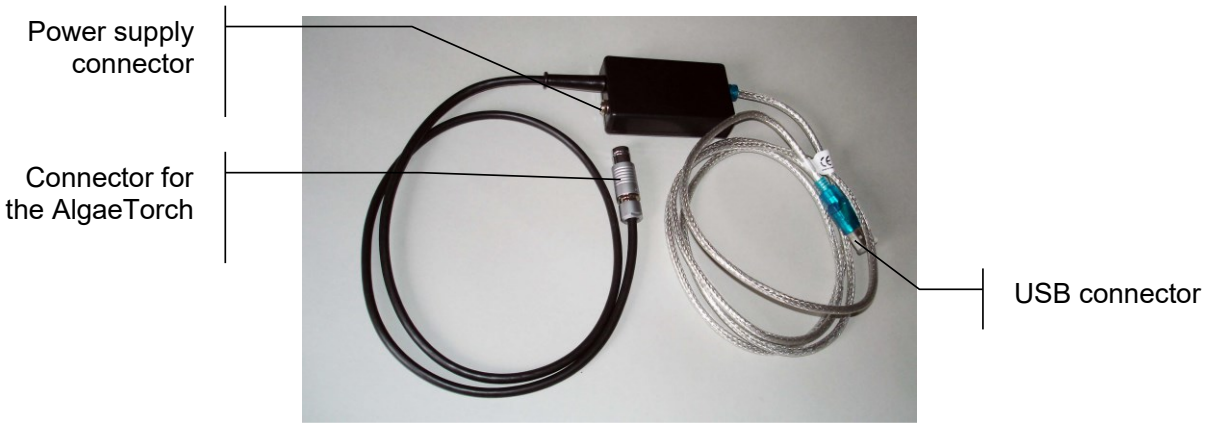
Use of the AlgaeTorch

Wrist strap or carrying cable/rope

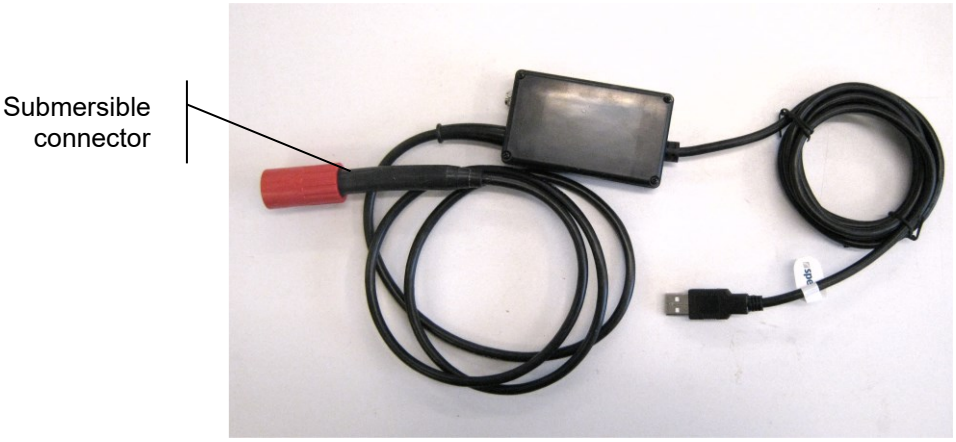
On top of the AlgaeTorch there is an eye to mount a wrist strap or carrying cable/rope.

USB connecting cable of the AlgaeTorch

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



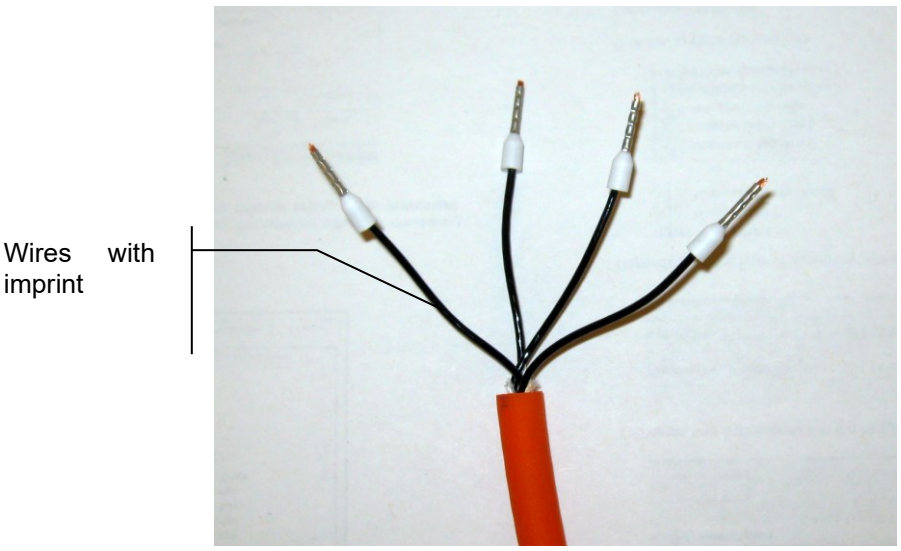
There are two versions available. One for the AlgaeTorch 10 equipped with a standard connector and one for the AlgaeTorch 100 equipped with a submersible connector.



RS232 / Modbus (RS232) connecting cables of the AlgaeTorch (option)

There are two types of RS232 cables available for the AlgaeTorch. One type is equipped with a standard RS232 connector to be used with a PC and one is delivered without a connector for stationary use.

The one without a connector is intended to be used together with a data logger. The numbers of the cables are printed on the black wires.



Number	Function
1	+ 12V
2	GND
3	RxD
4	TxD

Power supply of the AlgaeTorch

The AlgaeTorch comes with a power supply to charge the AlgaeTorch 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 AlgaeTorch with the power supply

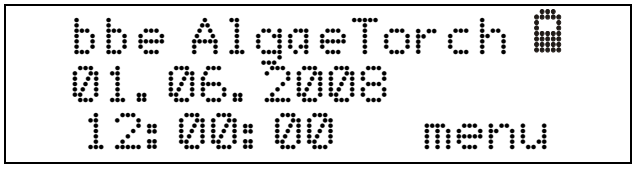
- Connect the small end of the cable to the box of the “connecting cable” of the AlgaeTorch.
- Connect the power supply to the mains.
- If the internal battery is not fully charged, charging will start (see below, page 17)

When using the power supply, the AlgaeTorch 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 AlgaeTorch with the power supply

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

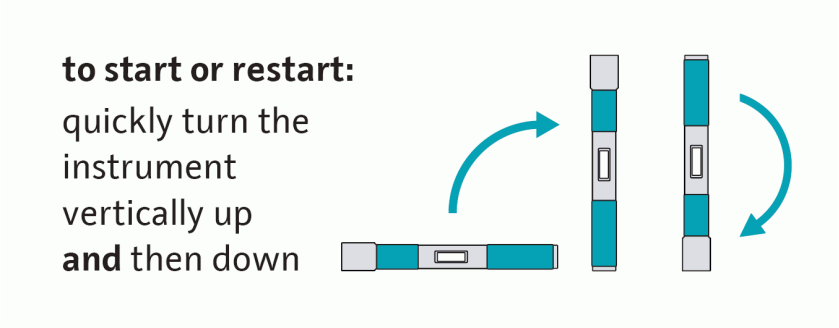
The AlgaeTorch will start up and show the charging process by moving bars in the battery symbol.



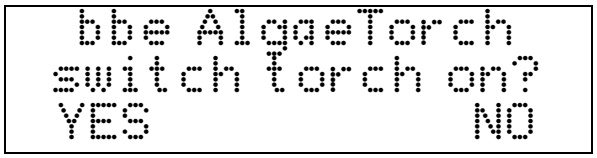
When the internal battery is charged completely, the battery symbol will be completely filled and it will stop moving.

Starting the AlgaeTorch

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

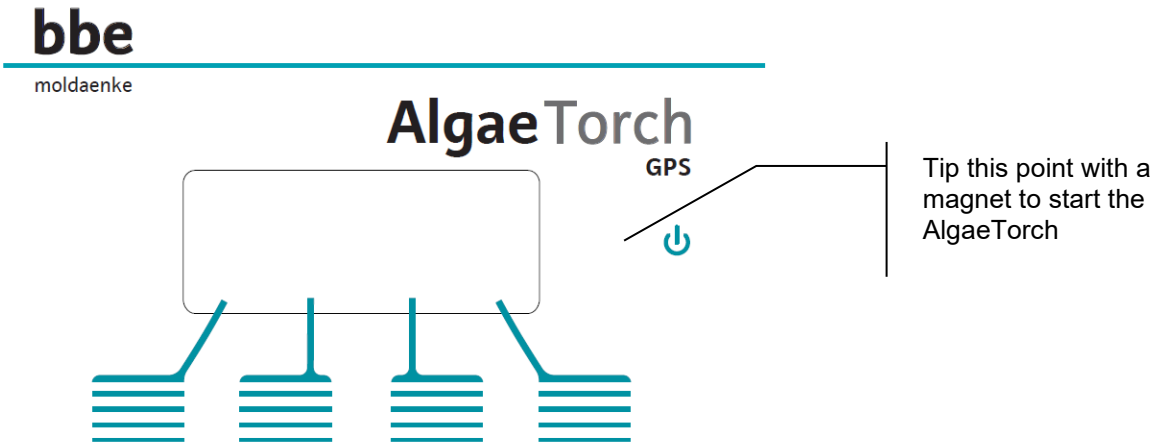


The AlgaeTorch then switches on. Please confirm the start of the instrument by touching the corresponding left key. Do not touch any key during the turning procedure.

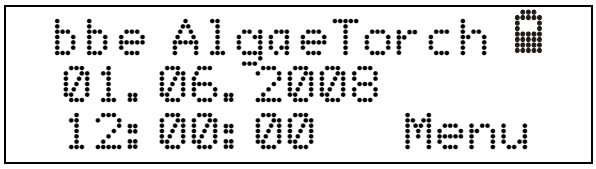


The confirmation is done in order to avoid unwanted starts, for example during transport.

If the AlgaeTorch is equipped with a reed switch to switch it on with a magnet, a symbol is printed on the label of the AlgaeTorch. Please tip on the symbol with the magnet to switch the AlgaeTorch on. The magnetic switch can be used alternatively to the tilt mechanism (described above).



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 AlgaeTorch 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 / Air Pressure Compensation

Three operation modes can be used with the AlgaeTorch.

- **Single mode:**
  after starting, one measurement is carried out. The end of the measurement is indicated by a vibration. Afterwards the result is displayed.
  In the case of the AlgaeTorch100 with integrated pressure sensor, an air pressure measurement is taken before the AlgaeTorch is submersed and the measurement starts. This is necessary since the air pressure influences the depths measurement.
- **Continuous mode:**
  The AlgaeTorch 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 AlgaeTorch” section.
  In the case of the AlgaeTorch100 with integrated pressure sensor, an air pressure measurement is taken before the first measurement starts. This is necessary since the air pressure influences the depths measurement. So please submerse the AlgaeTorch100 after the measurement has started.
- **Interval mode:**
  The AlgaeTorch operates continuously with the given parameters `Measuring Time` and `Interval`.
  If the interval is longer than the measuring time, the **AlgaeTorch 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 AlgaeTorch” section.
  In the case of the AlgaeTorch100 with integrated pressure sensor, an air pressure measurement is taken before the first measurement starts. This is necessary since the air pressure influences the depths measurement. So please submerse the AlgaeTorch100 after the measurement has started.

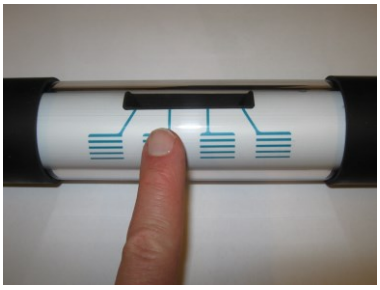
Operation of the AlgaeTorch by Capacitive Touch Keys

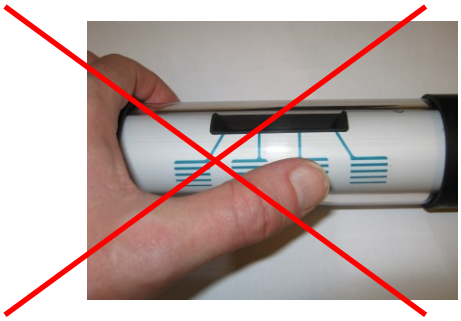
The AlgaeTorch is equipped with 4 capacitive keys with vibration feedback. The keys are located below the display. To actuate a key, just touch the marked area. The actuation is reconfirmed by the AlgaeTorch via a short palpable vibration.

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

The keys are calibrated during the start-up of the instrument. Please do not touch the keys during the switch-on procedure.

Please operate the touch keys as follows, in order to prevent the accidentally activation of 2 keys at the same time:



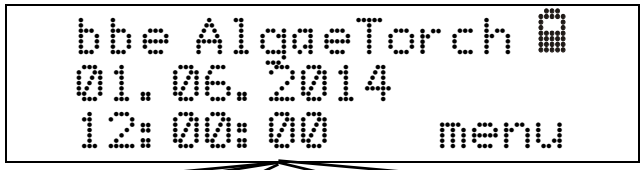


During submersion, the keys are deactivated. This is recognised by detecting more than one key pressed at the same time. The keys are reactivated when the keys are dry again.

Storing the AlgaeTorch

The best way to store the AlgaeTorch 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
Delete

Power-down

Settings

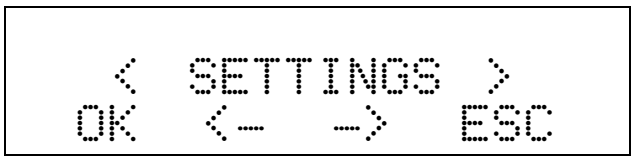
Mode
Measuring time
Measuring interval
..Auto Power off
Clock
Time
Date
Sync GPS time
UTC time shift
Dayli. saving
Display
Brightness
Contrast
Unit
GPS
Position
On/off
Req. Quality
Version
Serial protocol
Software version

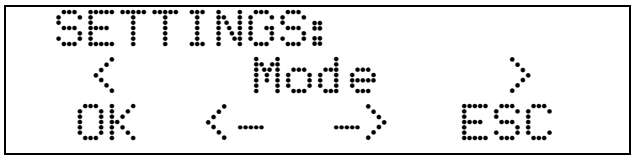
Calibration

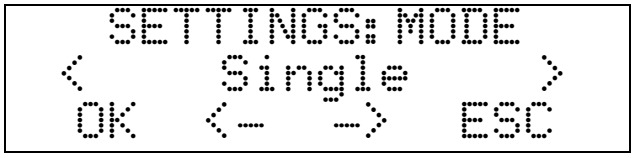
Offsets
Ultrafiltrated
Distilled
Fingerprints
Green algae (high / low)
Cyano (high / low)
Cell count factors
cyano/chlorophyll/others
..Dye
Set dye
Check dye
Turbidity
Slope (high / low)
offset
Pressure (option)
Show depth
Set air pressure
Set low point
Set high point
Voltage
Show
calibrate
Factory settings
Correction factor

NAVIGATION WITHIN THE SOFTWARE

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





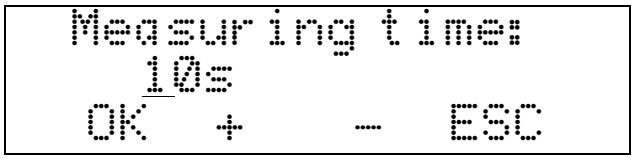


Functions of the keys:

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

ENTERING SETTINGS

To change the settings of the AlgaeTorch, 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.

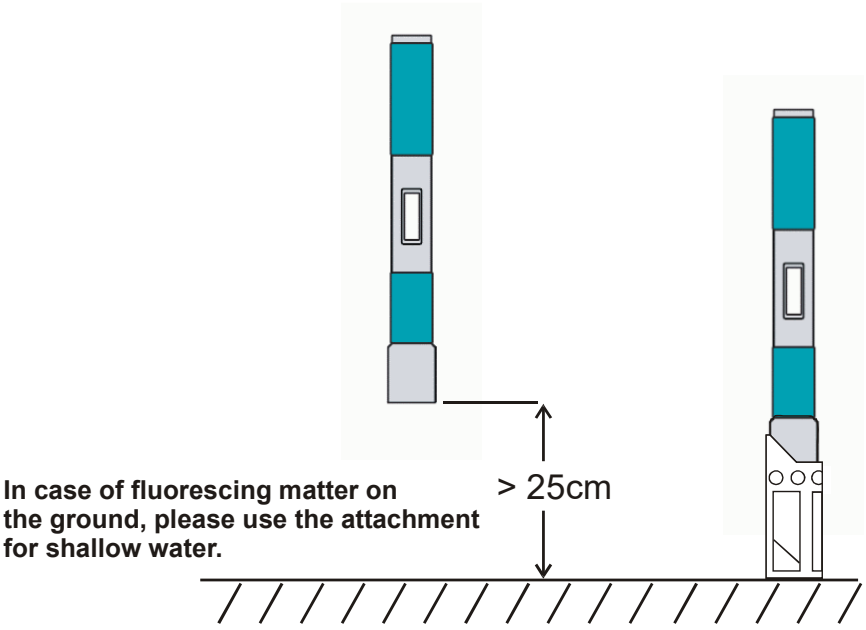
Operating the bbe AlgaeTorch

Measuring Procedure

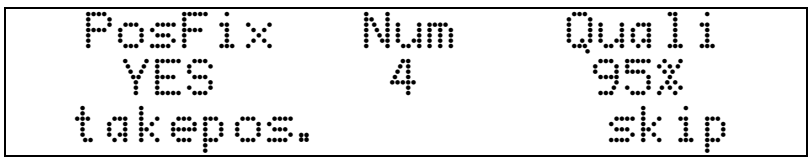
The AlgaeTorch was calibrated before delivery with the bbe standard algae types.

SINGLE DIP-IN MEASUREMENT

- Start the AlgaeTorch.
- Use a wrist strap to secure the instrument.
- Ensure that the connector is closed with the cap.
- Go to “Start measurement”.
- Dip the AlgaeTorch in the water. Ensure a sufficient distance from the water bed and that no fluorescent material (such as leaves) are nearby. This may influence the measurement. Please use the attachment for shallow water in this case. Move the AlgaeTorch slightly to avoid air bubbles at the front window. These air bubbles might influence the measuring results.
- In the lab, please use the bbe calibration vessel.

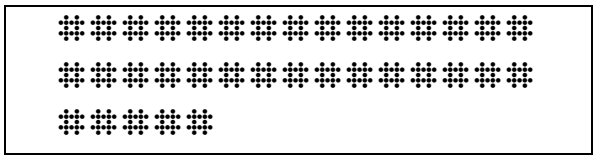


- If there is an internal GPS module available and activated, the status of the GPS signal is shown. If the given quality criteria are met, the measurement starts automatically, otherwise, the poor positioning information can be used (takepos) or the GPS information can be skipped.

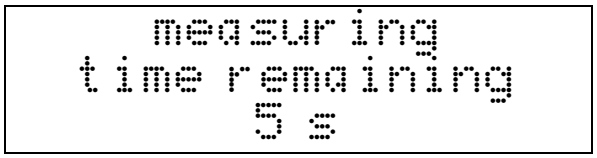


In case there is no GPS signal e.g. within buildings, only “skip” is available.

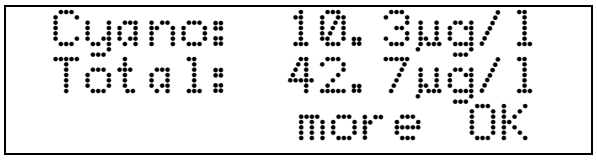
- During the internal calibration a decreasing number of # is shown .



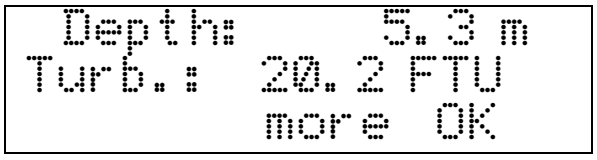
- During the measurement the remaining time is displayed:



- The end of the measurement is signalled by a short vibration
- The result can be read from the display:

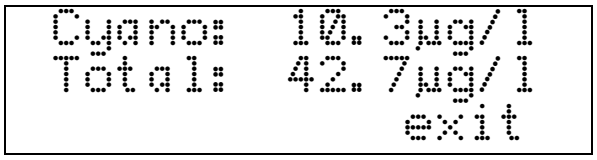


`More` shows the depth / turbidity (if available):



PROFILING / CONTINUOUS MEASUREMENT

- Start the AlgaeTorch
- 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”
- Submerse the AlgaeTorch
- To stop the AlgaeTorch, turn it upside down and back between two measurements when the AlgaeTorch switches of 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”

MOORED OPERATION

Moored operation is similar to the profiling operation. Please note:

- The maximum number of readings is 1000.
- During a longer period of mooring, biofouling may occur. Please contact bbe for anti-biofouling devices.

Display unit

The measured concentrations of the AlgaeTorch can be displayed either in µg chl-a/l or in cell counts (cells/l). The cell counts are calculated from the chlorophyll concentration by individual factors for each algae class.

Data Menu / View data

The data menu contains the commands for data handling.

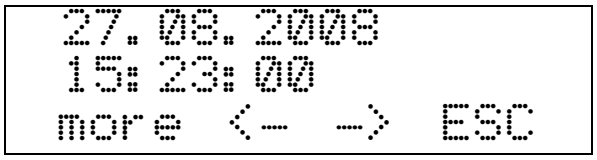
DATA -> VIEW

To view the measured data go to "Data -> View":

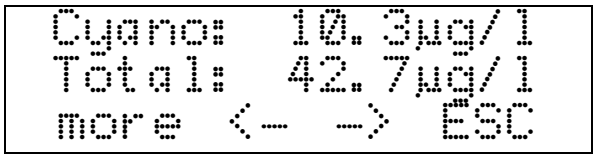
The display shows the date and time of the latest result.

More:

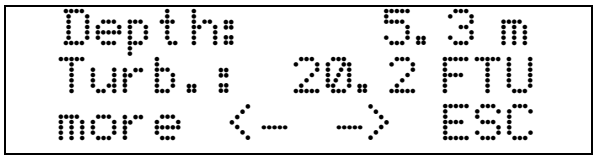
Displays the result of the chlorophyll measurement. In case of activated depth and/or turbidity measurement, these results will be displayed by touching "more" again.



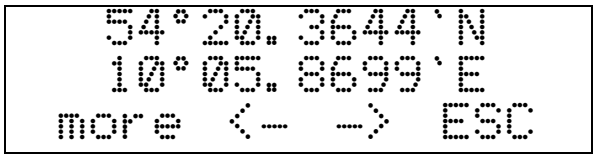
More shows the algae concentrations:



More shows the depth / turbidity (if available):

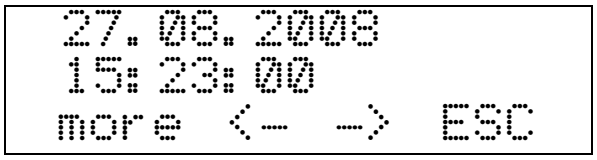


More shows the longitude / latitude (if available):

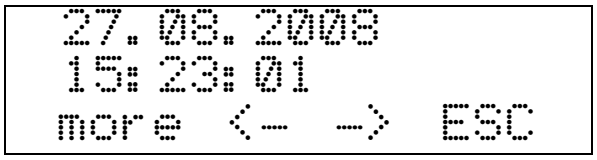


Arrow keys:

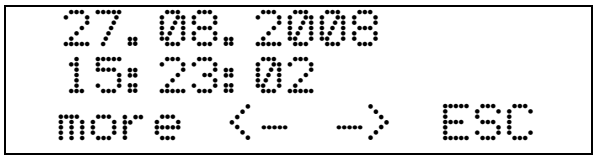
Please use the arrow keys to navigate to the required result.



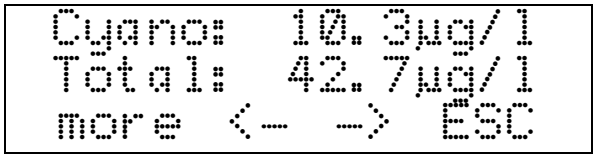
-> shows later results:



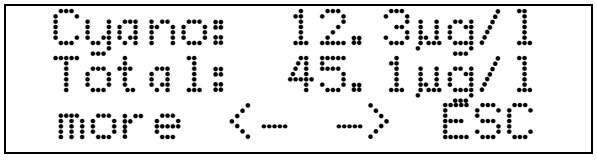
-> shows later results:



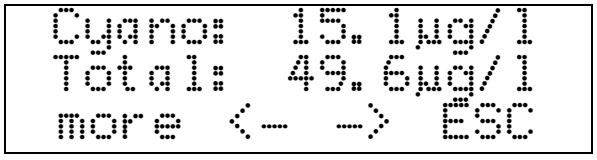
The arrow keys also function when the concentration or depth is shown:



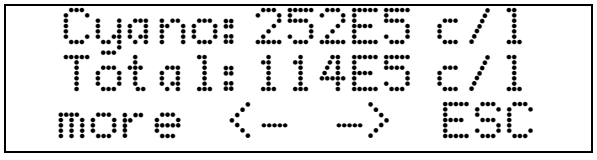
-> shows later results:



-> shows later results:



In case of cell count results, the display appears as follows:

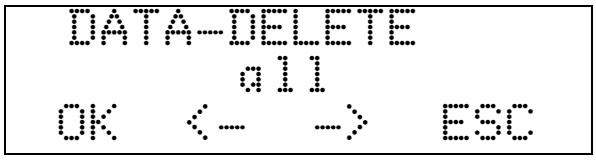


ESC:

Returns to the main menu.

DATA -> DELETE

Deletes all data from the memory of the AlgaeTorch.



OK Deletes all data from the memory.

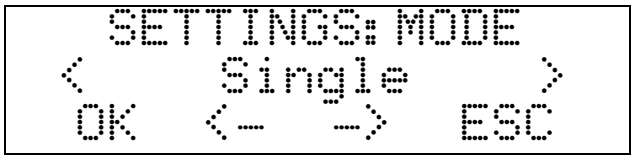
Settings Menu

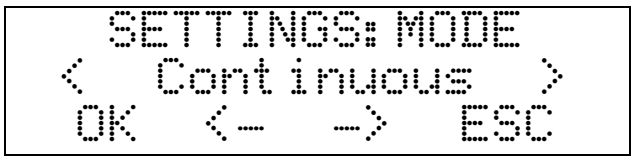
OVERVIEW

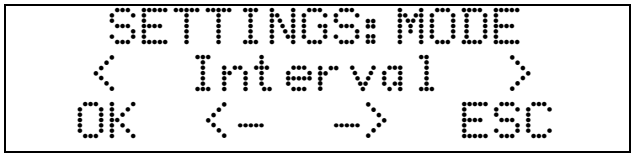
Mode	Single, continuous or interval measurements
Pressure mode	Set air pressure automatically at the begin of the measurement
Autostart*	Start a measurement automatically after switching on
Measuring duration	Set the duration of a single measurement (default = 10s)
Measuring interval	Set the interval between two measurements in interval mode
Clock -> time	Set time
Clock -> date	Set date
Display -> Contrast	Set the contrast of the display
Display -> Brightness	Set the brightness of the display
Unit	Toggle between µg/l and cell count
GPS	Read the current position / GPS settings
Software Version	Displays the software version

MODE

Changes between single, continuous and interval measurement.



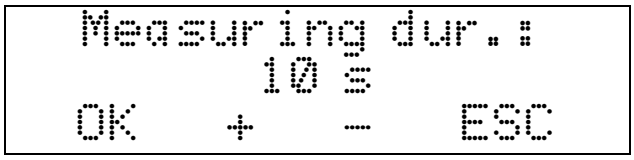




- Single: One single measurement is performed after starting.
- Continuous: The AlgaeTorch performs one measurement directly after the other.
- Interval: Performs one measurement after the other with the given measuring interval.

MEASURING DURATION

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

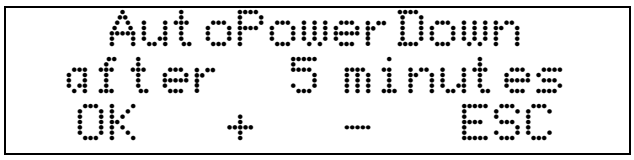


MEASURING INTERVAL

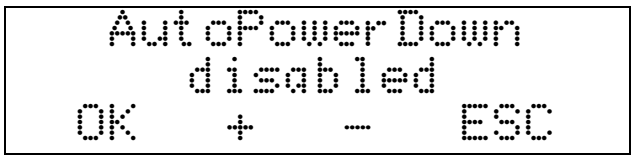
Sets the interval between two measurements in interval mode

AUTOPOWERDOWN

Sets the time after which the AlgaeTorch 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 periods available by using the + and – keys.



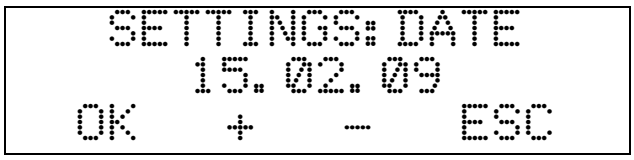
One additional option is to disable the power down:



The option is disabled in continuous operation.

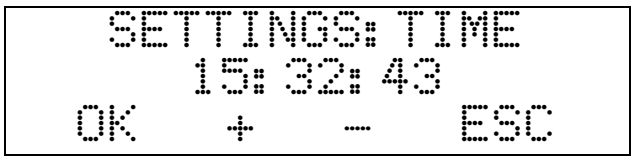
CLOCK -> DATE

Sets the date



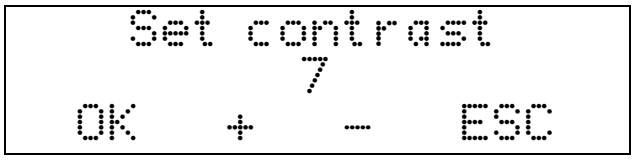
CLOCK -> TIME

Sets the time



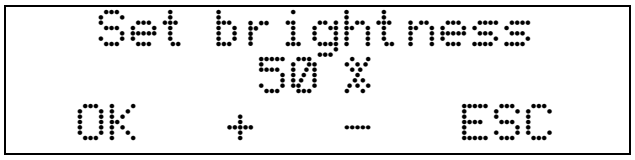
DISPLAY -> CONTRAST

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



DISPLAY -> BRIGHTNESS

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



UNIT

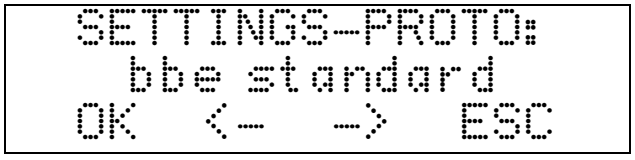
Switches from µg chl-a/l to cell counts. The calculation of the cell counts is performed using the factors given in the calibration menu.

GPS

See GPS chapter for details.

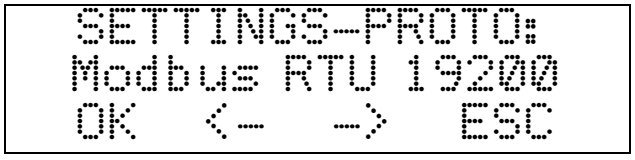
SERIAL PROTOCOL

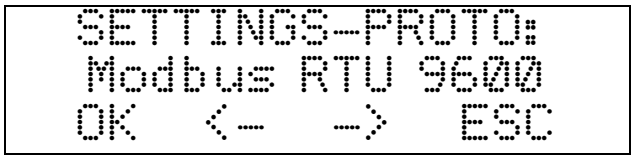
Sets the serial protocol of the AlgaeTorch. If a protocol different to bbe standard is selected, the AlgaeTorch will not communicate with bbe++. To communicate with bbe++ please set the protocol to bbe standard.



The protocol “bbe standard” is the protocol to communicate with the bbe++ PC software.

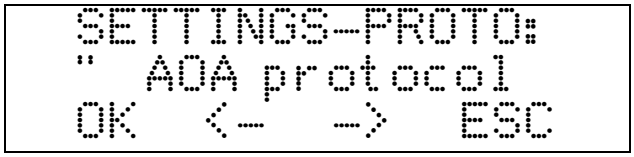
The data of the AlgaeTorch can also read by MODBUS.





