

Operating Instructions

for

Aquarium- and Terrarium Computer



Valid for firmware version 4.06 onward
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1 General

1.1 About this manual

This manual is valid for all aquarium- and terrarium computers of the series ProfiLux II:

- ProfiLux II
- ProfiLux Plus II
- ProfiLux II eX
- ProfiLux Plus II eX
- ProfiLux II Terra
- ProfiLux II Light

The availability of some functions depends on the model and the present extensions.

1.2 Operational features

Thank you for your confidence in our ProfiLux products!

You have purchased an aquarium computer outstanding in its efficiency, ease of use, and value for money.

Summary of operational features:

- Dimming of up to 8 separate lights
- Simulation of the phases of the moon, calculated according to calendar date
- Cloud simulation by random generation, storm simulation
- Programmable rainy days
- Feeding pause for pumps
- Control of variable current pumps (simulation of tides and waves)
- Operating hour meter for lamps
- "Burning-in" mode for fluorescent tubes
- Real-time clock with battery back-up
- PC-interfacing possible using free Windows™-compatible software *ProfiLuxControl II*
- Connectivity for external display
- Reminder display (e.g. "Clean filter!")
- Control of up to 24 switchable sockets
- 8 programmable timed operations (including medication function)
- Child-proofing via PIN code
- Simple, intuitive operation; all settings established via interactive dialogue
- All settings permanently stored in non-volatile memory (EEPROM) to avoid loss during power outages
- Computer expandable via additional modules
- Connectivity for radio-adjustment of clock setting (DCF)
- Multiple aquarium computers can be networked

Additional operational features of the ProfiLux Plus II (respectively ProfiLux II with adequate extension card):

- Regulation of pH via addition of CO₂ (downward adjustment) or alkalisation (upward adjustment), programmable night-time switch-off, 2 independent control cycles possible using expansion cards
- Sequential temperature regulation for immersion heaters, bottom heaters, and cooling, programmable night-time decrease, regulation of variable-speed aerators, 2 independent control cycles possible using expansion cards
- Alarm function: alarm operation optical, acoustic, and via switchable socket
- Operation hour meters for all sensors
- Therapy program for sick fishes
- Redox, conductivity and oxygen levels can be measured/regulated using expansion cards.
- Connectivity for level sensors
- Automatic calibration of all sensors
- Recording of data measured

In order to obtain maximum benefit from our products, please take the time to read through this manual. In particular please note the safety instructions and the guarantee conditions.

1.3 Items supplied

Before proceeding any further, please check that all the items comprising your Profilux package are present. The following items are supplied as standard:

- Aquarium computer
- AC/DC adaptor
- Temperature sensor (not for all types)
- This instruction manual

Switchable powerbars, lighting units, and all sensors apart from the temperature sensor, do not form part of the aquarium computer package and must be ordered separately.

1.4 Important operating instructions

The following instructions must be followed without fail in order to ensure correct and safe operation! Failure to follow these instructions will invalidate the guarantee and/or exonerate the manufacturer from any liability and/or responsibility for injury or damage!

- Line voltage-operated electrical equipment and water can be a dangerous combination. Hence it is essential that all line voltage-operated devices to be used in or near the aquarium should be connected to the line voltage via a Residual Current Device (RCD) or other appropriate circuit-breaker!
- The powerbar is operated by dangerous voltages and is not watertight. This means that the powerbar must be protected from moisture (including splashes)! This should be borne in mind when choosing a position for mounting.
- The fluorescent unit is watertight providing the following points are noted:
 - Always close tube screw-fittings carefully, ensuring the seals are in place
 - Never open the cable screw-fittings
 - Never pull on cables
 - Avoid mechanical damage to light fittings
- To avoid danger of electric shock, when working on the tank all line voltage powered devices must be disconnected from the main supply (all unplugged). There is always the possibility that a heater, a pump, or a light may be defective or be damaged during work on the aquarium. This can lead to life-threatening electric shock! The aquarium computer can remain on, it does not use dangerous voltages.
- Despite every care during the development and manufacture of our products it is impossible completely to exclude the possibility of defects. In addition external agencies such as lightning strikes, cable breaks, mechanical damage, etc. can lead to malfunctions! For this reason you should never leave an aquarium, especially one operated electronically, unsupervised for too long. We hereby disclaim any liability for consequential loss (including fish deaths) resulting from malfunction, insofar as the law allows!
- Our lighting units should never be opened!
- Only the leads provided and their respective connectors should be used. Connection of other components will invalidate the guarantee!

- Use only the original AC/DC adaptor!
- We strongly recommend the use of a thermostatically-controlled heater. This should be set such that it switches off if the temperature exceeds that required by more than around 1.5 °C. This is a safety measure (so that malfunction of a switchable socket won't lead to overheating) and also guarantees temperature control. We disclaim all responsibility for any loss resulting from the use of a heater without thermostat and from any malfunction of our products!
- Before a fluorescent tube can be dimmed it must first be "burned-in"! "Burning-in" means that the tube must be run for around 100 hours at full output (ie without dimming). The manufacturer of the tube can provide precise requirements for burning-in. If a tube is dimmed prematurely, without previously being burned in, the result may be flickering or shortened effective life. Burning in can be performed automatically, see 3.12.8 *Burning-in*.

1.5 Connections

The computer has various labelled connection ports at the rear. The photo below shows the rear of a ProFiLux Plus II. The following applies to all connections:

- With the exception of the pH electrode connection, only original accessories for the ProFiLux II aquarium computer from GHL should be connected!
- Treat the ports with care – do not use force when plugging in!
- **Important: Incorrect connections (e.g. plugging a lighting unit plug into a connector for powerbars) can result in serious damage to the ProFiLux! This is not a warranty case and may cause a repair with costs! So please always make connections with care.**



1.5.1 12VDC

The DC power plug of the AC/DC adaptor is plugged in here. Use only the adaptor provided!

1.5.2 Level

The plug of the optionally available level sensor plugs into this (upper) mini DIN socket. If two sensors are to be connected simultaneously this can be achieved using a *PL-LY* splitter.

1.5.3 Temp

The plug of the temperature sensor provided plugs into this (lower) mini DIN socket. See also 2.2 *Connecting the sensors*.

The temperature sensor does not need to be calibrated – this has already been done at the factory.

1.5.4 pH

The pH electrode is connected to this BNC connector. Follow the electrode manufacturer's instructions. Don't forget to calibrate it! See also 2.2 *Connecting the sensors*.

1.5.5 L1L2 (L3L4, L5L6)

The interface cable for a dimmable fluorescent unit, a dimmable hanging lamp, or a dimmable LED light (ProFiLux-Simu, Moon or Sunrise) from GHL is plugged into this Western socket. Single- or twin- lamp lighting units, not separately dimmable, can be controlled via dimming channel 1 (/3). Twin-lamp, separately dimmable, lighting units are controlled via dimming channels 1 (/3/5) and 2 (/4/6).

This connection can also be used to control variable current pumps, dimmable lights from other manufacturers, and rotation-speed-regulated aquarium fans. See our accessories list for further details.

1.5.6 S1-S4 (S5-S8)

These Western sockets are used for connecting a switchable powerbar or a dosing unit from GHL. The functions of all the sockets are free programmable, see 3.17.3 *Socket function*. **In the default configuration all sockets are deactivated for safety reasons!**

Important note:

On S1-S4 also a digital powerbar could be connected. In this case it is absolutely necessary to do the appropriate settings under 3.17.10 *Digital powerbars*!

1.5.7 RS232

This 9-pin SUB-D port is required for connecting a PC or the *ProfiLux View* external display unit.

The *ProfiLux RS232* interface cable (not supplied as standard) should be used for the connection of a PC. The use of a different cable can result in malfunctions or even complete failure. The RS232 connectivity of the ProfiLux is not the PC norm, as additional signals are transmitted for diagnostic purposes and the *ProfiLux View* external display unit!

Connection to a PC is not absolutely necessary, as all settings can be made via the associated control panel of the unit.

2 Installation

2.1 Setting up the aquarium computer

Site the unit away from any possible contact with water.

In principle any installation site is permissible, but ease of use and readability should be taken into consideration.

When selecting the site for installation, it is also important to bear in mind the maximum cable lengths for the sensors, lighting units, and interfaces.

2.2 Connecting the sensors

(ProfiLux Plus II only)

Connect the temperature sensor and pH electrode (if relevant) to the appropriate connections provided.

The sensors should be sited in the aquarium such that water constantly circulates around them. Please ensure that the pH electrode is positioned as near vertical as possible relative to the water's surface (otherwise it won't work properly!). To avoid the danger of it becoming coated with algae it should be placed in as dark a spot as possible. An open-topped hang-on external filter is a good place, for example. Under no circumstances should the connection between the electrode and its cable be immersed in water. In order to record the mean temperature the temperature sensor should be positioned halfway between the bottom and the water's surface. It may be immersed completely.

Important note:

The signal output of a pH electrode is very small. This can increase the degree of interference from electronic devices affecting the electrode or the cable. Interference results in incorrect measurements. For this reason there should always be a sufficient distance between the electrode and the cables of possible sources of interference (e.g. lighting ballast units, line voltage leads, pumps, TV/radio, etc)! In addition there are qualitative differences in these electrodes, such that some are more prone to interference than others because of a weak signal strength or poor shielding.

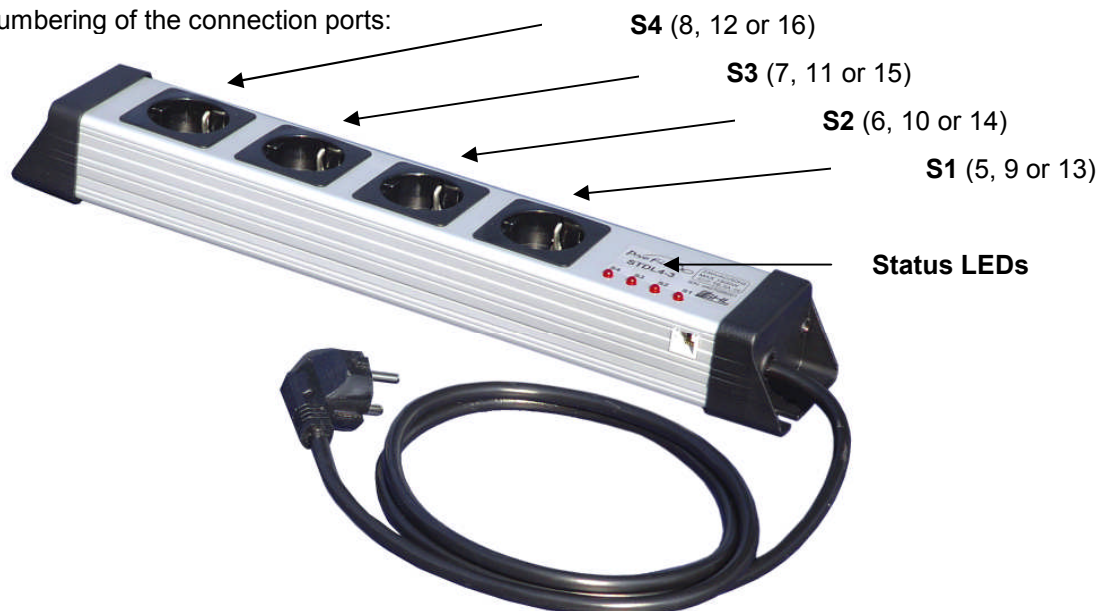
2.3 Connecting switchable powerbar

Up to four conventional (see 3.17.10 *Digital powerbars*) or digital switchable powerbars can be connected to the aquarium computer (using the appropriate expansion cards), producing up to 24 switchable sockets that are numbered sequentially from 1 to 24.

The functions of all the connection ports are free programmable, see 3.17.3 *Socket function*.

Once you have connected a switchable powerbar, you should label its sockets with the appropriate numbers and their functions using a waterproof pen or an adhesive label. The aquarium computer is connected to the switchable powerbar using the provided Western cable.

Numbering of the connection ports:



The switchable powerbar must be sited where they are protected from water. Under no circumstances should they come into contact with water. The best place is thus above water level, provided they are securely fixed so that they cannot fall into the tank!

The powerbar can be screwed firmly to a wall or cabinet using the two black mountings provided.

Attention: It is not allowed to connect ProfiLux II or ProfiLux Plus II with older powerbars of ProfiLux or ProfiLux Plus (the previous models, until 2005)! This would cause damage of the electronics!

2.4 Connecting lighting

The interface cables for dimmable lights (fluorescent units, hanging lamps, moonlight, etc.) are connected to the Western sockets L1L2, L3L4 or L5L6. The line voltage supply for these lights should be plugged into a line voltage socket that is **permanently** switched on! There is no need for external shutoff (shutoff takes place in the fluorescent units and/or hanging lamps from GHL). If you are using a light not manufactured by GHL, you can achieve shutoff by appropriate programming of a switchable socket or via our *EVG-AP* accessory.

The ports L1L2, L3L4 and L5L6 offer two 1-10V interfaces each and their relevant switching signals. The function of these interfaces can be set, see 3.17.4 *1-10V interface*.

As default the 1-10V interface L1 is configured as dimming channel 1, L2 as dimming channel 2, L3 as dimming channel 3, L4 as dimming channel 4. In most cases it is not necessary to alter this configuration when using the 1-10V interfaces for dimming control.

2.5 Connecting current pumps

The interface cables for variable current pumps are connected to L1L2 or L3L4. The function of the corresponding 1-10V interface should be set appropriately, see 3.17.4 *1-10V interface*.

Note: We offer a suitable adapter cable for connecting Tunze® current pumps.

2.6 Connecting the line voltage supply

Plug the DC power plug of the line voltage supply lead into the socket labeled 12VDC. Never use any other power supply lead as incorrect polarity or voltage could irreparably damage the computer! The line voltage supply lead has a nominal voltage of 12V; the positive is situated inside the socket.

2.7 Connecting to a PC

The aquarium computer can be connected to a PC using the optionally available serial interface cable. All settings can be readily and easily affected using our PC operating program. Of course all settings can also be set without using a PC, via the ProFiLux II control panel.

Note: Our interface employs not only the usual RS232 signals but also additional signals, for example for diagnostic purposes and for ProFiLux View – **hence only our cable can be used!**

2.8 Safety considerations

Water can run down any cables leading out of the aquarium. Hence the cables should be arranged such that water does not come into contact with any electrical or electronic items!

Before the fluorescent unit(s) or the switchable powerbar(s) are plugged into a line voltage socket it is absolutely essential to check that the device has not been damaged in any way (e.g. during transport).

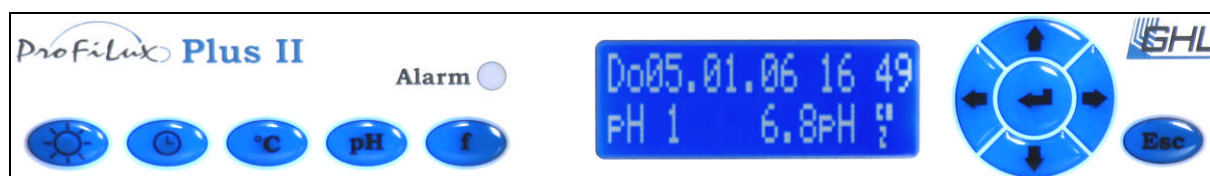
In particular please check that

- the housings and leads are undamaged and no parts that conduct electricity are accessible
- the fluorescent-tube fittings are firmly and securely inserted in the fluorescent unit(s)
- the cable grips are tight

In the event of any subsequent damage, disconnect from the line voltage supply immediately!

