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Meet the difference

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biological · biophysical · engineering bbe moldaenke

bbe IO cells

User Manual

Version, May 2015

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1 Preface

Thank you for choosing a IOcells™ fluorometer from bbe Moldaenke GmbH.
The bbe IOcells™ allows the rapid estimation of the number of cells in a water sample. The measurement is performed indirectly by the natural chlorophyll-a fluorescence of micro-algal cells. Algae have by far the largest proportion of living cells in natural waters and are therefore excellently suitable as an indicator.
Our enhancement of the standard PAM method led to a significant increase of the sensitivity of the instruments measurement. With the IOcells™ it is possible to detect concentrations 100-fold lower than the standard PAM detection limit.
The high sensitivity of IOcells™ in conjunction with the fast and uncomplicated handling makes it possible to extend the scope. The IOcells™ can therefore be a substitute for many applications where previously only lengthy laboratory procedures were in use.

2 Delivery content

- IOcells™
- External Power supply
- 50 filter-kits consist of:
  - 10ml syringe
  - Filter stripes in filter block
- 50µm pre filter
- foldable cup

3 Performing Filtration and Measurement

Please make sure that:

- You have a large enough sample available and
- This sample is representative for your application

Switch on the device.

Wait until the start screen for the measurement is shown (Fig. 1). The bar in the lower right area shows information about the actual resolution of the measuring unit. When the bar reached the red zone the temperature is very high and the resolution of the device decreases. If you operate the device with the external power supply you have the possibility to switch the device into ‘cooling mode’. The bar will then move into the green zone and the resolution reaches a much higher level.

3.1 Pre filtration

Figure 2: pre filter

Figure 1: pre filtration

Depending on your usage scenarios it may be necessary to pre-filtrate the sample. By using the pre-filter the upper limit of the size of the cells is set which are taken into account while the measurement is performed. For a ballast water inspection complying with the IMO D2 norm usage of the supplied 50µm pre-filter is recommended.

Rinse the filter before and after each use to retain its performance. Pour the sample slowly through the filter. Make sure that you avoid impurities.

3.2 Filtration

The pre-filtered sample is then to be drawn up into a syringe and to be pushed through the black filter unit. Now drag the plunger to the desired volume of fluid. Regarding the application, this amount varies – keep in mind: the higher the cells concentration (water shows slight turbidity) the smaller the necessary amount of sample (for instance 5ml). Larger quantities (e.g. 25ml) are required for very low concentrations. In typical applications such as Ballast water 10ml of sample are sufficient. The amount of filtration volume is limited because of clogging filters in the course of filtration and thereby a slight increase of pressure could be required. This pressure could damage the filter and renders it useless for further measurements.

Figure 3: Syringe with 10ml sample + 2ml air

In order to keep the sample volume loss in the filtration as small as possible it requires additional 2 ml of air in the syringe (see Fig. 2). Insert the syringe firmly with a twisting motion into the filter kit. Holding the syringe vertical and filter the entire content of the syringe (Fig. 3) through the membrane. Apply only as much force as necessary to filter the sample rapidly (drops are ok not a jet of water!).

When all the liquid got filtered you can detect a clear increase of filtration resistance. The reason is that the air has now reduced the sample volume loss of the filter unit to a minimum. You can press the rest of the air through the filter quickly (fig. 4).

Remove the filter stripe from the filter-kit by opening the flap (fig. 5).

The filter must be dried by putting a clean absorbent cloth on the bottom of the filter for a short moment (fig. 6). This prevents a drop of concentrated algae to run from the filter. Hold the filter horizontal while removing and drying.

Make sure that the filter is approached from the back side, the concentrated algae have to remain on the front side

Figure 4: filtering procedure

Figure 5: opened filter-kit

Figure 6: drying of the filter

3.3 Measurement

Open the lid of the measuring chamber and insert the filter stripe (regard the right direction). Now update the filtered amount to your actually filtered sample size. Tap the Start button. Now wait until the measurement performs. At the end of the measurement, the determined cell count per ml is displayed. Additionally a valuation of the number of counted cells is indicated by the traffic light. It will light green at concentrations of <10cells/ml and red at a higher concentration (default).