There are 2 possibilities to work with MODBUS RTU via RS232. The difference is the baud rate 19200 or 9600.

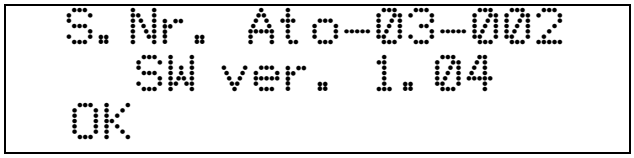
For details please see the chapter “How to access to an AlgaeTorch/BenthoTorch by ModBus”.



The “AOA protocol” is the protocol that is also used in. the bbe AlgaeOnlineAnalyser. It is a proprietary protocol defined by bbe. For details please see the chapter “AOA Protocol”.

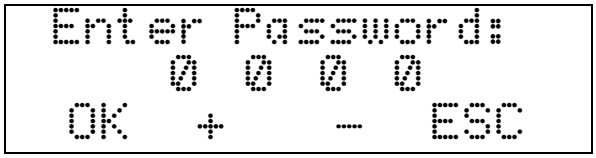
SOFTWARE VERSION

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.

Fingerprint calibration procedures

The AlgaeTorch has to be calibrated with two algae classes:

- Green algae
- Cyanobacteria

2 calibration concentrations are required for each algae class. Additionally the calibration of the offset has to be performed. For the offset measurement, ultra-filtrated sample water (free of algae) is used.

CALIBRATION OF THE OFFSET:

2 types of offsets need to be calibrated:

1. Offset distilled water. This is used as 0 for the turbidity measurement
2. Offset ultrafiltrated water. This is used as 0 for the chlorophyll measurement. The ultrafiltrated water contains no algae, but so called yellow substances. This are other fluorescing substances, that are no algae

- Avoid artificial light during the calibration, especially fluorescent lamps!
- Submerse the AlgaeTorch in the ultra-filtrated sample water and use “Calibration -> Offsets”

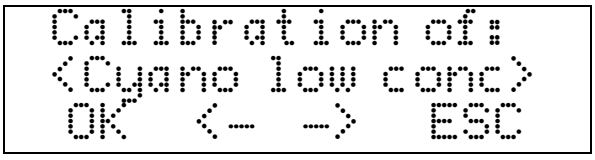
Calibration solution for the „ultra filtrated water offset and the yellow substances

In the lab, the calibration of the yellow substances can be easily done with tap water. In cases of very small chlorophyll-a concentration, it is recommended to use ultrafiltered sample of the water (from the water to be examined). For this the following equipment is needed:
Type of filter: Nitrocellulose filter, pore size 0.45 µm, diameter 47mm (for example: Sartorius Stedim)
Vessels: Depending on the sample volume flask with 5 L content
Negative pressure of 800mbar. The volume of the sample is determined by the instrument to be calibrated, BBE. For an ALA be about 100ml, requires approximately 5L filtrate for an AOA / AlgaeGuard / A-Tox sensor / AlgaeTorch about 1L and for an immersion probe.

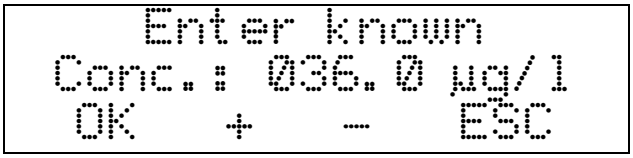
CALIBRATION OF THE ALGAE FINGERPRINTS:

The calibration of the fingerprints has to be performed in 2 steps: one low calibration point and one high calibration point. We recommend using 30-50µg/l for the lower point and 100-150µg/l for the higher point. After calibrating one point, the value is stored for 1 hour. Within this time the second calibration point has to be measured. Otherwise, the first calibration point will be deleted when re-entering the calibration menu.

- Do an offset calibration before calibrating the algae classes.
- For the calibration of the algae fingerprints, please use pure solutions of the algae class with a known chlorophyll concentration. The concentrations should be in the ranges of 30-50µg/l and 100-150µg/l.
- Avoid artificial light during the calibration, especially fluorescent lamps!
- Submerse the AlgaeTorch in the solution.
- Choose “Calibration -> Fingerprints” in the software, choose the algae class
- Choose the corresponding low or high concentration



- and enter the concentration.

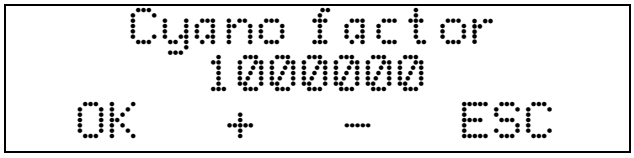


- OK starts the calibration.
- Apply the values after the calibration.
- Re-perform the same procedure with the high concentration between 100 and 150 µg/l within a maximum time of one hour.
- Re-perform the whole procedure with green algae.

SETTING THE CELL COUNT FACTORS:

The ratio of cell counts and chlorophyll concentration has to be determinated by microscopic investigation for each algae class. The default values given in the AlgaeTorch are based on several investigations from the literature. The numbers need to be confirmed for the specific location.

To set the cell counts go to “Calibration” -> “Fingerprints” -> “Cell Count factors”. It is possible to enter three different factors: one for cyanobacteria, one for green algae and one for others.



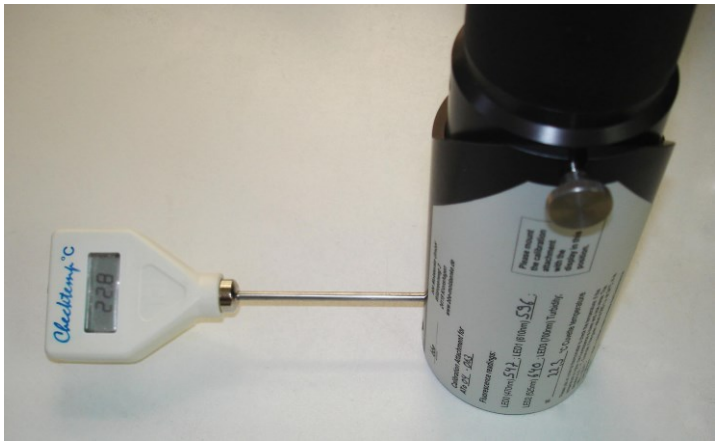
CHECK OF THE INSTRUMENT USING A DYE (OPTION)

To check the performance of the AlgaeTorch the Performance Test Attachment can be used:

The attachment contains a dye that is fluorescing when excited by any of the LED used in the AlgaeTorch. As soon as the AlgaeTorch is calibrated, the attachment can be applied to the AlgaeTorch and the fluorescence values can be stored (set dye).

To check the performance of the AlgaeTorch the attachment has to be applied to the AlgaeTorch, a measurement is performed and the result is compared to the stored values.

The dye is temperature sensitive – so the temperature has to be measured and entered during the setting and the checking procedure. The temperature sensor is delivered together with the test attachment.



The results of different Performance Test Attachments might vary from one attachment to the other. So the test has to be performed with the same attachment all the time.

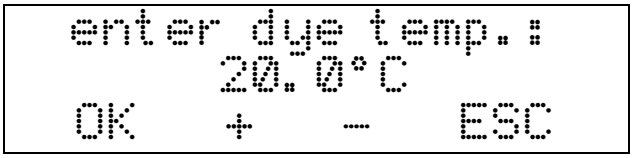
Procedure

- Mount the Performance Test Attachment and the temperature sensor. Take care for the right position of the attachment.
- Start a continuous measurement at the AlgaeTorch
- Switch on the temperature sensor
- Let the instrument run for 10 minutes
- Proceed with “set dye” for storing the fluorescence values
- Proceed with “check dye” for evaluating the performance of the instrument

Set dye

The set dye procedure is used to store the fluorescence pattern of a dedicated test attachment in the AlgaeTorch. This is the reference for the check dye procedure.

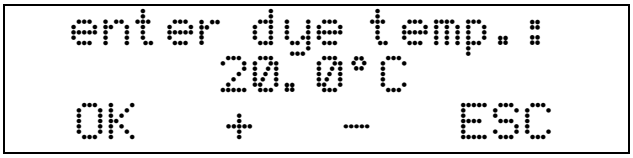
- go to Calibration -> dye -> set dye



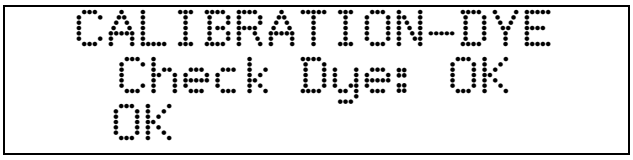
- Enter the temperature of the thermometer and confirm with OK
- The AlgaeTorch performs a fluorescence measurement. The results are shown afterwards
- Confirm to use the shown values as a new reference. Use ESC to retain the stored values.

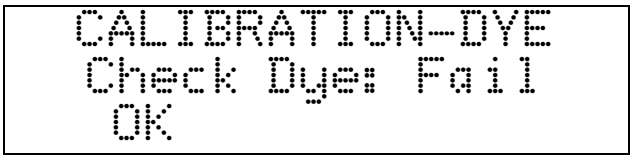
Check dye

- Go to Calibration -> dye -> check dye



- Enter the temperature of the thermometer and confirm with OK
- The AlgaeTorch performs a fluorescence measurement and displays the result of the check.





In case of a failed test, please check, if the Performance Test Attachment is mounted properly and the temperature is measured correctly. Contact the bbe service, if the error remains.

Turbidity calibration procedures

The AlgaeTorch is equipped with a turbidity measurement. The calibration is done in three steps:

1. Offset calibration in clean water
2. Turbidity calibration with a low concentration of turbidity standard (20-40FTU)
3. Turbidity calibration with a high concentration of turbidity standard (120-170FTU)

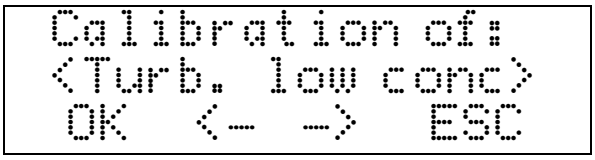
CALIBRATION OF THE TURBIDITY OFFSET:

- For the calibration of the offset, please use tap water or distilled water. Take care that the calibration water and the window of the AlgaeTorch is free of bubbles.
- Avoid artificial light during the calibration, especially fluorescent lamps!
- Submerse the AlgaeTorch in the water and use “Calibration -> Turbidity -> Offset”

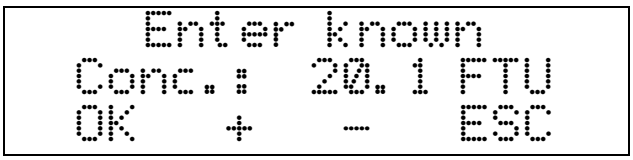
CALIBRATION OF THE TURBIDITY SLOPE:

The calibration of the turbidity slope has to be performed in 2 steps: one low-calibration point and one high-calibration point. We recommend using 20-40 FTU for the lower point and 120-170 FTU for the higher point. After calibrating one point, the value is stored for 1 hour. Within this time the second calibration point has to be measured. Otherwise the first calibration point will be deleted when re-entering the calibration menu.

- Do an offset calibration before calibrating the turbidity slope.
- For the calibration of the algae fingerprints, please use a turbidity standard. The concentrations should be in the ranges of 20-40FTU for the lower point and 120-170FTU for the higher point.
- Avoid artificial light during the calibration, especially fluorescent lamps!
- Submerse the AlgaeTorch in the solution.
- Choose “Calibration -> Turbidity -> Slope” in the software, choose the corresponding low or high concentration

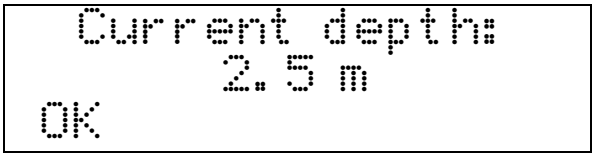


- and enter the concentration.



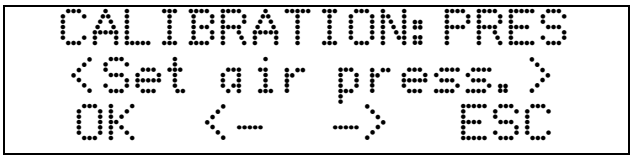
- OK starts the calibration.
- Apply the values after the calibration.
- Re-perform the same procedure with the high concentration between 120 and 170 FTU within a maximum time of one hour.

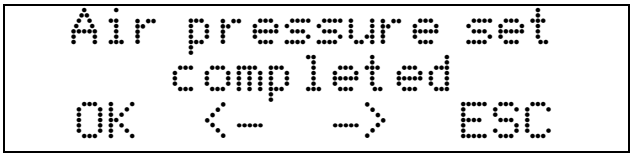
SHOW DEPTH:



Shows the measured depth with the current calibration.

SET AIR PRESSURE:



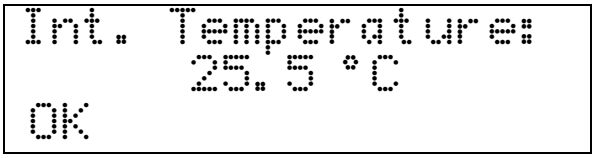


"Set air pressure" can be used to compensate the current air pressure. This is used to show the depth option (see above). During the measurement, the air pressure is set automatically at the beginning of the first measurement.

Internal Temperature

The internal temperature of the AlgaeTorch can be shown.

SHOW INTERNAL TEMPERATURE:

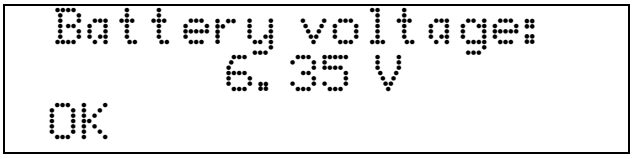


Shows the internal temperature.

Voltage

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

SHOW VOLTAGE:



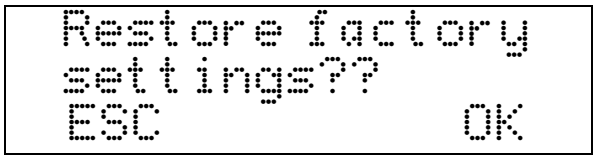
Shows the measured voltage with the current calibration.

CALIBRATE VOLTAGE:

Calibration of the voltage should only be done by the bbe service only.

Factory settings

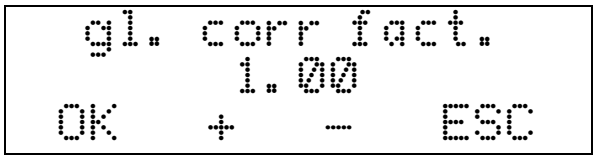
To reset the instrument to the factory settings including the factory calibration, please use this menu.



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.



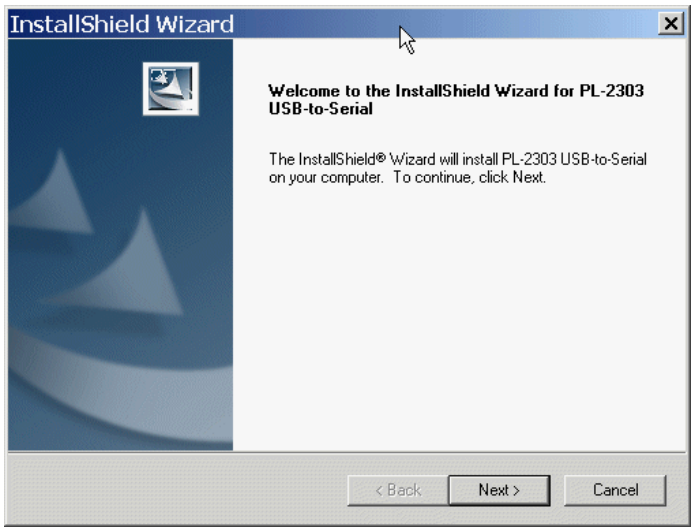
Connecting the bbe AlgaeTorch / BenthoTorch / AlgaeLabAnalyzer via USB to a PC

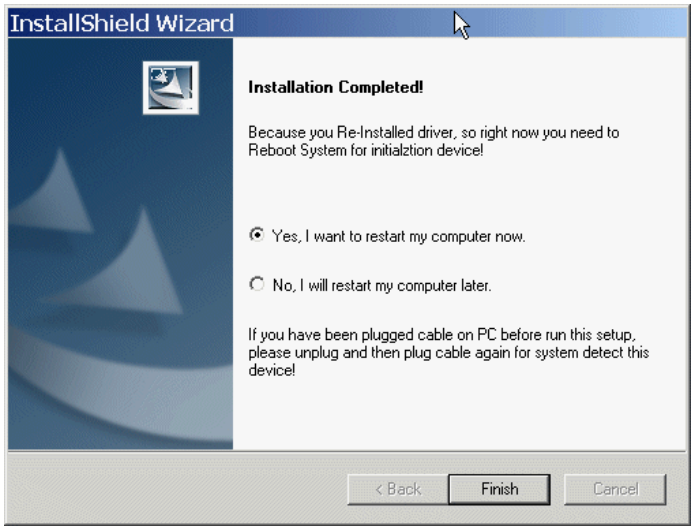
To connect the bbe AlgaeTorch, BenthoTorch or AlgaeLabAnalyser to a PC a USB driver has to be installed first.

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

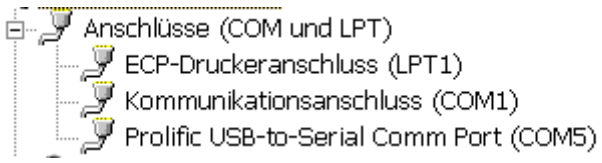
USB DRIVER SET-UP

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

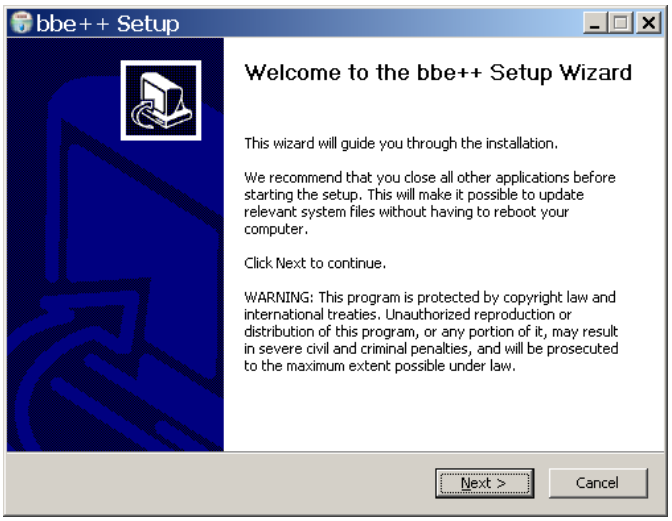
The bbe++ software is delivered together with bbe instruments. If a PC is delivered with the instrument or integrated in the instrument, the software is already installed.
It provides the following functions:

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

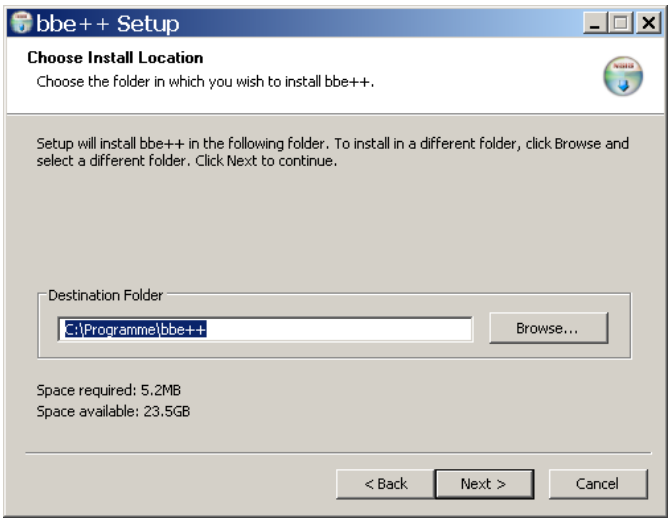
This chapter describes the general functions of the bbe++ software. The examples may show data or parameters of other bbe instruments. The data and parameters of your instrument can easily be handled accordingly. Whenever this manual deals with special features of a certain instrument, this will be explained in the special instrument chapter.
The data and parameters of the instruments are stored in a database. A single database may contain the data of different instruments of the same type and also different types of instruments.

Software Set-Up

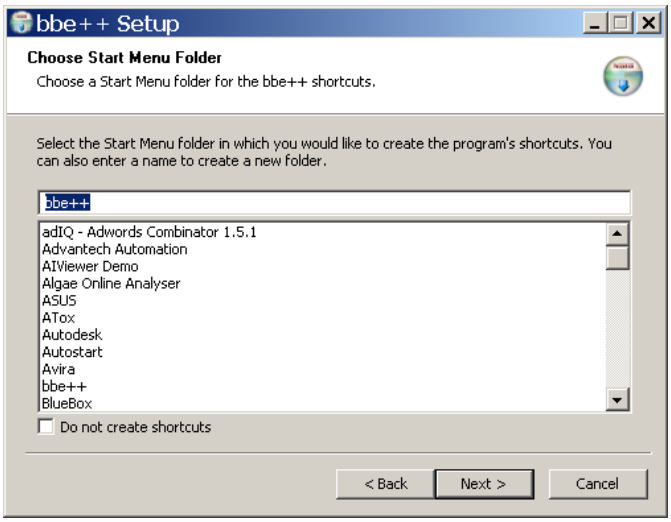
The software is stored on a CD delivered with the instrument. The latest version can also be downloaded from the bbe website after registration (http://www.bbe-moldaenke.de/log-in/).
The Windows autorun function should start the installation automatically. If it does not, open the Explorer and click on **setup.exe** on the CD for installation.
Welcome window: click “NEXT >”



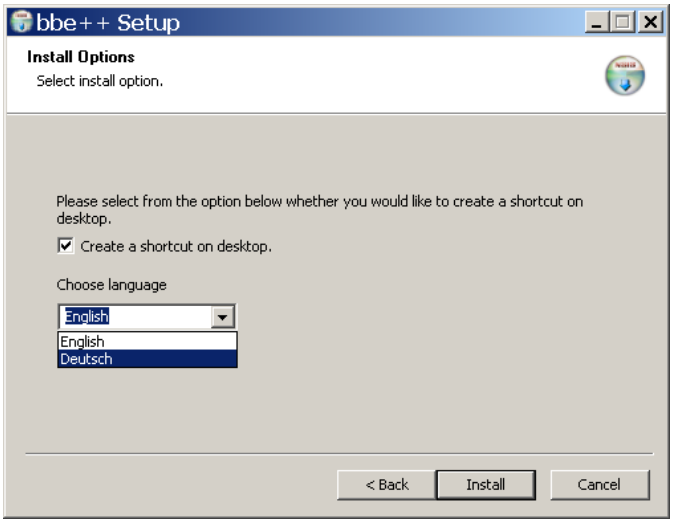
Choose the destination folder and click “NEXT >”



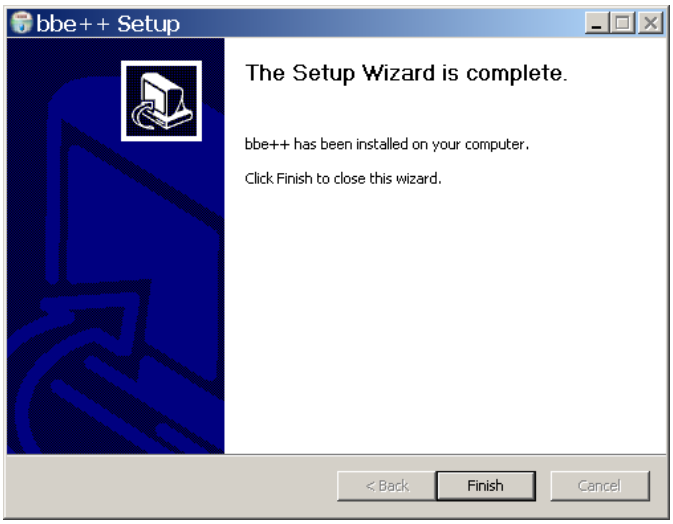
Choose a new start menu folder and click “NEXT >”



Choose your preferred language and click “NEXT >”



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



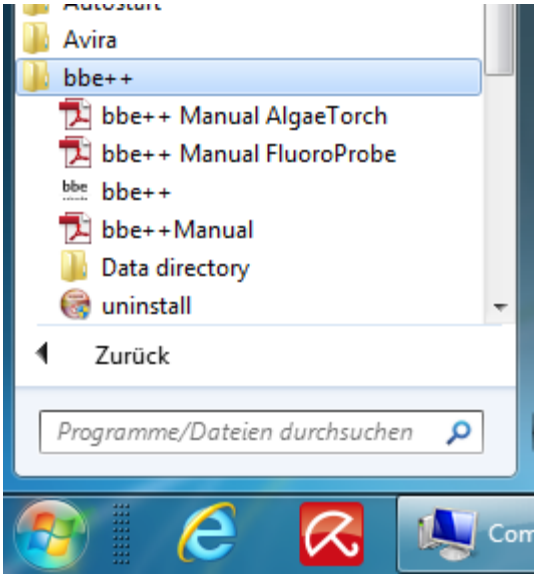
DESKTOP ICON OF THE BBE++ SOFTWARE

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

BBE++ SOFTWARE IN THE START MENU

The bbe++ folder in the start menu contains:

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



Software Update

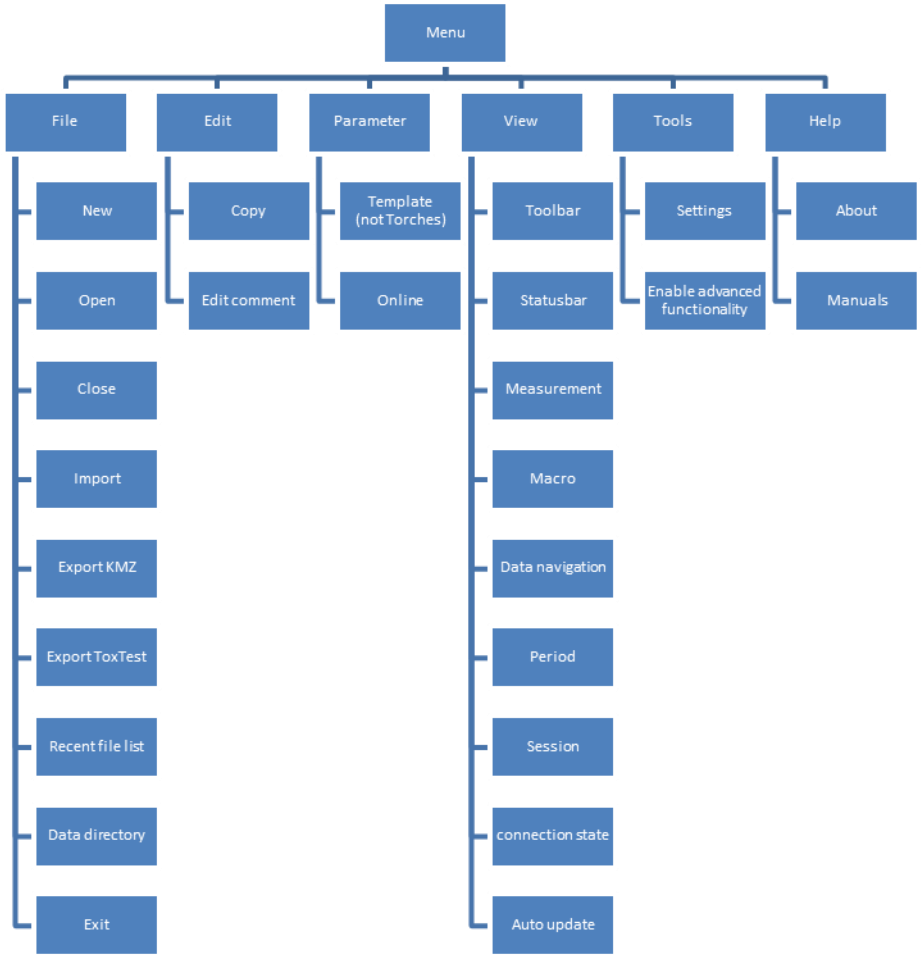
Updates of the bbe++ software and manuals can be downloaded from the bbe website http://www.bbe-moldaenke.de after registration.

Structure of the software

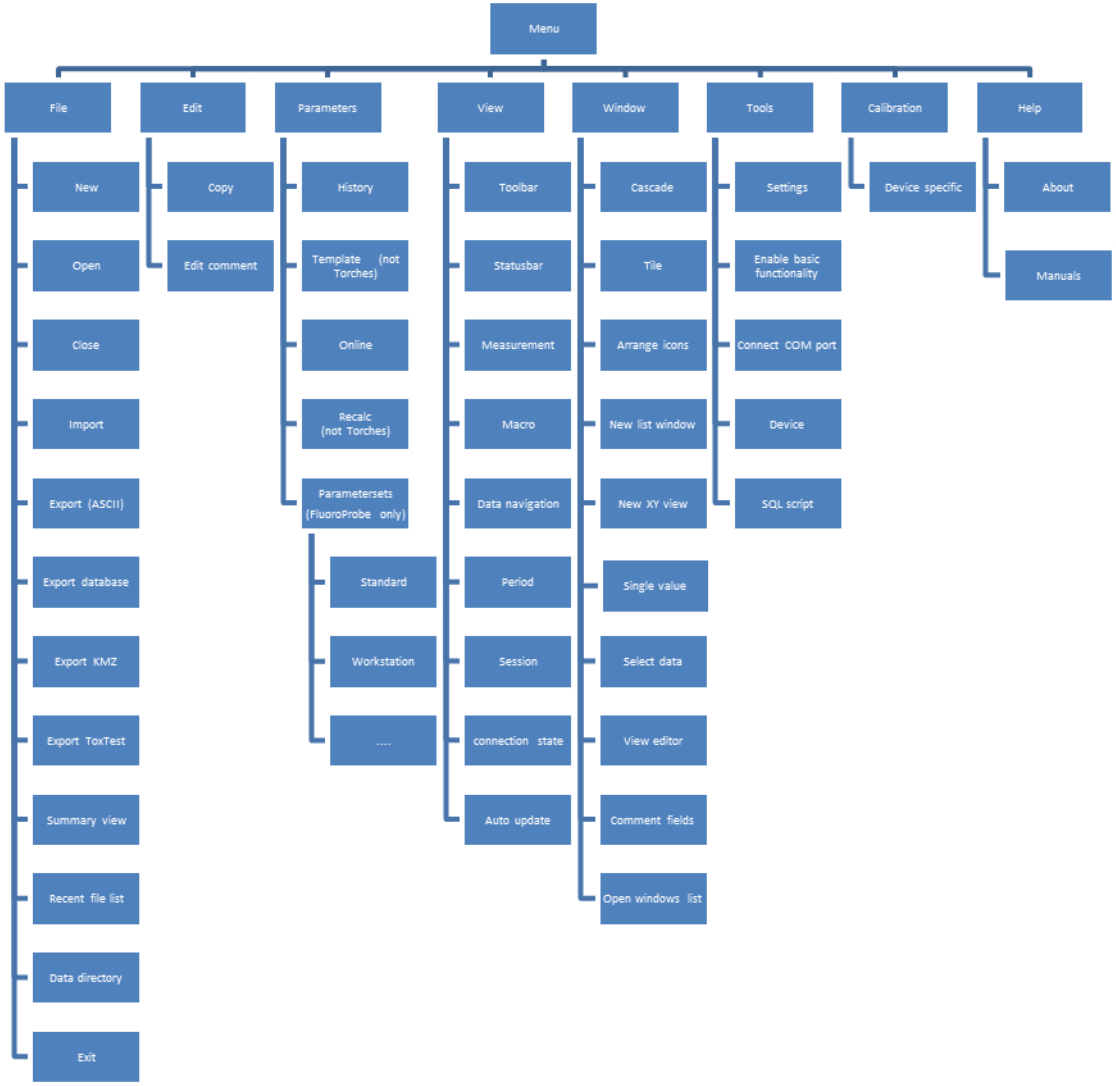
The following menus are available in the bbe++ software. Whether a menu is displayed, depends on the access level set.