3 Operation

3.1 Operational elements



The control panel of the ProFiLux Plus II aquarium computer (some of the buttons shown do not feature in the ProFiLux II aquarium computer):

- Quick key for setting lighting (sun icon)
- Quick key for setting the clock (clock icon)
- Quick key for setting temperature (°C)
- Quick key for setting pH
- Function key for extras (f)
- Navigation keys (up and down, left and right arrows)

- Confirmation key (RETURN, ↵)
- Escape key (Esc)

Displays:

- Main display
- Alarm LED, illuminated red in the event of an alarm

3.2 Display

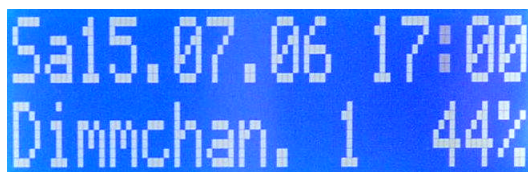
The upper line of the display shows the day of the week, date, and time of day. In the event that the radio-controlled clock accessory is fitted and has received a signal, then an additional antenna symbol will blink in the upper lines.

The lower line shows the current status of the various parameters, e.g. the dimming status of a dimming channel or the phase of the moon, the status of the level sensor or the temperature (ProfiLux Plus II only). The parameters to be displayed can be set, see also 3.16.6 *Display*.

The parameters described below are **not** all set in the basic ex-works configuration, so the display settings should be appropriately adjusted if required.

3.2.1 Illumination channel display

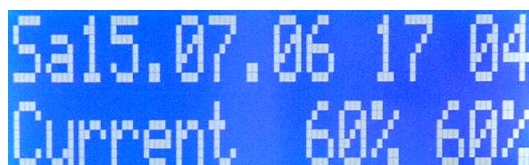
Displays the current brightness as a percentage. Example:



Sa15.07.06 17:00
Dimmchan. 1 44%

3.2.2 Current display

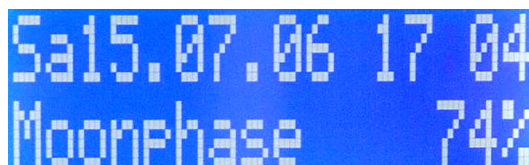
Displays the current output of the two current pumps as a percentage. Example:



Sa15.07.06 17 04
Current 60% 60%

3.2.3 Moon phase display

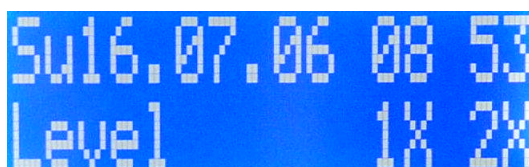
Displays the current phase of the moon as a percentage (0% = new, 100% = full moon). Example:



Sa15.07.06 17 04
MoonPhase 74%

3.2.4 Level sensor display

Displays the current status of the two level sensors (ProfiLux Plus II only). An active (or absent) sensor is represented by a "X", an inactive one by an "-". Example:



Su16.07.06 08 53
Level 1X 2X

3.2.5 pH display

Displays the current pH value and the status of the relevant outputs. Examples:



Sa15.07.06 17 21
pH 1 7.0pH -

The minus symbol is displayed, indicating that the controller has activated the relevant switchable sockets (if present) to lower the pH.



Sa15.07.06 17 21
pH 1 7.0pH +

The plus symbol is displayed, indicating that the controller has activated the relevant switchable sockets (if present) to raise the pH.

3.2.6 Temperature display

Displays the current temperature and the status of the relevant outputs. Examples:



The cooling symbol (*) is displayed, indicating that the controller has activated the relevant switchable socket (if present) to lower the temperature.



The symbols for the bottom heater and immersion heater are displayed, indicating that the controller has activated the relevant switchable sockets (if present) to raise the temperature.

3.3 General

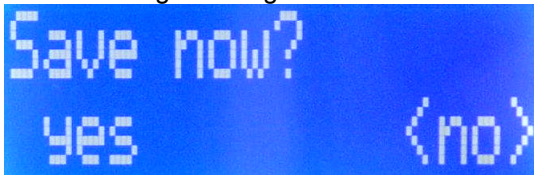
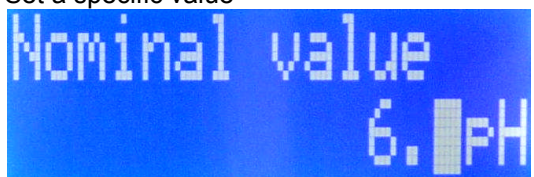
If you have connected the optionally available DCF module (radio control of clock), *use DCF* is enabled and the DCF signal can be received, then the time of day and the date will be set automatically after the line voltage supply is switched on (see also 3.14.1 *Time & date, DCF*).

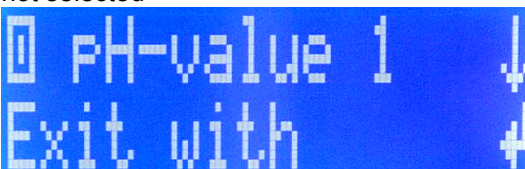
Otherwise it is wise to set the time of day and the date before making any additional settings.

All the settings you make will be stored permanently and will remain valid even after any interruption in the power supply. The clock has battery back-up and will run for several weeks in the event of any interruption in the power supply.

The operation of the device is very simple. The **up arrow** and **down arrow** keys can be used to navigate the menus and make a choice. When you enter a menu a symbol in the upper right-hand corner of the display will indicate whether additional menu items are available using the up and down arrows. The buttons **pH**, **°C**, **sun**, and **clock** take you directly into the appropriate configuration menu. The **f** key takes you to *extras*. A choice or setting can be confirmed using the **RETURN** key, and the **Esc** key exits the current process. After every configuration procedure you will be asked whether you wish to store the new setting(s). Only after you confirm with **Yes** will the new setting(s) be accepted and stored. These settings will also be stored in the nonvolatile memory (EEPROM, which is not line voltage-reliant) and reloaded from there after any interruption in the line voltage supply.

The following types of dialogue will be encountered in the operation of the device:

Dialogue type	Actual example	Implementation
Choice of Yes / No	Before storing a setting 	Use the left arrow key to select Yes or the right arrow key to select No . The chevron brackets indicate the choice made. The choice is then confirmed using the RETURN key.
Enter a number (0-9)	Details of the number of dimming stages 	The number can be increased using the up arrow , and decreased using the down arrow . The number, once set, is confirmed by RETURN .
Enter a word, a date, or a time	Set a specific value 	Use the left arrow and right arrow to locate the figure you wish to change. The up arrow can be used to increase the number, the down arrow to decrease it. The number, once set, is confirmed by RETURN .
Enter text	Reminder text	Use the left arrow and right arrow to locate the text you wish to change. Use the up arrow and down arrow to alter the characters. The text, once

		set, is confirmed by RETURN .
Simple choice – Choice of a single option	Choice of a single menu option 	Use the up arrow and down arrow to choose a menu option, then confirm it using RETURN .
Multiple choice - several options can be selected simultaneously	Choice of values to be stored  not selected  selected	Use the up arrow and down arrow to choose a menu option, use the right arrow to select the option (a box with a dot in the middle will then be displayed), use the left arrow to cancel the choice of option (an empty box will then be displayed). Use RETURN to confirm your choice.

3.4 Standard display

During normal operation the following information will be shown on the display:

- Upper line: Date with day of week and time of day as well as the DCF symbol, if relevant (only if using the optionally available module)
- Lower line according to configuration, e.g. light intensity of individual dimming channels or current water temperature and pH as well as controller activity (ProfiLux Plus II only)

When the standard display is displayed the device will be in main menu mode, and the navigation keys, **RETURN**, and the quick keys will all be active.

If the device is left in a sub-menu then after a fixed period of time with no user activity it will automatically revert to the main menu.

3.4.1 Feeding pause

When the standard display is displayed the **Esc** key has an additional feeding-pause function. Pressing the **Esc** key when the standard display is displayed will deactivate the pumps (and/or any switchable sockets whose function is set to *Filter*). After the elapse of a pre-set period of time the pumps will be automatically reactivated. See also 3.16.4 *Feeding pause* and 3.17.3 *Socket function*. Pressing the **Esc** key a second time aborts the feeding-pause.

3.5 Standard settings

As supplied, the device is configured such that in many cases little or no additional configuration will be necessary. The following is a list of the ex-works settings (some of the settings are not relevant to the ProfiLux II model).

Function	Standard setting
Device address	1
Nominal temperature	26.0 °C
Temperature - night-time decrease enabled	no

Temperature - night-time decrease	2.0°C
Start time for night-time decrease	19:00 hours
End time for night-time decrease	05:00 hours
Summer switching	no
Intensity of summer switching	20
Temperature hysteresis	0.2 °C (equivalent to +/-0.1 °C)
Nominal pH	7.0
pH night-time switch-off	no
Start time for pH night-time switch-off	19:00 hours
End time for pH night-time switch-off	05:00 hours
DCF	deactivated
Change from winter to summer time (MEZ-MESZ)	off
Duration of change from winter to summer time (MEZ-MESZ)	7 days
Probability of a cloud	0% (deactivated)
Minimum duration of a cloud	3s
Maximum duration of a cloud	30s
Maximum light reduction via a cloud	70%
Lights that affect moon-phase simulation	none
Start time for moon-phase simulation	19:00 hours
End time for moon-phase simulation	09:00 hours
Temperature alarm enabled	no
Maximum deviation for temperature alarm	2 °C
pH alarm enabled	no
Maximum deviation for pH alarm	1
"Burning-in" duration of all dimming channels	0h
Feeding pause	5 min
Rainy day	all off
Function of 1-10V interface 1	dimming channel 1
Function of 1-10V interface 2	dimming channel 2
Function of 1-10V interface 3	dimming channel 3
Function of 1-10V interface 4	dimming channel 4
Lower voltage limit of all 1-10V interfaces	1V
Upper voltage limit of all 1-10V interfaces	10V
Operation of both current pumps	deactivated
Wave form of both current pumps	sinus waves
Night-time decrease of both current pumps	off
Minimum current speed of both current pumps	60%
Maximum current speed of both current pumps	100%
Duration of ebb/flow/random of both current pumps	30 min

- The dimming curves are configured as in the example 3.15.1 *Illumination run* shown.
- All reminder texts and timers are deactivated.
- All switchable socket functions are set to *always off* due to safety reasons.

3.6 pH

This allows you to configure the functions relating to the pH value. In the event that several pH electrodes with the appropriate electronic metering are present you should first of all select the sensor to be configured (ProFiLux PlusII: 1 is the sensor of the onboard pH input). The pH can be adjusted downwards (e.g. addition of CO₂) and upwards (e.g. by alkalisation), or both together. For this the relevant switchable socket functions must be configured.

3.6.1 Nominal value

The nominal pH value can be set in steps of 0.1 within the range 4.5 to 9.5.

Downward adjustment:

If the pH falls below the nominal value then the pH downward adjustment will be switched off, if it rises above the nominal value by more than half the hysteresis (see 3.6.6 *Hysteresis*) the pH downward adjustment will be switched on again.

Upward adjustment:

If the pH rises above the nominal value the pH upward adjustment will be switched off, if it falls below the nominal value by more than half the hysteresis then the pH upward adjustment will be switched on again.

Note: For security reasons altering the nominal value deactivates a nocturnal change (if set)! If applicable these settings should be set again.

3.6.2 Nocturnal change

This allows you to choose whether the pH value is to altered at night.

Once you have enabled the nocturnal alteration with Yes, you can set the amount by which the pH value will alter:

The value can be set between -1.0 and 1.0° C in 0.1 steps. Thereafter you should input when the nocturnal alteration is to take effect.

Start of nocturnal alteration: a time between 14:00 and 23:59 hours

End of nocturnal alteration: a time between 00:00 and 10:00 hours

Note: Nocturnal nominal value = nominal value + nocturnal alteration

3.6.3 Calibration

This function permits the calibration of the pH electrode. Only when the ProfiLux (Plus) II aquarium computer has been calibrated for the relevant pH electrode can the correct pH value be recorded. Calibration is necessary whenever a new electrode is connected. In addition calibration should be repeated from time to time because of possible changes in the actual functioning of the electrode. Please follow the instructions provided by the electrode manufacturer. The electrode should always be carefully dried (with air, by shaking, or with a dry tissue) before immersion in a buffering solution!

First enter the *calibration tolerance* (between 1 and 3), which forms the basis of the calibration. In the case of old or disturbance-sensitive pH electrodes it may happen that the measurement may not be adequately stabilised and calibration is not possible. Depending on the circumstances it may nevertheless be possible to stabilise such electrodes by increasing the calibration tolerance, but naturally at the expense of accuracy of measurement. In principle the calibration process should be performed using the smallest possible calibration tolerance.

Thereafter you will have the option of altering the two values at which calibration is to be performed. The standard values (calibration at pH 4.0 and 7.0) should be altered if measurement is to take place predominantly in the alkaline zone (> 7.0).

First of all you will be required to immerse the probe of the electrode in a buffering solution with the first calibration value. Thereafter pressing **RETURN** will start the measurement process, during which two numbers will be seen in the lower line of the display. The left-hand number gives the maximum time remaining in seconds. If this time expires without the measurement stabilising sufficiently then the electrode will be deemed defective and the calibration aborted. The right-hand number shows the measurement in an internal code. ProfiLux Plus II recognises automatically when this value has stabilised and then terminates the measurement process. After this measurement you will next be required to perform the same procedure using a buffering solution with the second calibration value. Again the measurement process is started by **RETURN**.

When this measurement too is completed, you will be asked whether the data are to be stored. If no errors have occurred, confirm with Yes.

Finally, it is advisable to check the calibration. Place the electrode in the each of the two buffering solutions in turn and check whether the aquarium computer shows the correct values.

3.6.4 Activity

This allows you to determine whether the sensor and the associated recording of measurements and adjustment should be active (standard: Yes). If No is selected the adjustment and sensor monitoring will be switched off and all switchable sockets associated with the sensor will be deactivated. This is advisable only when this input is not required. A deactivated sensor is indicated by “---“ in the display.

3.6.5 Operation hours

An associated operation hour meter is provided to record how long the pH electrode has been in service. The operation hours are recorded cyclically every hour in the permanent storage, ensuring that the operation hours are still recorded in the event of any interruption in line voltage power.

After the menu option *Operation hours* is selected the operation hours of the pH electrode are displayed.

After a few seconds have elapsed or if any button is pressed you will be asked *Reset operation hour meter?*

Confirmation with *Yes* will reset the operation hour meter to 0h. Obviously this should be done whenever the pH electrode is changed.

3.6.6 Hysteresis

The so-called hysteresis determines the interval between the switching points and is necessary in order to reduce the switching frequency. The hysteresis set here encompasses the interval between the switching on of the CO₂ socket and the switching on of the alkalisation socket. The nominal pH value lies precisely at the centre of the interval between these two switching points. The setting for the hysteresis can be a value between 0.1 and 1.0.

The ex-works hysteresis setting of 0.3 should not normally be altered. A reduction in the hysteresis is advisable only when the adjustment precision is to be increased. This will, however, also increase switching frequency.

Example: nominal pH value = 7.0, hysteresis = 0.4

-> The CO₂ socket switches on at 7.2 and off again at 7.0.

-> The alkalisation socket switches on at 6.8 and off again at 7.0.

Be aware that the pH adjustment will use 7.1 and/or 6.9 as the pivotal point rather than the precise nominal value set, in this case 7.0. This is necessary in order to make possible simultaneous upward and downward adjustment. If adjustment is to be only via CO₂ or alkalisation then the nominal value can be adjusted accordingly or the hysteresis reduced.

3.6.7 Alarm

First of all configure whether the pH alarm is to be enabled. If the alarm is enabled then the *Maximum deviation* of the actual pH value from the nominal value must be entered. The deviation for the pH alarm can be set between 0.5 and 3.0.