4 Software

After switching on the IOcells ™ the software starts immediately into the measuring mode. From here all other functions on the ‘action bar’ can be reached. Part of the action bar is also a battery level indicator and an exit button. With the latter you exit the software. For switching off press the hardware power button shortly and confirm your request on display.

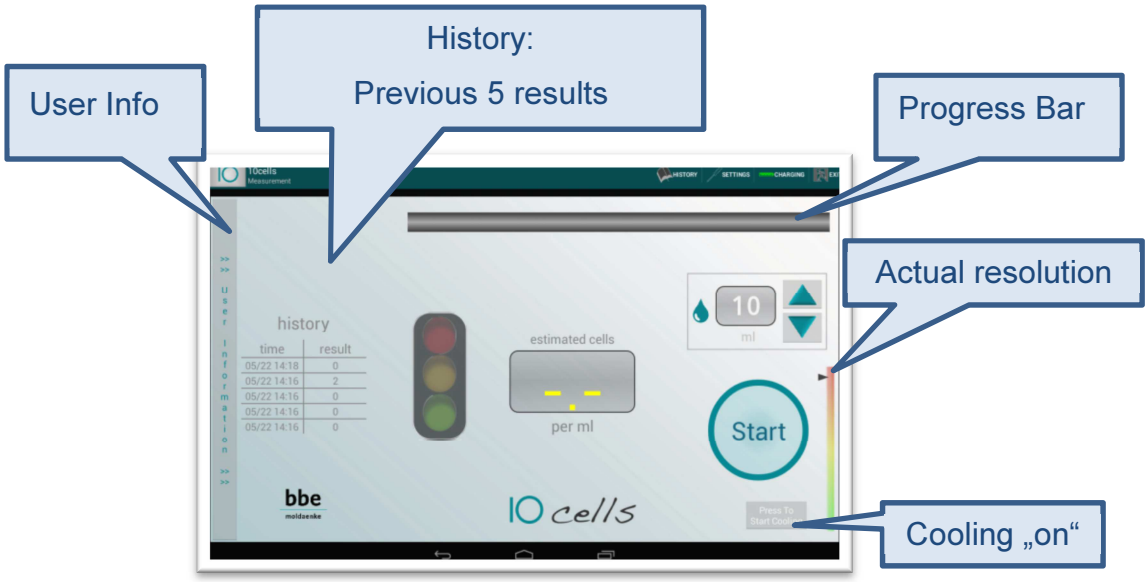


Figure 7: Measurement Menu

4.1 Measurement

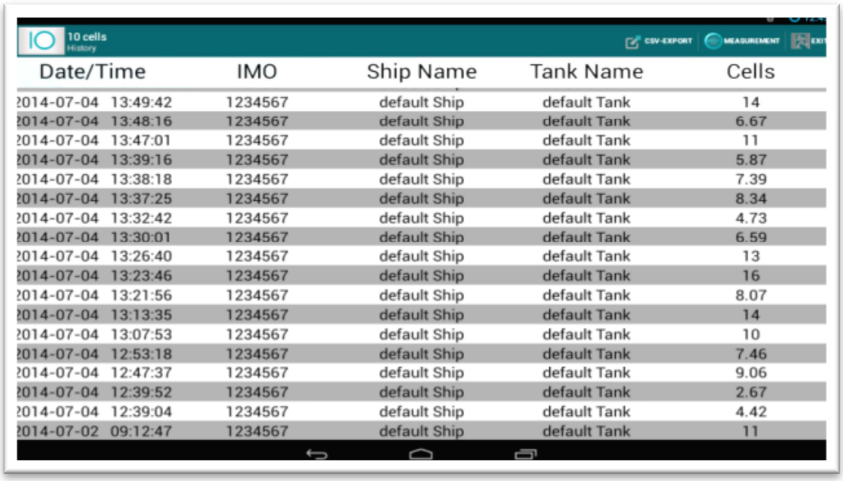
In addition to the functionality described under ‘Measurement’ you got the possibility to enter extra information for each measurement.
Use the button on the left side of the display. The data you provide here will facilitate the allocation of the measured values.