- 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”)



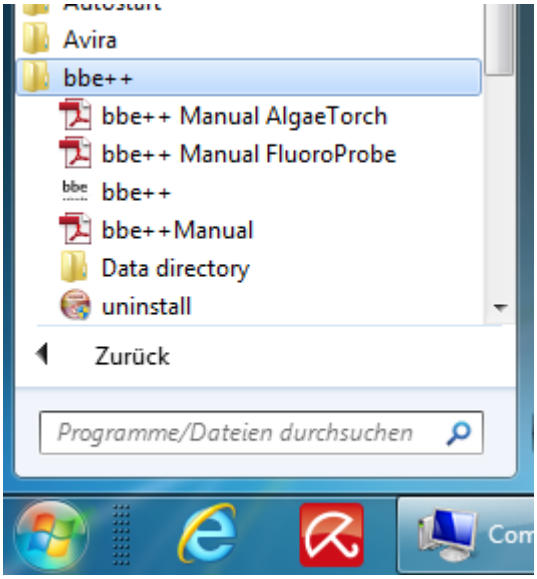
General considerations for storing and displaying data and parameters in bbe++

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 file menu of bbe++ or start menu of Windows called “Data directory”:



HOW TO DISPLAY THE DATA?

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

- graphics
- tables
- single dataset
- data export

User-defined views may be added as well.

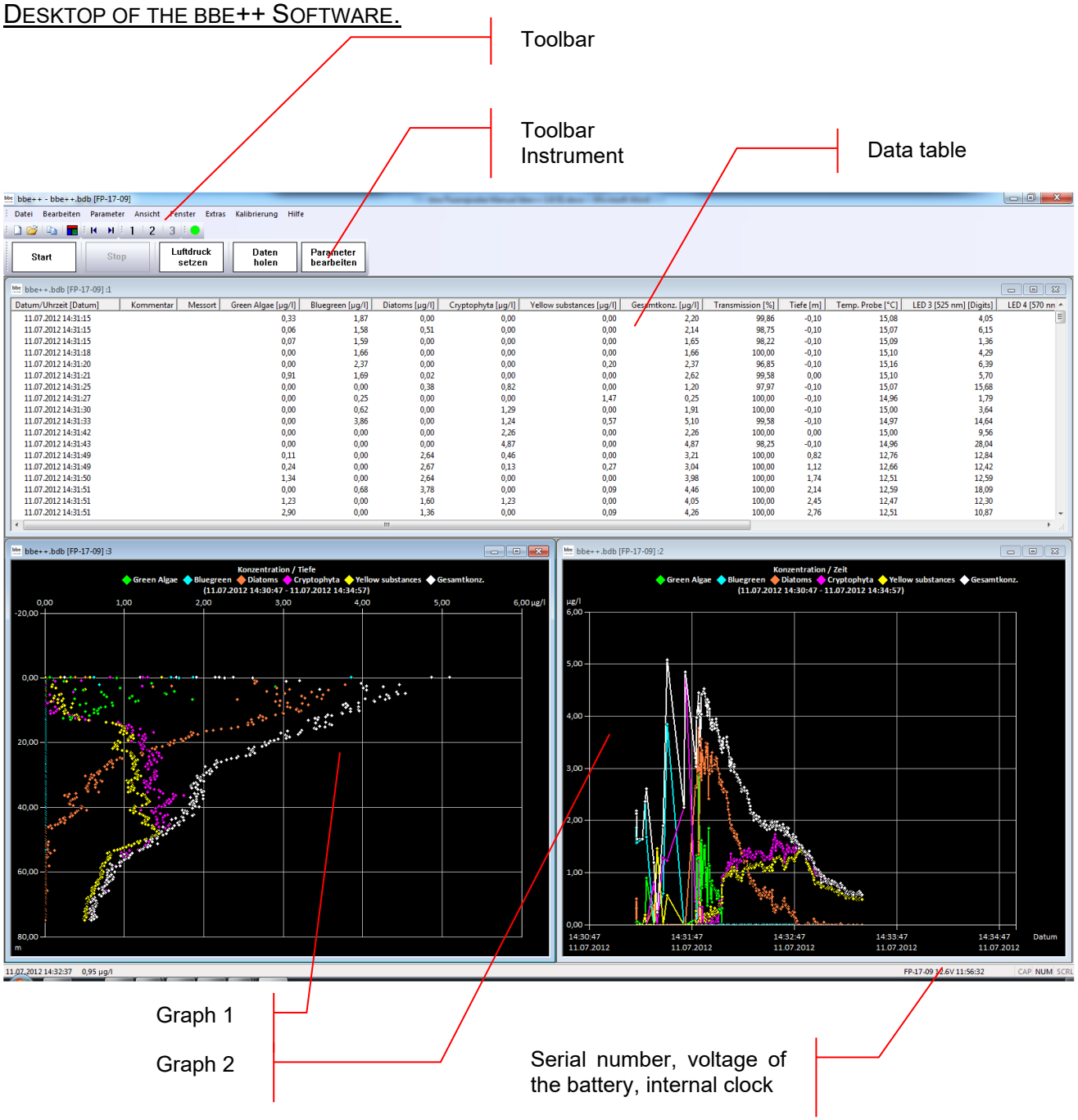
SIMULTANEOUS DISPLAY OF DATA OF DIFFERENT TYPES OF INSTRUMENTS

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

WHO CAN ACCESS TO THE PARAMETERS OF THE INSTRUMENTS?

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

DESKTOP OF THE BBE++ SOFTWARE.



TOOLBAR

Toolbar to navigate within the datasets.

TOOLBAR INSTRUMENT

Toolbar to operate the instrument

GRAPHIC- UND TABLE VIEWS

User configurable windows with graphs and tables.

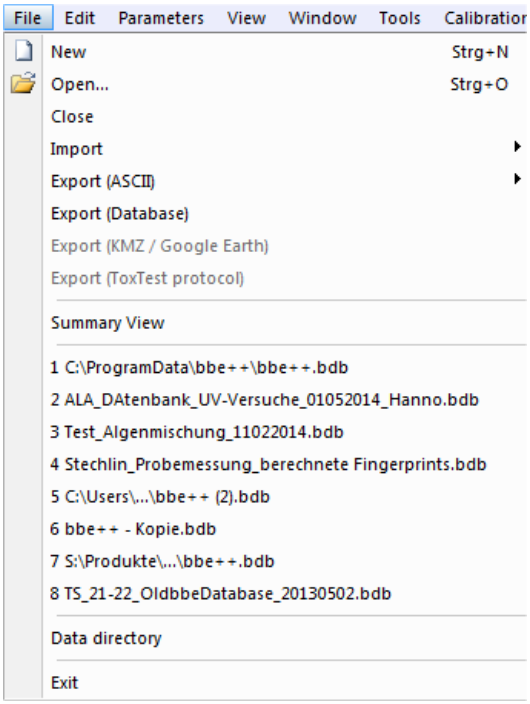
SERIAL NUMBER, VOLTAGE OF THE BATTERY, INTERNAL CLOCK

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

The Menus

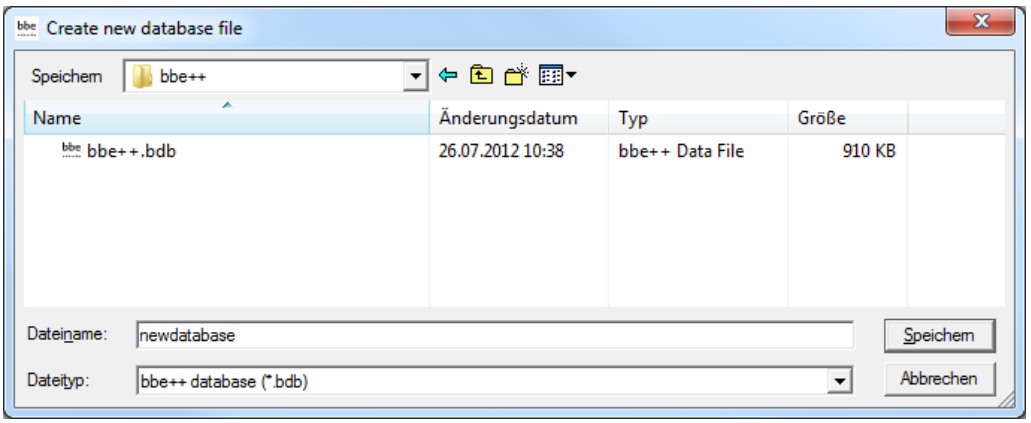
FILE MENU

The File Menu contains all the input/output functions.

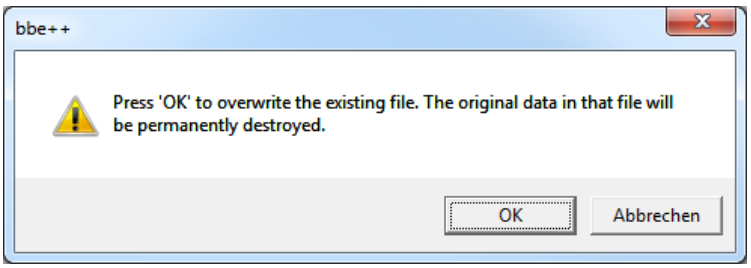


New

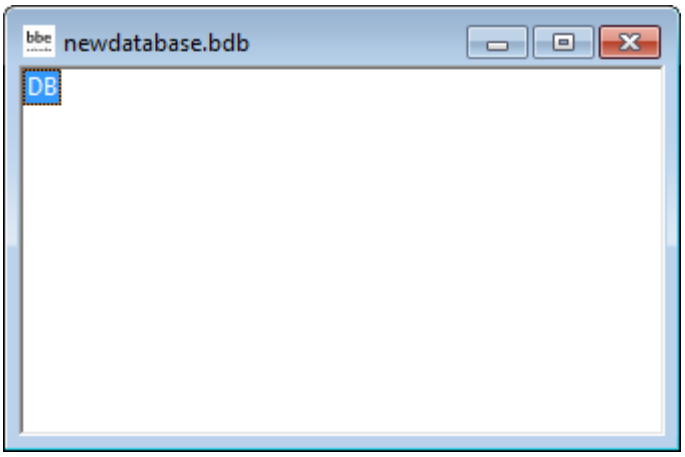
Creates a new database file for data and parameters.



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



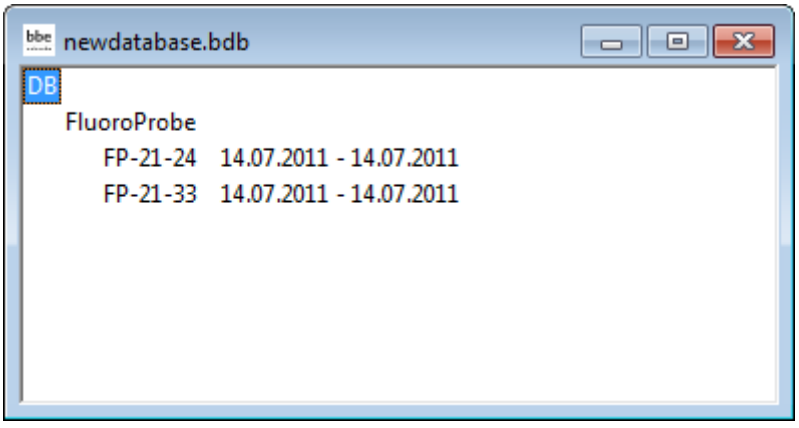
The new and empty database is displayed.



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.

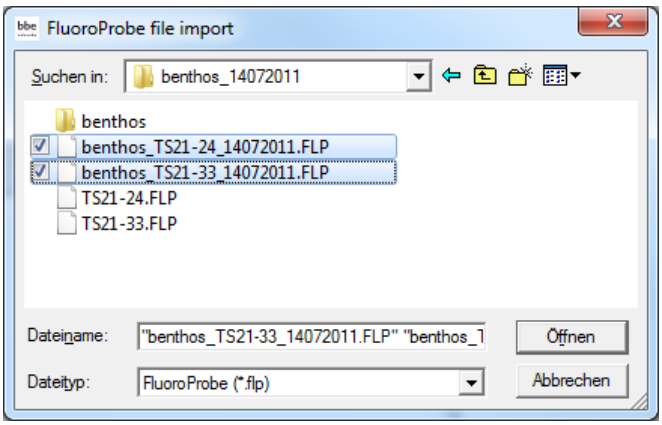


Close

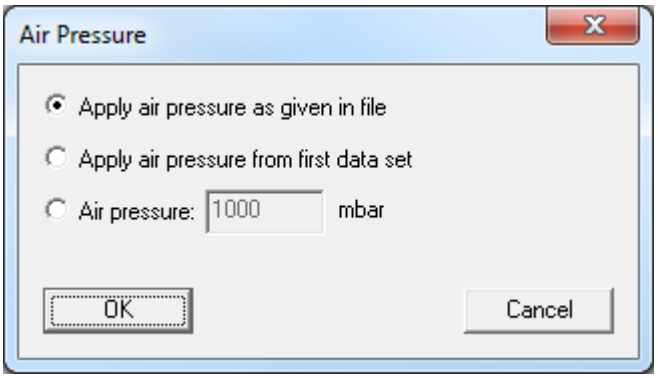
Closes the active database.

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)

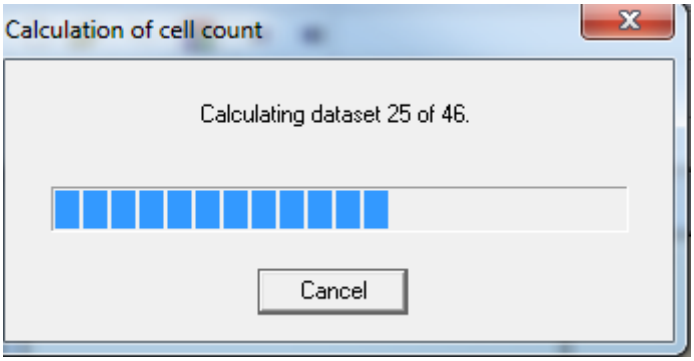
Air pressure was measured at the beginning of the measurement. This value is used.

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

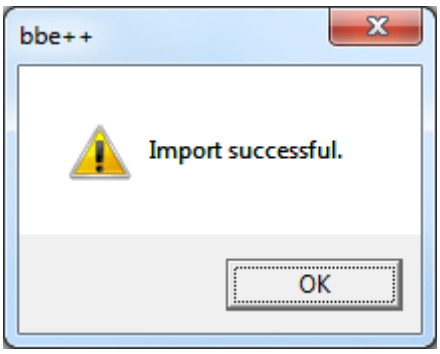
The first measurement of air pressure took place in air. This is the appropriate selection if an autostart-plug without a PC was used (for further information see the FluoroProbe-manual).

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

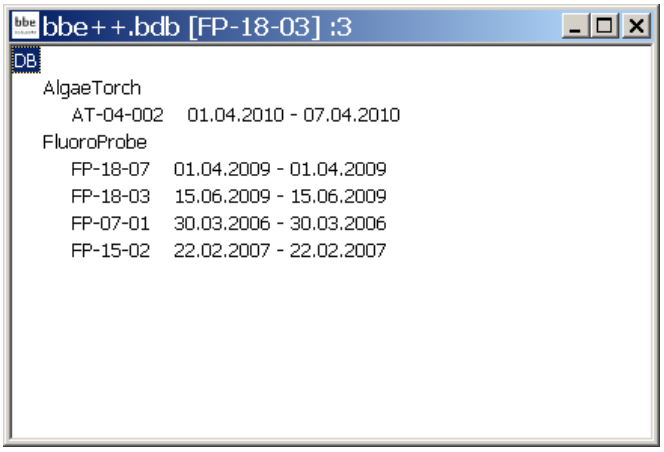
This item is used to export geo data from instruments with GPS receiver to be displayed in Google Earth.

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:

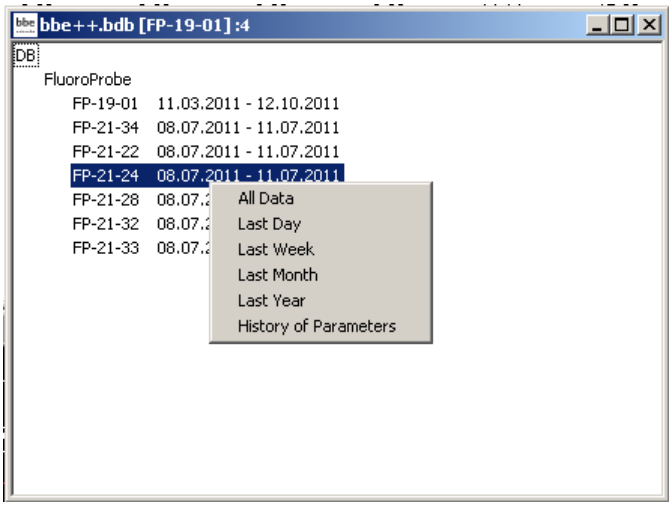


The database bbe++.bdb above contains data of two types of instruments: AlgaeTorch and FluoroProbe.
The serial numbers and the point in time of the first measurement and the last measurement stored in the database are shown below the heading with the name of the instrument.
The header of the window (bbe++.bdb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

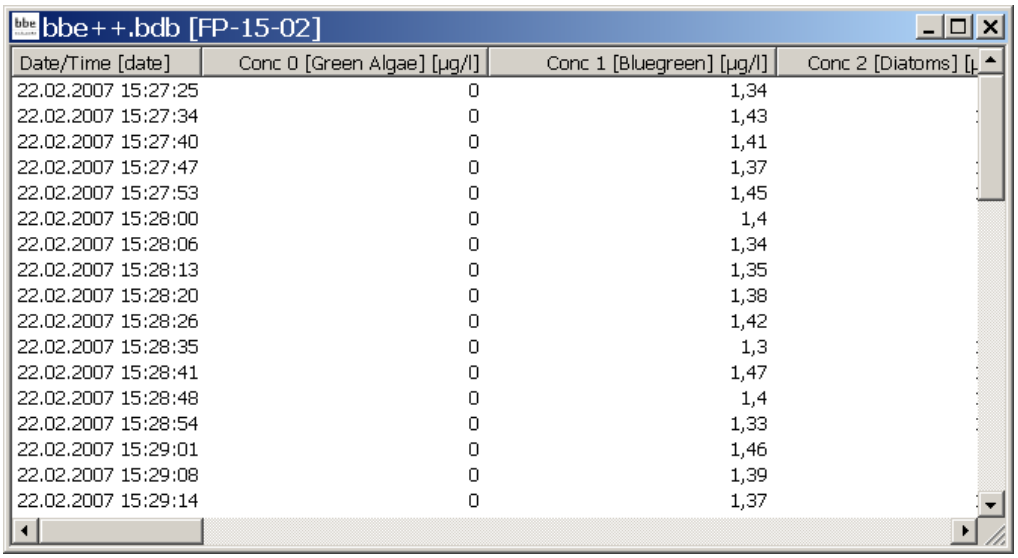
- the name of the database bbe++.bdb

- 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

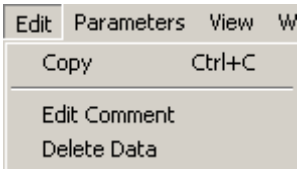
Opens the explorer with the current data directory to copy or rename the data base. This is the same function as in the start menu up to Windows 7.

Exit

Terminates the program.

EDIT MENU

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

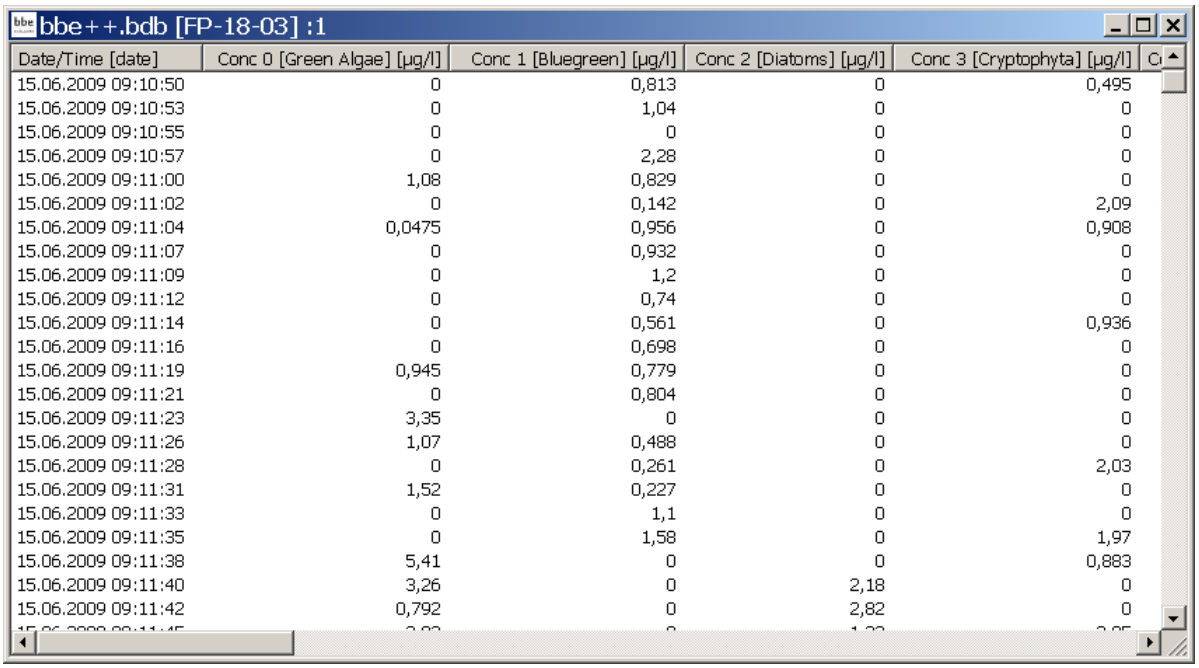


Copy

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.

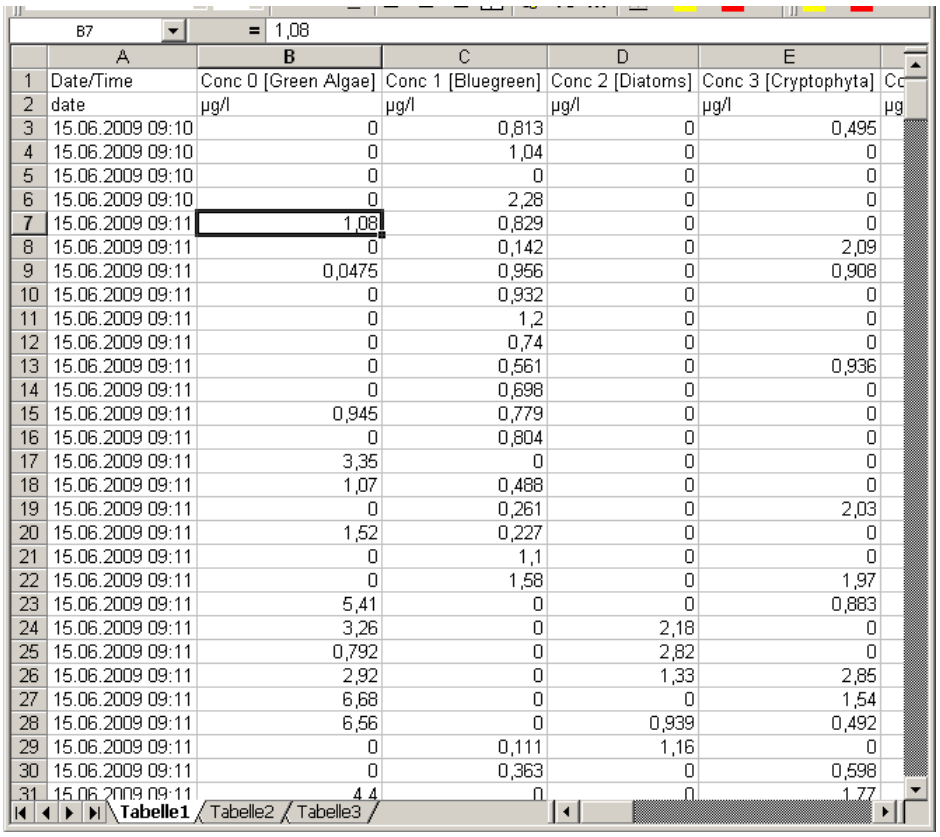
HOW TO COPY DATA TO EXCEL:

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.


bbe++.bdb [FP-18-03] :1

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

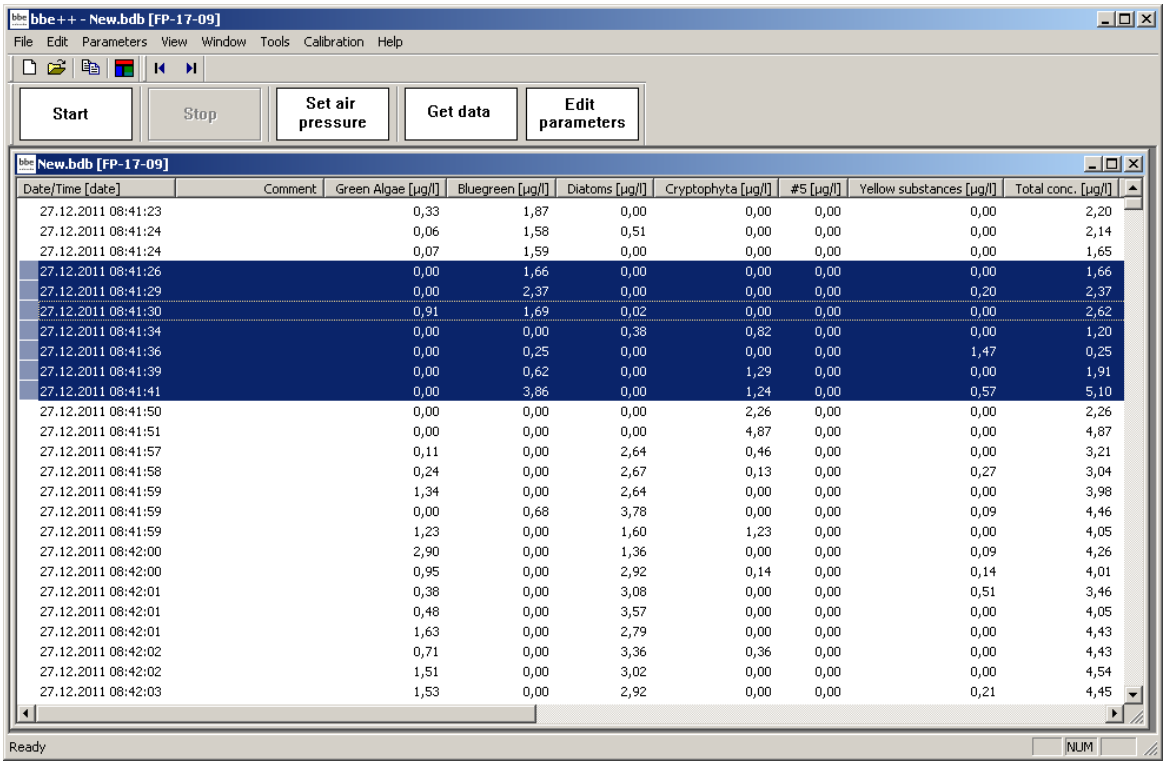
	A	B	C	D	E	
1	Date/Time	Conc 0 [Green Algae]	Conc 1 [Bluegreen]	Conc 2 [Diatoms]	Conc 3 [Cryptophyta]	Cc
2	date	µg/l	µg/l	µg/l	µg/l	µg
3	15.06.2009 09:10	0	0,813	0	0,495	
4	15.06.2009 09:10	0	1,04	0	0	
5	15.06.2009 09:10	0	0	0	0	
6	15.06.2009 09:10	0	2,28	0	0	
7	15.06.2009 09:11	1,08	0,829	0	0	
8	15.06.2009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

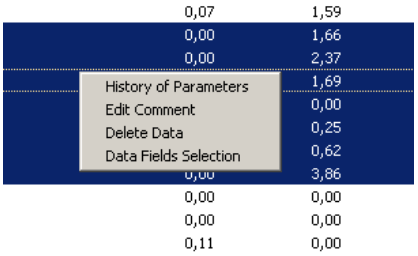
Edit Comment – advanced functionality only

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.

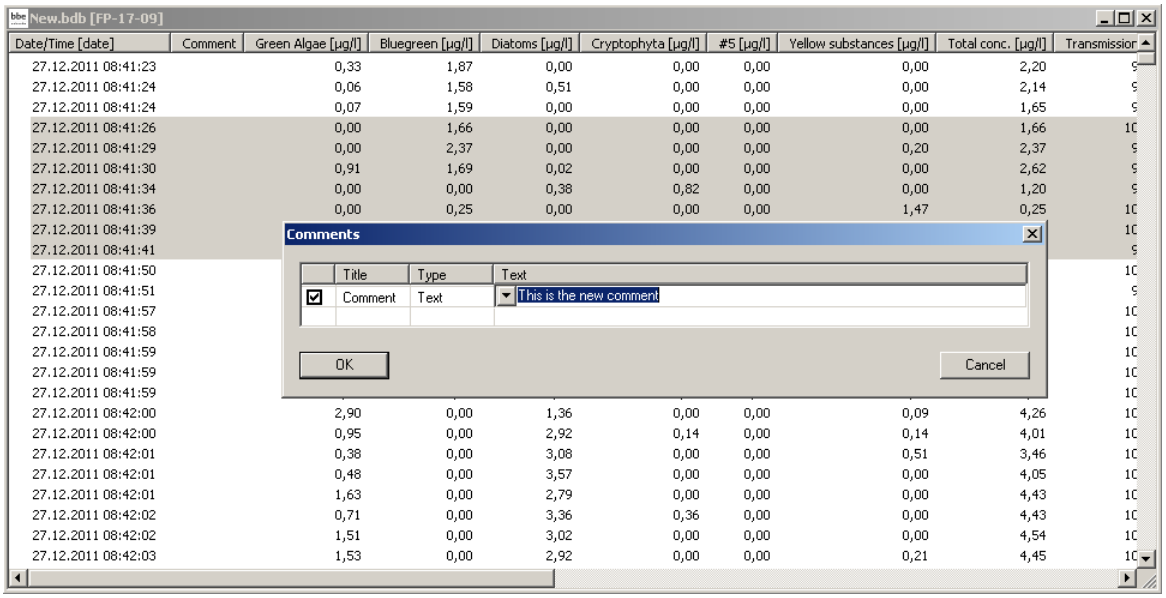


Date/Time [date]	Comment	Green Algae [µg/l]	Bluegreen [µg/l]	Diatoms [µg/l]	Cryptophyta [µg/l]	#5 [µg/l]	Yellow substances [µg/l]	Total conc. [µg/l]
27.12.2011 08:41:23		0,33	1,87	0,00	0,00	0,00	0,00	2,20
27.12.2011 08:41:24		0,06	1,58	0,51	0,00	0,00	0,00	2,14
27.12.2011 08:41:24		0,07	1,59	0,00	0,00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

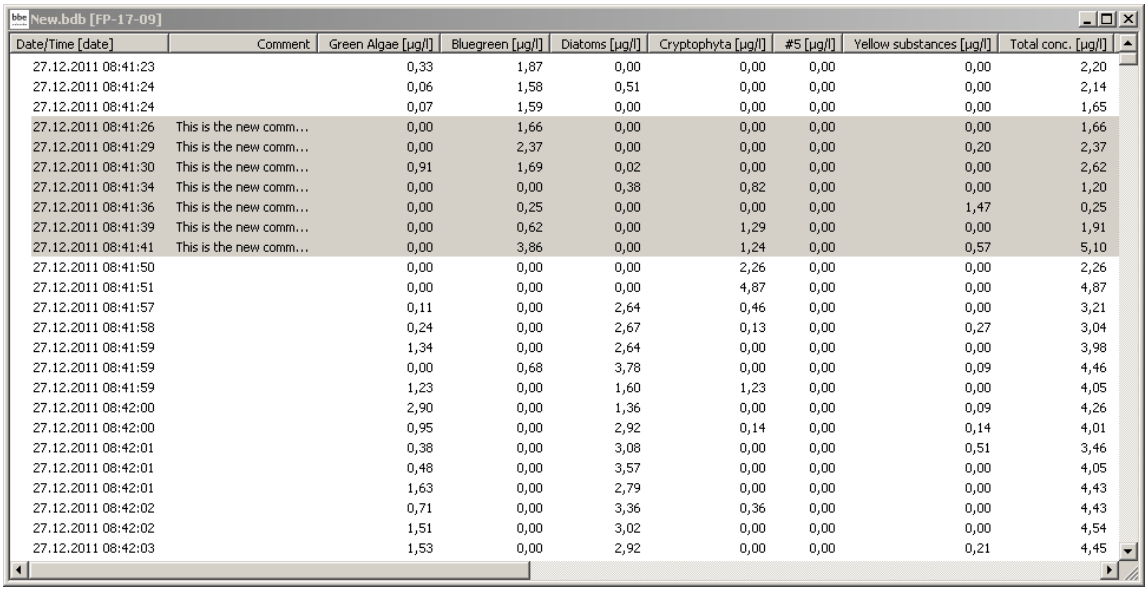
Go to Edit → Edit comments or use right click on the marked datasets:



Enter the new comment for the selected data:



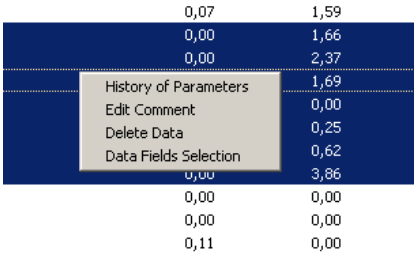
Click OK:



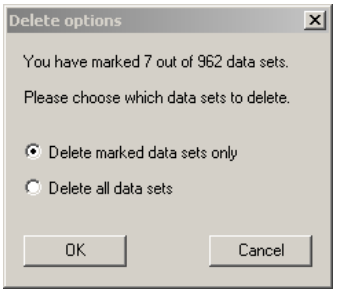
Delete Data – advanced functionality only

To delete data, mark the datasets as described above.