Then can be set if in the case of an alarm the *controller* should be *shut-off*.

After the enabling of an alarm the relevant actual value will be constantly compared with the nominal value. In the event that the deviation (above or below nominal) is larger than that set under *Maximum deviation* then an alarm will be activated. The adjustment hysteresis is taken into account during comparison of nominal and actual values.

In the event of an alarm the red alarm LED will be illuminated and the buzzer will be activated dependent on the mode set (see 3.17.8 *Alarm*). In addition, a switchable socket can be programmed such that it will be activated in the event of an alarm.

If *controller shut-off* has been set then the alarm function will immediately deactivate all sockets involved in pH regulation with this sensor!

The configuration of the alarm should be performed with the greatest care. It is essential to avoid the alarm parameters being exceeded during normal operation!

3.6.8 Current actual value

This displays the current actual pH value. The display can be ended by pressing any key.

3.6.9 Operation mode controller

You can set how the controller should work. For most cases, the standard setting *Twoposition controller* is completely sufficient and so it needs not be changed. For some special cases, the other operation modes are necessary to optimize the controlling behaviour. The following operating modes can be selected:

- *Twoposition controller*
This is the common operation mode. At two switchpoints, which are determined through nominal value and hysteresis, a belonging socket is switched on or off. See here also 3.6.6 *Hysteresis*.
- *Pulse/Pause fixed*
If the actual value differs from the nominal value by a half hysteresis, the belonging switchable socket is switched on for an adjustable time (*Pulse duration*). After expiration of the pulse duration,

the socket is switched off again and relines voltage so at least for the set *Pause duration*. After expiration of the pause duration, the socket can be switched on again by the control when the actual value differs from the nominal value again (or still) by a half hysteresis, the switching circle (pulse and pause) starts again.

- *Pulse variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the actual turn on time depends on the difference of nominal value and actual value. The bigger the deviation, the longer is also the turn on time, but at the maximum it is as long as set under *Pulse duration*.
- *Pause variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the turn-off time depends on the difference of nominal value and actual value. The bigger the deviation, the shorter is also the turn-off time, but at the maximum it is as long as set under *Pause duration*.

The operation modes *Pulse/Pause fixed*, *Pulse variable* and *Pause variable* make sense, when the measured size (pH value) reacts only slowly and delayed to the controller activities (e.g. Switching on CO₂) or only small amounts of substances should be added. An example is introducing an acid into a pond. For these operation modes, you have to make the following settings:

- *Pulse duration*
The corresponding socket is switched on for this duration (at the maximum). A pulse duration between 1s and 1h can be set.
- *Pause duration*
This is the (maximum) time until the control can switch on the corresponding socket again. A pause duration between 1s and 1h can be set.

3.6.10 Signal filter

Here you can adjust the strength of the measurement signal filter.

Valid values are 1 (strong filter) to 10 (weak filter), default is 5 (medium filter). Strong filtering will delay the readings and make them more constant. If a reading has a large fluctuation (e.g. caused by electromagnetic noise or this value varies fast in reality) a stronger filter may make sense. If the calibration takes too long and can't be completed successfully it may be wise to reduce the filter strength.

3.7 Temperature

This allows you to configure the temperature functions. In the event that several temperature sensors with the appropriate electronic metering are present you should first of all select the sensor to be configured (ProfiLux Plus II: 1 is the sensor of the onboard temperature input).

The water temperature is measured using the temperature sensor supplied. ProfiLux constantly monitors this sensor for cable fracture or short-circuit. In the event that such a failure occurs the display shows the sign "****" instead of the temperature, and the associated heating or cooling systems are immediately deactivated!

The intelligent temperature regulation of the ProfiLux II permits optimal control of bottom heater and heater using only a single temperature sensor, and also control of a cooling system.

Please note: All *settings* have to be done in °Celsius. But nevertheless the current actual value can be *displayed* either in °Celsius or °Fahrenheit.

The conversion can be made with this formula: $T_{\text{Celsius}} = (T_{\text{Fahrenheit}} - 32^{\circ}\text{F}) * 5/9$; for example $80^{\circ}\text{F} = (80^{\circ}\text{F} - 32^{\circ}\text{F}) * 5/9 = 26.7^{\circ}\text{C}$

The following sub-menus can be accessed.

3.7.1 Nominal value

The nominal water temperature can be set in steps of 0.1°C within the range 15.0°C and 35.0°C.

Depending on the difference between the desired (nominal) and the actual temperature the heating or cooling will be switched on.

The following combinations of activities may take place:

- Heater and bottom heater on
- Bottom circulator only on
- All off
- Cooling only on

ProFiLux is programmed such that the bottom heating takes precedence over the heater. This permits optimal heating of the substrate. The heater is switched on only when the bottom heating alone is no longer adequate.

Note: The heat from the lighting and the ambient temperature can have an effect on the water temperature. If no cooling is installed it is possible that the nominal temperature may be exceeded.

Note: For security reasons altering the nominal value deactivates a nocturnal change (if set)! If applicable these settings should be set again.

3.7.2 Summer switching

This permits you to enable summer switching and adapt it to your personal requirements. As already mentioned, it is possible that the water temperature may exceed the nominal temperature.

In this case the bottom heating will be switched off and there will be no circulation in the substrate.

The Activation of summer switching results in the bottom heating being regulated such that the water temperature is not increased appreciably.

After you have enabled the bottom heating with Yes, you can set the intensity of the bottom heating (5-30).

This value represents the time in minutes for which the bottom heating will be switched on given a temperature excess of 1°C. The on-period will be calculated by the aquarium computer depending on the actual temperature excess. If the temperature excess is lower the on-period will be increased. If the excess is more than 3°C the bottom heating will remain off regardless. The settings for the nocturnal decrease and the cooling are taken into account. This intelligent process has the advantage that optimal substrate circulation, precisely tailored to your aquarium, is achieved!

3.7.3 Nocturnal change

This allows you to choose whether the water temperature is altered at night.

Once you have enabled the nocturnal alteration with Yes, you can set the amount by which the temperature will alter:

The value can be set between -0.1° C and -3.0° C in 0.1°C steps. Thereafter you should input when the nocturnal alteration is to take effect.

Start of nocturnal alteration: a time between 14:00 and 23:59 hours

End of nocturnal alteration: a time between 00:00 and 10:00 hours

Note: Nocturnal nominal value = nominal value + nocturnal alteration

3.7.4 Therapy

In the event of fish disease it may be useful to be able to vary the water temperature for a period of time.

Activation of the Therapy function will alter the temperature to the desired level (anywhere from a reduction of 5°C to an increase of 5°C) for the time specified (3 - 21 days). The changes in temperature at the beginning and end of the treatment will be made gently (over the space of a day). In the event that for safety reasons you have set a maximum temperature limit using the associated thermostat of the heater then you will have to alter this in order to permit a rise in temperature.

3.7.5 Calibration

This function calibrates the temperature probe input. This function is depending on the type of the input – internal (onboard) or external.

- Internal (onboard-) temperature probe input
Recovers the factory calibration and resets a potentially given extension cord compensation (see 3.7.14 *Extension*) – after that ProFiLux assumes that no extension cable is present.
- External temperature probe (PLM-...)
Additional temperature-sensor inputs (using expansion cards, e.g. *PLM-Temp*) will need to be calibrated! Each expansion card with temperature-sensor port comes with a calibration leaflet. The two values given in this leaflet should be input under *Calibrate ADC1* and *Calibrate ADC2*. After entering these two values the temperature-sensor port will be calibrated.

3.7.6 Activity

This allows you to determine whether the sensor and the associated recording of measurements and adjustment should be enabled (standard: Yes). If No is selected the adjustment and sensor monitoring will

be switched off and all switchable sockets associated with the sensor will be deactivated. This is advisable only when this input is not required. A deactivated sensor is indicated by “---“ in the display.

3.7.7 Operation hours

An associated operation hour meter is provided to record how long the temperature sensor has been in service. The operation hours are recorded cyclically every hour in the permanent storage, ensuring that the operation hours are still recorded in the event of any interruption in line voltage power.

After the menu option *Operation hours* is selected the operation hours of the temperature sensor are displayed. After a few seconds have elapsed or if any button is pressed you will be asked *Reset operation hour meter?* Confirmation with *Yes* will reset the operation hour meter to 0h. Obviously this should be done whenever the temperature sensor is changed.

3.7.8 Hysteresis

The so-called hysteresis determines the interval between the switching points and is necessary in order to reduce the switching frequency. The hysteresis set here encompasses the interval between the switching on of the normal heating and the switching off of the bottom heating. The nominal temperature lies precisely at the centre of the interval between these two switching points. The setting for the hysteresis can be a value between 0.15°C and 2.0°C.

With the hysteresis set at 0.2°C this means that:

- If the actual temperature drops below the nominal by more than 0.1°C -> the heater will be switched on (the bottom heating will already be on)
- If the nominal temperature is exceeded by more than 0.1°C -> the bottom heating will be switched off (the heater will already be off)

The hysteresis set also affects when the cooling will be active. The point at which the cooling is switched on also depends on the cooling difference (see 3.7.10 *Cooling difference*) and can be calculated as follows:

$T = \text{nominal temperature} + 5/6 * \text{hysteresis} + \text{cooling difference}$; in the above example: $T = \text{nominal temperature} + 0.167^\circ\text{C} + \text{cooling difference}$.

The default hysteresis setting of 0.2 °C should not normally be altered. A reduction in the hysteresis is advisable only when the adjustment precision is to be increased. This will, however, also increase switching frequency. The hysteresis should be increased when, for example, the cooling comes on shortly after heater activity. This is particularly likely where there is a large volume of water and only low current.

3.7.9 Alarm

First of all configure whether the temperature alarm is to be enabled. If you choose *Enabled, except during AWC* the alarm monitoring will be disabled temporarily during an automatic water change.

If the alarm is enabled then the *maximum deviation* of the actual temperature value from the nominal value must be entered.

The deviation for the temperature alarm can be set between 0.5°C and 5.0°C.

Then can be set if in the case of an alarm the *controller* should be *shut-off*.

After the enabling of an alarm the relevant actual value will be constantly compared with the nominal value.

In the event that the deviation (above or below nominal) is larger than that set under *Maximum deviation* then an alarm will be activated. During temperature monitoring the adjustment hysteresis is taken into account during comparison of nominal and actual values, as is the nocturnal change and any cooling difference that has been set (see 3.7.12 *Cooling difference*).

In the event of an alarm the red alarm LED will be illuminated and the buzzer will be activated dependent on the mode set (see 3.17.8 *Alarm*). In addition, a switchable socket can be programmed such that it will be activated in the event of an alarm.

If *controller shut-off* has been set then the alarm function will immediately deactivate all sockets involved in temperature regulation with this sensor!

The configuration of the alarm should be performed with the greatest care. It is essential to avoid the alarm parameters being exceeded during normal operation!

Example of calculation of the upper and lower temperature alarm limits:

Nominal value 26.0°C, nocturnal decrease of 2°C enabled, overall hysteresis 0.2°C, maximum deviation 1.5°C, cooling difference 2.0°C

Lower limit = $26.0^\circ\text{C} - 2.0^\circ\text{C} - \frac{1}{2} * 0.2^\circ\text{C} - 1.5^\circ\text{C} = 22.4^\circ\text{C}$

Upper limit = $26.0^\circ\text{C} + 5/6 * 0.2^\circ\text{C} + 1.5^\circ\text{C} + 2.0^\circ\text{C} = 27.7^\circ\text{C}$ (5/6 because of the upper switching point for the cooling, see also 3.7.8 *Hysteresis*)

3.7.10 Current actual value

This displays the current actual temperature. The display can be ended by pressing any key

3.7.11 Display

It can be selected if the current actual value should be *displayed* as °Celsius (°C) or °Fahrenheit (°F). Independent from this *settings* have always to be done in °Celsius!

3.7.12 Cooling difference

If the cooling is not to be enabled within the normal temperature regulation (maintenance of the nominal temperature with regard to the hysteresis), but delayed, then the *cooling difference* can be set to determine how far the actual temperature must exceed the nominal temperature before the cooling is enabled. Values between 0.0°C (no delay, cooling is enabled as soon as the nominal temperature is exceeded) and 5.0°C (maximum delay, cooling does is not enabled until the nominal temperature is exceeded by 5.0°C). The *cooling difference* also has an effect on the alarm monitoring.

3.7.13 Operation mode controller

You can set how the controller should work. For most cases, the standard setting *Twoposition controller* is completely sufficient and so it needs not be changed. For some special cases, the other operation modes are necessary to optimize the controlling behaviour. The following operating modes can be selected:

- *Twoposition controller*
This is the common operation mode. At two switch points, which are determined through nominal value and hysteresis, a belonging socket is switched on or off. See here also 3.7.8 *Hysteresis*.
- *Pulse/Pause fixed*
If the actual value differs from the nominal value by a half hysteresis, the belonging switchable socket is switched on for an adjustable time (*Pulse duration*). After expiration of the pulse duration, the socket is switched off again and reline voltage so at least for the set *Pause duration*. After expiration of the pause duration, the socket can be switched on again by the control when the actual value differs from the nominal value again (or still) by a half hysteresis, the switching circle (pulse and pause) starts again.
- *Pulse variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the actual turn on time depends on the difference of nominal value and actual value. The bigger the deviation, the longer is also the turn on time, but at the maximum it is as long as set under *Pulse duration*.
- *Pause variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the turn-off time depends on the difference of nominal value and actual value. The bigger the deviation, the shorter is also the turn-off time, but at the maximum it is as long as set under *Pause duration*.

The operation modes *Pulse/Pause fixed*, *Pulse variable* and *Pause variable* make sense, when the measured size (temperature) reacts only slowly and delayed to the controller activities (e.g. Switching on the heater). An example is heating the sump.

For these operation modes, you have to make the following settings:

- *Pulse duration*
The corresponding socket is switched on for this duration (at the maximum). A pulse duration between 1s and 1h can be set.
- *Pause duration*
This is the (maximum) time until the control can switch on the corresponding socket again. A pause duration between 1s and 1h can be set.

3.7.14 Extension

In the case of adding (or removing) an extension cable to the temperature probe *ProfiLux* must compensate a measuring error which is caused by the changed cable length. Changing the cable length without compensation can cause a significant deviation of the measured value.

To make *ProfiLux* calculate the correct compensation you have to proceed as below:

The probe must be connected and it should be placed in water (and remain there while this procedure – the water temperature should not change in the next minutes).

- Invoke this menu (*Temperature->extension*).
- Wait for the given time.
- Change the extension (add or replace), confirm with **RETURN**.

Now *ProfiLux* calculates the compensation values, then you can save these values.
From here on *ProfiLux* displays the correct (compensated) temperature value.

3.7.15 Measurement range

Here you can adjust the measurement range suitable for the connected temperature probe. There are 2 types of temperature probes available:

- *Aquarium* – measurement range app. 11.5°C to 38°C
- *Pond* – measurement range app. 0°C to 40°C

The default setting is *Aquarium*. Change the measurement range only when you are connecting a pond-probe! If measurement range and used probe don't fit the reading will be wrong!

3.7.16 Signal filter

Here you can adjust the strength of the measurement signal filter.

Valid values are 1 (strong filter) to 10 (weak filter), default is 5 (medium filter). Strong filtering will delay the readings and make them more constant. If a reading has a large fluctuation (e.g. caused by electromagnetic noise or this value varies fast in reality) a stronger filter may make sense. If the calibration takes too long and can't be completed successfully it may be wise to reduce the filter strength.

3.7.17 1-10V max. at...