4.2 History

To return to the list of values tap the ‘History’ button. When you tap onto a line the comment to this measurement will be presented.
The CSV export (Action Bar) offers the option to export this table:

- The export is filed under: /bbe10cells_exportfiles/zeitstempel.zip
- Select the export file (timestamp in the filename) and hold it until the context menu appears.
- choose ’send’ in the context menu

- select Bluetooth
- Select the Bluetooth module of the device you would like to send the data to
- Note: The exported data can be opened and edited with any standard text editor or be imported into Excel or OOo Calc etc.



Date/Time	IMO	Ship Name	Tank Name	Cells
2014-07-04 13:49:42	1234567	default Ship	default Tank	14
2014-07-04 13:48:16	1234567	default Ship	default Tank	6.67
2014-07-04 13:47:01	1234567	default Ship	default Tank	11
2014-07-04 13:39:16	1234567	default Ship	default Tank	5.87
2014-07-04 13:38:18	1234567	default Ship	default Tank	7.39
2014-07-04 13:37:25	1234567	default Ship	default Tank	8.34
2014-07-04 13:32:42	1234567	default Ship	default Tank	4.73
2014-07-04 13:30:01	1234567	default Ship	default Tank	6.59
2014-07-04 13:26:40	1234567	default Ship	default Tank	13
2014-07-04 13:23:46	1234567	default Ship	default Tank	16
2014-07-04 13:21:56	1234567	default Ship	default Tank	8.07
2014-07-04 13:13:35	1234567	default Ship	default Tank	14
2014-07-04 13:07:53	1234567	default Ship	default Tank	10
2014-07-04 12:53:18	1234567	default Ship	default Tank	7.46
2014-07-04 12:47:37	1234567	default Ship	default Tank	9.06
2014-07-04 12:39:52	1234567	default Ship	default Tank	2.67
2014-07-04 12:39:04	1234567	default Ship	default Tank	4.42
2014-07-02 09:12:47	1234567	default Ship	default Tank	11

Figure 8: overall History

4.3 Settings

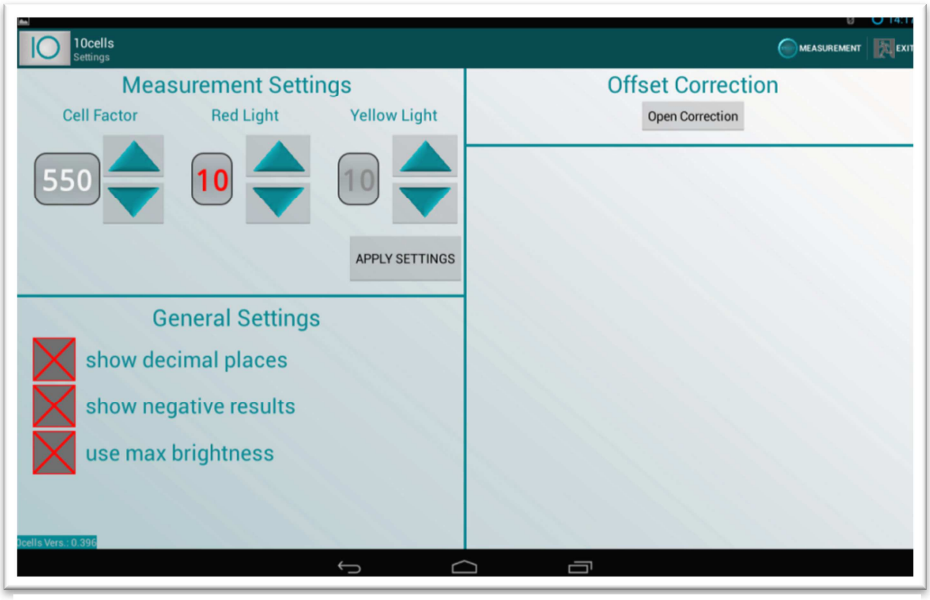


Figure 9: Settings Menu

Under ‘Settings’ parameter adjustments can be made.