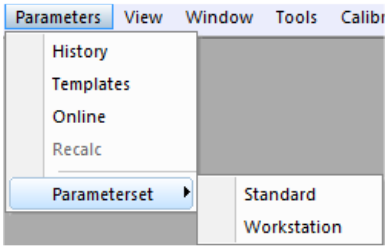
Go to "EDIT → DELETE DATA" or use right click on the marked datasets:



Click OK to delete the data.



PARAMETERS MENU



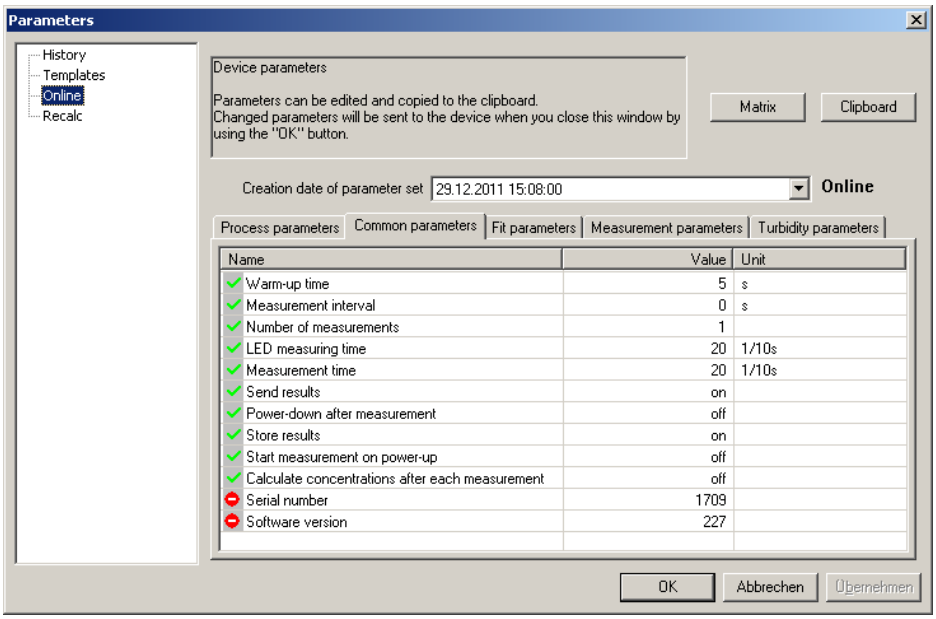
Item	Function	Available for
History	Display parameters of datasets stored in the database	All instruments
Template	Apply a user-defined selection of parameters to an instrument	All but AlgaeTorch and BenthoTorch
Online	Display and change parameters in the instruments	All but AlgaeTorch and BenthoTorch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

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

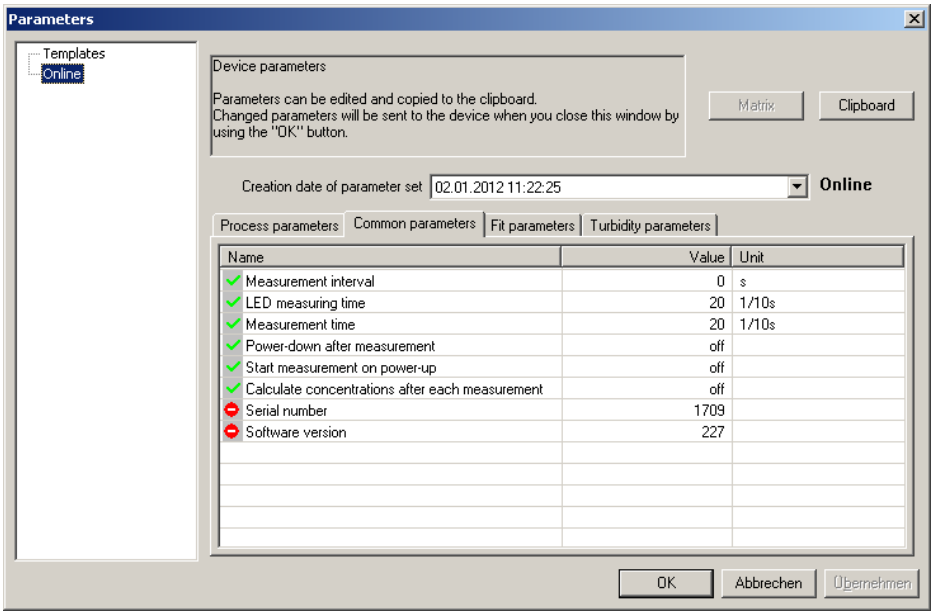
Please note:
Only parameters of the current type of instrument are shown.
It depends on the user level, whether a parameter is shown or not. The higher the user level, the more parameters are shown.

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

Access level “advanced functionality”:

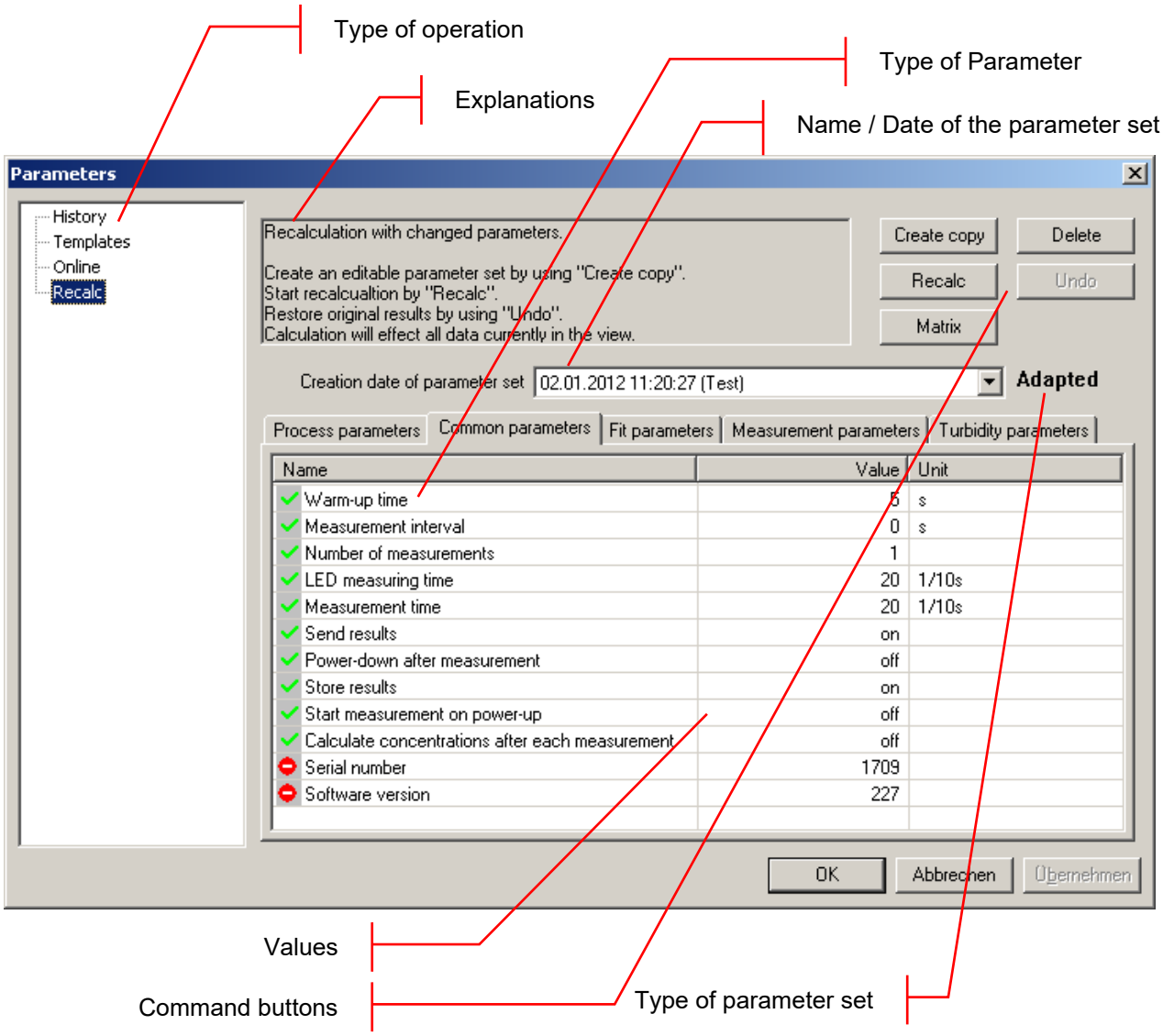


Access level “User”:



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

Overview



TYPE OF OPERATION

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

EXPLANATIONS

Gives a short introduction to what can be done.

BUTTONS

Export: exports the current parameter set to another database for recalculation
Clipboard: copies the current parameter set to the clipboard to paste it into another application such as Office Word or Excel etc.
Upload: sends the parameters to the connected instrument
Matrix: shows all the calibration parameters of the connected instrument in one window.

NAME OF PARAMETER SET

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

TYPE OF PARAMETER

Each tab shows the parameters of a specific topic.

VALUES

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

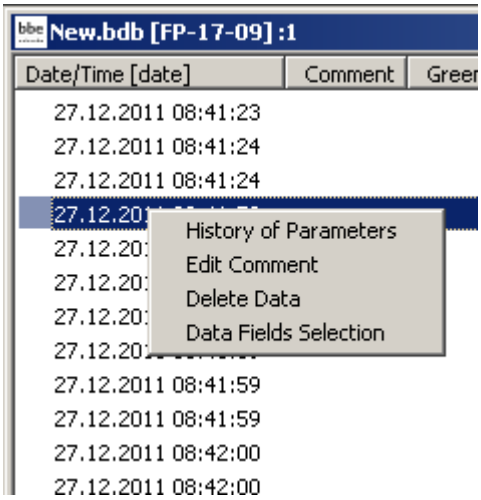
TYPE OF PARAMETER SET

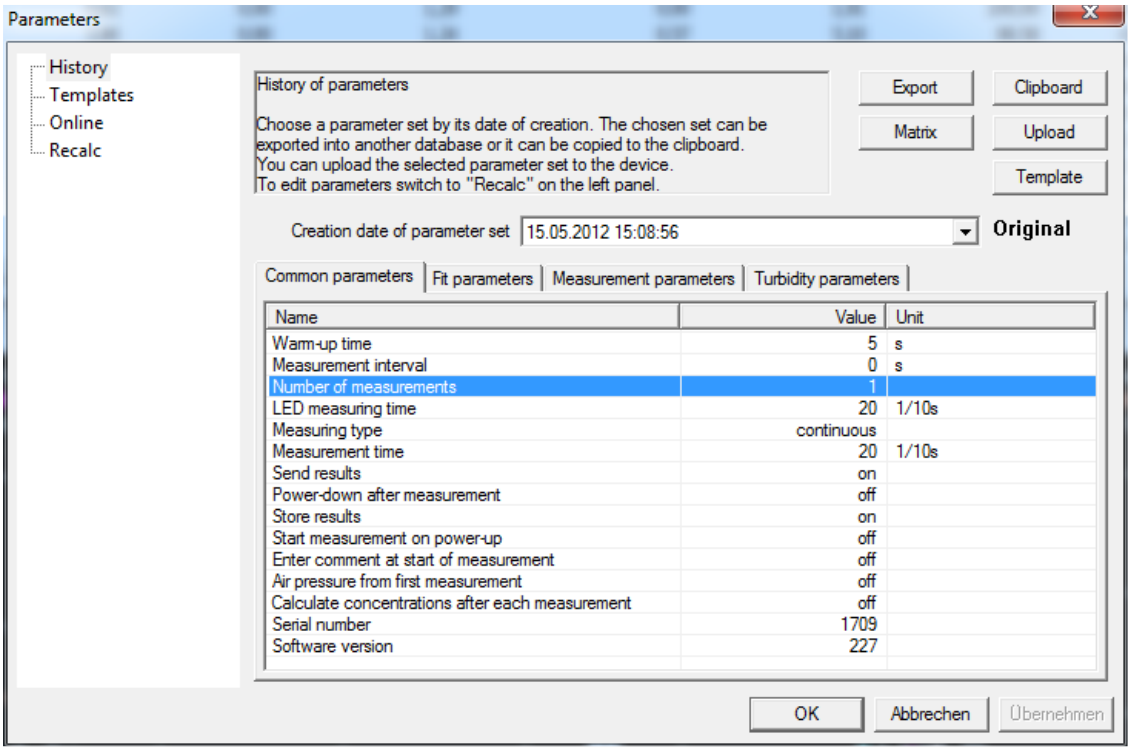
Indicates the type of parameter set:
Original: this parameter set has been used originally for a measurement, it cannot be deleted.
Adapted: this is a parameter set has been adapted by the user, it can be used to recalculate the datasets.

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

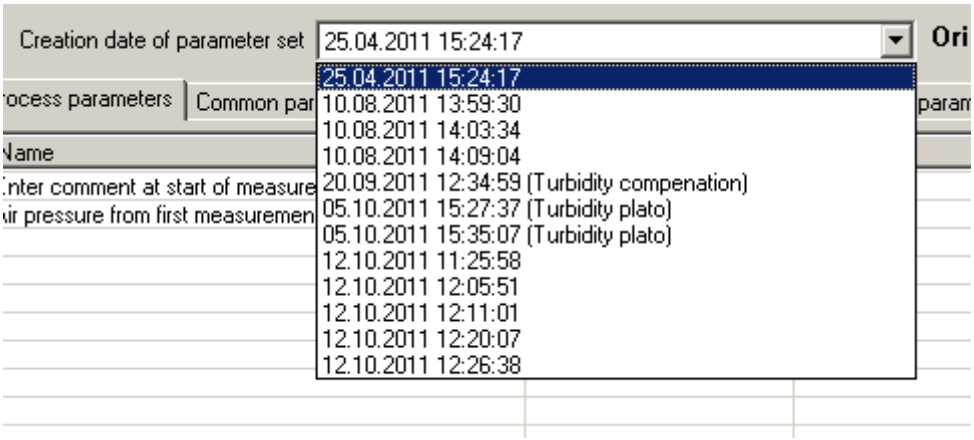
History – advanced functionality only

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

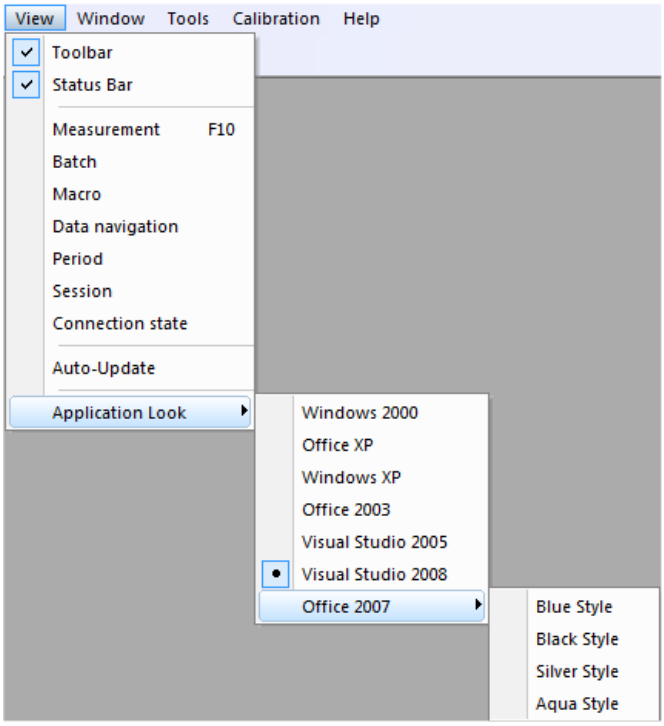




All parameter sets in the database can be displayed. To choose one parameter set, select the date from the drop-down box:

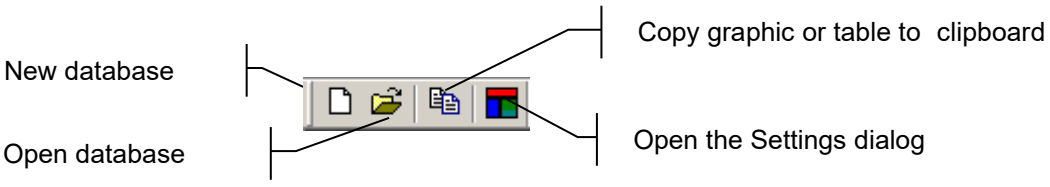


VIEW MENU



Toolbar

Displays or hides the toolbar.
The toolbar allows quick access to some important instructions:



Status Bar

Displays or hides the status bar.

Measurement

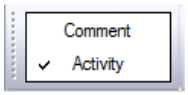
Displays / hides the measurement toolbar.
The toolbar “Measurement” is different for each type of instrument. It allows quick access to functions such as starting and stopping the measurement or retrieving the parameters.
The measurement toolbar of the FluoroProbe is given here as an example:

In case of the AlgaeOnlineAnalyser or AlgaeLabAnalyser a progress bar is integrated

Batch (AOA only)

In case of activating the batch mode, pumping and cleaning can be controlled by the user. The measurement is started with the start button in the measurement toolbar – but the selected sample has to be pumped in by clicking the pump button.
The checkboxes Transmission and Cleaning activate or deactivate the Transmission measurement and the cleaning during the measurement process.

Measurement mode (AOA and ALA only)



The checkboxes Comment and Activity do have the same functions as described in the chapter “tools -> submenu.

Macro

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

For the grey buttons, no macro has been defined.

Data Navigation

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

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

Period

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

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

Session

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

Connection State

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

The colour indicates the status:

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

To open the COM port setting click the coneection state button

Auto-Update

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

Application look

Changes the style of the application

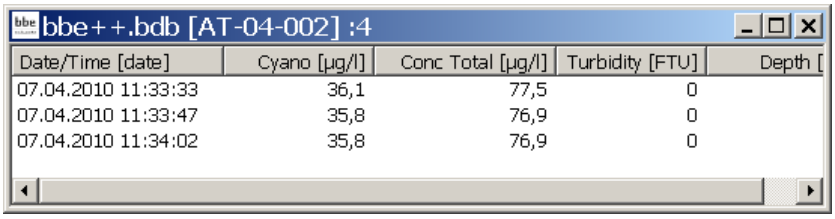
Window – Advanced functionality only

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

New Table Window

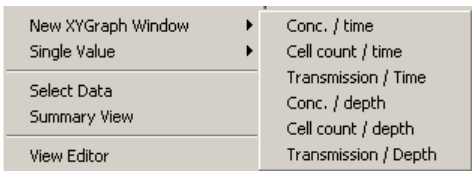
Opens a new window and displays the data according to the selected window type.

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



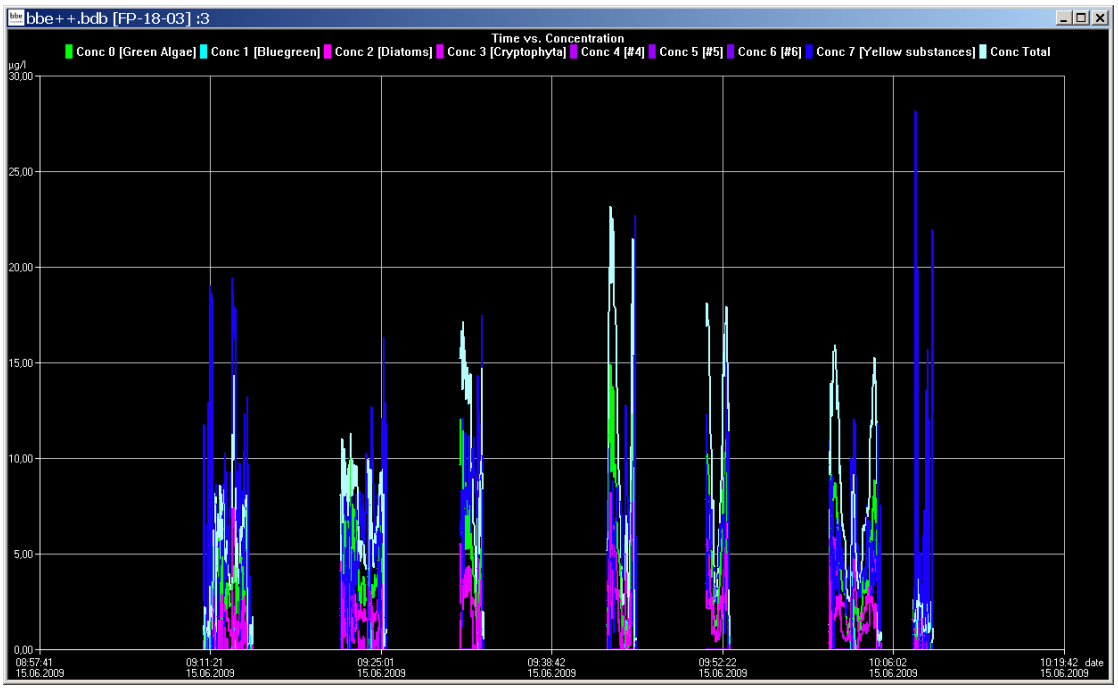
New XYGraph Window

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



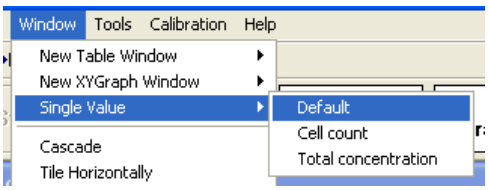
There are some view types pre-defined for each instrument. It is also possible to add new window types by using the view editor.

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

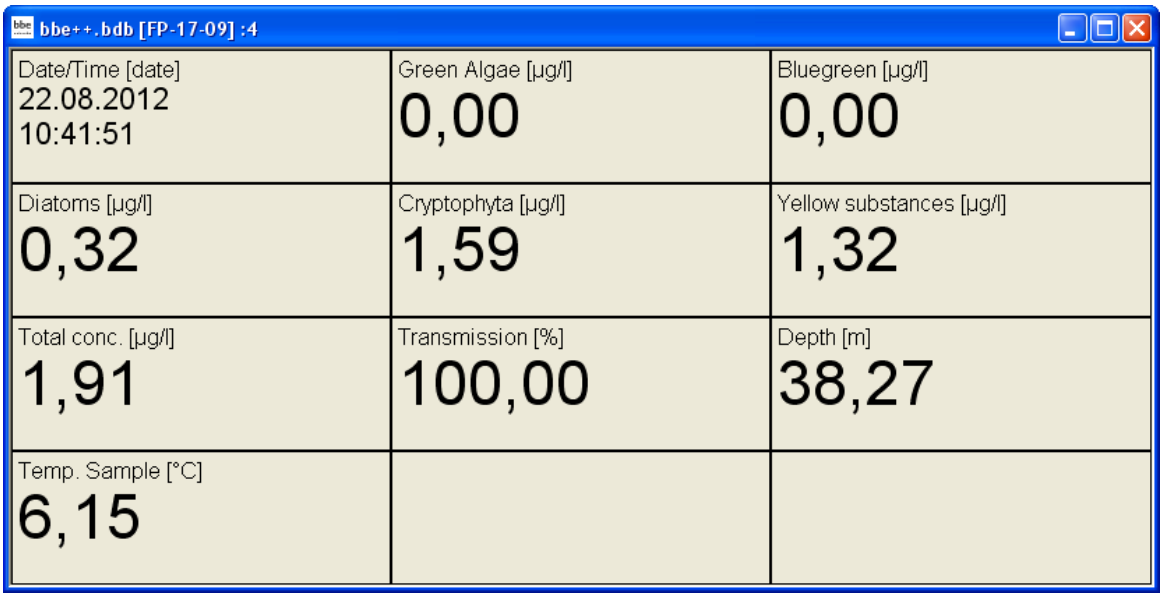


New Single Value View

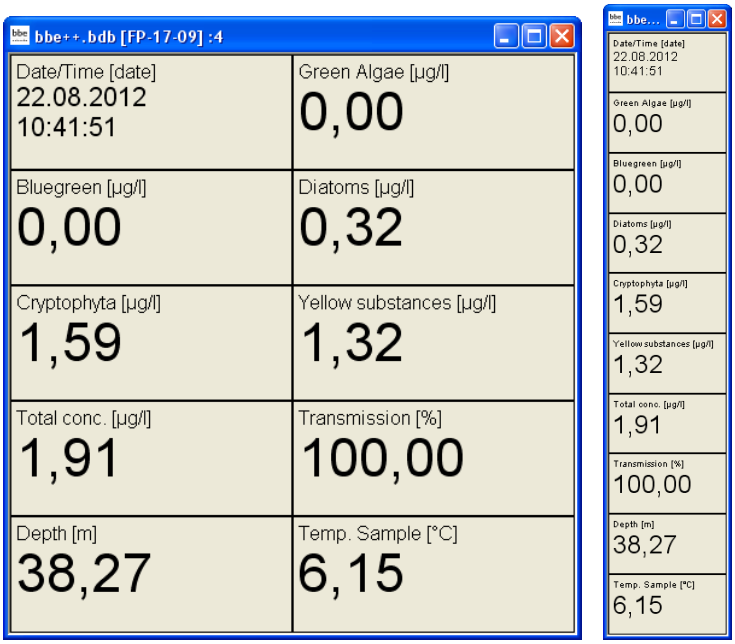
Opens a new window and displays the data of one data-set according to the selected window type.

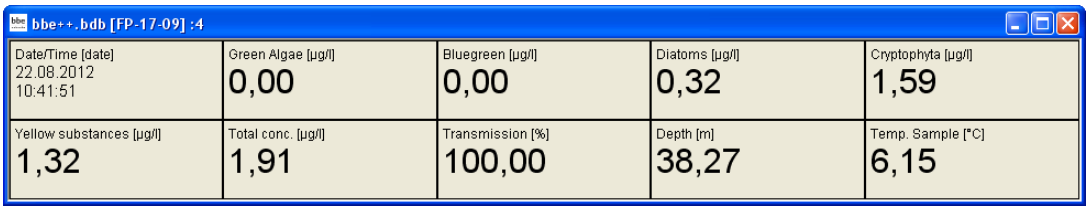


The data-set is shown in larger digits to help the user read the display even in bright sunlight. The latest data-set is shown.



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





Cascade

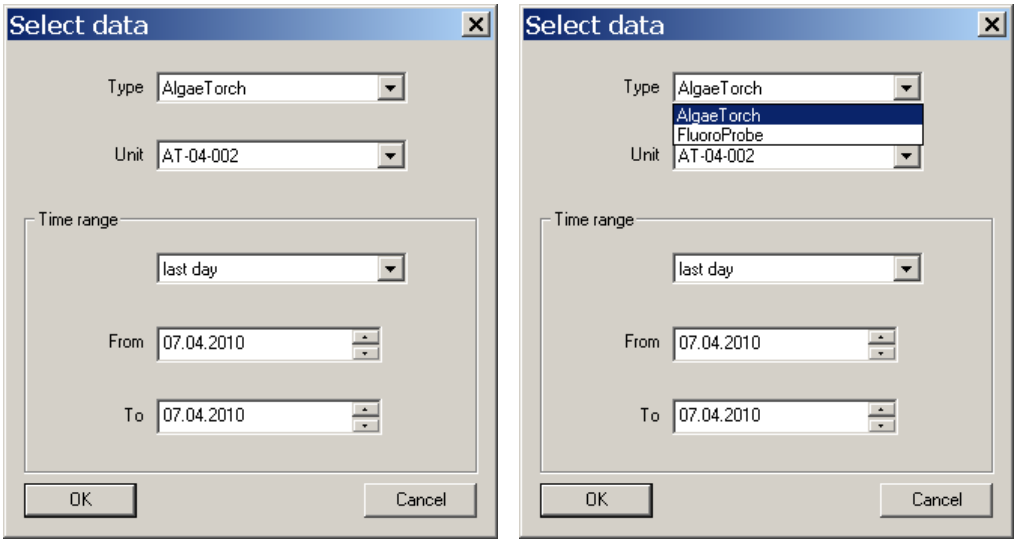
Arranges the windows one behind the other.

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.

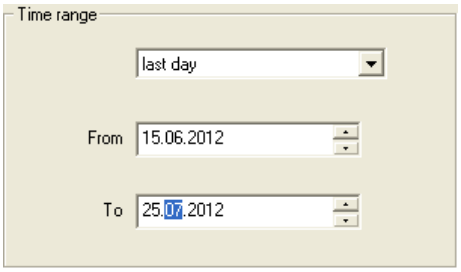


Type: shows the types of instruments available in this database.
Unit: shows the serial numbers of the type of instruments chosen above available in this database.

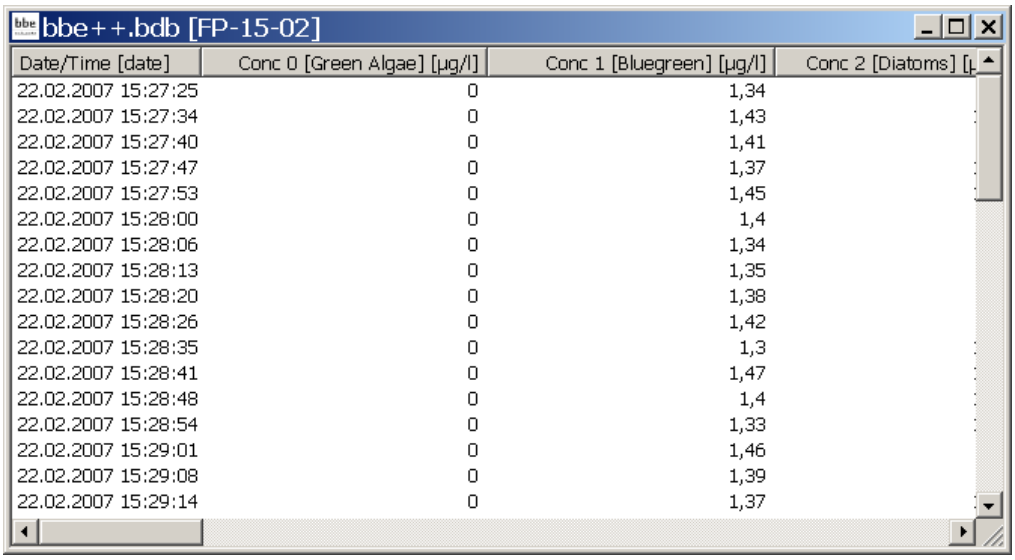
TIME RANGE

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.