With this setting you can determine at which temperature deviation an assigned 1-10V interface (e.g. for *PTC* or *PropellerBreeze*) should have the maximum output voltage. The connected device has the maximum power at this set deviation. Adjustable are values between 0.2°C and 10°C.

3.8 Redox

This allows you to configure the functions relating to the redox value. In the event that several redox electrodes with the appropriate electronic metering are present you should first of all select the sensor to be configured (the inputs are numbered sequentially from left to right, viewed from the rear). The redox can be adjusted downwards and upwards, or both together. For this the relevant switchable socket function must be configured.

3.8.1 Nominal value

The nominal redox value can be set in steps of 1mV within the range –300mV to +600mV.

Downward adjustment:

If the redox falls below the nominal value then the redox downward adjustment will be switched off, if it rises above the nominal value by more than half the hysteresis (see 3.8.5 *Hysteresis*) the redox downward adjustment will be switched on again.

Upward adjustment:

If the redox rises above the nominal value the redox upward adjustment will be switched off, if it falls below the nominal value by more than half the hysteresis then the redox upward adjustment will be switched on again.

3.8.2 Calibration

This function permits the calibration of the redox electrode. Only when the *ProfiLux* aquarium computer has been calibrated for the relevant redox electrode can correct redox values be recorded. Calibration is necessary whenever a new electrode is connected. In addition calibration should be repeated from time to time because of possible changes in the actual functioning of the electrode. Please follow the instructions provided by the electrode manufacturer. The electrode should always be carefully dried (with air, by shaking, or with a dry tissue) before immersion in a buffering solution!

First enter the calibration tolerance (between 1 and 3), which forms the basis of the calibration. In the case of old or disturbance-sensitive redox electrodes it may happen that the measurement may not be adequately

stabilised and calibration is not possible. Depending on the circumstances it may nevertheless be possible to stabilise such electrodes by increasing the calibration tolerance, but naturally at the expense of accuracy of measurement. In principle the calibration process should be performed using the smallest possible calibration tolerance.

Thereafter you will have the option of setting the second calibration value within in the range 200mV to 250mV (depending on the standard calibration fluid available).

First of all you will be required to insert the null plug (supplied with our redox cards). Thereafter pressing **RETURN** will start the measurement process, during which two numbers will be seen in the lower line of the display. The left-hand number gives the maximum time remaining in seconds. If this time expires without the measurement stabilising sufficiently then the electrode will be deemed defective and the calibration aborted. The right-hand number shows the measurement in an internal code. ProfiLux Plus II recognises automatically when this value has stabilised and then terminates the measurement process. After this measurement you will next be required to immerse the electrode in the calibration solution (with the previously set standard value). Obviously the null plug should now be removed and the electrode connected! Again the measurement process is started by **RETURN**.

When this measurement too is completed, you will be asked whether the data are to be stored. If no errors have occurred, confirm with **Yes**.

Finally, it is advisable to check the calibration. First plug in the null plug – is the reading around 0mV? Then connect the electrode and immerse it in the calibration solution. Is a figure approximating to the upper calibration value now displayed?

3.8.3 Activity

This allows you to determine whether the sensor and the associated recording of measurements and adjustment should be enabled (standard: **Yes**). If **No** is selected the adjustment and sensor monitoring will be switched off and all switchable sockets associated with the sensor will be deactivated. This is advisable only when this input is not required. A deactivated sensor is indicated by “---“ in the display.

3.8.4 Operation hours

An associated operation hour meter is provided to record how long the redox electrode has been in service. The operation hours are recorded cyclically every hour in the non-volatile memory, ensuring that the operation hours are still recorded in the event of any interruption in line voltage power.

After the menu option *Operation hours* is selected the operation hours of the redox electrode is displayed. After a few seconds have elapsed or if any button is pressed you will be asked *Reset operation hour meter?* Confirmation with **Yes** will reset the operation hour meter to 0h. Obviously this should be done whenever the redox electrode is changed.

3.8.5 Hysteresis

The so-called hysteresis determines the interval between the switching points and is necessary in order to reduce the switching frequency. The hysteresis set here encompasses the interval between the switching on of the *Redox upwards* socket and the switching on of the *Redox downwards* socket. The nominal redox value lies precisely at the centre of the interval between these two switching points.

The setting for the hysteresis can be a value between 10mV and 100mV.

The default hysteresis setting of 20mV should not normally be altered. A reduction in the hysteresis is advisable only when the adjustment precision is to be increased. This will, however, also increase switching frequency.

Example: nominal redox value = 100mV, hysteresis = 20mV

-> The *Redox downwards* socket switches on at 110mV and off again at 100mV.

-> The *Redox upwards* socket switches on at 90mV and off again at 100mV.

Be aware that the redox adjustment will use 105mV and/or 95mV as the pivotal point rather than the precise nominal value set, in this case 100mV. This is necessary in order to make possible simultaneous upward and downward adjustment. If adjustment is to be only upwards or downwards then the nominal value can be adjusted accordingly or the hysteresis reduced.

3.8.6 Alarm

First of all configure whether the redox alarm is to be enabled. If you choose *Enabled, except during AWC* the alarm monitoring will be disabled temporarily during an automatic water change.

If the alarm is enabled then the *Maximum deviation* of the actual redox value from the nominal value must be entered. The deviation for the redox alarm can be set between 40mV and 400mV.

Then can be set if in the case of an alarm the *controller* should be *shut-off*.

After the enabling of an alarm the relevant actual value will be constantly compared with the nominal value. In the event that the deviation (above or below nominal) is larger than that set under *Maximum deviation* then an alarm will be activated. The adjustment hysteresis is taken into account during comparison of nominal and actual values.

In the event of an alarm the red alarm LED will be illuminated and the buzzer will be activated dependent on the mode set (see 3.17.8 Alarm). In addition, a switchable socket can be programmed such that it will be activated in the event of an alarm.

If *controller shut-off* has been set then the alarm function will immediately deactivate all sockets involved in redox regulation with this sensor!

The configuration of the alarm should be performed with the greatest care. It is essential to avoid the alarm parameters being exceeded during normal operation!

3.8.7 Current actual value

This displays the current actual redox value. The display can be ended by pressing any key.

3.8.8 Operation mode controller

You can set how the controller should work. For most cases, the standard setting *Twoposition controller* is completely sufficient and so it needs not be changed. For some special cases, the other operation modes are necessary to optimize the controlling behaviour. The following operating modes can be selected:

- *Twoposition controller*
This is the common operation mode. At two switch points, which are determined through nominal value and hysteresis, a belonging socket is switched on or off. See here also 3.8.5 Hysteresis.
- *Pulse/Pause fixed*
If the actual value differs from the nominal value by a half hysteresis, the belonging switchable socket is switched on for an adjustable time (*Pulse duration*). After expiration of the pulse duration, the socket is switched off again and relines voltage so at least for the set *Pause duration*. After expiration of the pause duration, the socket can be switched on again by the control when the actual value differs from the nominal value again (or still) by a half hysteresis, the switching circle (pulse and pause) starts again.
- *Pulse variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the actual turn on time depends on the difference of nominal value and actual value. The bigger the deviation, the longer is also the turn on time, but at the maximum it is as long as set under *Pulse duration*.
- *Pause variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the turn-off time depends on the difference of nominal value and actual value. The bigger the deviation, the shorter is also the turn-off time, but at the maximum it is as long as set under *Pause duration*.

The operation modes *Pulse/Pause fixed*, *Pulse variable* and *Pause variable* make sense, when the measured size (redox value) reacts only slowly and delayed to the controller activities or only small amounts of substances should be added.

For these operation modes, you have to make the following settings:

- *Pulse duration*
The corresponding socket is switched on for this duration (at the maximum). A pulse duration between 1s and 1h can be set.
- *Pause duration*
This is the (maximum) time until the control can switch on the corresponding socket again. A pause duration between 1s and 1h can be set.

3.8.9 Signal filter

Here you can adjust the strength of the measurement signal filter.

Valid values are 1 (strong filter) to 10 (weak filter), default is 5 (medium filter). Strong filtering will delay the readings and make them more constant. If a reading has a large fluctuation (e.g. caused by electromagnetic noise or this value varies fast in reality) a stronger filter may make sense. If the calibration takes too long and can't be completed successfully it may be wise to reduce the filter strength.

3.9 Conductivity

This allows you to configure the functions relating to the conductivity (or the salinity/density in the marine aquarium). In the event that several conductivity electrodes with the appropriate electronic metering are present you should first of all select the sensor to be configured (the inputs are numbered sequentially from left to right, viewed from the rear). The conductivity can be adjusted downwards and upwards, or both together. For this the relevant switchable socket functions must be configured.

There are 2 different types of conductivity measurement cards with different ranges available: 0 to 2000 μ S (for freshwater aquaria), 0 to 100mS (for marine aquaria). Depending on the range chosen, the following parameters can be set as described.

3.9.1 Nominal value

Fresh water: The nominal conductivity value can be set in steps of 1 μ S within the range 10 μ S to 1900 μ S.

Salt water: The nominal conductivity value can be set in steps of 0.1mS within the range 0.5mS to 99.5mS.

Downward adjustment:

If the conductivity falls below the nominal value then the conductivity downward adjustment will be switched off, if it rises above the nominal value by more than half the hysteresis (see 3.9.5 *Hysteresis*) the conductivity downward adjustment will be switched on again.

Upward adjustment:

If the conductivity rises above the nominal value the conductivity upward adjustment will be switched off, if it falls below the nominal value by more than half the hysteresis then the conductivity upward adjustment will be switched on again.

3.9.2 Calibration

This function permits the calibration of the conductivity electrode. Only when the ProFiLux aquarium computer has been calibrated for the relevant conductivity electrode can the correct conductivity value be recorded. Calibration is necessary whenever a new electrode is connected. In addition calibration should be repeated from time to time because of possible changes in the actual functioning of the electrode. Please follow the instructions provided by the electrode manufacturer. The electrode should always be carefully dried (with air, by shaking, or with a dry tissue) before immersion in a calibrating solution!

First enter the calibration tolerance (between 1 and 3), which forms the basis of the calibration. In the case of old or disturbance-sensitive conductivity electrodes it may happen that the measurement may not be adequately stabilised and calibration is not possible. Depending on the circumstances it may nevertheless be possible to stabilise such electrodes by increasing the calibration tolerance, but naturally at the expense of accuracy of measurement. In principle the calibration process should be performed using the smallest possible calibration tolerance.

Thereafter you will have the option of setting the second calibration value within the range 1000 μ S to 2000 μ S (fresh water) or 40mS to 80mS (salt water) (depending on the standard calibration fluid available).

Next you must configure whether temperature compensation is to be effected using a fixed temperature setting (*Aquarium temp. manual*) or a measured value (in which case select the relevant temperature sensor). In the event that *Aquarium temp. manual* is selected then next enter the relevant temperature.

Next enter the temperature of the calibration liquid.

Note: The simplest method is to place the (firmly closed) container of calibration liquid in the tank for a while until the temperatures have equalised. Obviously this is feasible only if the aquarium temperature is known. The actual calibration follows next. First you will be asked to hold the electrode in the air (i.e. it shouldn't be placed in the calibration liquid at this stage). The electrode should already be plugged in! Thereafter pressing **RETURN** will start the measurement process, during which two numbers will be seen in the lower line of the display. The left-hand number gives the maximum time remaining in seconds. If this time expires without the measurement stabilising sufficiently then the electrode will be deemed defective and the calibration aborted. The right-hand number shows the measurement in an internal code. ProFiLux Plus II recognises automatically when this value has stabilised and then terminates the measurement process. After this measurement you will next be asked to immerse the electrode in the calibration solution (with the previously set calibration value). Again the measurement process is started by **RETURN**.

When this measurement too is completed, you will be asked whether the data are to be stored. If no errors have occurred, confirm with Yes.

Finally, it is advisable to check the calibration. First hold the electrode in the air – is the reading around 0 μ S (fresh water) or 0mS (salt water)? Then connect the electrode and immerse it in the calibration solution. Is a figure approximating to the upper calibration value now displayed?

3.9.3 Activity

This allows you to determine whether the sensor and the associated recording of measurements and adjustment should be enabled (standard: Yes). If No is selected the adjustment and sensor monitoring will be switched off and all switchable sockets associated with the sensor will be deactivated. This is advisable only when this input is not required. A deactivated sensor is indicated by "---" in the display.

3.9.4 Operation hours

An associated operation hour meter is provided to record how long the conductivity electrode has been in service. The operation hours are recorded cyclically every hour in the non-volatile memory, ensuring that the operation hours are still recorded in the event of any interruption in line voltage power.

After the menu option *Operation hours* is selected the operation hours of the conductivity electrode are displayed. After a few seconds have elapsed or if any button is pressed you will be asked *Reset operation hour meter?* Confirmation with Yes will reset the operation hour meter to 0h. Obviously this should be done only when the conductivity electrode is changed.

3.9.5 Hysteresis

The so-called hysteresis determines the interval between the switching points and is necessary in order to reduce the switching frequency. The hysteresis set here encompasses the interval between the switching on of the *Conductivity upwards* port and the switching on of the *Conductivity downwards* port. The nominal conductivity value lies precisely at the centre of the interval between these two switching points. The setting for the hysteresis can be a value between 8µS and 200 µS (fresh water) or 0.3mS and 10.0mS (salt water). The default hysteresis setting of 20µS (fresh water) or 0.5mS (salt water) should not normally be altered. A reduction in the hysteresis is advisable only when the adjustment precision is to be increased. This will, however, also increase switching frequency.

Example: salt water, nominal value = 50.0mS, hysteresis = 0.4mS

-> The *Conductivity downwards* socket switches on at 50.2mS and off again at 50.0mS.

-> The *Conductivity upwards* socket switches on at 49.8mS and off again at 50.0mS.

Be aware that the conductivity adjustment will use 50.1mS and/or 49.9mS as the pivotal point rather than the precise nominal value set, in this case 50.0mS. This is necessary in order to make possible simultaneous upward and downward adjustment. If adjustment is to be only upwards or downwards then the nominal value can be adjusted accordingly or the hysteresis reduced.

3.9.6 Alarm

First of all configure whether the conductivity alarm is to be enabled. If you choose *Enabled, except during AWC* the alarm monitoring will be disabled temporarily during an automatic water change.

If the alarm is enabled then the *Maximum deviation* of the actual conductivity value from the nominal value must be entered. The deviation for the conductivity alarm can be set between 50µS and 500µS (fresh water) or 2.5mS and 25.0mS (salt water).

Then can be set if in the case of an alarm the *controller* should be *shut-off*.

After the enabling of an alarm the relevant actual value will be constantly compared with the nominal value. In the event that the deviation (above or below nominal) is larger than that set under *Maximum deviation* then an alarm will be activated. The adjustment hysteresis is taken into account during comparison of nominal and actual values.

In the event of an alarm the red alarm LED will be illuminated and the buzzer will be activated dependent on the mode set (see 3.17.8 *Alarm*). In addition, a switchable socket can be programmed such that it will be activated in the event of an alarm.

If *controller shut-off* has been set then the alarm function will immediately deactivate all sockets involved in conductivity regulation with this sensor!

The configuration of the alarm should be performed with the greatest care. It is essential to avoid the alarm parameters being exceeded during normal operation!

3.9.7 Current actual value

This displays the current actual conductivity value. The display can be ended by pressing any key.

3.9.8 Display

In the event that the conductivity is measured in the range up to 100mS (salt water) it is possible to configure whether the value measured is displayed as conductivity, salinity, or density. ProfiLux calculates the relevant values internally.