- Cell Factor: Since the measurement is performed indirectly a conversion factor is needed. The default value is particularly suitable for mixed samples or algae with

average chlorophyll-a content and good activity. This factor can be adjusted when the algae and / or activity are known. (Laboratory and research environment)

- Red Light: This marks the threshold above which the traffic light turns red. Default value: 10 cells
- Yellow Light: This marks the threshold above which the traffic light turns yellow. Default value: 10 cells
- If the values for yellow and red are equal the light will turn to red. (above the threshold)
- If the value “0” is selected for red the traffic light will be hidden.
- To avoid negative results or decimal places below 10cells you can deselect them under “General settings”.
- To increase the run duration on battery you can decrease the screen brightness by deselect “use max brightness”.
- Offset Correction: Here a ‘normal’ measurement can be performed. At the end of the measurement the measurement result (actual value) is displayed. In the field ‘set to’ the nominal-value can be entered. In case of uncontaminated water the value is ‘0’. The offset correction, ~~which, however,~~ must be carried out in case of extreme temperature variations (e.g. temperature range red & cooling not possible).

All values must be transferred by click on ‘APPLY’.

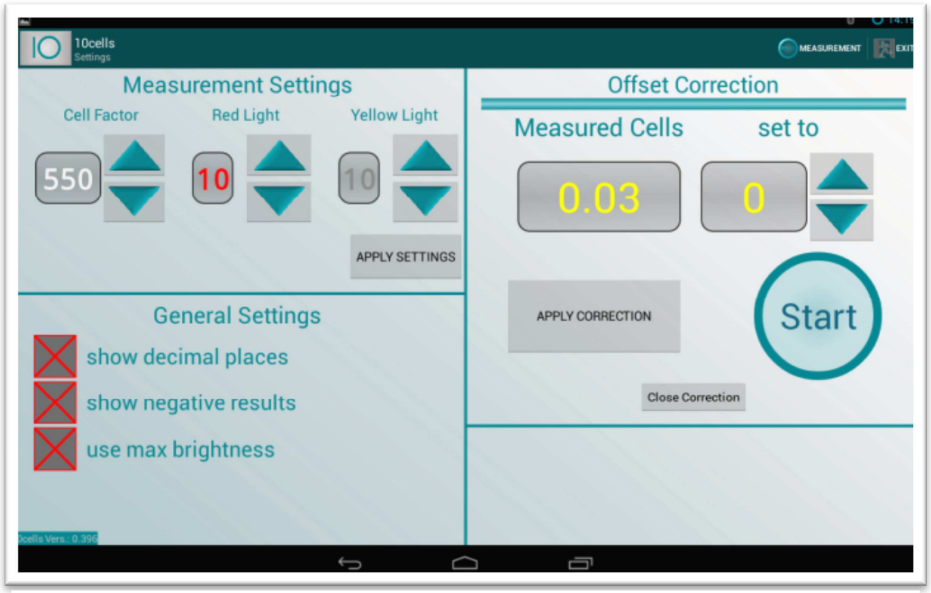


Figure 10: Offset Correction

5 Safety instructions

- Please note that the unit **must not be operated out of** specifications.
- The cover for the measurement unit must not be left open.
- You should also avoid direct sunlight when the measuring chamber is open.
- Only the bbe Moldaenke GmbH is authorized to remove the seals.
- Avoid moisture on the device by only removing the cover of the measuring chamber for filter exchange.
- Avoid drops of water brought into the device by the filter strip.
- Remember to remove the filter from the device after each measurement.

6 Specifications

Features	Min	Max
Storage temperature	- 20°C / -4°F	40°C / 104°F
Operating temperature	+ 5°C / 40°F	35°C / 95°F
Voltage power supply	100 V 50 Hz	240 V 60 Hz
Protection class (closed)	IP 65	
Protection class (open lid, closed cap)	IP31	
Type of batteries	nickel metal hydride	
Weight (without accessories)	5 kg / 11 lbs.	

7 Trouble shooting

Problem	Approach
Filter tears apart during filtration	• Perform the filtration with less pressure
Results/Values vary greatly between different filters	• Sample has to be mixed better • Dry the filter thoroughly after filtration from the backside
Display unit stops responding	• Press and hold the POWER button /reset button • Reboot device
Device displays negative values	• Re-calibrate the device, if necessary increase the set value
Device is not cooling	• Use the power supply / make sure the power supply works properly

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