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

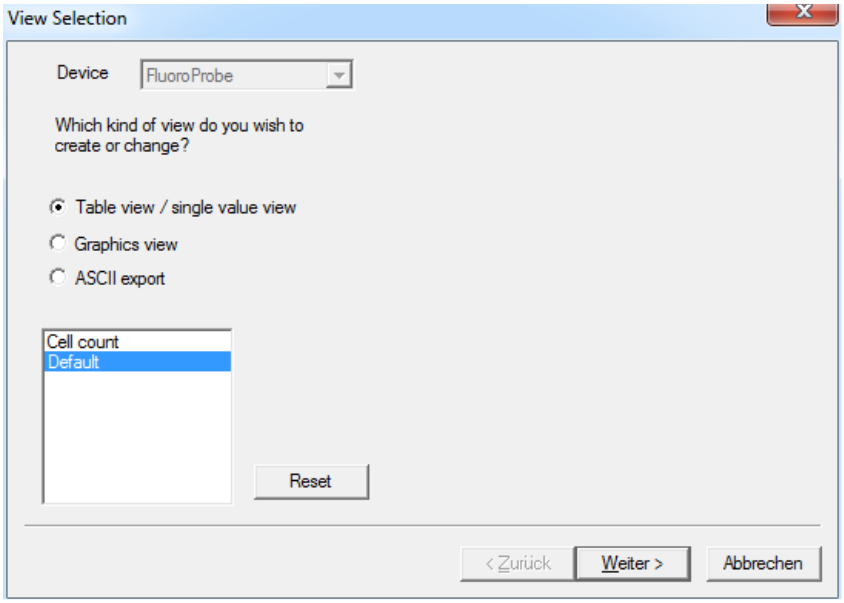
The View Editor is used to generate your own table or graphic window type as well as a template for the export to text files. The View Editor is an assistant that leads through the whole process.
When starting the View Editor, the current view is selected automatically to be edited or used as a template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

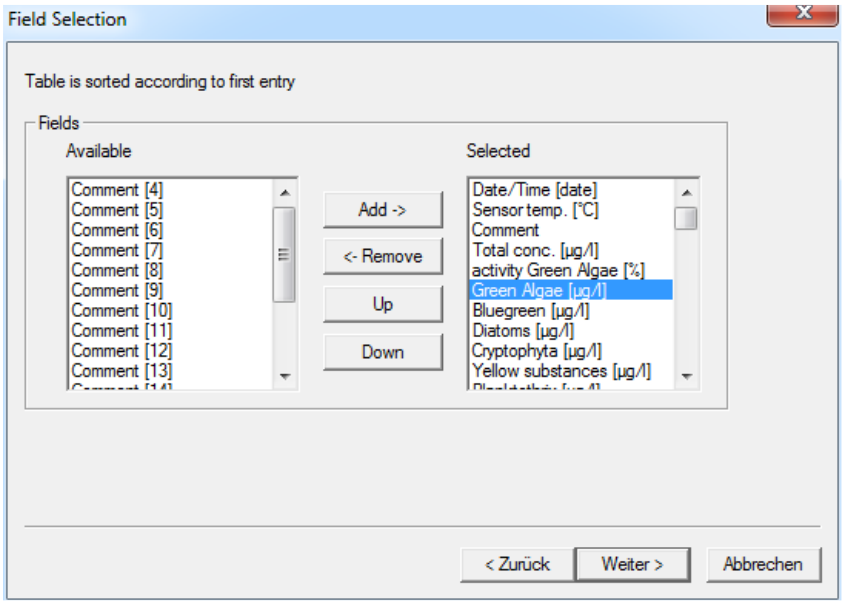


2. Choose the type of instrument the view is to be used for (in the example “FluoroProbe”).
3. Choose the type of view that is to be generated or edited (in the example “Table view / single value view”).
4. Choose one existing view to edit or as a template for a new one.

   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”.

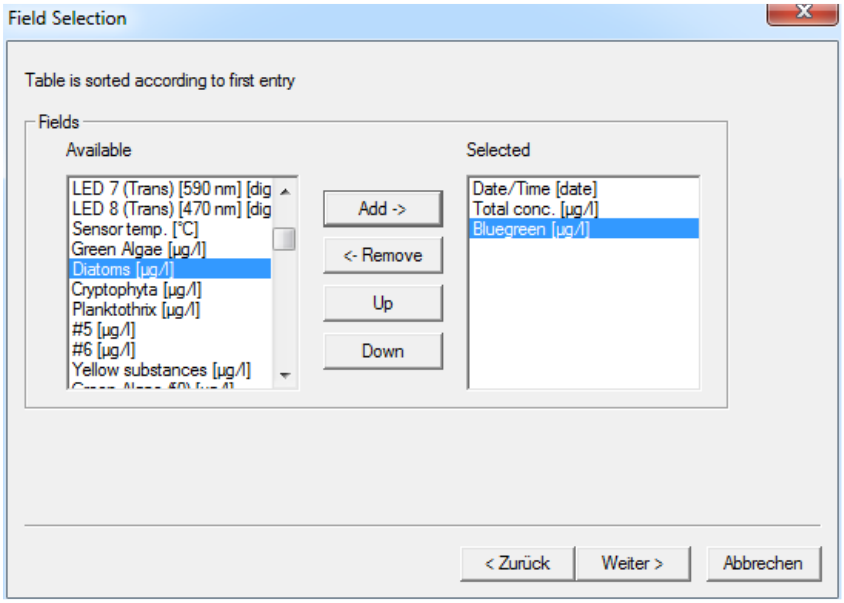
Field Configuration

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]”.

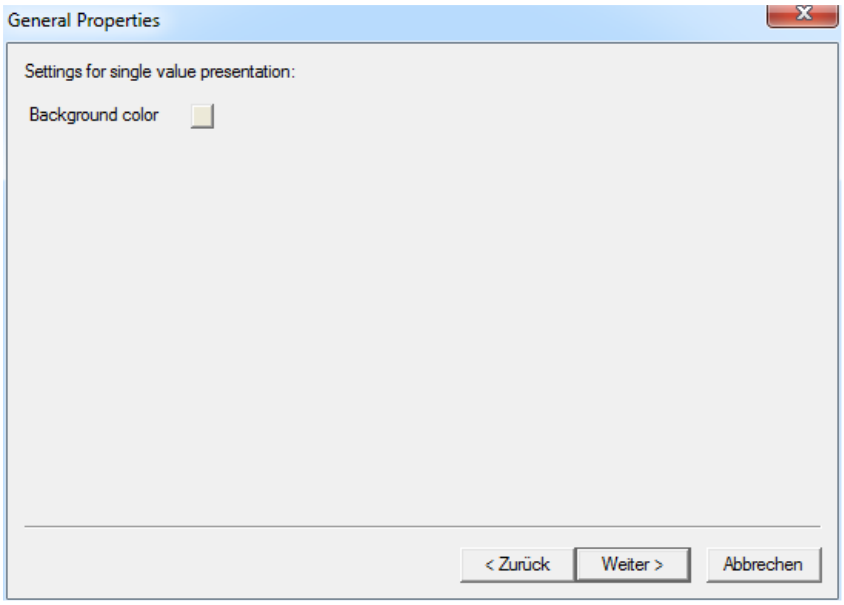
8. Click on “Total conc. [µg/l]” and ”UP” to change the order.



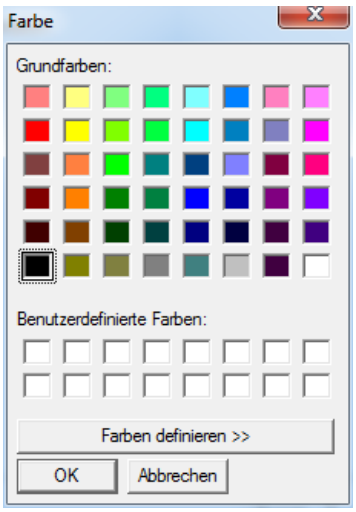
9. Click “Next”.

General Properties

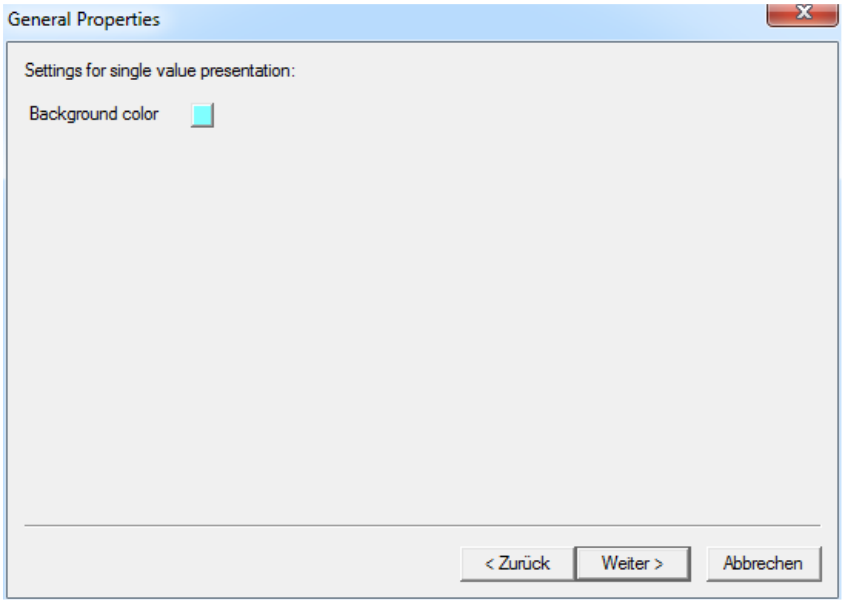
The General Properties page allows the user to change the background color of a “Single value” view.



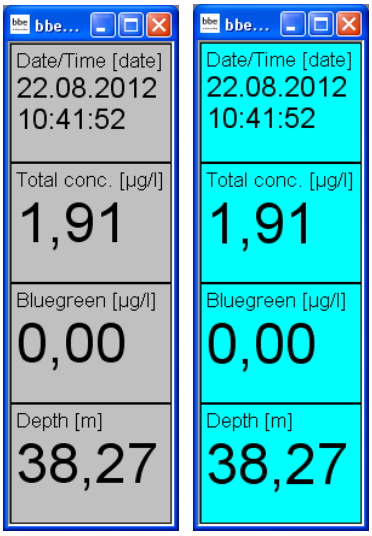
10. Click on the color picker box behind „Background color“ and choose a new color.



The chosen color is now shown in the color picker box

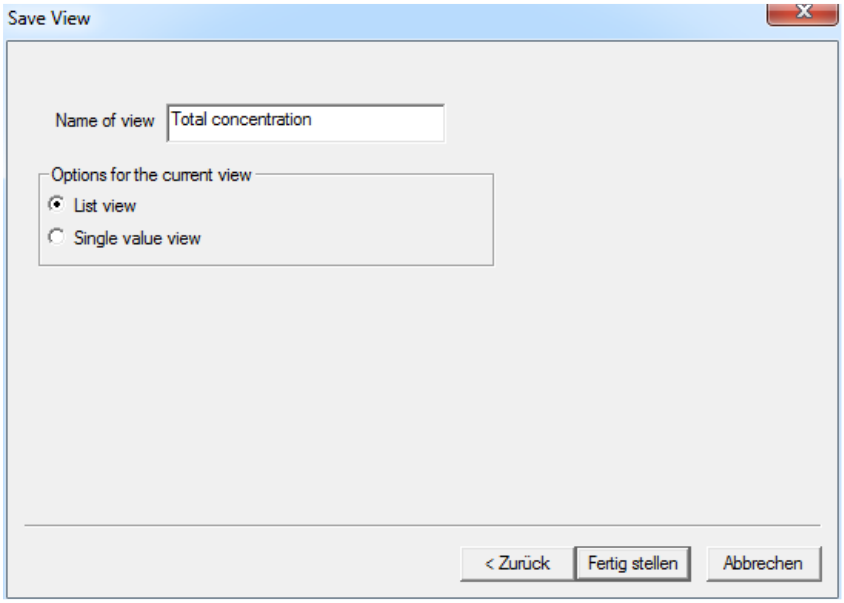


Example of a change in background color:

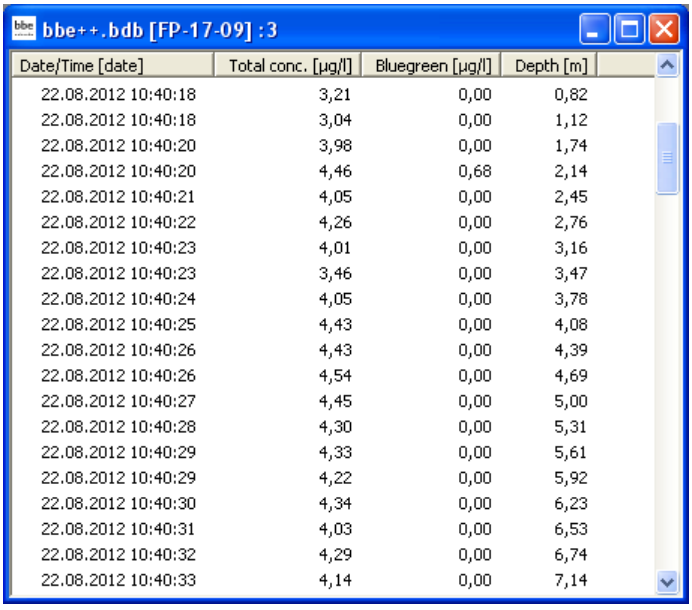


Save View

11. Enter a name for the view.

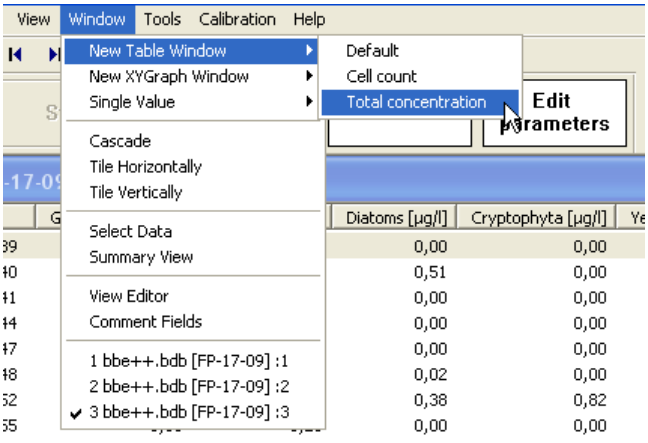


12. Click “OK” to confirm. The current data is then shown with the new view.



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

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

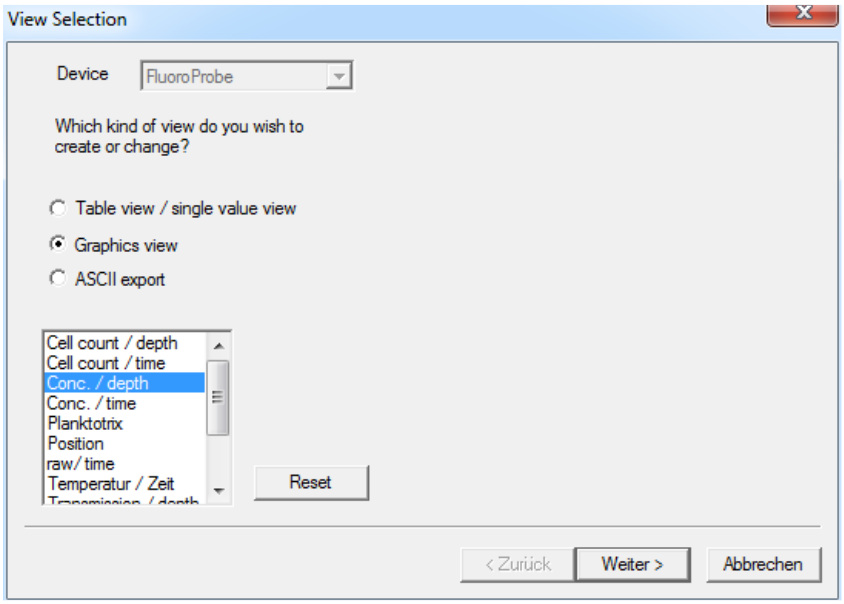


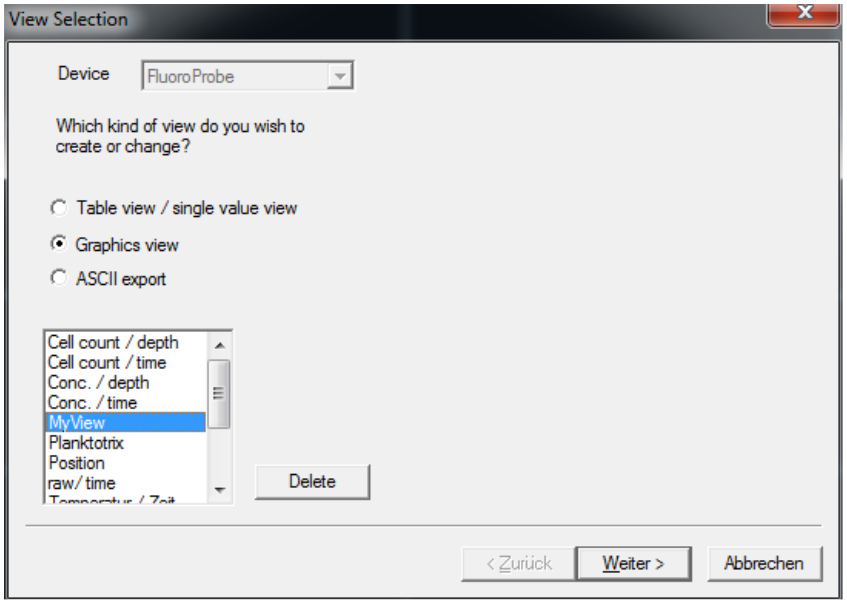
GENERATING AND EDITING A GRAPHIC VIEW WINDOW

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

View Selection

1. Open the view editor:



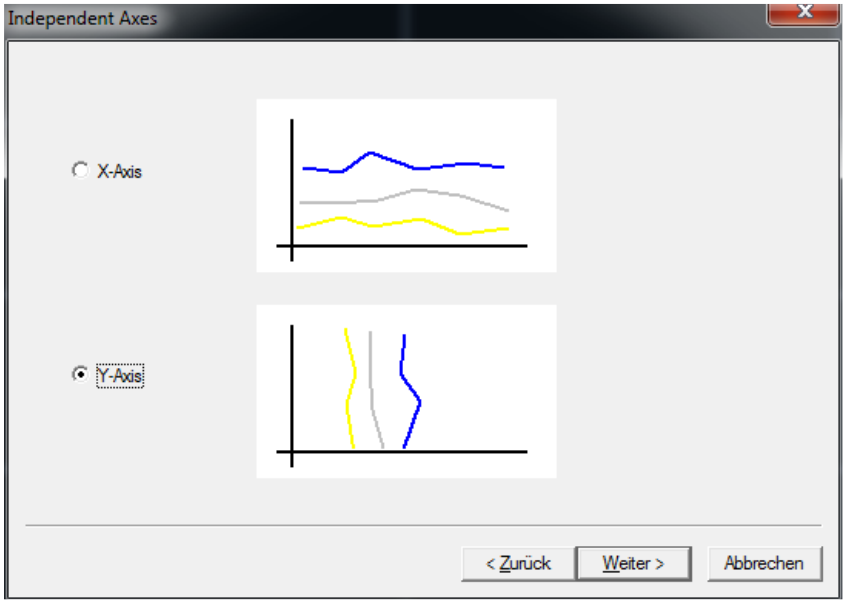


2. Choose the type of instrument the view is to be used for (in the example “FluoroProbe”).
3. Choose the type of view that is to be generated or edited (in the example “Graphics view”).
4. Choose one existing view to edit or as a template for a new one (in the example “Conc. / depth”).

   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”.

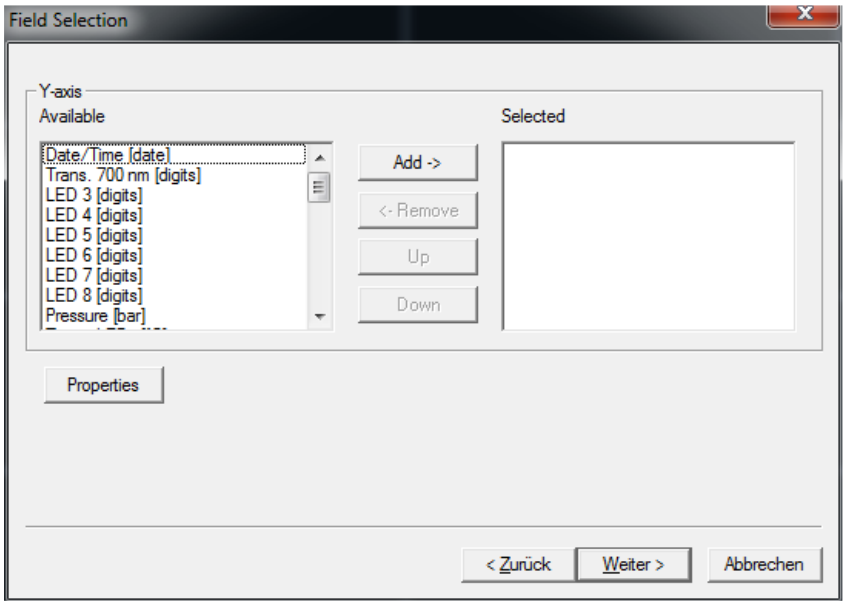
Independent Axis

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

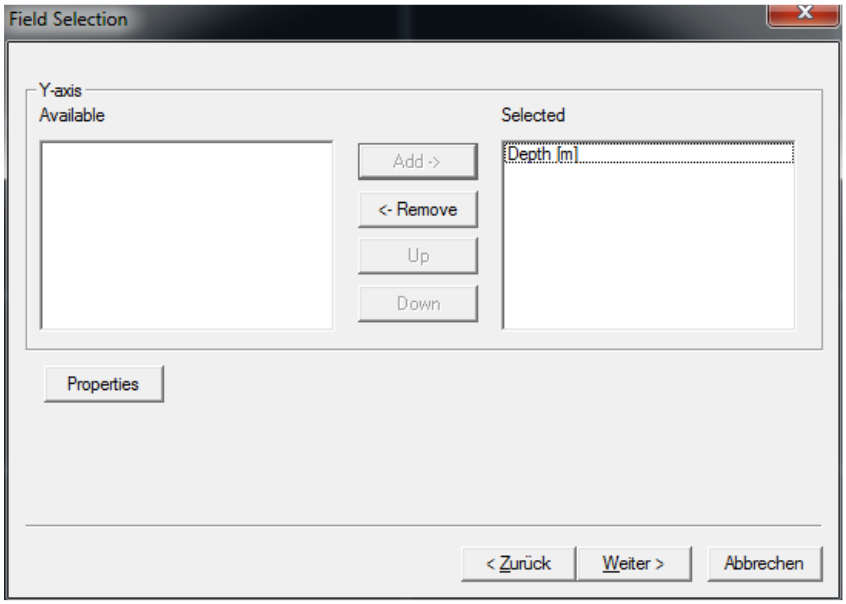


Field Configuration

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



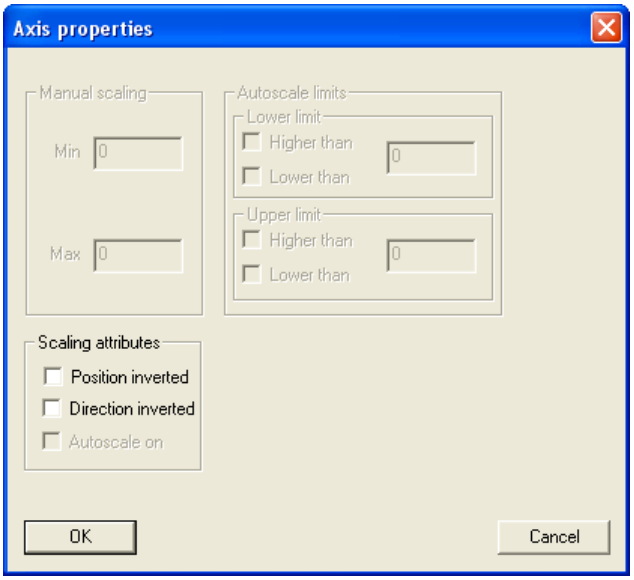
8. After choosing one entry all other entries vanish. Removing the entry by clicking "←REMOVE" brings back all available entries.



9. Click on „PROPERTIES"

Axis Properties - first axis

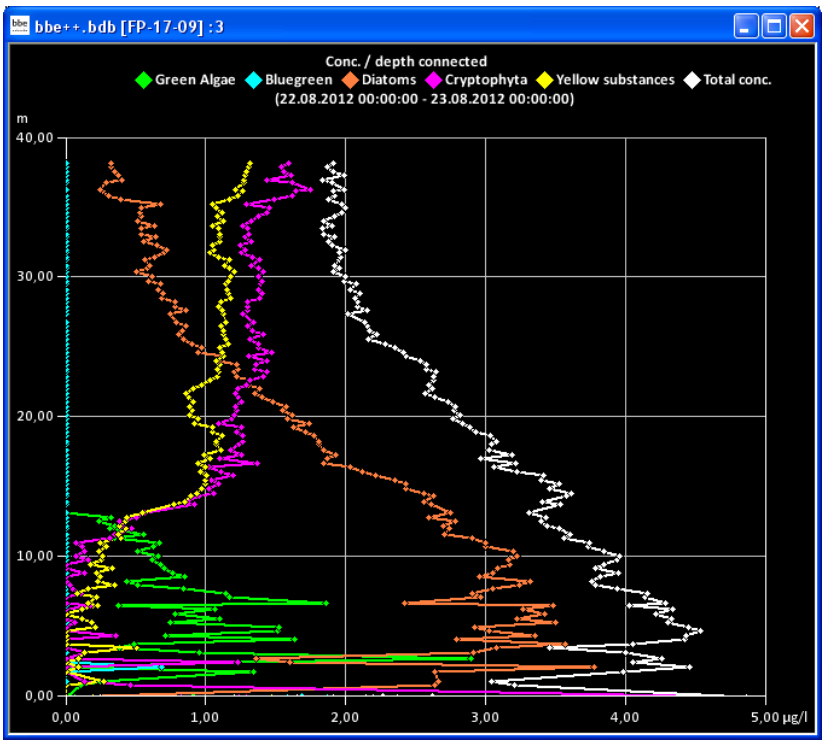
Some properties can be set for each axis. For the first axis, this is the position and the direction.

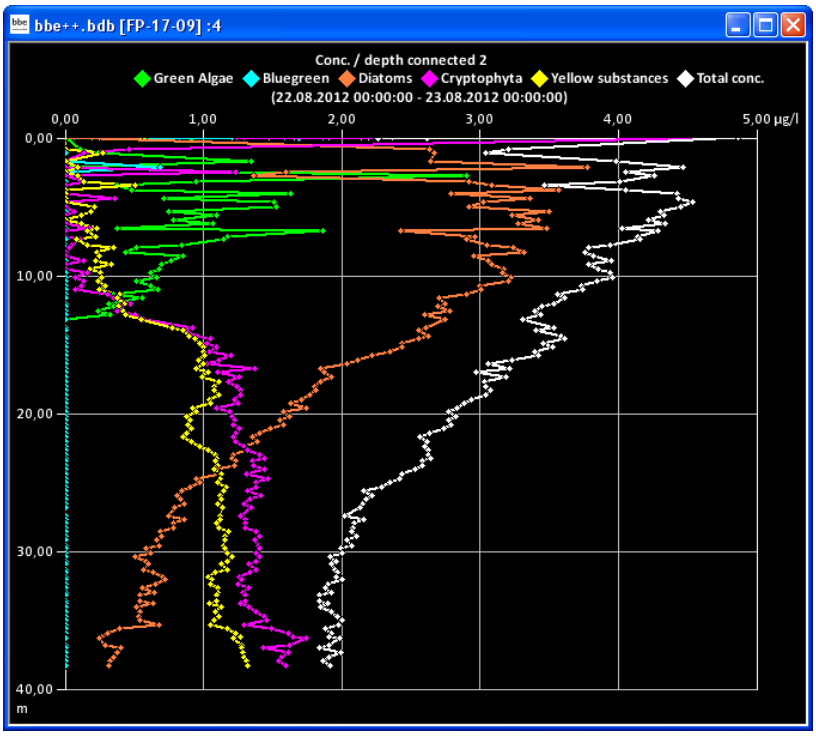


Normally the first axis is on the lower or left side of the graph. The direction is normally defined as:

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

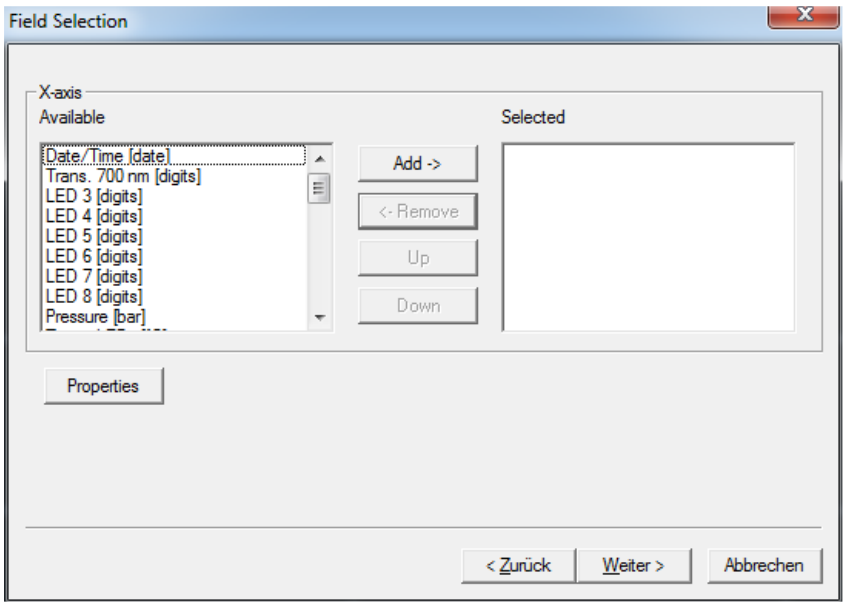
To display e.g. chlorophyll concentration versus depth, it is easier to use the top position of the X-axis and to invert the direction of the Y-axis for the depth. Please see the following example: the first picture shows the standard settings, the second one with a direction-inverted Y-axis and inverted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



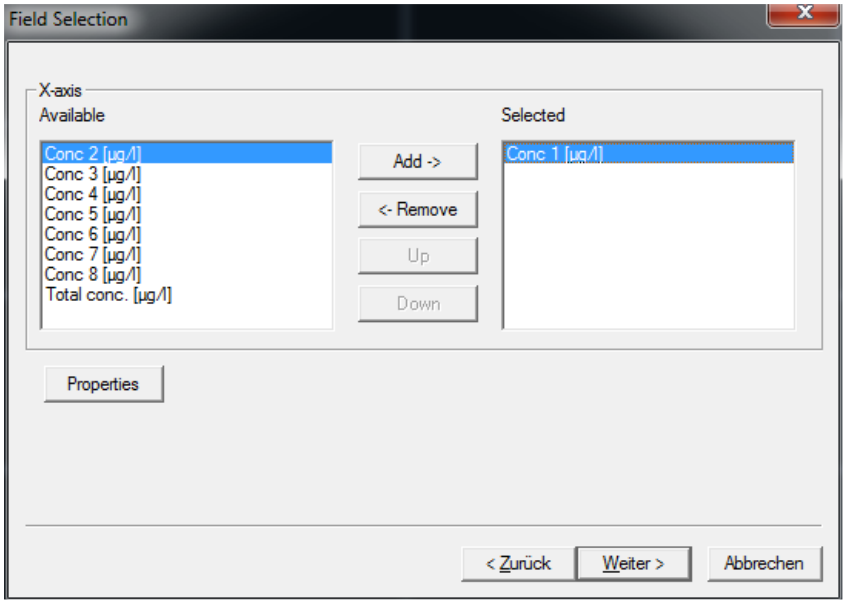


10. Click “OK” to confirm the settings.
11. Click “NEXT”.
12. Now the data and settings for the other axis can be selected.