3.9.9 Operation mode controller

You can set how the controller should work. For most cases, the standard setting *Twoposition controller* is completely sufficient and so it needs not be changed. For some special cases, the other operation modes are necessary to optimize the controlling behaviour. The following operating modes can be selected:

- *Twoposition controller*
This is the common operation mode. At two switch points, which are determined through nominal value and hysteresis, a belonging socket is switched on or off. See here also 3.9.5 *Hysteresis*.
- *Pulse/Pause fixed*
If the actual value differs from the nominal value by a half hysteresis, the belonging switchable socket is switched on for an adjustable time (*Pulse duration*). After expiration of the pulse duration, the socket is switched off again and reline voltage so at least for the set *Pause duration*. After expiration of the pause duration, the socket can be switched on again by the control when the actual value differs from the nominal value again (or still) by a half hysteresis, the switching circle (pulse and pause) starts again.
- *Pulse variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the actual turn on time depends on the difference of nominal value and actual value. The bigger the deviation, the longer is also the turn on time, but at the maximum it is as long as set under *Pulse duration*.
- *Pause variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the turn-off time depends on the difference of nominal value and actual value. The bigger the deviation, the shorter is also the turn-off time, but at the maximum it is as long as set under *Pause duration*.

The operation modes *Pulse/Pause fixed*, *Pulse variable* and *Pause variable* make sense, when the measured size (conductivity) reacts only slowly and delayed to the controller activities (e.g. introducing osmosis water) or only small amounts of substances should be added.

For these operation modes, you have to make the following settings:

- *Pulse duration*
The corresponding socket is switched on for this duration (at the maximum). A pulse duration between 1s and 1h can be set.
- *Pause duration*
This is the (maximum) time until the control can switch on the corresponding socket again. A pause duration between 1s and 1h can be set.

3.9.10 Measurement range

If the sensor input in question is an onboard-input of ProfiLux Plus II eX the measurement range can be altered – for freshwater or saltwater. Please keep in mind that changing the measurement range will cause a recovery of the default settings for this input, all previous settings will be lost.

Hint: It is NOT possible to alter the measurement range of an extension card!

3.9.11 Signal filter

Here you can adjust the strength of the measurement signal filter.

Valid values are 1 (strong filter) to 10 (weak filter), default is 5 (medium filter). Strong filtering will delay the readings and make them more constant. If a reading has a large fluctuation (e.g. caused by electromagnetic noise or this value varies fast in reality) a stronger filter may make sense. If the calibration takes too long and can't be completed successfully it may be wise to reduce the filter strength.

3.9.12 Density-offset

Here you can set an offset for the density display of seawater between -0.005 and +0.005 if the shown value is different to the actual value.

3.10 Oxygen

This allows you to configure the functions relating to the dissolved oxygen. In the event that several oxygen probes with the appropriate electronic metering are present you should first of all select the sensor to be configured (the inputs are numbered sequentially from left to right, viewed from the rear). The oxygen can be adjusted downwards and upwards, or both together. For this the relevant switchable socket function must be configured.

3.10.1 Nominal value

The nominal value can be set in steps of 0.1% within the range 0% to 130%.

Downward adjustment:

If the oxygen value falls below the nominal value then the oxygen downward adjustment will be switched off, if it rises above the nominal value by more than half the hysteresis (see 3.10.5 *Hysteresis*) the oxygen downward adjustment will be switched on again.

Upward adjustment:

If the oxygen value rises above the nominal value the oxygen upward adjustment will be switched off, if it falls below the nominal value by more than half the hysteresis then the oxygen upward adjustment will be switched on again.

3.10.2 Calibration

This function permits the calibration of the oxygen probe. Only when the ProFiLux aquarium computer has been calibrated for the relevant oxygen probe can correct values be recorded. Calibration is necessary whenever a new probe is connected. In addition calibration should be repeated from time to time because of possible changes in the actual functioning of the probe.

First enter the calibration tolerance (between 1 and 3), which forms the basis of the calibration. In the case of old or disturbance-sensitive oxygen probes it may happen that the measurement may not be adequately stabilised and calibration is not possible. Depending on the circumstances it may nevertheless be possible to stabilise such probes by increasing the calibration tolerance, but naturally at the expense of accuracy of measurement. In principle the calibration process should be performed using the smallest possible calibration tolerance.

In difference to all other probes the oxygen probe has to be calibrated in 2 steps (because there is a minimum waiting period of 30 minutes necessary); that means the calibration period must be started twice:

Zero calibration

The zero calibration must only be done one time. You are asked to unplug the probe's plug. After unplugging (the BNC-connector of the oxygen-input is free now) you have to confirm with **RETURN**. This will start the measurement process, during which two numbers will be seen in the lower line of the display. The left-hand number gives the maximum time remaining in seconds. If this time expires without the measurement stabilising sufficiently then the probe will be deemed defective and the calibration aborted. The right-hand number shows the measurement in an internal code. ProFiLux recognises automatically when this value has stabilised and then terminates the measurement process. When this measurement is completed, you will be asked whether the data are to be stored. If no errors have occurred, confirm with Yes. Now connect the oxygen probe again.

Air calibration

Important: Air calibration is only possible if the zero calibration has been performed at least once successfully.

Before air calibration the probe must have been connected to the running ProFiLux at least for 30 minutes. Only in this case the calibration will produce reasonable values!

After choosing air calibration you can select the source of the temperature compensation – a manually entered temperature, select *Aquarium temperature manual* (can be entered subsequently) or a *temperature probe* (if available).

The next step is the selection of the source of the salinity compensation. If you choose *Salinity manual* you are asked to enter a constant value for the salinity. For freshwater 0.0 must be entered here!

Alternatively you can select a *conductivity probe saltwater* – if available.

Now you have to enter *temperature of air* at the calibration location (above the water surface).

You are asked now to *hold probe above the water*. Hold the oxygen probe now just over the water surface, maximum distance of 1cm – don't touch the water surface with the probe! Confirming with **RETURN** starts the calibration, during which two numbers will be seen in the lower line of the display. The left-hand number gives the maximum time remaining in seconds. If this time expires without the measurement stabilising sufficiently then the probe will be deemed defective and the calibration aborted. The right-hand number shows the measurement in an internal code. ProfiLux recognises automatically when this value has stabilised and then terminates the measurement process. When this measurement is completed, you will be asked whether the data are to be stored. If no errors have occurred, confirm with **Yes**.

3.10.3 Activity

This allows you to determine whether the sensor and the associated recording of measurements and adjustment should be enabled (standard: **Yes**). If **No** is selected the adjustment and sensor monitoring will be switched off and all switchable sockets associated with the sensor will be deactivated. This is advisable only when this input is not used. A deactivated sensor is indicated by "---" in the display.

3.10.4 Operation hours

An associated operation hour meter is provided to record how long the oxygen probe has been in service. The operation hours are recorded cyclically every hour in the non-volatile memory, ensuring that the operation hours are still recorded in the event of any interruption in line voltage power.

After the menu option *Operation hours* is selected the operation hours of the oxygen probe is displayed. After a few seconds have elapsed or if any button is pressed you will be asked *Reset operation hour meter?* Confirmation with **Yes** will reset the operation hour meter to 0h. Obviously this should be done whenever the oxygen probe is changed.

3.10.5 Hysteresis

The so-called hysteresis determines the interval between the switching points and is necessary in order to reduce the switching frequency. The hysteresis set here encompasses the interval between the switching on of the *Oxygen upwards* socket and the switching on of the *Oxygen downwards* socket. The nominal oxygen value lies precisely at the centre of the interval between these two switching points.

The setting for the hysteresis can be a value between 2% and 10%.

The default hysteresis setting of 5% should not normally be altered. A reduction in the hysteresis is advisable only when the adjustment precision is to be increased. This will, however, also increase switching frequency.

Example: nominal value = 100%, hysteresis = 8%

-> The *Oxygen downwards* socket switches on at 104% and off again at 100%.

-> The *Oxygen upwards* socket switches on at 96% and off again at 100%.

Be aware that the adjustment will use 102% and/or 98% as the pivotal point rather than the precise nominal value set, in this case 100%. This is necessary in order to make possible simultaneous upward and downward adjustment. If adjustment is to be only upwards or downwards then the nominal value can be adjusted accordingly or the hysteresis reduced.

3.10.6 Alarm

First of all configure whether the oxygen alarm is to be enabled. If you choose *Enabled, except during AWC* the alarm monitoring will be disabled temporarily during an automatic water change.

If the alarm is enabled then the *Maximum deviation* of the actual oxygen value from the nominal value must be entered. The deviation for the oxygen alarm can be set between 2% and 20%.

Then can be set if in the case of an alarm the *controller* should be *shut-off*.

After the enabling of an alarm the relevant actual value will be constantly compared with the nominal value. In the event that the deviation (above or below nominal) is larger than that set under *Maximum deviation* then an alarm will be activated. The adjustment hysteresis is taken into account during comparison of nominal and actual values.

In the event of an alarm the red alarm LED will be illuminated and the buzzer will be activated dependent on the mode set (see 3.17.8 *Alarm*). In addition, a switchable socket can be programmed such that it will be activated in the event of an alarm.

If *controller shut-off* has been set then the alarm function will immediately deactivate all sockets involved in oxygen regulation with this sensor!

The configuration of the alarm should be performed with the greatest care. It is essential to avoid the alarm parameters being exceeded during normal operation!

3.10.7 Current actual value

This displays the current actual oxygen value. The display can be ended by pressing any key.

3.10.8 Display

It is possible to configure whether the value measured is displayed as % *saturation* or as *mg/Liter*. ProfiLux calculates the relevant values internally.

3.10.9 Operation mode controller

You can set how the controller should work. For most cases, the standard setting *Twoposition controller* is completely sufficient and so it needs not be changed. For some special cases, the other operation modes are necessary to optimize the controlling behaviour. The following operating modes can be selected:

- *Twoposition controller*
This is the common operation mode. At two switch points, which are determined through nominal value and hysteresis, a belonging socket is switched on or off. See here also 3.10.5 *Hysteresis*.
- *Pulse/Pause fixed*
If the actual value differs from the nominal value by a half hysteresis, the belonging switchable socket is switched on for an adjustable time (*Pulse duration*). After expiration of the pulse duration, the socket is switched off again and relines voltage so at least for the set *Pause duration*. After expiration of the pause duration, the socket can be switched on again by the control when the actual value differs from the nominal value again (or still) by a half hysteresis, the switching circle (pulse and pause) starts again.
- *Pulse variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the actual turn on time depends on the difference of nominal value and actual value. The bigger the deviation, the longer is also the turn on time, but at the maximum it is as long as set under *Pulse duration*.
- *Pause variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the turn-off time depends on the difference of nominal value and actual value. The bigger the deviation, the shorter is also the turn-off time, but at the maximum it is as long as set under *Pause duration*.

The operation modes *Pulse/Pause fixed*, *Pulse variable* and *Pause variable* make sense, when the measured size (oxygen value) reacts only slowly and delayed to the controller activities.

For these operation modes, you have to make the following settings:

- *Pulse duration*
The corresponding socket is switched on for this duration (at the maximum). A pulse duration between 1s and 1h can be set.
- *Pause duration*
This is the (maximum) time until the control can switch on the corresponding socket again. A pause duration between 1s and 1h can be set.

3.10.10 Signal filter

Here you can adjust the strength of the measurement signal filter.

Valid values are 1 (strong filter) to 10 (weak filter), default is 5 (medium filter). Strong filtering will delay the readings and make them more constant. If a reading has a large fluctuation (e.g. caused by electromagnetic noise or this value varies fast in reality) a stronger filter may make sense. If the calibration takes too long and can't be completed successfully it may be wise to reduce the filter strength.

3.11 Level

ProfiLux Plus II can regulate the water level in various ways. Up to three of our level sensors can be connected. On the port *Level* (or *Level 1 & 2* at *ProfiLux Plus II eX*) two level sensors can be connected by using a splitter (available as an accessory component). Moreover *ProfiLux Plus II eX* has an additional port *Level 3* – a third level sensor can be connected there.

Because water-level control is a delicate matter (because of the risk of flooding) various safety precautions are applied. Our sensors and computational electronics are designed such that the removal of the sensor plug or a cable fracture is interpreted as the desired level being achieved and the relevant socket is switched off. In addition we offer not only fairly low-priced mechanical float-operated sensors but also optical sensors (no mechanical components). The latter cannot become stuck in a single position due to clogging with debris. Moreover time limits can be set to restrict the on-time of the socket. As a result overflow due to a defect is not possible.

The water-level regulation is configured via the following settings.

3.11.1 Operational mode

First you can choose if the Auto Top Off should be active always. If ATO should not be always active then you can select a timer. In this case the chosen timer determines when ATO for all sensors is allowed to be active.

After selection of a level sensor the operational mode can be altered:

- *Not enabled*
- This sensor is not used.
- *Auto Top Off*
As soon as sensor 1 (respectively 2 or 3) registers too low a level the switchable socket with the function *Water 1* (respectively *Water 2* or *Water 3*) is switched on. When the nominal level is attained the socket is switched off again.
- *Leakage detection*
If sensor 1 (respectively 2 or 3) is activated *ProfiLux* assumes a leakage and causes an alarm. While there is no alarm the socket with the function *Water 1* (respectively *Water 2* or *Water 3*) is switched on, otherwise switched off.

Sensor 1 provides additional operation modes. Since sensor 1 and sensor 2 are working together in these modes for sensor 2 automatically the operation mode *Not enabled* will be selected.

- *Min/Max adjustment*
The two sensors work together to regulate a single water level. Sensor 1 functions as the maximum switch, sensor 2 as the minimum switch. As soon as sensor 2 registers too low a level the switchable socket with the function *Water 1* is switched on. Then when the water level reaches the setting for sensor 1 the switchable socket is switched off again.
- *Water change*
At pre-set times water is drained off (the switchable socket with the function *Water 2* is then switched on) until sensor 2 signals the minimum water level has been reached. Thereafter *Water 2* is switched off and the switchable socket *Water 1* is switched on until the water reaches the level set for sensor 1.
-> Sensor 1 signals that the tank is full again; sensor 2 indicates when sufficient water has been drained off. The switchable socket *Water 1* turns on the fresh water supply, *Water 2* turns on the outflow.
After selecting this operational mode the timer that is to determine the timing of the water change must be selected. Don't forget to program the chosen timer accordingly in the appropriate menu (set the *switching period* to *Event start* there, see 3.14.3 *Timer*). The water change will then be started at the time set there.
- *Water change and ATO*
Same as *Water change*, additionally sensor 1 and socket *Water 1* work as Auto Top Off when no water change is in progress.
- *ATO with 2 sensors*
Similar to *Auto Top Off* but now 2 sensors are used to recognize one water level. Only if both sensors measure a too low level the socket with the function *water 1* will be switched on. This function provides additionally security.

Hint: If an operation mode is selected for sensor 1 which uses sensor 2 as well (*Min/Max adjustment* or *Water change*) then a change of the operation mode of sensor 2 causes a disabling of sensor 1!

3.11.2 Sensor settings

After selecting the sensor its reaction time can be set between 0s and 240s. To prevent movement of the water's surface from constantly activating a sensor and thus causing the associated switchable socket to

switch on and off continuously, ProFiLux monitors whether the signal transmitted by the sensor (= water present/not present) is stable. In this case "stable" signifies that the signal must remain constant for at least the reaction time set. Only if the signal is stable does the water-level regulation come into play. The reaction time should be sufficiently great that water movement does not result in activation of the regulation system, but sufficiently small that the attaining of a specified level is recognised not too late!

3.11.3 Maximum on-time

For safety reasons it is possible to configure the maximum time for which the switchable socket s with the functions *Water 1*, *Water 2* and *Water 3* can be active. The time can be set separately for each of the three switchable sockets, with a maximum setting of 8 hours. This is intended to prevent a defective sensor resulting in (excessive) flooding. In the event that the on-time limit is exceeded then water-level regulation and the associated switchable sockets will be immediately deactivated! Water-level regulation will remain deactivated until the error status is reset. If the on-time limit is set to 0 here then on-time monitoring will be deactivated.

After this you can configure whether exceeding an on-time limit should activate an alarm.

Hint: There is no monitoring of the maximum on-time for a switchable socket which is assigned to a sensor with the function *Leakage detection*.

3.11.4 Error reset

In the event that an on-time limit is exceeded (a socket with the function *Water* is switched on too long, see 3.11.3 *Maximum on-time*) or the leakage detection reports an error the error status of the device must be reset. This will also reset the alarm. Water-level regulation will remain disabled for as long as the error status isn't reset!

3.11.5 Diagnostic

In order to facilitate the implementation of the level sensors there is a menu option *Diagnostics*.

This displays the current status of any sensors connected. A "X" signifies "Contact with water – sensor active", a "-" signifies "No contact with water – sensor not active". Please note that a "X" will be displayed if no sensor is connected. The diagnostic can be ended by pressing the **Esc** key.

3.11.6 Start water change

In the event that operation mode *Water change* or *Water change and ATO* is selected for sensor 1 you can start an automatic water change manually. After confirming the security request with **Yes** the water change will start.

3.12 Humidity

This allows you to configure the functions relating to the humidity. In the event that several humidity sensors with the appropriate electronic metering are present you should first of all select the sensor to be configured. The humidity can be adjusted downwards and upwards, or both together. For this the relevant switchable socket functions must be configured.

3.12.1 Nominal value

The nominal humidity value can be set in steps of 0.1% within the range 2% to 98%.

Downward adjustment:

If the humidity falls below the nominal value then the humidity downward adjustment will be switched off, if it rises above the nominal value by more than half the hysteresis (see 3.12.5 *Hysteresis*) the humidity downward adjustment will be switched on again.

Upward adjustment:

If the humidity rises above the nominal value the humidity upward adjustment will be switched off, if it falls below the nominal value by more than half the hysteresis then the humidity upward adjustment will be switched on again.

Note: For security reasons altering the nominal value deactivates a nocturnal change (if set)! If applicable these settings should be set again.

3.12.2 Nocturnal change

This allows you to choose whether the humidity is to be altered at night.

Once you have enabled the nocturnal alteration with *Yes*, you can set the amount by which the humidity will alter:

The value can be set between 1% and 50% in 0.1% steps. Thereafter you should input when the nocturnal alteration is to take effect.

Start of nocturnal alteration: a time between 14:00 and 23:59 hours

End of nocturnal alteration: a time between 00:00 and 10:00 hours

Note: Nocturnal nominal value = nominal value + nocturnal alteration

3.12.3 Activity

This allows you to determine whether the sensor and the associated recording of measurements and adjustment should be active (standard: *Yes*). If *No* is selected the adjustment and sensor monitoring will be switched off and all switchable sockets associated with the sensor will be deactivated. This is advisable only when this input is not required. A deactivated sensor is indicated by "---" in the display.

3.12.4 Operation hours

An associated operation hour meter is provided to record how long the humidity sensor has been in service. The operation hours are recorded cyclically every hour in the permanent storage, ensuring that the operation hours are still recorded in the event of any interruption in line voltage power.

After the menu option *Operation hours* is selected the operation hours of the humidity sensor are displayed.

After a few seconds have elapsed or if any button is pressed you will be asked *Reset operation hour meter?*

Confirmation with *Yes* will reset the operation hour meter to 0h. Obviously this should be done whenever the humidity sensor is changed.

3.12.5 Hysteresis

The so-called hysteresis determines the interval between the switching points and is necessary in order to reduce the switching frequency. The hysteresis set here encompasses the interval between the switching on of the *humidity control downwards* socket and the switching on of the *humidity control upwards* socket. The nominal humidity value lies precisely at the centre of the interval between these two switching points. The setting for the hysteresis can be a value between 0.2% and 15%.

The default hysteresis setting of 2% should not normally be altered. A reduction in the hysteresis is advisable only when the adjustment precision is to be increased. This will, however, also increase switching frequency.

Example: nominal value = 60%, hysteresis = 4%

-> The downwards socket switches on at 62% and off again at 60%.

-> The upwards socket switches on at 58% and off again at 60%.

Be aware that the humidity adjustment will use 61% and/or 59% as the pivotal point rather than the precise nominal value set, in this case 60%. This is necessary in order to make possible simultaneous upward and downward adjustment. If adjustment is to be only upwards or downwards then the nominal value can be adjusted accordingly or the hysteresis reduced.

3.12.6 Alarm

First of all configure whether the humidity alarm is to be enabled. If the alarm is enabled then the *Maximum deviation* of the actual humidity value from the nominal value must be entered. The deviation for the humidity alarm can be set between 1% and 20%.

Then can be set if in the case of an alarm the *controller* should be *shut-off*.

After the enabling of an alarm the relevant actual value will be constantly compared with the nominal value. In the event that the deviation (above or below nominal) is larger than that set under *Maximum deviation* then an alarm will be activated. The adjustment hysteresis and nocturnal change is taken into account during comparison of nominal and actual values.

In the event of an alarm the red alarm LED will be illuminated and the buzzer will be activated dependent on the mode set (see 3.17.8 *Alarm*). In addition, a switchable socket can be programmed such that it will be activated in the event of an alarm.

If *controller shut-off* has been set then the alarm function will immediately deactivate all sockets involved in humidity regulation with this sensor!

The configuration of the alarm should be performed with the greatest care. It is essential to avoid the alarm parameters being exceeded during normal operation!

3.12.7 Current actual value

This displays the current actual humidity value. The display can be ended by pressing any key.

3.12.8 Operation mode controller

You can set how the controller should work. For most cases, the standard setting *Twoposition controller* is completely sufficient and so it needs not be changed. For some special cases, the other operation modes are necessary to optimize the controlling behaviour. The following operating modes can be selected:

- *Twoposition controller*
This is the common operation mode. At two switchpoints, which are determined through nominal value and hysteresis, a belonging socket is switched on or off. See here also 3.12.5 *Hysteresis*.
- *Pulse/Pause fixed*
If the actual value differs from the nominal value by a half hysteresis, the belonging switchable socket is switched on for an adjustable time (*Pulse duration*). After expiration of the pulse duration, the socket is switched off again and reline voltage so at least for the set *Pause duration*. After expiration of the pause duration, the socket can be switched on again by the control when the actual value differs from the nominal value again (or still) by a half hysteresis, the switching circle (pulse and pause) starts again.
- *Pulse variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the actual turn on time depends on the difference of nominal value and actual value. The bigger the deviation, the longer is also the turn on time, but at the maximum it is as long as set under *Pulse duration*.
- *Pause variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the turn-off time depends on the difference of nominal value and actual value. The bigger the deviation, the shorter is also the turn-off time, but at the maximum it is as long as set under *Pause duration*.

The operation modes *Pulse/Pause fixed*, *Pulse variable* and *Pause variable* make sense, when the measured size (humidity) reacts only slowly and delayed to the controller activities (e.g. Switching on sprinkling).

For these operation modes, you have to make the following settings:

- *Pulse duration*
The corresponding socket is switched on for this duration (at the maximum). A pulse duration between 1s and 1h can be set.
- *Pause duration*
This is the (maximum) time until the control can switch on the corresponding socket again. A pause duration between 1s and 1h can be set.

3.12.9 Signal filter

Here you can adjust the strength of the measurement signal filter.

Valid values are 1 (strong filter) to 10 (weak filter), default is 5 (medium filter). Strong filtering will delay the readings and make them more constant. If a reading has a large fluctuation (e.g. caused by electromagnetic noise or this value varies fast in reality) a stronger filter may make sense.

3.13 Air temperature

This allows you to configure the functions relating to the air temperature. In the event that several air temperature sensors with the appropriate electronic metering are present you should first of all select the sensor to be configured. The air temperature can be adjusted downwards and upwards, or both together. For this the relevant switchable socket functions must be configured.

3.13.1 Nominal value

The nominal air temperature can be set in steps of 0.1°C within the range 0°C to 50°C.

Downward adjustment:

If the air temperature falls below the nominal value then the air temperature downward adjustment (= cooling) will be switched off, if it rises above the nominal value by more than half the hysteresis (see 3.13.5 *Hysteresis*) the air temperature downward adjustment will be switched on again.

Upward adjustment:

If the air temperature rises above the nominal value the air temperature upward adjustment (= heating) will be switched off, if it falls below the nominal value by more than half the hysteresis then the air temperature upward adjustment will be switched on again.

Note: For security reasons altering the nominal value deactivates a nocturnal change (if set)! If applicable these settings should be set again.

3.13.2 Nocturnal change

This allows you to choose whether the air temperature is to altered at night.

Once you have enabled the nocturnal alteration with **Yes**, you can set the amount by which the temperature will alter:

The value can be set between -0.5° C and -30.0° C in 0.1°C steps. Thereafter you should input when the nocturnal alteration is to take effect.

Start of nocturnal alteration: a time between 14:00 and 23:59 hours

End of nocturnal alteration: a time between 00:00 and 10:00 hours

Note: Nocturnal nominal value = nominal value + nocturnal alteration

3.13.3 Activity

This allows you to determine whether the sensor and the associated recording of measurements and adjustment should be active (standard: **Yes**). If **No** is selected the adjustment and sensor monitoring will be switched off and all switchable sockets associated with the sensor will be deactivated. This is advisable only when this input is not required. A deactivated sensor is indicated by "----" in the display.

3.13.4 Operation hours

An associated operation hour meter is provided to record how long the air temperature sensor has been in service. The operation hours are recorded cyclically every hour in the permanent storage, ensuring that the operation hours are still recorded in the event of any interruption in line voltage power.

After the menu option *Operation hours* is selected the operation hours of the air temperature sensor are displayed. After a few seconds have elapsed or if any button is pressed you will be asked *Reset operation hour meter?* Confirmation with **Yes** will reset the operation hour meter to 0h. Obviously this should be done whenever the air temperature sensor is changed.

3.13.5 Hysteresis

The so-called hysteresis determines the interval between the switching points and is necessary in order to reduce the switching frequency. The hysteresis set here encompasses the interval between the switching on of the *air temperature control downwards* socket and the switching on of the *air temperature control upwards* socket. The nominal air temperature value lies precisely at the centre of the interval between these two switching points. The setting for the hysteresis can be a value between 0.2°C and 3.0°C.

The default hysteresis setting of 0.5°C should not normally be altered. A reduction in the hysteresis is advisable only when the adjustment precision is to be increased. This will, however, also increase switching frequency.

Example: nominal value = 30°C, hysteresis = 2°C

-> The cooler socket switches on at 31°C and off again at 30°C.

-> The heater socket switches on at 29°C and off again at 30°C.

Be aware that the air temperature adjustment will use 30.5°C and/or 29.5°C as the pivotal point rather than the precise nominal value set, in this case 30°C. This is necessary in order to make possible simultaneous upward and downward adjustment. If adjustment is to be only upwards or downwards then the nominal value can be adjusted accordingly or the hysteresis reduced.

3.13.6 Alarm

First of all configure whether the air temperature alarm is to be enabled. If the alarm is enabled then the *Maximum deviation* of the actual air temperature value from the nominal value must be entered. The deviation for the air temperature alarm can be set between 1°C and 15°C.

Then can be set if in the case of an alarm the *controller* should be *shut-off*.

After the enabling of an alarm the relevant actual value will be constantly compared with the nominal value. In the event that the deviation (above or below nominal) is larger than that set under *Maximum deviation* then an alarm will be activated. The adjustment hysteresis and nocturnal change is taken into account during comparison of nominal and actual values.

In the event of an alarm the red alarm LED will be illuminated and the buzzer will be activated dependent on the mode set (see 3.17.8 *Alarm*). In addition, a switchable socket can be programmed such that it will be activated in the event of an alarm.

If *controller shut-off* has been set then the alarm function will immediately deactivate all sockets involved in air temperature regulation with this sensor!

The configuration of the alarm should be performed with the greatest care. It is essential to avoid the alarm parameters being exceeded during normal operation!

3.13.7 Current actual value

This displays the current air temperature. The display can be ended by pressing any key.

3.13.8 Display

It can be selected if the current actual value should be *displayed* as °Celsius (°C) or °Fahrenheit (°F).

Independent from this *settings* have always to be done in °Celsius!

3.13.9 Operation mode controller

You can set how the controller should work. For most cases, the standard setting *Twoposition controller* is completely sufficient and so it needs not be changed. For some special cases, the other operation modes are necessary to optimize the controlling behaviour. The following operating modes can be selected:

- *Twoposition controller*
This is the common operation mode. At two switchpoints, which are determined through nominal value and hysteresis, a belonging socket is switched on or off. See here also 3.13.5 *Hysteresis*.
- *Pulse/Pause fixed*
If the actual value differs from the nominal value by a half hysteresis, the belonging switchable socket is switched on for an adjustable time (*Pulse duration*). After expiration of the pulse duration, the socket is switched off again and relines voltage so at least for the set *Pause duration*. After expiration of the pause duration, the socket can be switched on again by the control when the actual value differs from the nominal value again (or still) by a half hysteresis, the switching circle (pulse and pause) starts again.
- *Pulse variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the actual turn on time depends on the difference of nominal value and actual value. The bigger the deviation, the longer is also the turn on time, but at the maximum it is as long as set under *Pulse duration*.
- *Pause variable*
Works in principle like *Pulse/Pause fixed*. The difference is that the calculation of the turn-off time depends on the difference of nominal value and actual value. The bigger the deviation, the shorter is also the turn-off time, but at the maximum it is as long as set under *Pause duration*.

The operation modes *Pulse/Pause fixed*, *Pulse variable* and *Pause variable* make sense, when the measured size (temperature) reacts only slowly and delayed to the controller activities (e.g. Switching on heater).

For these operation modes, you have to make the following settings:

- *Pulse duration*
The corresponding socket is switched on for this duration (at the maximum). A pulse duration between 1s and 1h can be set.
- *Pause duration*
This is the (maximum) time until the control can switch on the corresponding socket again. A pause duration between 1s and 1h can be set.

3.13.10 Signal filter

Here you can adjust the strength of the measurement signal filter.

Valid values are 1 (strong filter) to 10 (weak filter), default is 5 (medium filter). Strong filtering will delay the readings and make them more constant. If a reading has a large fluctuation (e.g. caused by electromagnetic noise or this value varies fast in reality) a stronger filter may make sense.

3.14 Clock

This allows you to configure the functions relating to time.

3.14.1 Time & date, DCF

It is important to understand that two clocks operate in the aquarium computer. One of these clocks registers the actual ("our") time of day. This is also the time normally shown by the display. But the computer also contains a second (internal) clock, which controls all the automatic functions such as dimming, nocturnal decrease, timers, etc. The two clocks normally operate in parallel, except when the actual time is altered (e.g. automatic or manual change to summer time), when the internal clock is changed not immediately but over the course of a set period of days. For example, a setting of 10 days will mean a daily adjustment of $60/10 = 6$ minutes.

First of all you will be asked whether you wish to use *DCF* (the externally connected radio-signal receiver).

If you answer *Yes* here then the time received via the radio-signal receiver will be used. Assuming the signal is adequate it will be unnecessary to set the date and the time, and they will be automatically updated.