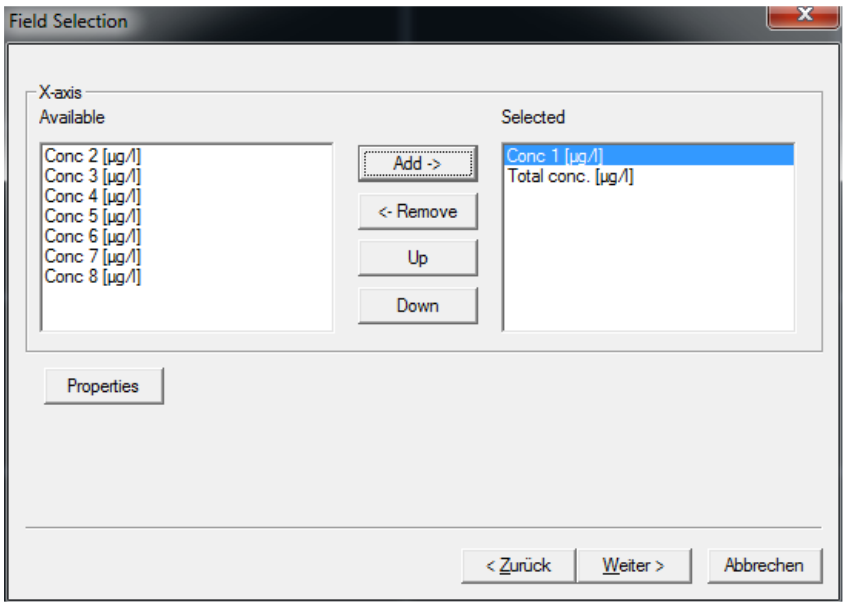
Field Configuration - second axis



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

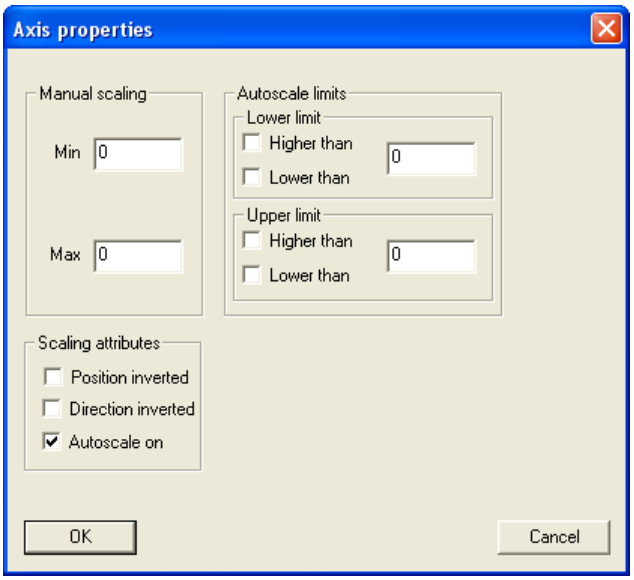


14. For example, “Total chlorophyll concentration” and “Bluegreen” have to be selected here.



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:

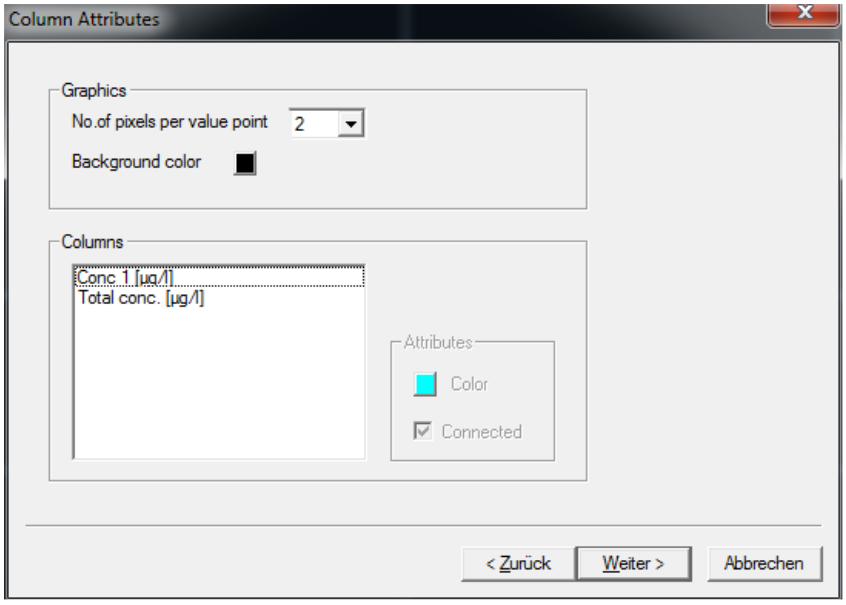
  In this case, it is difficult to analyze the data because the auto-scaling generates a high span value. To prevent this, please use:
  lower limit: higher than for outliners with low values and
  upper limit: lower than for outliners with high values
  This leads to an optimized span in the graph.

15. Click “Next”

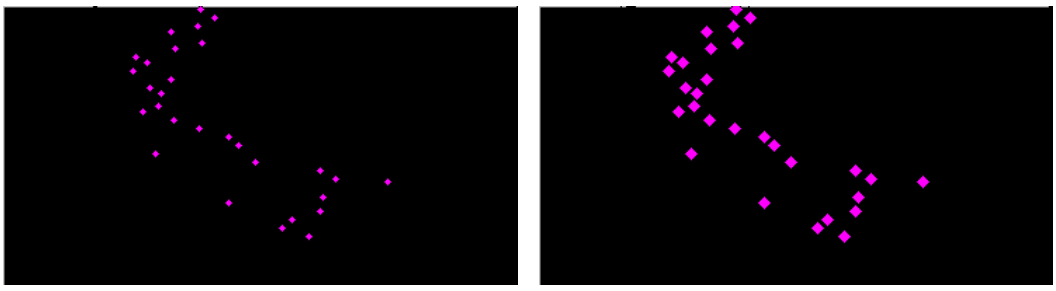
Attributes

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

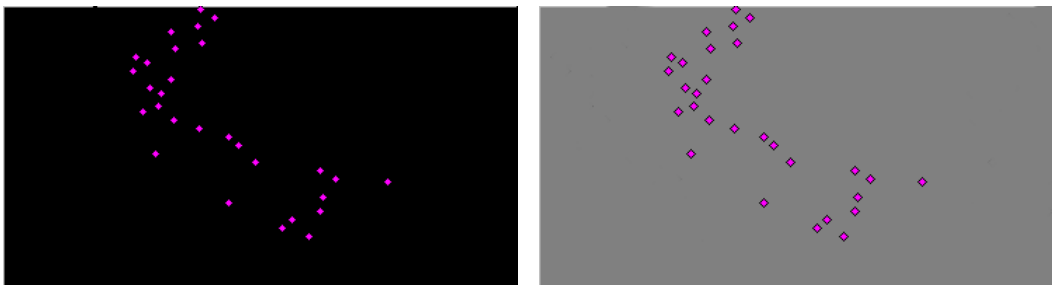
16. Set the value in the attributes window according to your needs.



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:

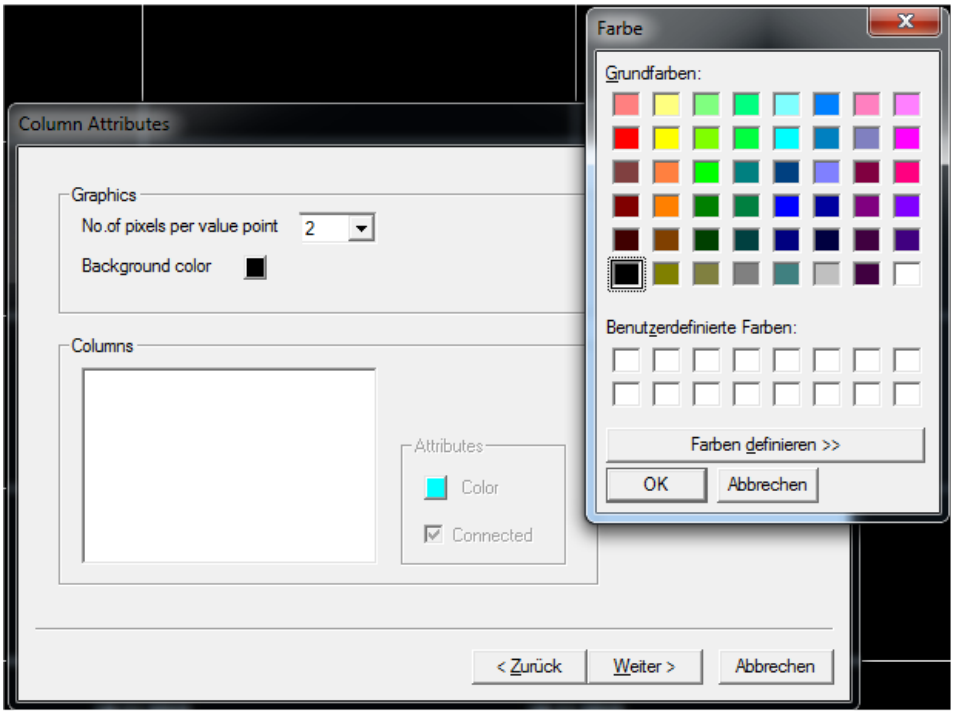


Different background colors:



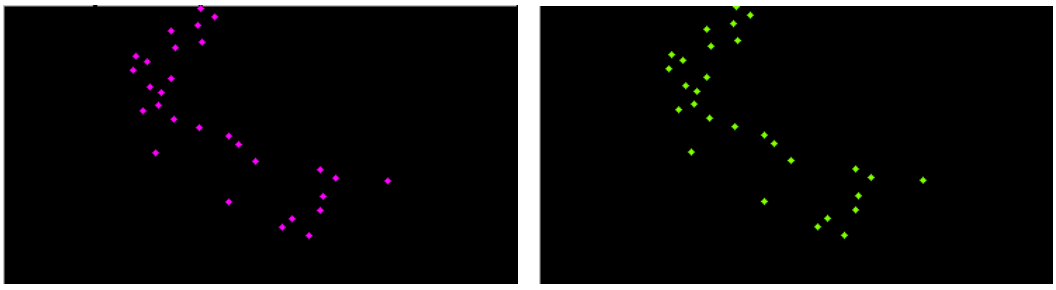
Column Attributes

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.

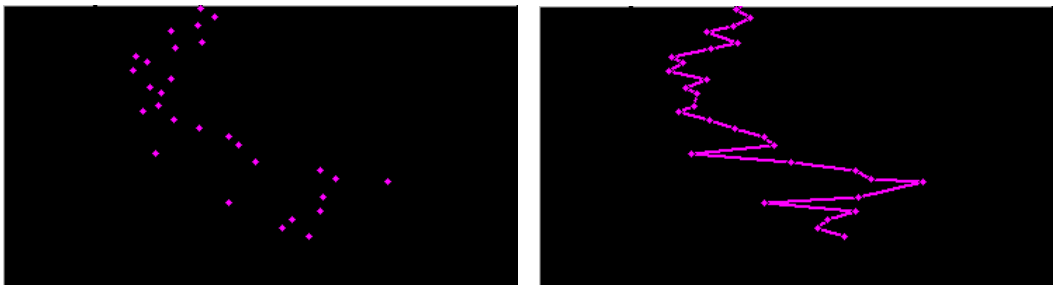


Hint: The data points are not connected if the time of measurement differs more than the given value in "TOOLS → SETTINGS → DISPLAY".

Different dot colors:



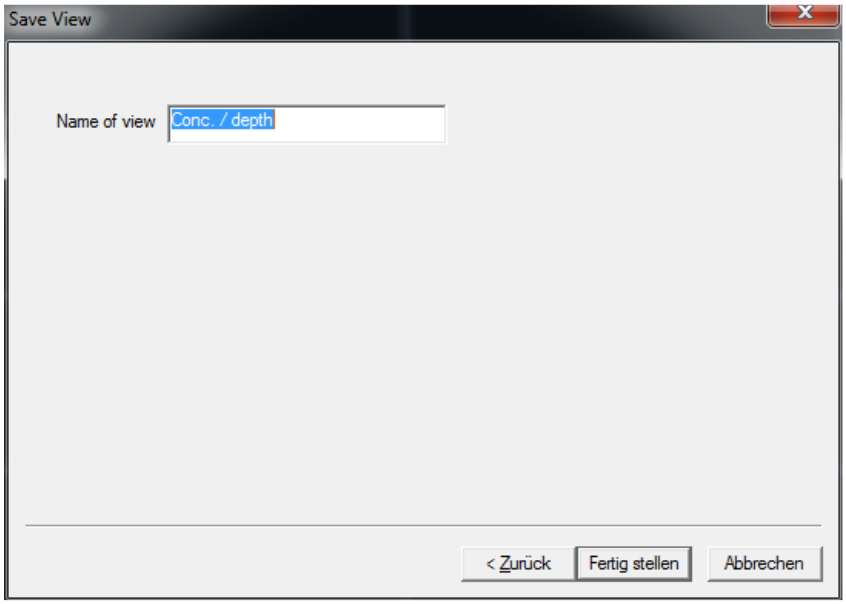
Unconnected dots / connected dots:



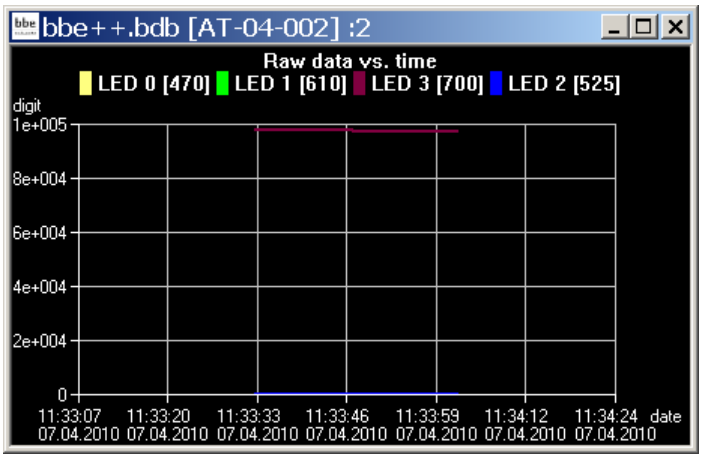
17. Click "Next"

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.



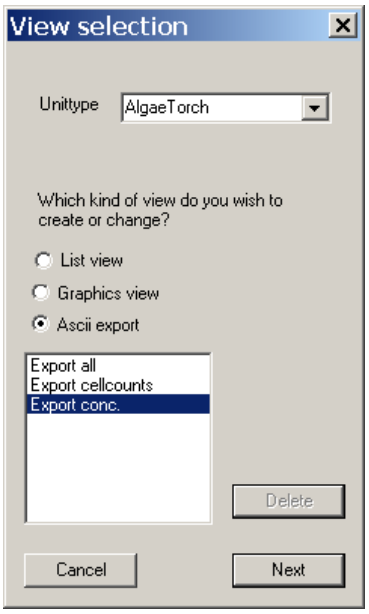
19. The current data is shown using the new view after clicking “OK”.



GENERATING AND EDITING AN ASCII EXPORT

View Selection

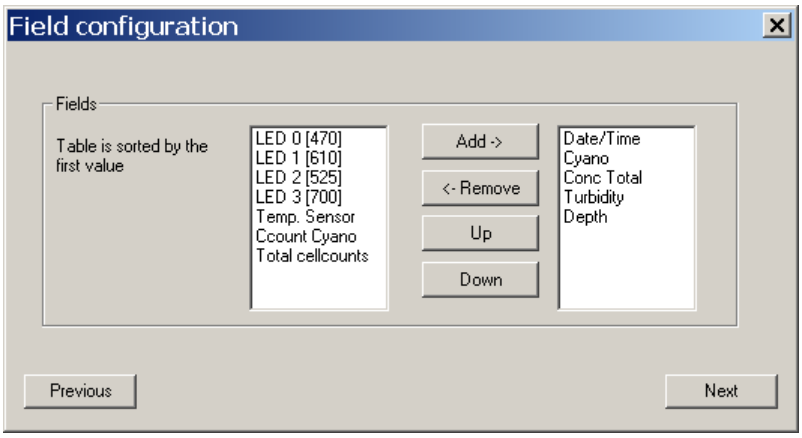
1. Open the view editor:



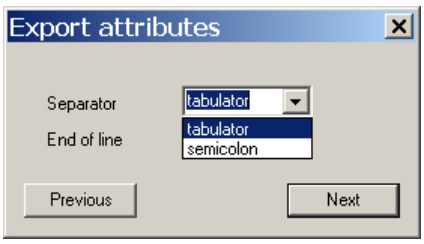
2. Choose the type of instrument the export is to be used for (in the example “AlgaeTorch”)
3. Choose the type of export that is to be generated or edited (in the example “ASCII export”)
4. Choose one existing view to edit or as a template for a new view. The delete button is used to delete a view. It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

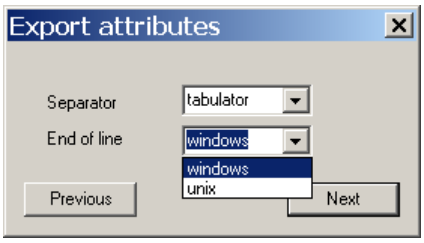
Field Configuration

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”.

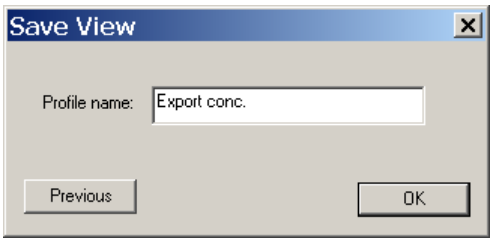




8. Define separator and end of line characters according to the needs of the importing software.
9. Click “Next”.

Save View

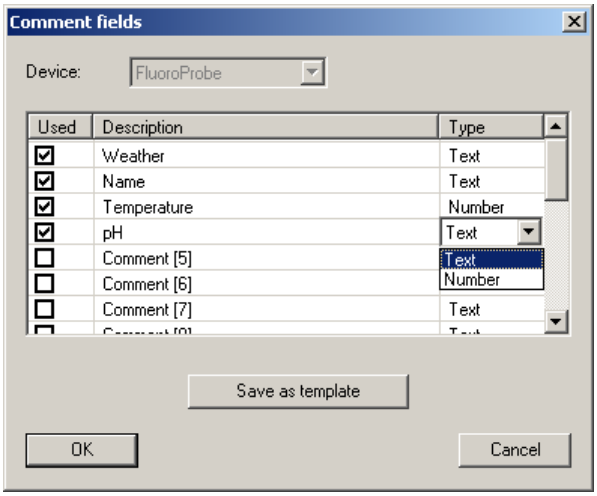
10. Enter a new name for the view. It is not possible to edit pre-defined views. Please store a view based on a pre-defined view with a new name.



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.



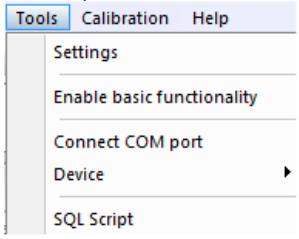
Type of instrument:	the type of instrument is defined in the settings "TOOLS → SETTINGS → ACCESS".
Used:	if tagged, the comment can be used at the start of the measurement, otherwise the comment is hidden.
Description:	name of the comment
Type:	"Text" allows entry of text, "Number" allows digits only;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

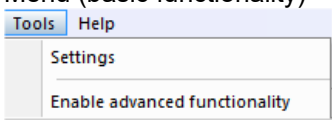
Shows all the currently opened windows.

TOOLS

Menu (advanced functionality)



Menu (basic functionality)

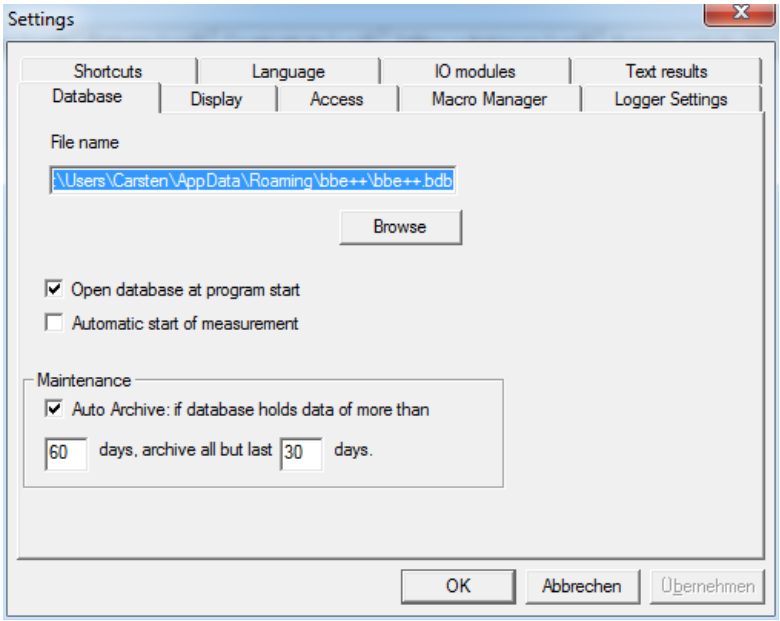


Settings

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

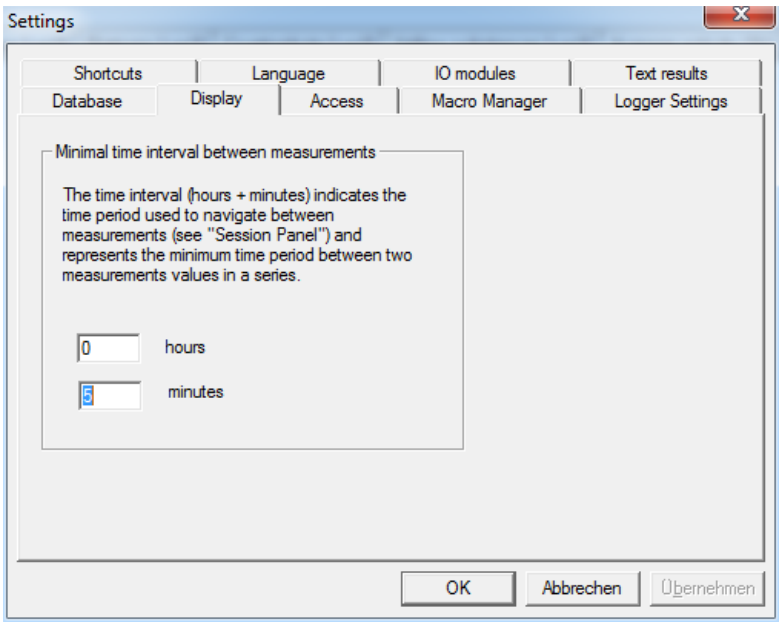
For continuously working instruments (AOA or FluoroProbe / AlgaeTorch) the software can be configurated to start the measurement directly after starting the software. The feature can be used to ensure, that the measurement starts again after a power fail.

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.

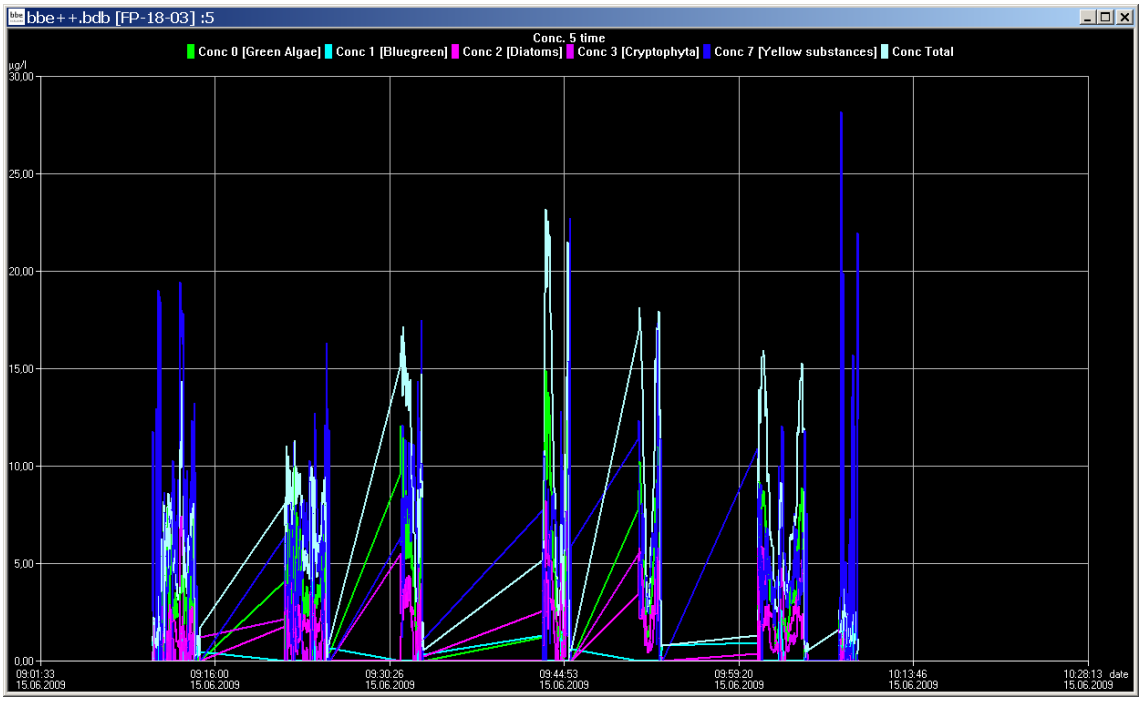
DISPLAY

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.

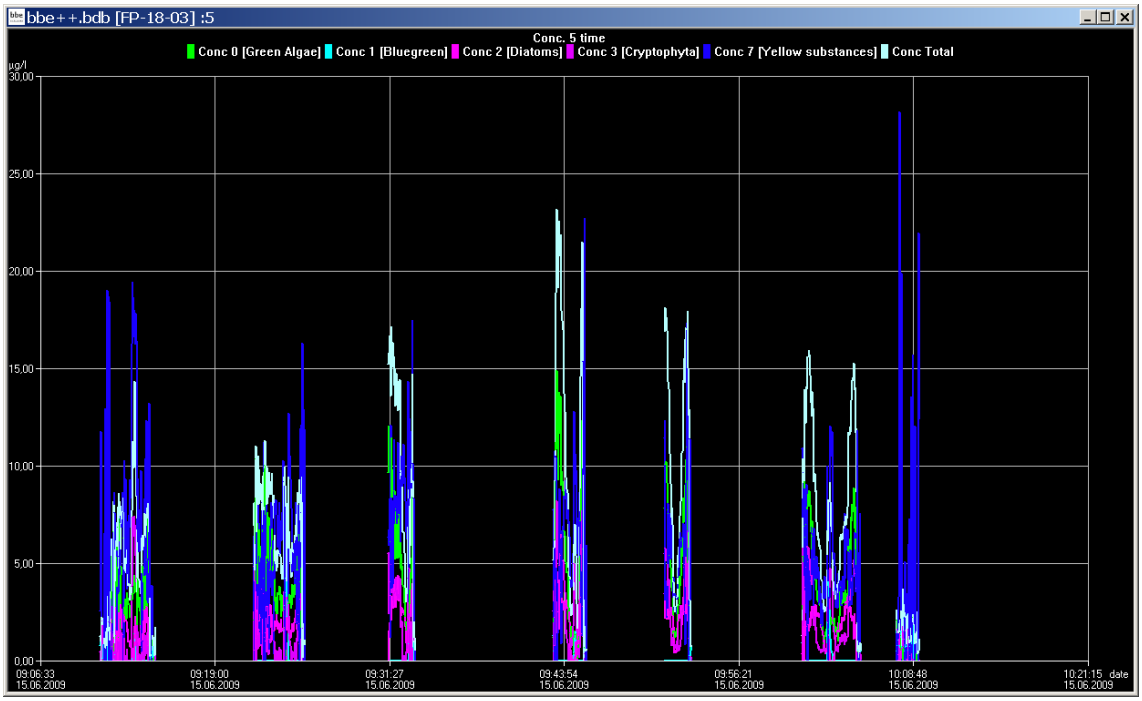


Next and previous measurement buttons in the toolbar.

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

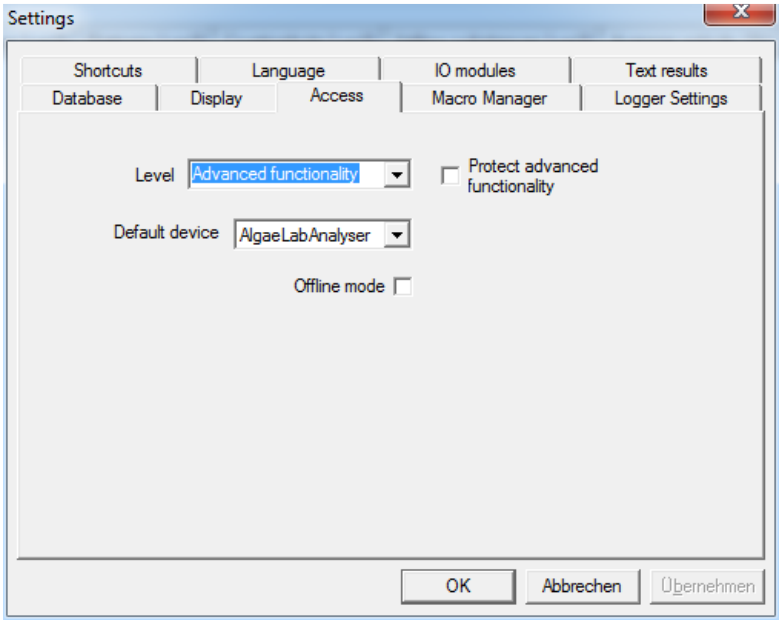


Minimal interval set to 1 minute

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.

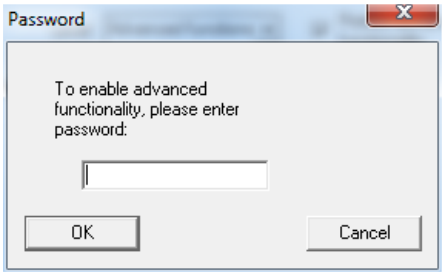


User-levels:

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

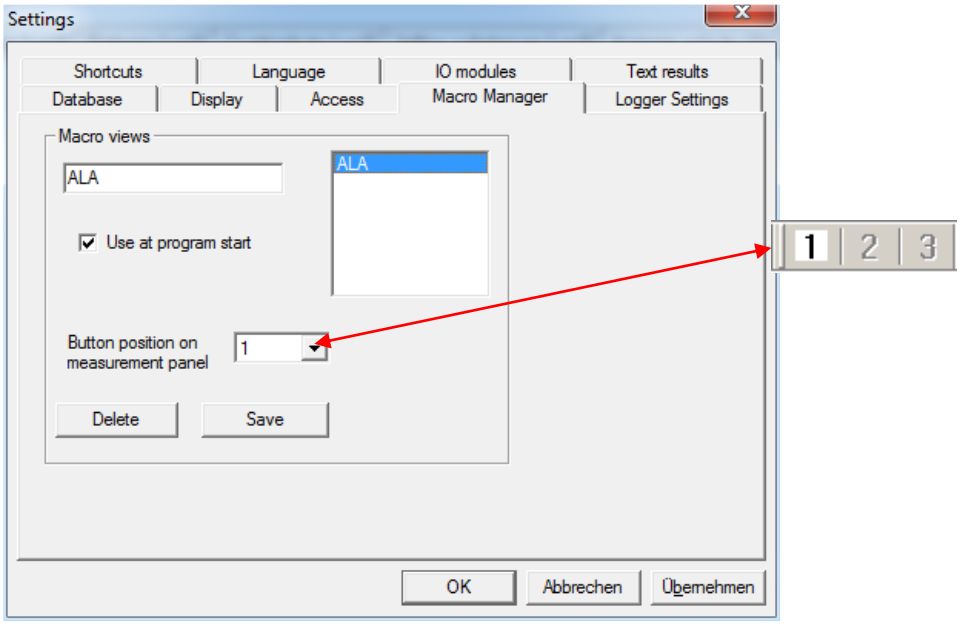
The bbe++ software is able to control different types bbe instruments, but only one type at one time. The type of instrument is entered here. Various settings within the bbe++ software can only be made for the default type instrument. To make entries for an other type of instrument, the default type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

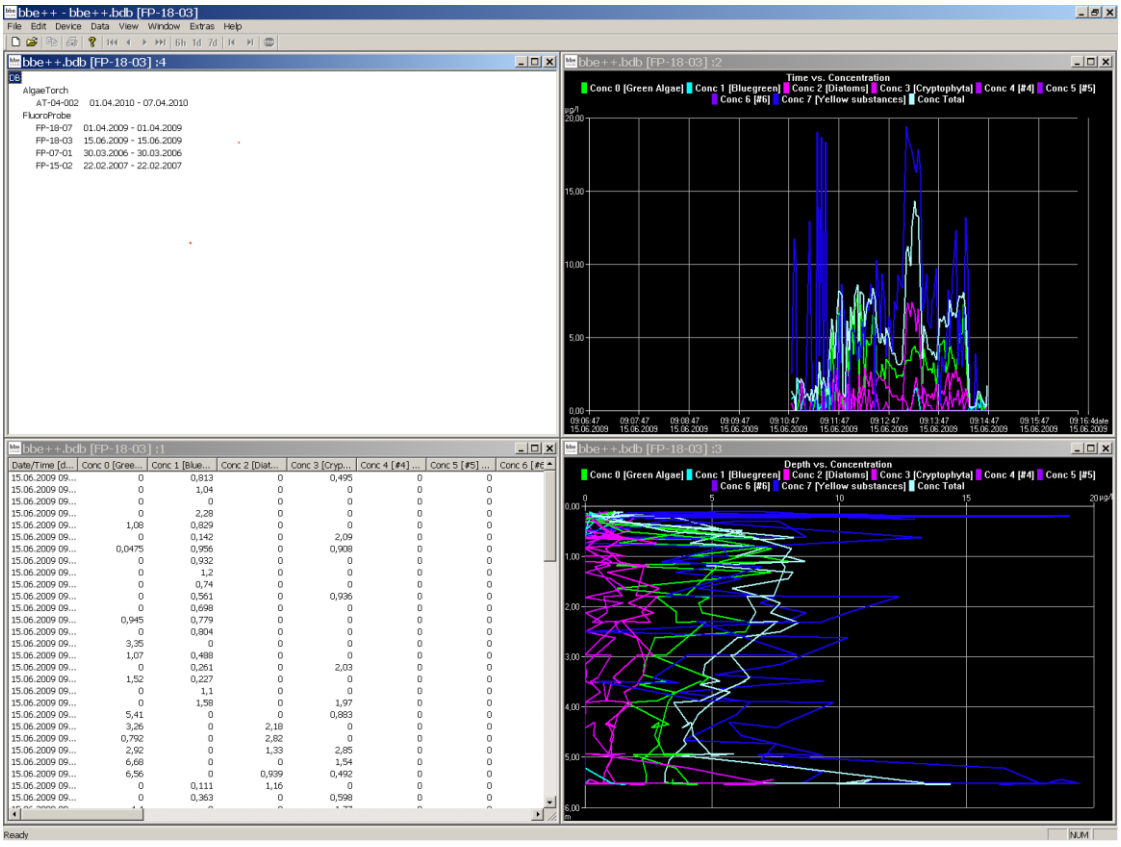
MACRO MANAGER

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++.