Thereafter you are given the opportunity of configuring whether the ProFiLux clock should change between normal (winter) time (MEZ) and summer time (MESZ). If you reply in the negative then only normal time will operate in your aquarium (ie in summer the clock will be an hour wrong, which may be desirable if you don't want to subject your fishes and plants to the change-over). But if you prefer to make the seasonal change then you can also set the number of days over which the time change is to be spread. If DCF is being used then this gentle alteration in the time will take place following the real-time change from normal to summer time. If DCF is not in use then the time can be altered manually by an hour. In this case too the internal clock will be slowly adjusted over the set period of days. You thus have the opportunity to divide the hour over several days and make the change gently.

Following this you can set the date and clock time manually. When storing the time you will be asked whether you would like to make the internal time (see above) the same as the actual time.

If you answer *Yes* the internal time will immediately be set to the newly entered time, otherwise the internal time will be slowly adjusted as described above. When first setting the time you should answer *Yes* here, but when re-setting the clock to summer time you should answer *No*.

Note: The DCF signal for the radio-controlled clock is not always available. Hence it may happen that sometimes no signal can be received. The internal clock will nevertheless continue to run and will be re-synchronised next time a signal is received (possible slight discrepancies will then be corrected). Thus it relines voltage fully-functional even if the DCF signal is received only occasionally.

3.14.2 Reminder

The aquarium computer can remind you of activities to be performed. You will be reminded via a text, which will appear on the display, alternating with the standard display, after the period of time (in days) set. The reminder will be displayed until you mark it as done. In the event that a repeating reminder is set then it will be displayed again after the set time has elapsed. Monthly filter maintenance is a possible example of a repeating reminder. The time for removing the young fish you have bred from the tank is an example of a reminder that would be displayed only once.

First select the reminder memory (1 - 4). In the event that the reminder has already been activated you can now mark it as done, and it will not be displayed again thereafter. Otherwise you will next be asked whether the reminder is to be enabled. Once you have enabled the reminder by answering *Yes*, you must set whether it is to be repeated more than once. Then you must enter after how many days you would like to be reminded. After the number of days has been set the text of the reminder should be entered. After storing the reminder details ProFiLux will confirm by displaying when the next reminder is to take place.

3.14.3 Timer

ProfiLux (Plus) II provides 8 completely programmable clock timers. The sockets to be controlled by the switching processes can be assigned as described under 3.17.3 *Socket function*.

After selecting the timer you wish to program, the operational mode must be set. The following options are available:

- *Days of week*
If you select days of the week then first you must set the number of switching cycles per day (0 to 4; 0 indicates that the clock timer in question is not active). Next you must set the day(s) of the week on which switching is to take place. A box with a dot in the middle indicates "Switching enabled on this day of the week", an empty box indicates "not enabled".
- *Interval of days*
If you wish to switch at intervals of a set number of days then first you must set the number of switching cycles per day (0 – 4; 0 indicates that the timer in question is not enabled). Next you must set the number of days after which the switching cycle is to be repeated, 1 day denotes a daily switching cycle. Then set after how many days the switching is to begin.

After selecting *Days of week* or *Interval of days* the switching period can be set. The available options are:

- *Dosing*
Using this setting short switching periods (1s to 300s, accuracy 1s) can be achieved, and it is usually used for the control of dosing pumps. The switching period is defined by the *Switch-on time* and the *Duration*.
- *Normal*
This type of operation is used for programming longer switching periods (accuracy 1 minute). The switching period is established via the *Switch-on time* and the *Switch-off time*.
- *Event start*
The timer starts a procedure such as a water change, see 3.11 *Level*. Only the start time is input here.

Finally you must configure whether the timer in question should affect the feeding pause (except when *Event start* is selected). If the answer here is Yes then the feeding pause will be activated for as long as the timer in question is enabled. In addition the feeding pause will operate for the period set as feeding pause duration. This can be useful when, for example, the timer in question controls automatic feeder or a dosing pump. Bear in mind that the feeding pause should not last too long – see also 3.16.4 *Feeding pause*.

3.14.4 Location

The coordinates (longitude and latitude) of your location can be set. This information will be used for further simulations in the future.

Factory setting is 49.4°N and 7.8°E – the coordinates of Kaiserslautern in Germany – your ProfiLux was produced there!

3.15 Illumination

Under this menu option you will find all the settings associated with the illumination. ProfiLux is able to control up to 8 dimmable or non dimmable lamps independently. Lamps can be switched by our switchable powerbars. Dimmable lamps are controlled by the 1-10V interfaces.

Dimmable lamps

You can connect up to 2 dimmable fluorescent unit(s) from GHL directly to the aquarium computer (using our splitter even more). Alternatively you can also connect our dimmable LED lamps and hanging lamps, or other manufacturers' products or home-constructed units (connected via accessory component *EVG-AP* or *LF-ABOX*). In total you can have a maximum of 4 independently dimmable lights (or sets of lights). Dimmable lights are connected to the ports L1L2 or L3L4. These ports provide a total of four 1-10V interfaces and appropriate switching signals. The interfaces L1 to L4 are assigned ex works to the dimming channels 1 to 4, see also 3.17.4 *1-10V interface*.

Additional 1-10V interfaces can be fitted (e.g. using the expansion module PLM-2L4S, see also 4 *Hardware modules*).

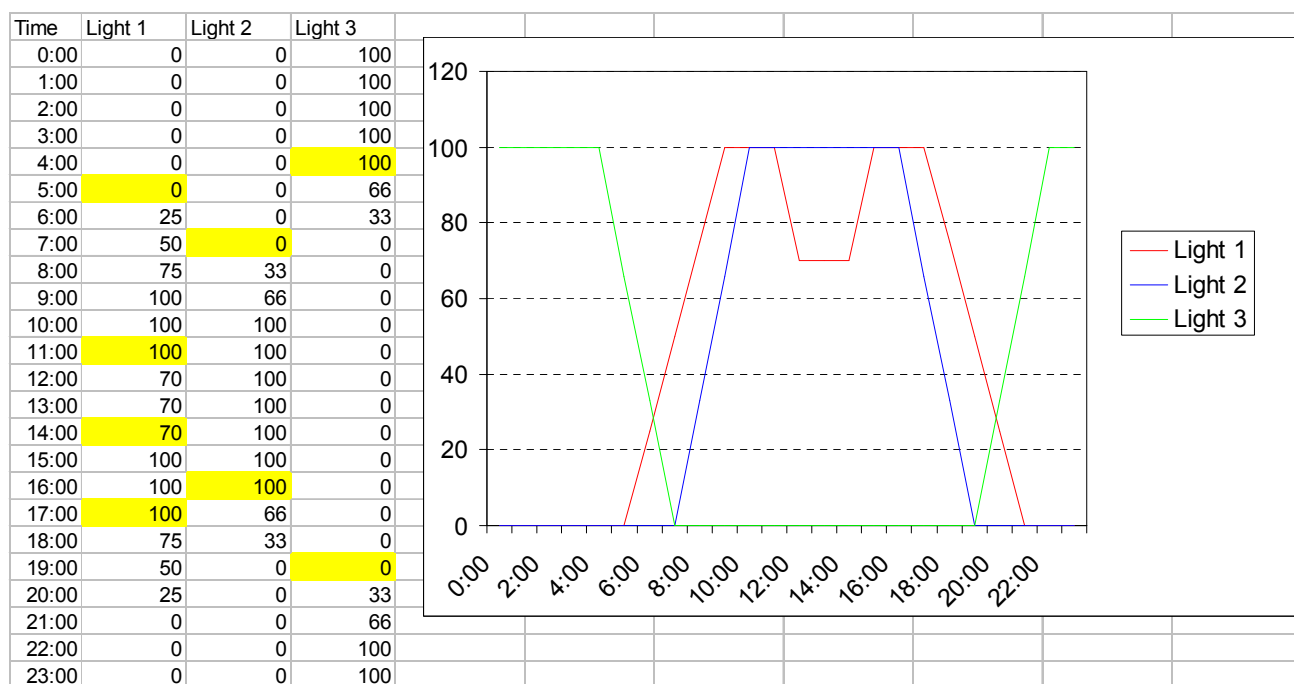
Notes:

- The aquarium computer can be expanded to up to eight 1-10V interfaces.

- In the case of together dimmable fluorescent units, dimming channel 1/3 controls both tubes of a fluorescent unit as standard. Dimming channel 2/4 then relines voltage free and has no effect. If, for example, two together dimmable fluorescent unit(s) are connected, dimming channels 1 and 3 are used, 2 and 4 remain inoperative. Together dimmable fluorescent units are optionally available for use with channel 2/4. It is thus possible to connect 4 combination dimmable fluorescent units using our Y-adapter, and these will then react to all 4 dimming channels.

You can set the lighting cycle separately for each illumination channel. It is thus possible to achieve effects such as sunrise or moonlight.

The following graphic may be helpful in understanding the remaining settings and the combined interplay of the various lights.



The light-intensity cycle of three lights is shown. Light 1 is fitted with a reddish, colour-intensifying tube, Light 2 with a white tube, and Light 3 with a moonlight tube. Light 4 is not used in this example.

Light 1 is switched on at 05:00 hours, and reaches 100% strength at 09:00 hours (after 240 min).

Light 2 starts later, at 07:00 hours, and reaches full strength at 10:00 hours. By virtue of the offset timing the reddish light dominates initially, but by late morning both lights are at full power.

At midday the red light is dimmed for a time, such that there is a higher white component in the light spectrum and a reduction in the overall light intensity ("tropical half-light", algae limitation). In the afternoon through evening the entire procedure is carried out in reverse. Light 3, the moonlight, is switched on at 20:00 hours and attains full intensity by 22:00. Next morning it is switched off again.

In order to define a light-intensity cycle *Dimming points* must be set. These are marked in yellow in the above example. Using each such starting point the light will be dimmed over a configurable time period to a configurable light intensity.

In the above example this means that there are the following 4 *dimming points* for Light 1:

- (dimming) *start*: 05:00 hours, (dimming) *duration* 240 min, (final) *light intensity* 100%
- (dimming) *start*: 11:00 hours, (dimming) *duration* 60 min, (final) *light intensity* 70%
- (dimming) *start*: 14:00 hours, (dimming) *duration* 60 min, (final) *light intensity* 100%
- (dimming) *start*: 17:00 hours, (dimming) *duration* 240 min, (final) *light intensity* 0%

3.15.1 Illumination run

Here you must first of all select the illumination channel to be set. After choosing one of the eight illumination channels the lamp type has to be adjusted:

- dimmable
- non dimmable

Then you can decide whether the associated lights are to be controlled automatically. If you answer in the negative then the light in question will operate on manual mode. This means that the light intensity of the light can be set manually.

If you have activated automatic operation then you can input the number (up to 8) of dimming points (dimnable) or switching times (non dimnable).

In the example above for dimmable lamps there were 4 dimming points for the first light.

In the case of a dimmable lamp the dimming points have to be defined. For each dimming point the following parameters need to be set:

- *Start* – the dimming process starts at this time
- *Duration* – the dimming process lasts this long, up to 480 minutes
- *Light intensity* (0% - 100%) – light intensity of the light at the end of the dimming process

Warning: The individual dimming phases of a light may not overlap!

For a non dimmable lamp have these settings to be done:

- *Switch on* – the lamp is switched on at this time
- *Switch off* – the lamp is switched off at this time

3.15.2 Manual light intensity

This menu is intended predominantly for testing and diagnostic purposes. If automatic operation is enabled for at least one dimming channel (which is the case as standard) then you will be asked whether you want to switch off the automatic operation. If you reply Yes then all automatic operation will be switched off temporarily. On quitting the menu the previous settings will be re-instated.

Using the **left arrow** and **right arrow** keys you can select the dimming channel whose light intensity you want to set. The choice of either I1 to I4 or I5 to I8 will be displayed simultaneously. Using the **up arrow** and **down arrow** keys you can make the relevant light brighter or darker (only possible for dimming channels whose automatic operation is switched off) – for non dimmable lamps only 0% and 100% can be set. The key **sun** toggles the light intensity between 0% and 100%.

A symbol will be displayed to left and right of the number of the chosen dimming channel (D1 ... D8).

The symbol can be variable in form:

Symbol	Meaning
*	This light cannot be dimmed as it is in automatic operation, turn off the automatic operation if necessary
↑	Only increased light intensity possible (occurs at 0%)
↓	Only decreased light intensity possible, (occurs at 100%)
↑↓	Light intensity can be adjusted in either direction.

Manual setting can be ended by pressing the **Esc** key.

3.15.3 Clouds

ProFiLux can simulate passing clouds using a random generator. When a cloud passes all the lights are dimmed for a short time. You can set the cloud probability (0% - 100%) and the maximum dimming (10% - 90%) as well as the minimum and maximum cloud duration. A cloud probability of 0% deactivates the cloud simulation. Cloud simulation also operates simultaneously with moon-phase simulation and during a dimming process.

3.15.4 Moon

ProFiLux simulates the phases of the moon dependant on the date. The lunar cycle is actually a very complicated affair. The period from new moon to new moon varies, but on average is around 29.5 days. Equally complicated are the time when the moon rises, its distance from the Earth, and several other details. In addition it is not the case that the moon shines with 50% of its light intensity at half moon. We reckon on 25%. Our moonlight simulation doesn't aim to replicate all these complex processes in precise detail. For our purposes it is sufficient to create a repeating succession of degrees of moonlight which will provide the aquarium with slightly different illumination every evening and supply a degree of rhythm that is largely in accord with that in nature. The phases of the moon are calculated by the aquarium computer on the basis of the date such that full moon and new moon always correspond to the relevant actual (real-time) phases of the moon with an error of at most a day. At the same time we have placed the emphasis on simple and easy-to-understand operation.

First of all you can select the *Dimming channels* (D1 to D8) that are to be involved in the moon-phase simulation. A box with a dot in the middle signifies "this dimming channel is to be subject to the phase of the moon", an empty box signifies "this dimming channel has nothing to do with the phase of the moon". Once you have selected at least one dimming channel you can then set from what time (earliest 14:00 hours) to what time (latest 10:00 hours) the moon-phase simulation is to be activated.

Note: The automatic dimming for the selected dimming channel(s) must be enabled!

The following will now occur for the selected dimming channels within the time set: the light intensity of an associated light (determined by the dimming curve set) will be multiplied by the calculated moon-phase light intensity (= moon phase²). The dimming curve will thus also be taken into consideration. For example at half moon (=50% phase of the moon) and a light intensity of 30% (determined by the dimming curve) this will produce a light intensity of $50\%^2 * 30\% = 7.5\%$.

All dimming channels that are not selected for moon-phase simulation will be unaffected and follow their dimming curves exactly as usual. Outside the set simulation period no dimming channels will be affected, all dimming channels will work just as normal.

Using this method, during the day (outside the set simulation period) it is possible to run a light as usual (no moon-phase influence), but during the evening (within the set simulation period) to link it to the phases of the moon.

The start and end times of the moon-phase simulation should be chosen such that they encompass the night-time dimming interval of the relevant dimming channel(s). For example, if the dimming curve of a light is programmed such that it produces moonlight from 19:00 to 07:00 hours, the moon-phase simulation should also be set from 19:00 to 07:00 hours.

The moon-phase simulation can work simultaneously with cloud simulation and during a dimming process.

3.15.5 Rainy days

ProfiLux allows the programming of "rainy days". On a rainy day the light intensity is reduced to a configurable value, and this can be helpful in avoiding algae.

First you must configure which *Dimming channels* (D1 to D8) are to be used by the rainy-day program. Then on which *Days of week* rainy days are to be created. Finally the degree of *Darkening* on a rainy day must be set (0% - 100%).

The rainy-day program takes into account any moon-phase and cloud simulation as well as the relevant dimming curves.

3.15.6 Storms

Using special lights with flash from GHL (e.g. ProfiLux Simu) ProfiLux can simulate an electrical storm.