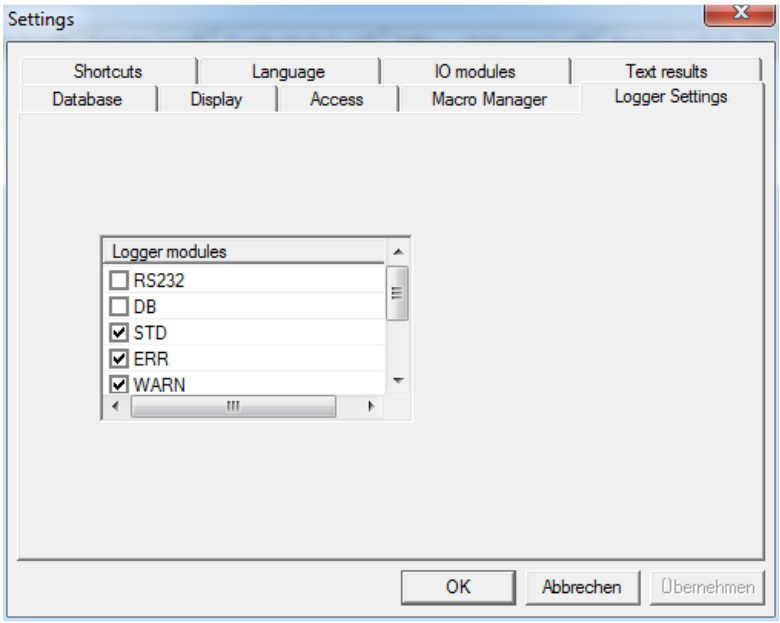
To generate a new view macro:

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



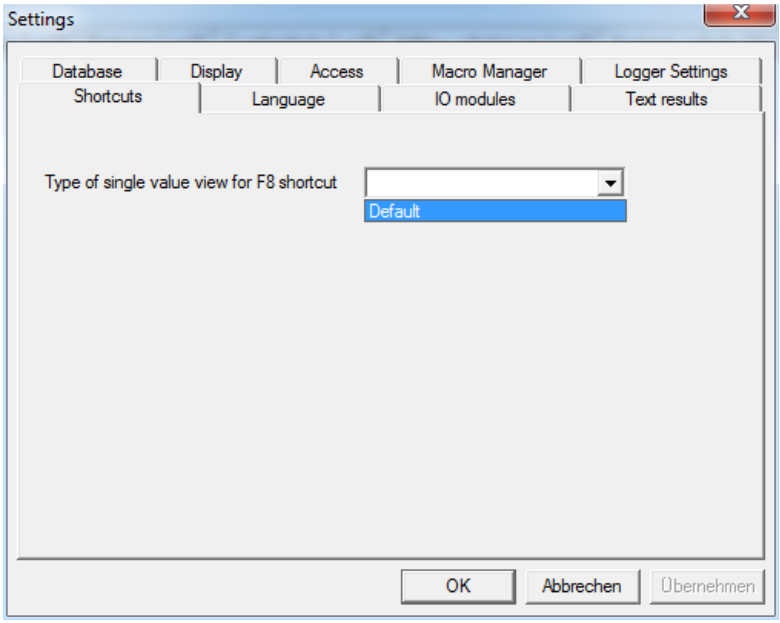
LOGGER SETTINGS

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

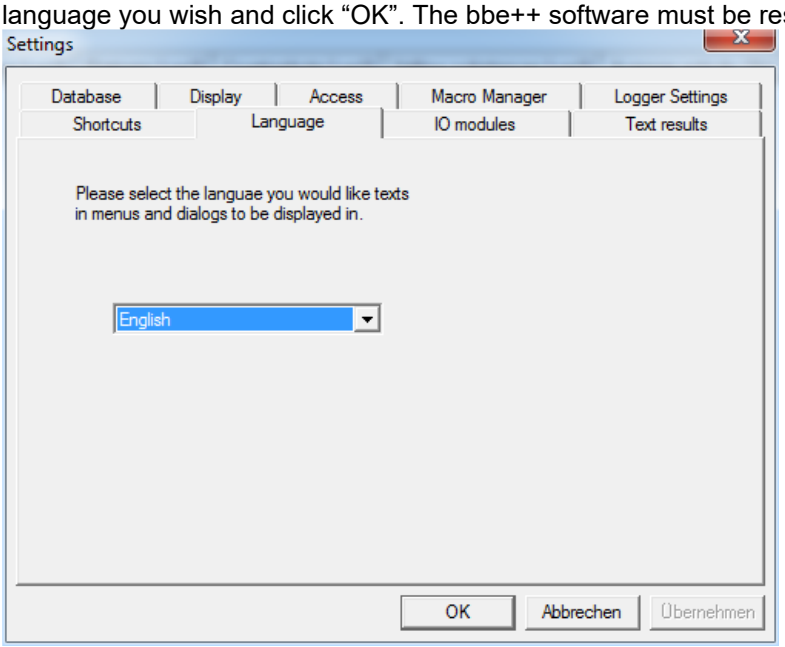
With the F8 key, one single view can be retrieved. Please enter the single view macro to be used for this.



F8 shows the selected macro

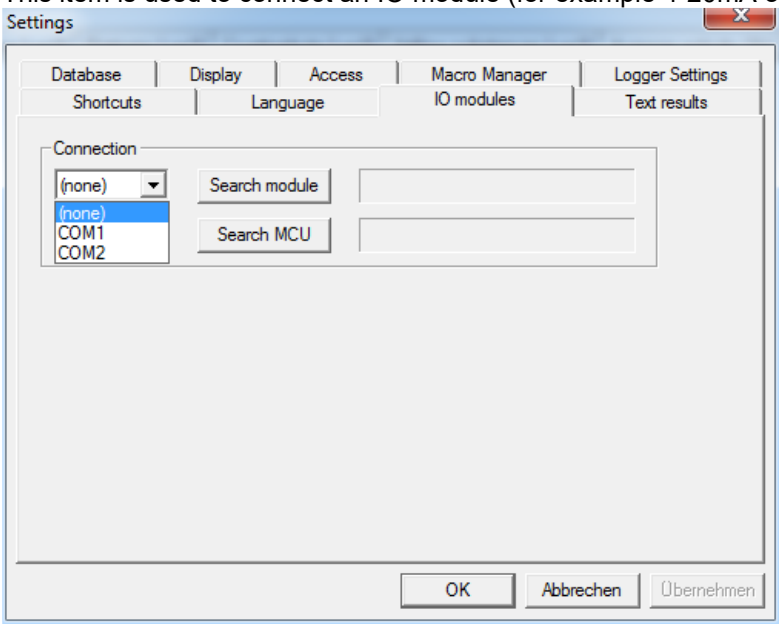
LANGUAGE

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.

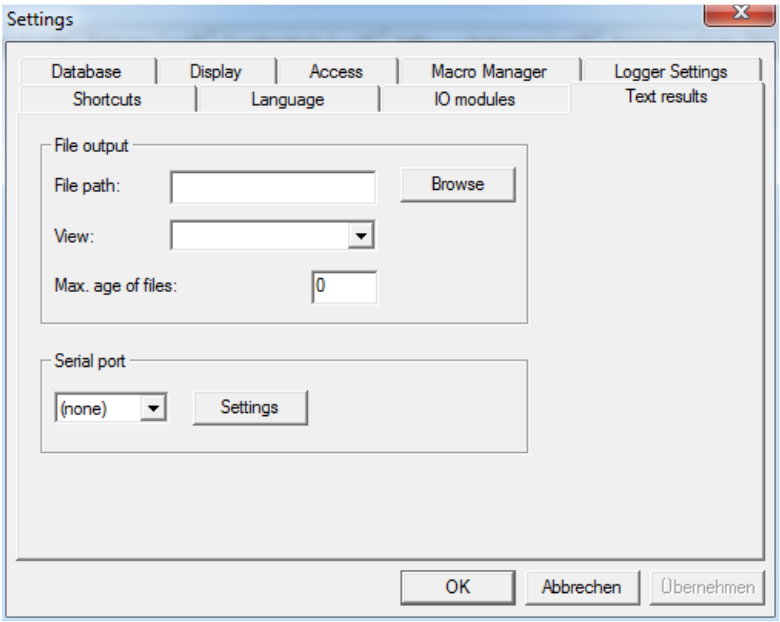


- the COM port can either be chosen from the drop down box or the software can search all COM ports for the selected instrument.
- once an instrument has been found the COM port is stored for the next use.
- To configurate the devices goto Tools -> device -> … . This item is not available for all instruments.

With “search MCU” a multi channel unit for the AlgaeOnlineAnalyser can be conncted.

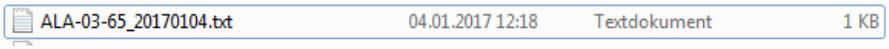
TEXT RESULTS

This item is used to do the configuration of writing text files and sending data via RS232.



FILE OUTPUT

If the file output is configured daily text files are written by bbe++. The files are stored in the path given in “file path”.
The name is the serial number of the instrument date:



The format of the output is defined by a “view” of the type “ASCII export”. For details please see the chapter “view editor”. In the view editor the data columns and the format can be defined.
Files older than given in the “max. age of files” are deleted automatically. If this is set to “0” no files will be deleted.

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.

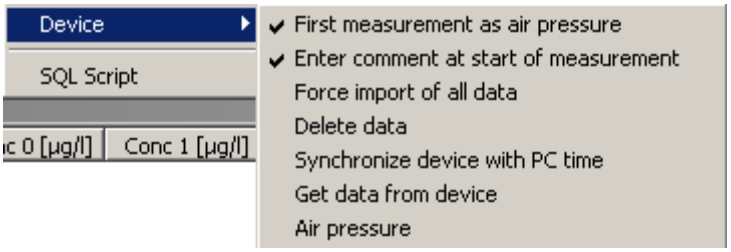
Device

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

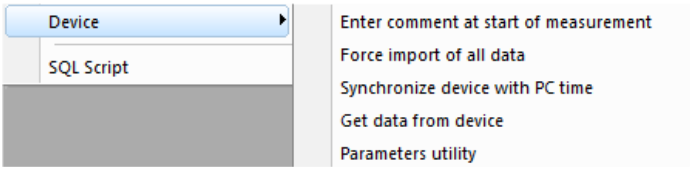
DEMOMODE

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

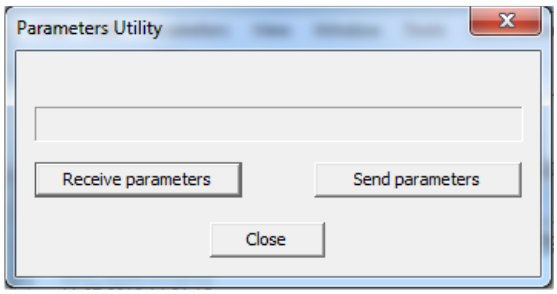
To set the clock of the FluoroProbe, synchronise it with the clock of the PC by activating “Synchronize with PC”.

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

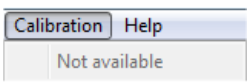
Receiving the complete parameters set from the AlgaeTorch / BenthoTorch and sending a Parameters file to the instrument. This is supplied by the bbe service in most of the cases.



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.

Calibration

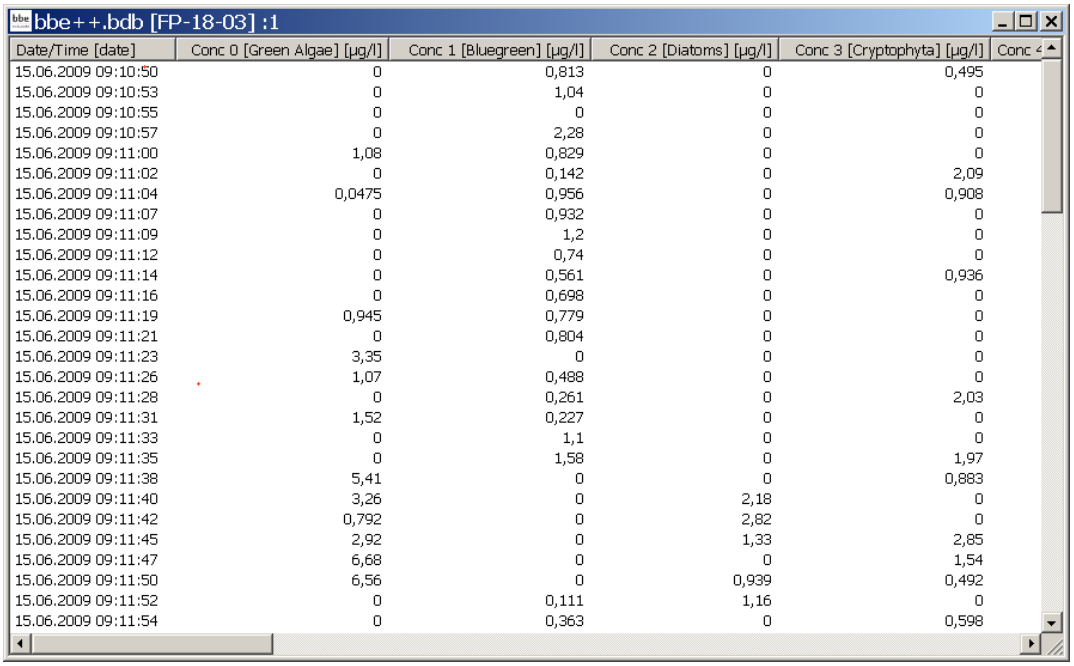


To calibrate the Torches please use the calibration menu of the internal software.

The Views

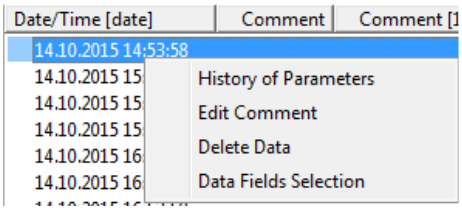
TABLE VIEWS

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



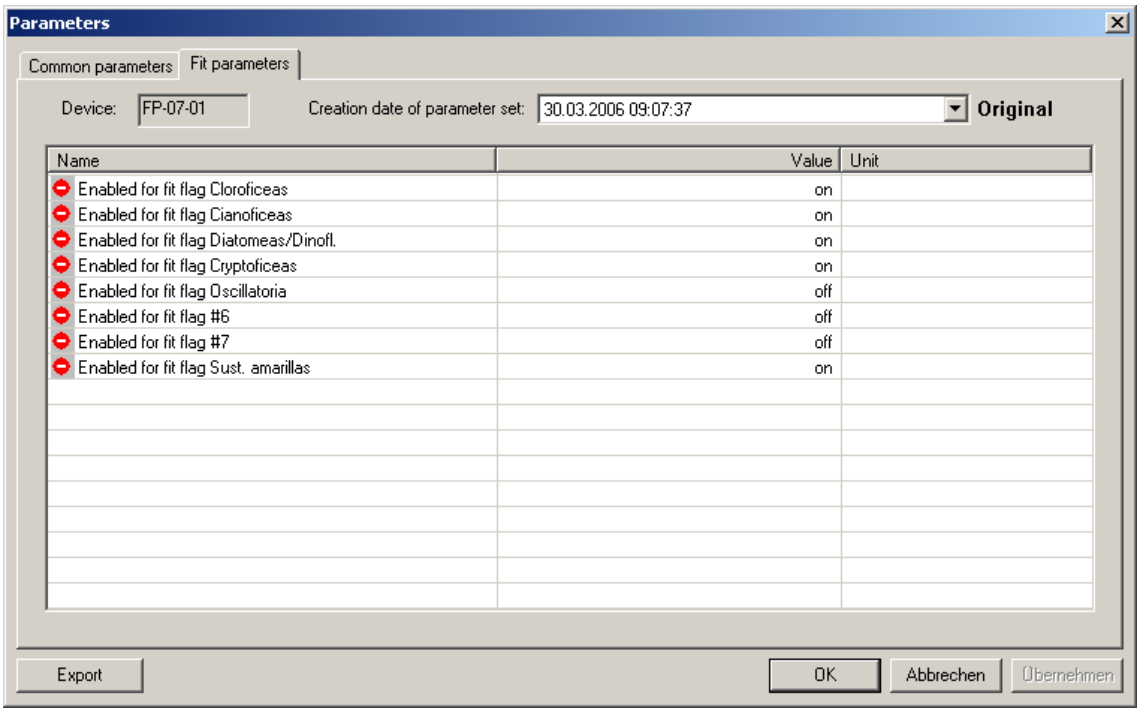
Date/Time [date]	Conc 0 [Green Algae] [µg/l]	Conc 1 [Bluegreen] [µg/l]	Conc 2 [Diatoms] [µg/l]	Conc 3 [Cryptophyta] [µg/l]	Conc 4
15.06.2009 09:10:50	0	0,813	0	0,495	
15.06.2009 09:10:53	0	1,04	0	0	
15.06.2009 09:10:55	0	0	0	0	
15.06.2009 09:10:57	0	2,28	0	0	
15.06.2009 09:11:00	1,08	0,829	0	0	
15.06.2009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



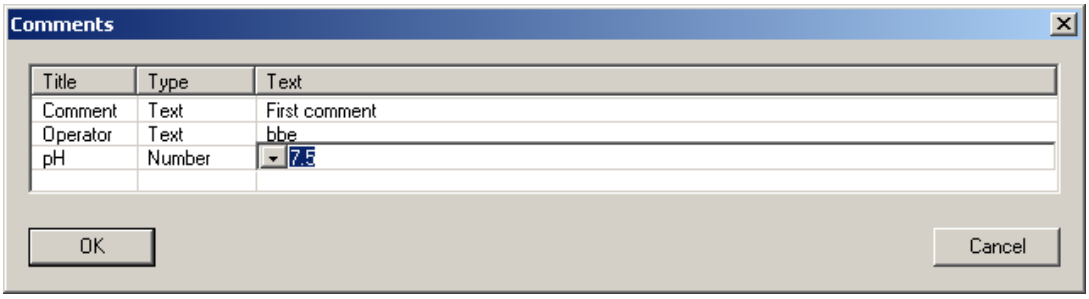
History of Parameters

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



Edit comment

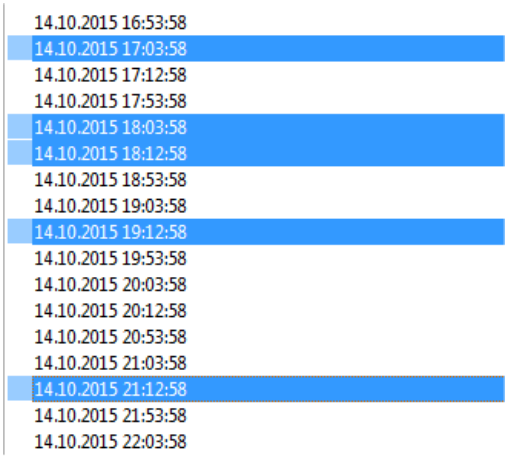
EDIT COMMENTS allows the user to change the comments of a specific data set retrospectively.



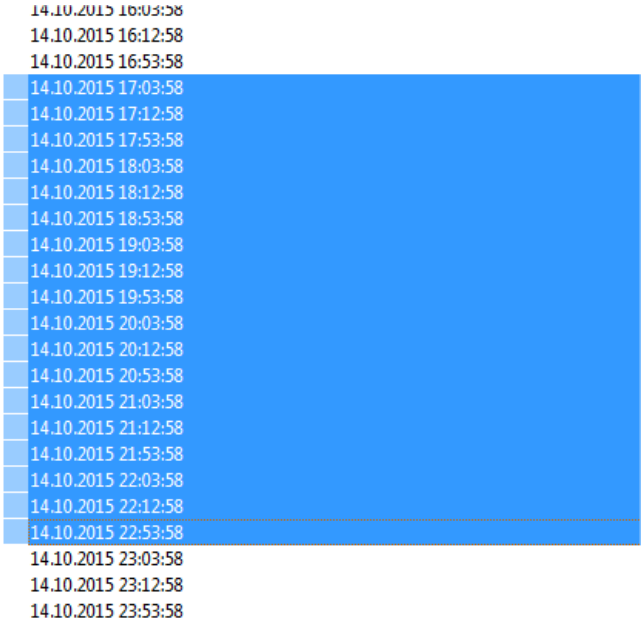
The dropdown list contains previously entered comments (if applicable).

Delete data

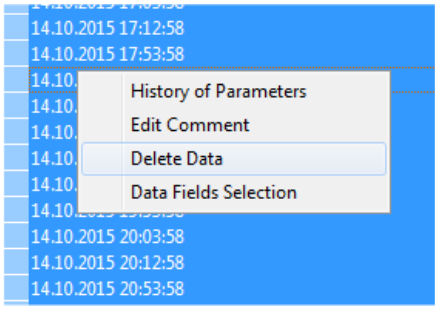
To delete data rows from the data base, mark one or more row by clicking on the row.
Hold the Ctrl. key while clicking to add more rows to the selection.



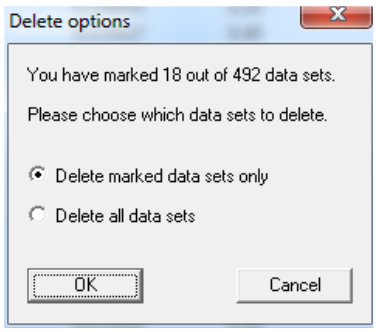
Hold the Shift. key while clicking to expand the.



Select “Delete Data”

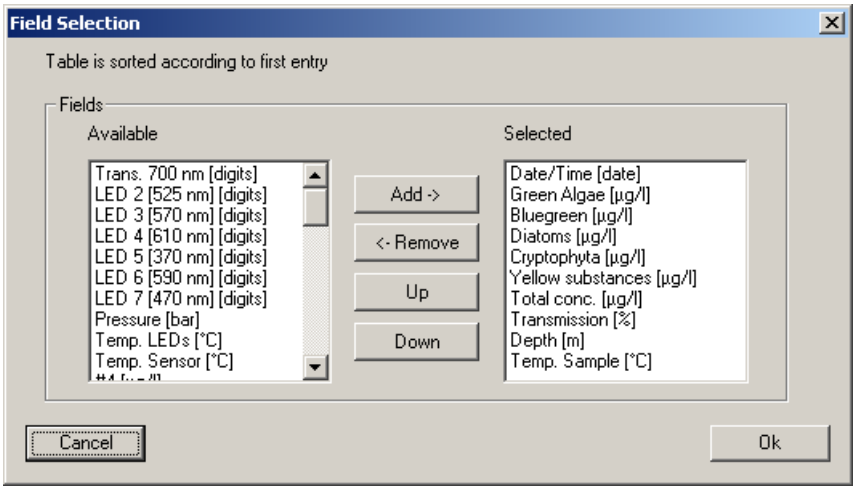


All data or the selected only can be deleted. Click OK to delete.



Data Fields Selection

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



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

Sorting of the list view

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

Sorted by time/date ascending:

Date/Time [date]	Green Algae [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

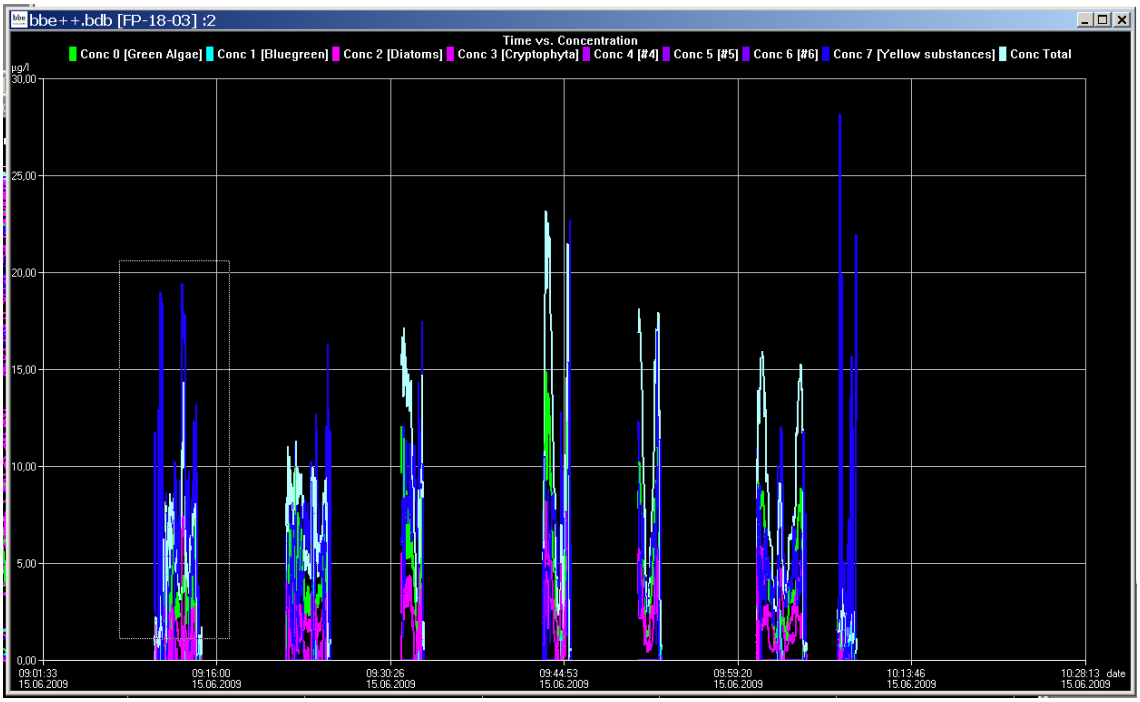
XY GRAPH VIEWS

Features of the XY graph view:

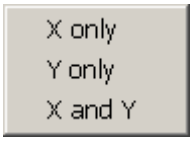
4. Select data of interest
5. Scaling of the axes (right click)
6. Display of the corresponding parameters (right click)
7. Editing a XY view, to change colours the type of graph.
8. Navigation within the data

Select data of interest

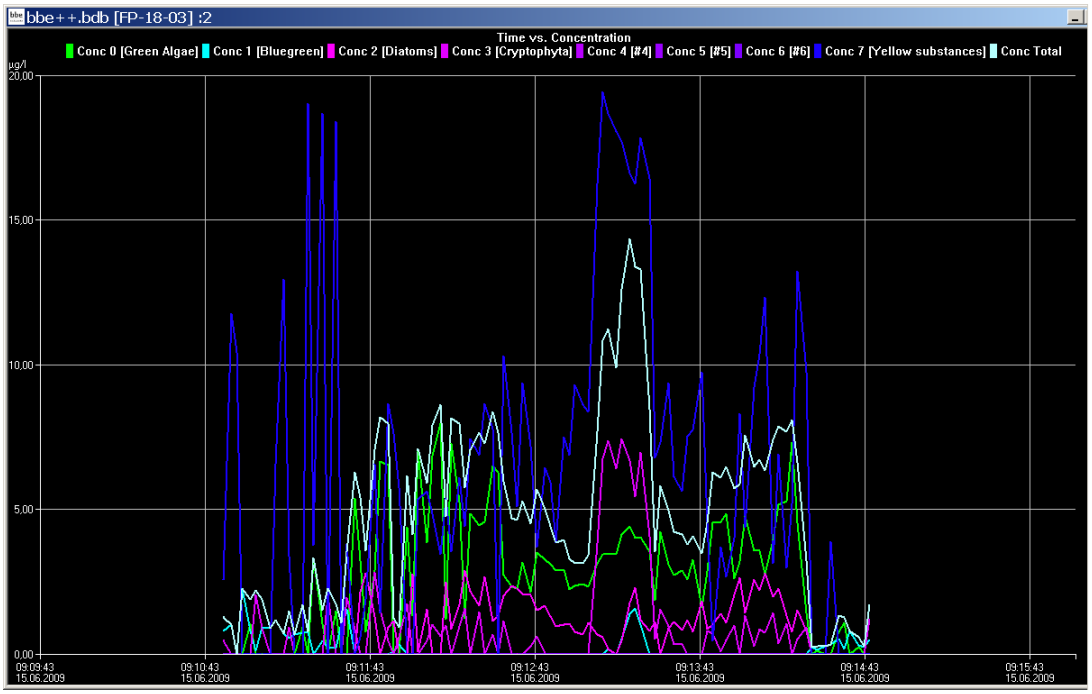
Please click and draw the mouse to select the required data.



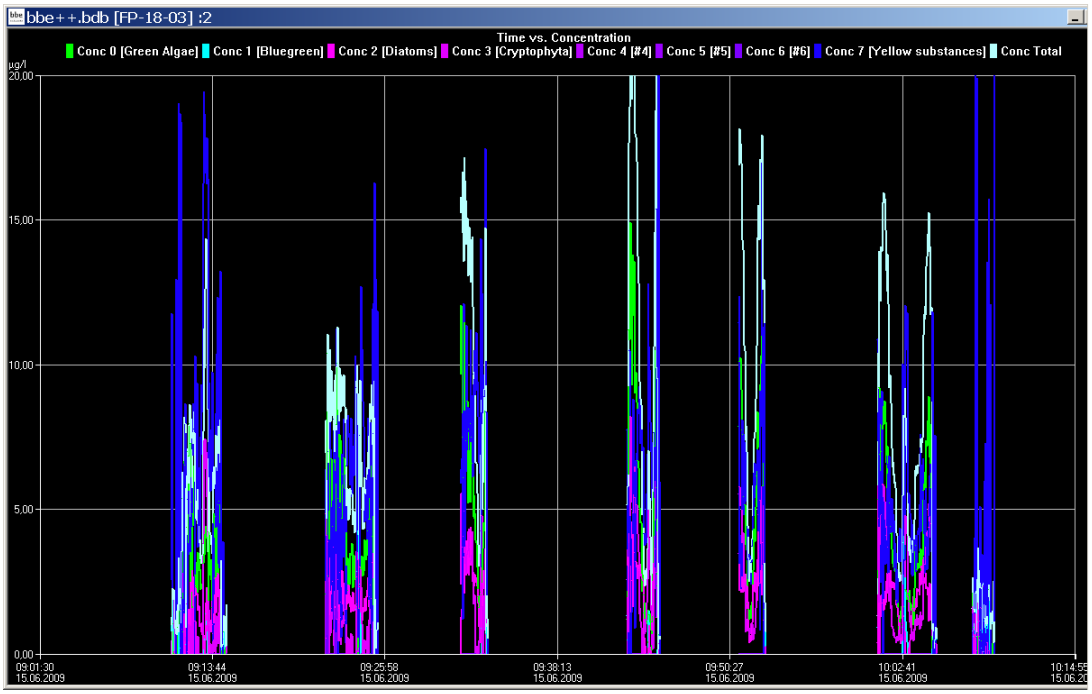
A pop-up window is shown to choose the axis to which the selection is to be applied.



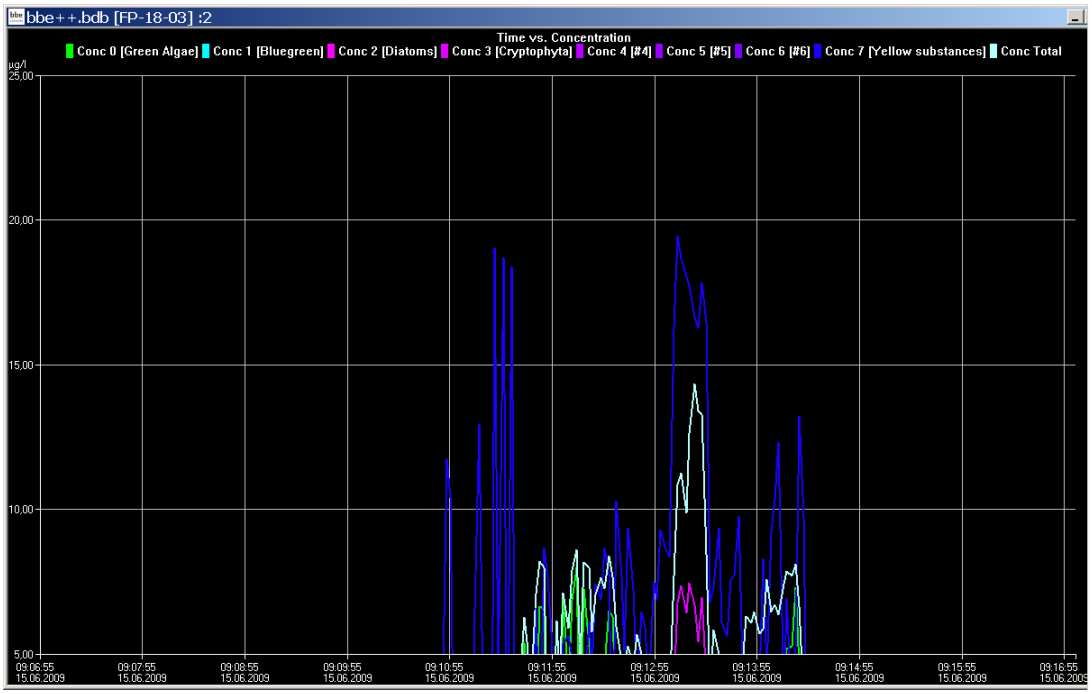
X only	only the selection on the horizontal axis is applied.
Y only	only the selection on the vertical axis is applied.
X and Y	the selection on the horizontal and the vertical axis is applied.



X only applied

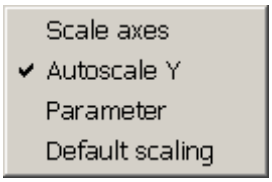


Y only applied



X and Y applied

Right-click menu

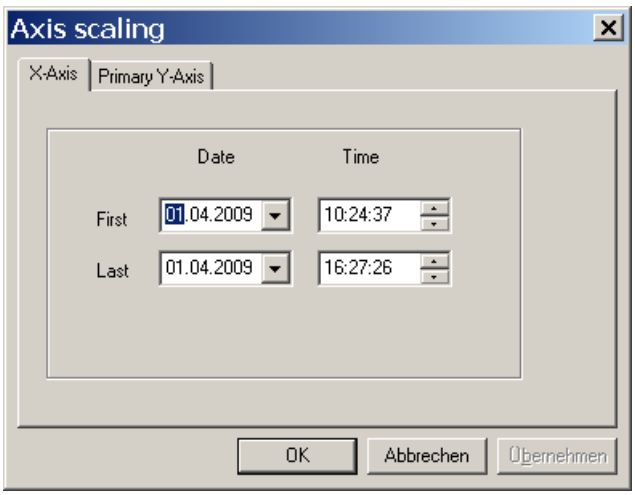


Features:

- 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

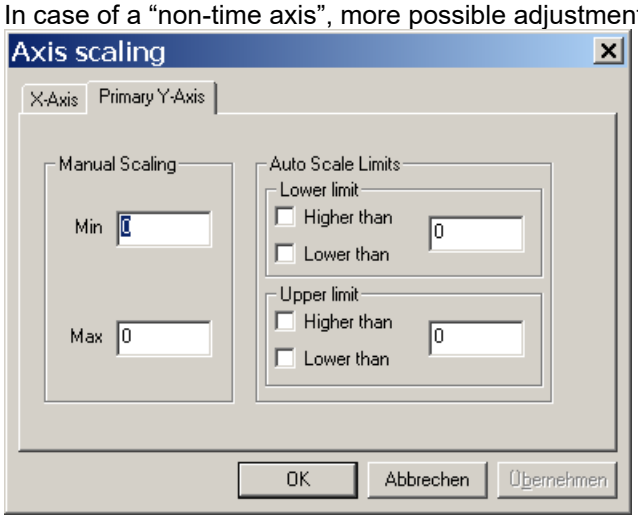
By default, scaling is done automatically. This means, all datasets of the selected period are displayed. To have a closer look at the data, it is sometimes useful to change the scaling. In the right-click menu, there is a “Scale axis” option:
In case of a time axis, the scaling tab of this axis is as 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”
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/l	Result of the calibration of cyanos
Service	Fingerprint LED 1 Cyanos	digits/µg/l	Result of the calibration of cyanos
Service	Fingerprint LED 2 Cyanos	digits/µg/l	Result of the calibration of cyanos
Service	Fingerprint LED 3 Cyanos	digits/µg/l	Result of the calibration of cyanos
Service	Fingerprint LED 0 green algae	digits/µg/l	Result of the calibration of green algae
Service	Fingerprint LED 1 green algae	digits/µg/l	Result of the calibration of green algae
Service	Fingerprint LED 2 green algae	digits/µg/l	Result of the calibration of green algae
Service	Fingerprint LED 3green algae	digits/µg/l	Result of the calibration of green algae
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/l	Factor to convert µg/l in cells /l
Service	Cellcount factor green algae	cells/µg/l	Factor to convert µg/l in cells /l
Service	Global correction factor	1/100	Factor to adapt the results to a local reference method
Service	Gradient turbidity	1/10 FTU/digit	Result of turbidity calibration
Service	Offset pressure	1/100 digits	Result of pressure calibration
Service	Gradient pressure	1/1000000 mbar/digits	Result of pressure calibration
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		

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.

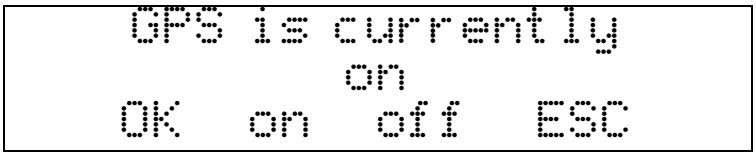
For data evaluation, the results can be read from the instruments display or transferred to the bbe++ PC software. bbe++ offers an export of the data to Google Earth to display the chlorophyll results on a map.

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.

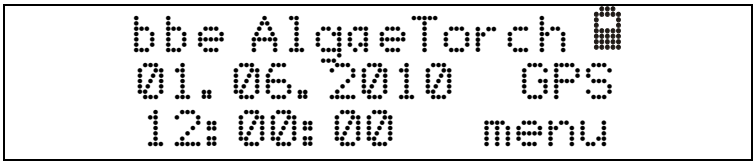
Please note:
After starting the Algae- or BenthoTorch especially after a longer time or after transporting the instrument, it takes some minutes to obtain the correct position.

ACTVATING AND DEACTIVATING

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

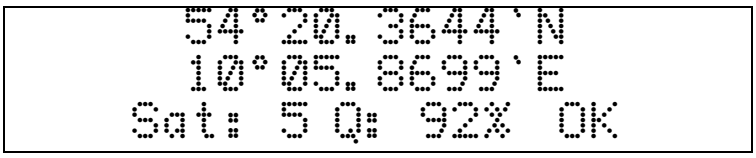


If the GPS is activated and the position has been found, this is indicated on the display:



POSITION (SETTINGS -> GPS -> POSITION)

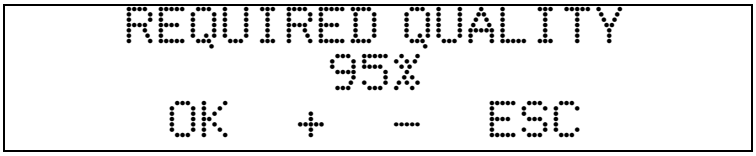
This screen is only available if the signal quality is sufficient.



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

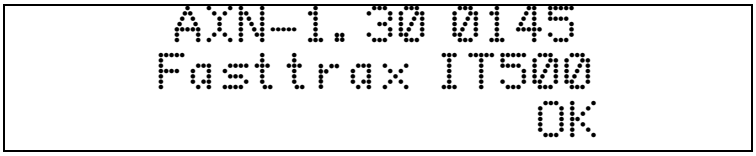
REQUIRED QUALITY (SETTINGS -> GPS -> REQUIRED QUALITY)

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.



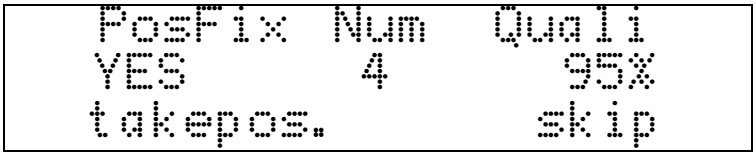
95% is the standard quality value.

VERSION (SETTINGS -> GPS -> VERSION)



STARTING THE MEASUREMENT

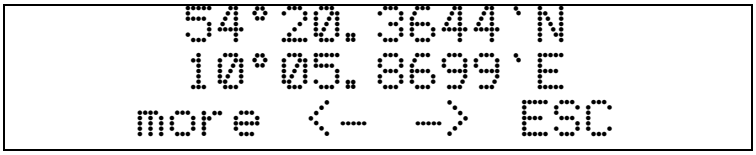
If the GPS module activated, the status of the GPS signal is shown after starting the measurement. If the given quality criteria are met, the measurement starts automatically, otherwise, the poor positioning information can be used (takepos) or the GPS information can be skipped.



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:



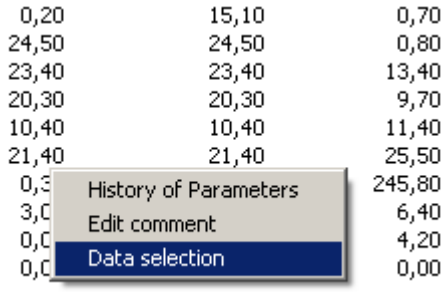
DATA EVALUATION WITHIN BBE++

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.

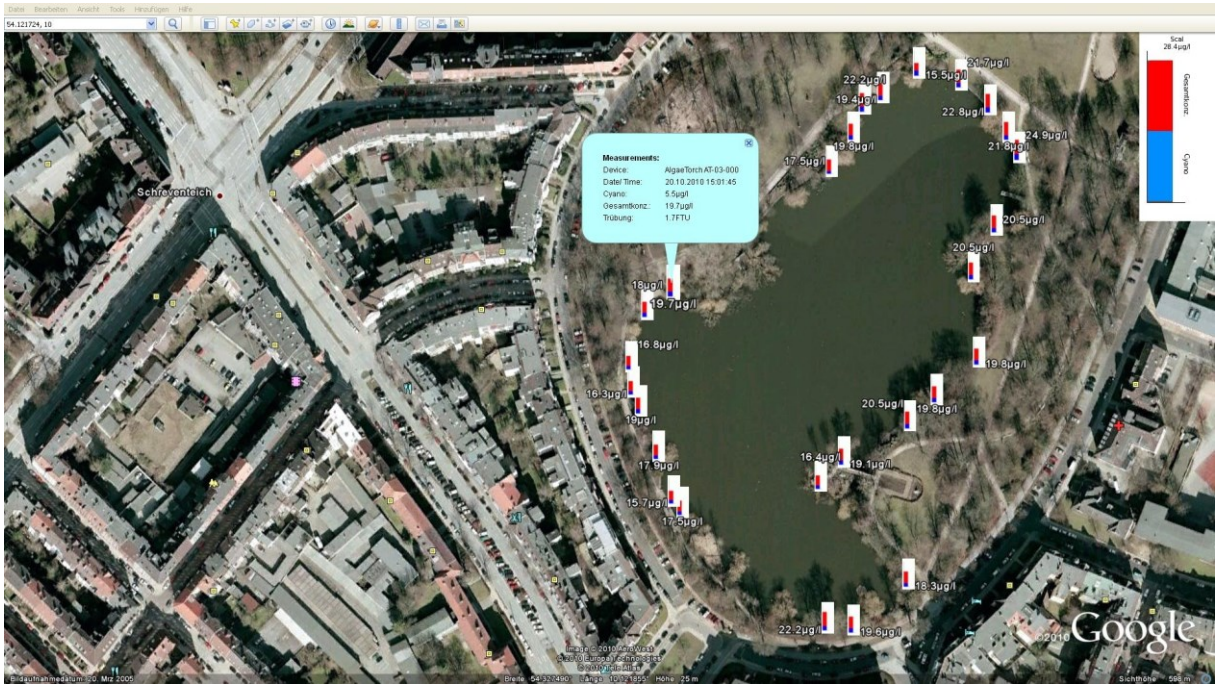


DATA EXPORT TO GOOGLE EARTH

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

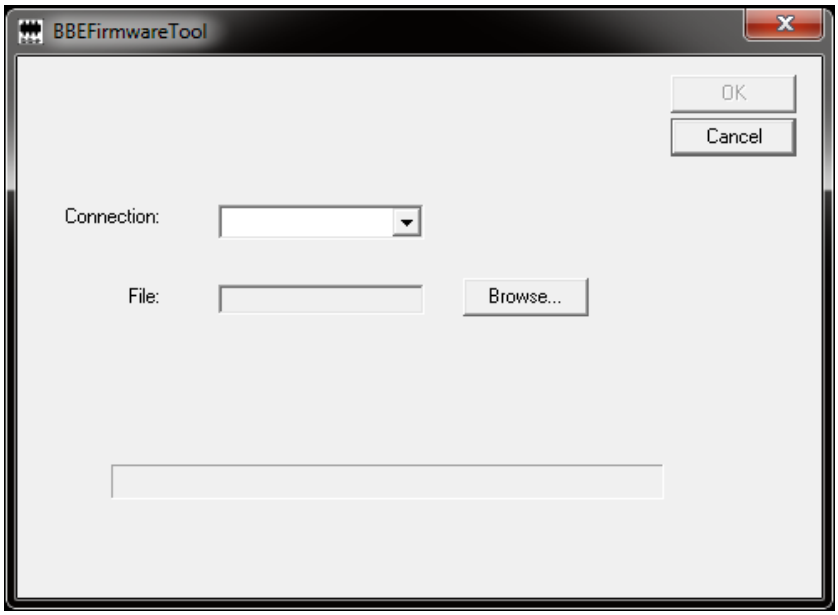
Example of data display using Google Earth:


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

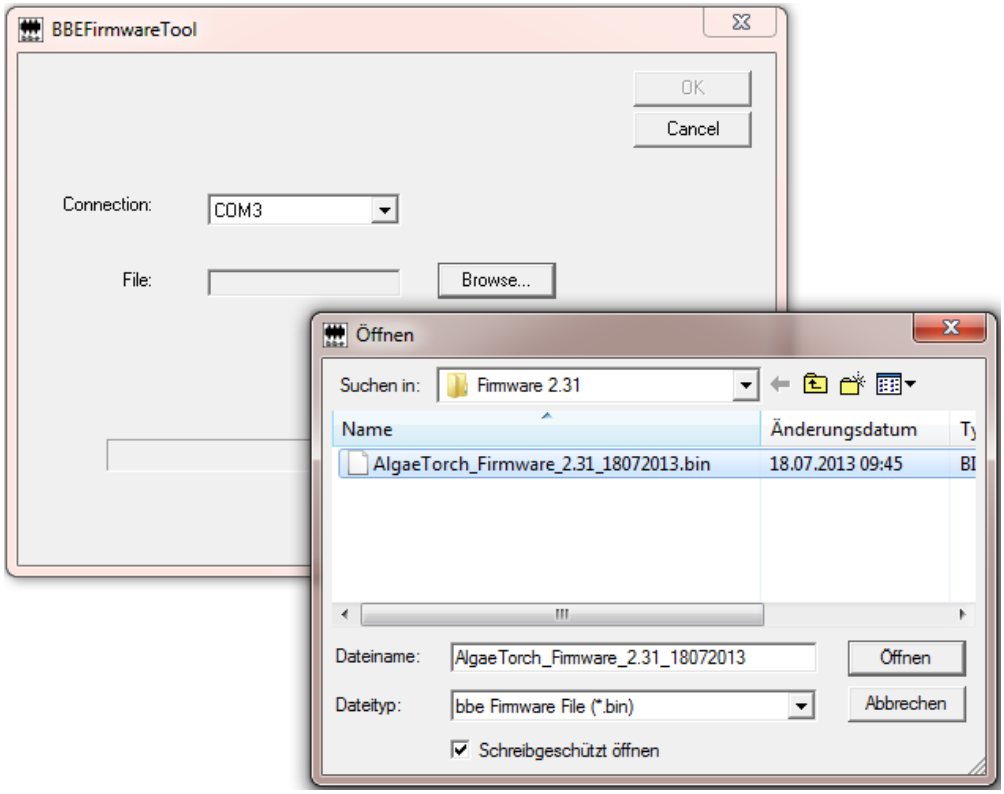
Update of the firmware

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).

How to access to an AlgaeTorch by ModBus

To access the AlgaeTorch by ModBus, the serial protocol needs to be set accordingly (AlgaeTorch -> settings -> serial protocol).

Available values per Read Input Registers (Modbus function 0x04)

Register 1..n	Value	Comment
1	Hi-Word constant 1234.56	BE constant float value: 1234.56
2	Lo-Word	
3	Hi-Word Date	BE float representing day
4	Lo-Word Date	
5	Hi-Word Time	BE float time
6	Lo-Word Time	
7	Hi-Word Total [ug/l]	BE float total chlorophyll
8	Lo-Word Total [ug/l]	
9	Hi-Word Cyanobacteria [ug/l]	BE float cyano
10	Lo-Word Cyanobacteria [ug/l]	
11	Hi-Word Total [cells/l]	BE float
12	Lo-Word Total [cells/l]	
13	Hi-Word Cyanobacteria [cells/l]	BE float
14	Lo-Word Cyanobacteria [cells/l]	
15	Hi-Word FTU	BE float
16	Lo-Word FTU	
17	Hi-Word Depth [m]	BE float
18	Lo-Word Depth [m]	
2342	Word Device address	BE word (r/w)

Please note:

- Date and Time, added together, are representing Date and Time as an MS-Excel compatible value (e.g. days since 31.12.1899).
- If device has no FTU option FTU will read -1.0.
- If device has no pressure option Depth will read -1.0.
- Use Write Single Register (Modbus function 0x06) to change value of register 2342. Acceptable values are from 1 to 247. Answer to write will contain old device address. Further communication must use new device address. Default address is 1.

BE = Big endian

There is PC software available to check the MODBUS functions. For example:

http://www.modbustools.com/
http://www.chipkin.com/products/software/modbus-software/cas-modbus-scanner/

In case of questions contact bbe service.

Use of the AOA protocol for the AlgaeTorch

To access the AlgaeTorch by AOA protocol, the serial protocol needs to be set accordingly (AlgaeTorch -> settings -> serial protocol) in the AlgaeTorch.

The PC or data logger needs to be set to

Baudrate: 19200
Parity: N
Databit: 8
Stopbit 1

The protocol is ASCII-based. The AlgaeTorch waits for a character and sends an answer as soon as a command has been recognized. The following commands are allowed:

- “h” request for the header with the names of the single data.
- “u” request for the units of the single data.
- “d” request for the actual dataset.
- “s” to start the measurement in the continuous mode or interval mode according to the settings of the AlgaeTorch. In this case there will be no answer string.
- “p” to stop the measurement. In this case there will be no answer string.

The answer is a string terminated with CR and LF. Each answer contains a fixed number of fields, separated by TAB.

The “h” and “u” commands always return the same answers.

The “d” command always returns the actual dataset. If there is no new dataset since the last request, the same dataset is delivered.

The first field is the checksum of the whole string. The format of the checksum is a P (capital) and a two-digit hexadecimal number. The checksum is an XOR function of the following characters, excluding the TAB directly after the checksum and excluding the CR and LF. All the other TABs are included. The calculation of the checksum starts with 0. The 0 is linked by XOR to the ASCII number of the first character after the first TAB. The result is linked to the ASCII number of the second character, and so on.

“C” example for the calculation of the checksum:

```
char * response; /* response contains the complete response string */
int i = 4; /* Checksum and first TAB is not included */
unsigned char checksum = 0; /* First value is 0 */

while (response[i] && (response[i] != '\r') && (response[i] != '\n'))
{
    checksum = checksum ^ response[i];
    i = i + 1;
}
```

The value in the checksum has to be the same as the two-digit number after the P.

The TAB-separated fields have the following meaning:

1	Checksum in the format "Pxx", where xx is a hexadecimal value in text representation for example "P0F" - P: marker for checksum; 0F: hexadecimal representation of 15. This value depends on the string and is calculated as shown above.
2	Number of software version
3	Number of data fields "7"
4	Day, month, year in the format "DD.MM.YYYY"
5	Date and time in the format "hh:mm:ss"
6	Total Chlorophyll concentration in µg/l
7	Chlorophyll concentration of cyano bacteria in µg/l
8	Turbidity in FTU
9	Total Chlorophyll concentration in cells/l
10	Chlorophyll concentration of cyano bacteria in cells/l

Example for the communication (bold characters sent by the PC):

```
h
P61   01.00  7   date        time      total  cyano  turbidity  total-cc   cyano-cc
u
P5F   01.00  7                         µg/l   µg/l   FTU        cells/l    cells/l
d
P3E   01.00  7   09.06.2016  06:50:10  138.5  138.5  0.0        138500000  138500000
```

Troubleshooting

Please call us:
Tel.: +49 431 380 40-40
Fax.: +49 431 380 40-10
e-mail.: service@bbe-moldaenke.de

We will gladly help you.

Instrument Does Not Start

- rechargeable battery is empty
- power supplier is not connected
- timing problem when turning the AlgaeTorch. Try again a bit more slowly or quickly or use the magnetic switch.

PC Does Not Recognise the AlgaeTorch

- wrong COM port is being used
- data cable or power supply is disconnected
- the driver does not fit to the operating system. Please download the latest driver from www.bbe-moldaenke.de.
- COM port is used by other software (mouse pad/IR interface), please refer the manual of the PC
- a virus scanner is used that delays the data; deactivate the virus scanner and try again.

Problems in Detecting Low Concentrations

- avoid bright sunlight
- recalibrate the offsets in ultra-filtrated sample water

Problems with wrong readings

- Please use the attachment for shallow water in case of low distances to the ground (> 25 cm)
- use the black bbe calibration vessel in the lab
- check, the front glass for air bubbles

Problems in Detecting Algae Classes

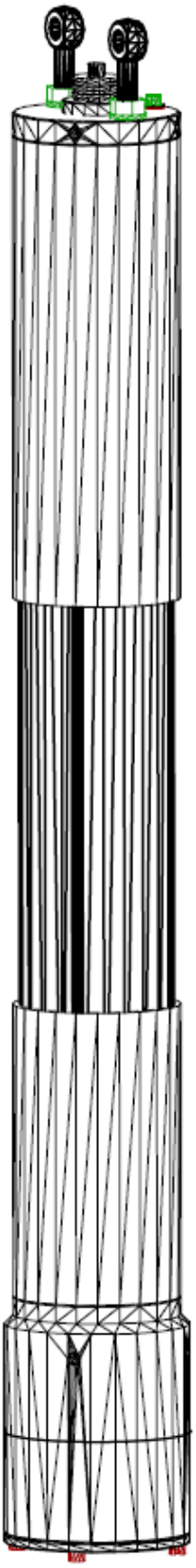
- recalibrate the offsets in ultra-filtrated sample water
- you may have another type of cyanobacteria or green algae in the water. In this case, you have to calibrate a new algae class and use this one instead of the one calibrated by **bbe**.

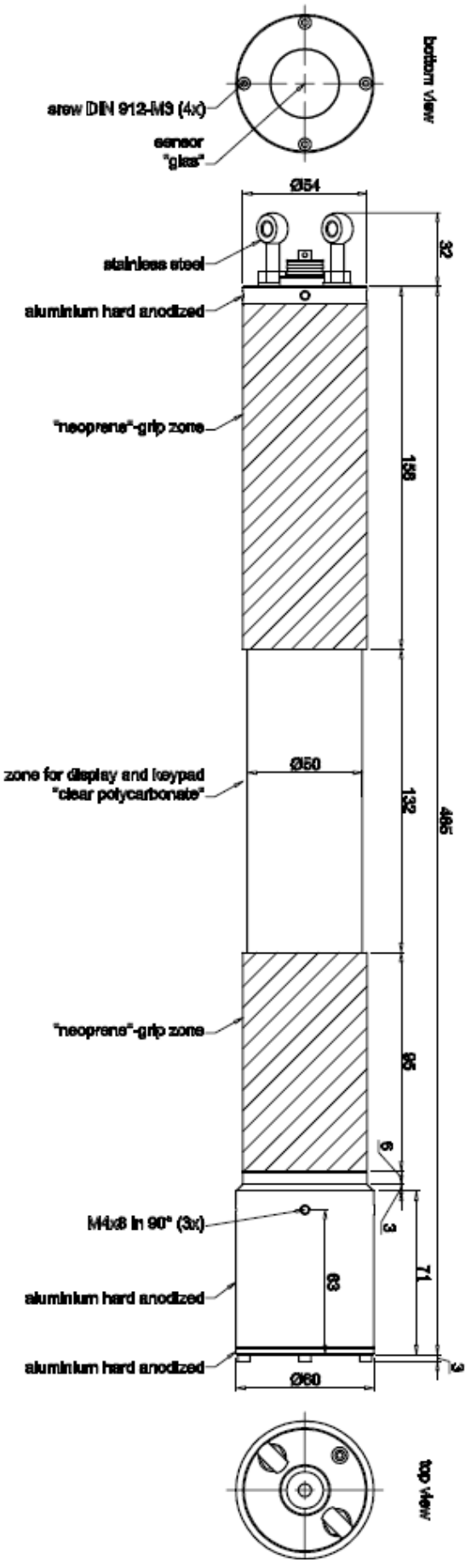
Data and Tables

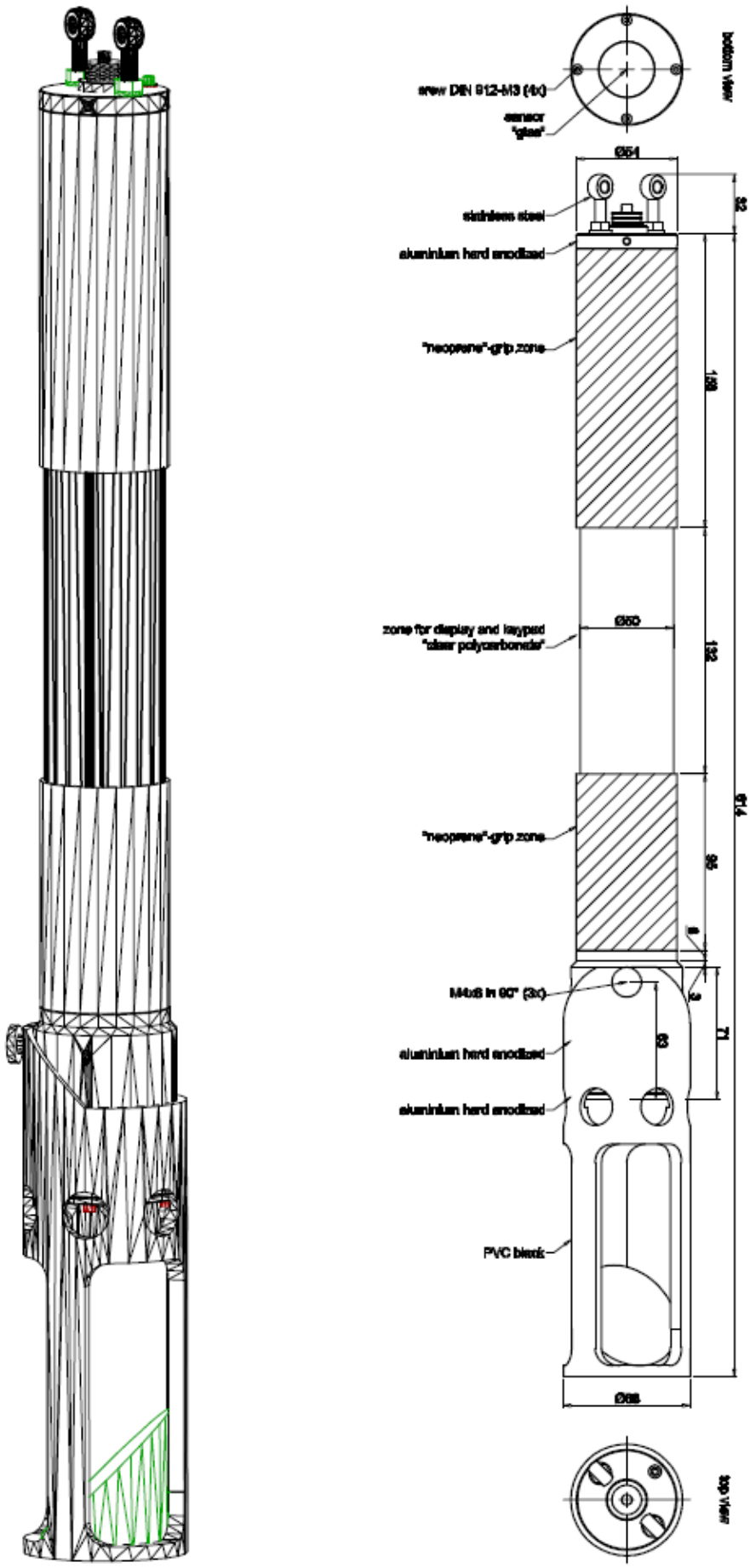
Specifications

Measurands	Total chlorophyll [µg Chl-a/l], Concentration of cyanobacteria [µg Chl-a/l]
Measuring range	0 - 500 µg Chl-a/l
Resolution	0.1 µg Chl-a/l
Weight	1.3 kg
Size (H x ∅)	500 x 60mm
Power supply	110/230 V - 50/60 Hz | 12V DC
Power input	10 W
Sample temperature	0 – 40 °C
Temperature range (storage)	0 – 50 °C
Protection class	IP 68
Depth range	10 m (AlgaeTorch 10), 100m (AlgaeTorch 100)
Interface	USB data port
Accessories	hard plastic carrying case, mains unit, manual, software, hand loop
Options	10m rope, telescopic rod, nylon shoulder bag, SDI-12 with bbe converter
Data capacity	2000 datasets (1000 datasets in Series 1 to 5)

Dimensions




bottom view
screw DIN 912-M3 (4x)
sensor "glas"
Ø54
stainless steel
aluminium hard anodized
"neoprene"-grip zone
zone for display and keypad "clear polycarbonate"
Ø50
"neoprene"-grip zone
M4x8 in 90° (3x)
aluminium hard anodized
aluminium hard anodized
Ø60
top view
32
158
132
495
95
9
3
63
71
3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aluminium hard anodized
PVC black
top view