A storm results in a slow lowering of the light intensity of all the connected lights. With the steadily increasing darkness the number of flashes is increased. After the storm has reached its culmination the lighting is slowly brought back to normal strength and the flashes become less frequent, until finally the storm is over.

A storm can be started manually as often as desired, or automatically up to four times per day.

In the storm menu, under *Settings*, you can determine the parameters for the storm:

- *Darkening* (0% - 100%) during a storm
- *Intensity* (1 – 10) of the storm
- *Storms/day* – there will automatically be this number of storms per day (maximum 4)
- *Days of week* – there will be a storm only on these days of the week
- *Start time 1...4* – a storm will begin at this time
- *Duration 1...4* – the storm will last this long
- *Simu type* – here you should input whether you have a *ProfiLux Simu* of the new model (serial number 0512..... onward). ProfiLux requires this information in order to send the correct signals to the *Simu*.

The option *Manual start* in the storm menu will start a storm. In this case the duration again needs to be input. When a storm is started manually the *Intensity* and *Darkening* input via *Settings* are used.

Note: The signals required for a storm can be produced only by the onboard 1-10V interfaces (L1 to L4). Hence an “electrical storm light” should not be connected to any additional 1-10V interface (e.g. expansion card *PLM_2L4S*) that may be present!

3.15.7 Burning-in

Fluorescent tubes need to be burned-in before they can be used for dimming (see also *1.4 Important operating instructions*). ProfiLux provides a quick and easy way of automating burning-in.

After selecting the dimming channel to which the tube to be burned-in is connected, the burning-in period can be set between 0h and 100h. The dimming channel in question will then operate at only 0% or 100% until such time as the operation hour meter (see also *3.15.8 Operation hours*) for the dimming channel reaches the burning-in duration (all dimming settings greater than 0% will automatically be treated as 100%).

At 0% the light will be switched off again – the burning-in is performed in stages. The burning-in period is set to 0h as standard, ie with burning-in disabled.

3.15.8 Operation hours

Each dimming channel is provided with its own operation hour meter to record how long the dimming channel in question is active (light intensity greater than 0%). In this way you can tell in each case how long the light has been in operation and can replace it in good time, before its performance deteriorates too much through age. The operation hour meter is also used by the burning-in program. The operation hours are recorded cyclically every hour in the non-volatile memory, ensuring that the operation hours are still recorded in the event of any interruption in line voltage power.

After the menu option *Operation hours* is selected the relevant *Dimming channel* must be input, after which the operation hours for the dimming channel in question will be displayed. After a few seconds have elapsed or if any button is pressed you will be asked *Reset operation hour meter?* Confirmation with *Yes* will reset the operation hour meter to 0h. Obviously this should be done only when the light is changed.

3.15.9 Temperature-dependent light reduction

Using temperature-dependent light reduction it is possible to reduce the lighting intensity smoothly (for dimmable lamps) or to shut off lights (for non dimmable lamps), depending on the amount by which the nominal temperature is exceeded. In calculating the reduction any existing dimming sequence as well as any simulation will be taken into account. Temperature-dependent light reduction can be used to prevent further overheating, caused by the lighting, in a tank that on hot summer days becomes so warm that any cooling system present is no longer able to achieve an adequate decrease in the temperature.

The following parameters can be set:

- the determining *temperature sensor*
- the *Illumination channels* to which the temperature-dependent light reduction is to be applied; for example LED lights can be omitted as these emit virtually no heat at all.
- *Min. temperature excess* – if the nominal temperature is exceeded by this amount then the reduction in the lighting intensity of the relevant lights will be triggered; can be set between 1°C and 5°C – this setting is relevant for *dimmable* lamps only!
- *Max. temperature excess* – if the nominal temperature is exceeded by this amount then the relevant light(s) will be switched off completely; can be set between 2°C and 10°C, but must be at least 1°C higher than the *Min. temperature excess* - this setting is relevant for *dimmable* lamps only!
- *Shut off limit* – exceeding the nominal temperature by this amount causes a shut off of the non dimmable lamps. A value between 1°C and 10°C can be adjusted. These lamps will be switched on again not until the programming of the corresponding illumination run schedules a re-start (lamp was off – e.g. at night – and should be switched on again - e.g. in the morning). A reduction of the temperature only does not cause a re-start. This is important especially for gas discharge lamps since they should not be switched on/off frequently.
This setting is relevant for *non dimmable* lamps only!

Example for dimmable lamp:

Nominal temperature = 26.0°C, Min. temperature excess = 2.0°C, Max. temperature excess = 4.0°C, this results in:

Current temperature	Light reduction	Current temperature	Light reduction
28.5°C	25%	29.5°C	75%

29.0°C	50%	30.0°C	100% (off)
--------	-----	--------	------------

3.15.10 Special lamp

Here you can change settings for special lamps. At present only lamps from *Aqua Illumination (AI)* are supported.

First you have to set if an *AI lamp present* is. After confirming with *Yes* the illumination channels (1...8) can be assigned to the white and blue LEDs. Additionally an action can be performed:

- *Baseline temperature* – tells the lamp to determine its baseline temperature (refer to manual of AI)
- *Flash intensity* – sets the intensity of flashes during a thunderstorm (0 = weak ... 9 = strong)

If the *AI*-support is enabled ProFiLux sends permanently commands to the AI lamp via the built-in serial RS232 interface. An appropriate cable for the connection of *ProFiLux* and *AI* is available.

Hint: If a PC is connected to the serial interface although *AI*-support is enabled *ProFiLux* stops the transmission of *AI* commands to allow a communication with the PC. The transmission of *AI* commands will be continued after a reboot or if *AI lamp present* is confirmed with *Yes* again.

3.15.11 Variable illumination

This function allows you to use different illumination settings at different days of the week.

Up to 4 variable illumination programs can be defined. After choosing the program (1 to 4) for each day of the week (Monday to Sunday) the illumination channel (see 3.15.1 *Illumination run*) can be selected which should be used for that day.

Example:

You want for Monday to Friday different settings for the illumination than for Saturday and Sunday, which means you need 2 different illumination channels.

First you adjust both illumination channels (e.g. channel 1 for Monday to Friday and channel 5 for Saturday and Sunday) according to your wishes.

Then you change e.g. *Variable Illumination 1* accordingly (Monday: 1, Tuesday: 1, ..., Friday: 1 and Saturday: 5 and Sunday: 5).

At the end you choose the function *Variable illumination 1* for the 1-10V-interface (see 3.17.4 *1-10V interface*) respectively for the switchable socket (see 3.17.3 *Socket function*) in question.

3.16 Extras

Special functions and settings are summarized here. The following sub-menus can be accessed when required.

3.16.1 Maintenance

During maintenance and servicing the aquarium it could be handy to change the activation state of some sockets or the brightness of lamps. For example: Disable the heaters, reduce the current to minimum and adjust the brightness of a dimmable lighting unit to 80%. To reach a maximum of flexibility the settings take affect directly on hardware (sockets and 1-10V interfaces) and not on the controlling functions (e.g. temperature control or dimming channel).

In the menu *maintenance* the maintenance parameters can be altered under *settings*:

- *Select affected 1-10V-interfaces*
Select the 1-10V interfaces (1 - 8) to be affected during an maintenance. All non-selected interfaces will continue working normally and program controlled.
- *Select percentage during maintenance*
Here it is possible to adjust the voltage (in percent) of the 1-10V interfaces selected in the previous step during maintenance.
- *Select affected sockets*
Select the socket-outlets (1 - 8 and 9 - 16) to be affected during maintenance. All non-selected socket-outlets will continue working normally and program controlled.
- *Adjust selected sockets*
Here it is possible to adjust the activation state (on or off) of the socket-outlets selected in the previous step during maintenance.

The maintenance program is activated in the menu *maintenance* by selecting *start*. While the maintenance program is active the status of the selected socket-outlets will be set to the configured maintenance-settings, the voltage of the selected 1-10V-interfaces will be set according to the given configuration. ProFiLux will show that a maintenance program is active by signaling a flashing announcement with the text *Operational mode: Maintenance*. The maintenance program is terminated by pressing any key.
Hint: During maintenance the alarm monitoring of all sensors will be disabled!

3.16.2 Internal time

This function causes the internal clock time (see 3.14 *Clock*) to be displayed. This function is for diagnostic purposes only; no settings can be configured here.

3.16.3 Info & support

When this menu option is selected then information will be displayed sequentially (automatically after a period of time or if a key is pressed) regarding the software version, model, and our website.

3.16.4 Feeding pause

Here you can configure the length of the feeding pause, which can be started manually using the **Esc** key or automatically via a timer. In order to avoid compromising the microbiological environment of your filter, you should select this time to be no longer than absolutely necessary (around 5 to 10 minutes).

In addition you can configure which pumps are to be affected by the feeding pause:

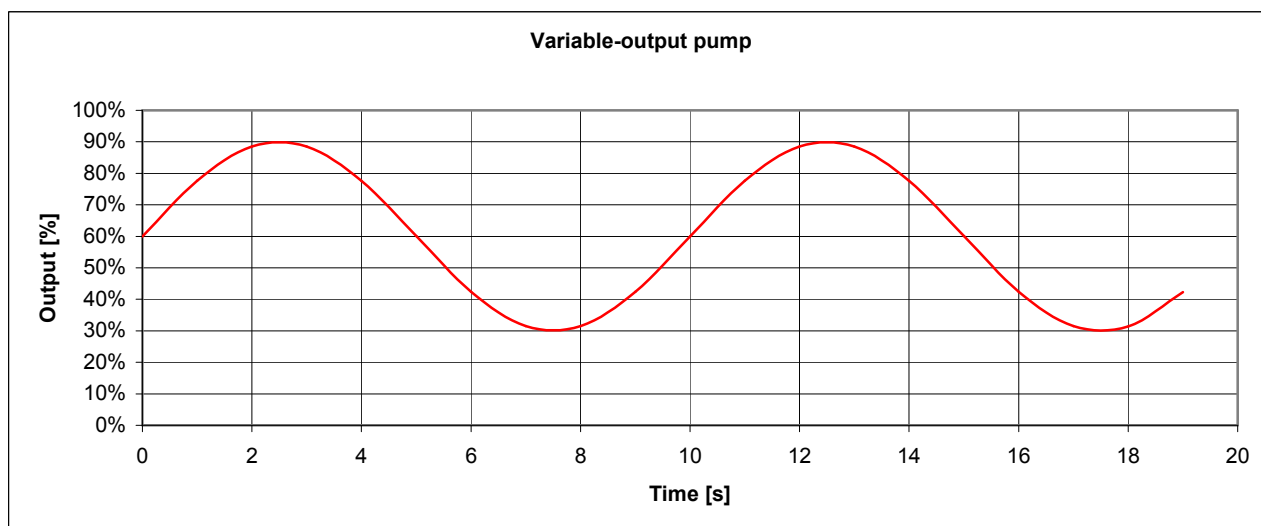
- *Stop filter* – after selection of Yes there will be no power to the switchable socket with the function *filter* during the feeding pause
- *Current pumps at minimum* - during the feeding pause the current pumps will run at the minimum speed set
- *Current pumps off* - during the feeding pause the current pumps will be halted
- *Current pumps uninvolved* – the feeding pause has no effect on the current pumps

3.16.5 Current

ProFiLux (Plus) can regulate current pumps in numerous ways. If variable-output pumps are used (these must either have an interface cable or be suitable for control via phased voltage, for which a dimmable socket is required) then the current will be gently alternated between minimum and maximum flow rates. The pattern of the control signal can be set to sinus form – on the one hand this is the gentlest method of increasing and/or decreasing the speed of a motor, on the other it is the closest to what occurs in nature. The control signal can be output via a 1-10V interface, see also 3.17.4 *1-10V interface*. In addition non-variable pumps can be switched via switchable ports (for further details see 3.17.3 *Socket function*), though obviously such pumps can only be switched on or off, their flow rate cannot be varied.

Note: "Pump active" signifies that the pump continuously fluctuates between minimum and maximum flow rate (= creates "waves"), and a port assigned to the current pump is then switched on. "Pump inactive" doesn't necessarily signify that the pump is off, but that it is running at its minimum flow rate, and a port assigned to the current pump is then switched off.

The graph below shows the flow pattern of a variable-output pump (settings: *Minimum flow rate* = 30%, *Maximum flow rate* = 90%, *Wave duration* = 10s, *Wave form* = sinus):



In addition the pumps can be set for variable switching for wave creation (*Sequence* or *Random*). The pumps active at any one time create the waves configured, the inactive pumps run at the minimum flow rate set.

Two independent groups can be programmed. A group consists of 0 to 4 pumps which can be controlled independently. The 2 groups can not be synchronized.

If several pumps should be operated synchronously it is wise to connect them all to the same control signal. These pumps will then be handled like one single pump.

3.16.5.1 Nocturnal change

A *nocturnal change* of the pump power can be adjusted for the current control. If the nocturnal change has been activated a *start-* and *end-time* can be entered. During these times the pumps will be operated with the power which has been set for night.

For each group these parameters can be set:

3.16.5.2 Count of pumps

Here you can set the count of pumps in this group. In one group 0 to 4 pumps can be controlled (0 pumps means that this group is not enabled). The count of pumps in a group defines what pumps belong to this group (a free assignment pumps to groups is not possible). In sum 4 pumps are available; these combinations are possible:

Count of pumps in group 1	Pumps belonging to group 1	Count of pumps in group 2	Pumps belonging to group 2
4	1, 2, 3 or 4	0	none
3	1, 2 or 3	0	none
3	1, 2 or 3	1	4
2	1 or 2	0	none
2	1 or 2	1	3
2	1 or 2	2	3 or 4
1	1	0	none
1	1	1	2
1	1	2	2 or 3
1	1	3	2, 3 or 4
0	none	0	none
0	none	1	1
0	none	2	1 or 2
0	none	3	1, 2 or 3
0	none	4	1, 2, 3 or 4

3.16.5.3 Mode

The operational mode for a group can be adjusted here. Both groups may have different modes.

- *No current* – The pumps of this group are permanently off.
- *Permanent* – The pumps are permanently active and run synchronously.
- *Permanent opposite* – The pumps are permanently active and run reciprocally, i.e. when pump 1 is running at maximum flow rate, pump 2 will be running at minimum flow rate, and vice versa.
- *Sequence 1* – The pumps of this group will be activated alternately. The duration for the change from one pump to next one can be set (see below). When the last pump of this group was active the sequence starts again with the first pump of this group. If this group has 2 pumps an ebb-tide-simulation will be created. If this group has only one pump this pump will be switched on and off in turns.

Example: A group with 3 pumps will result in this switch-on pattern:

Step	Pump 1	Pump 2	Pump 3
1	on	off	off
2	off	on	off
3	off	off	on
4	on	off	off
5	off	on	off
6	off	off	on
7	on	off	off

Etc.

- *Sequence 2* – Similar to *Sequence 1*, but the pumps will be activated in an alternating order.

Example: A group with 3 pumps will result in this switch-on pattern:

Step	Pump 1	Pump 2	Pump 3
1	on	off	off
2	off	on	off
3	off	off	on
4	off	on	off
5	on	off	off
6	off	on	off
7	off	off	on

Etc.

- *Surge 1* – The pumps of this group will be activated one after the other until all pumps are on. Thereafter the pumps will be switched off in the same order until all pumps are off. The duration for changing the switch-on-state can be adjusted (see below).

Example: A group with 3 pumps will result in this switch-on pattern:

Step	Pump 1	Pump 2	Pump 3
1	on	off	off
2	on	on	off
3	on	on	on
4	off	on	on
5	off	off	on
6	off	off	off
7	on	off	off

Etc.

- *Surge 2* – Similar to *Surge 1*, but the pumps will be switched off inversely.

Example: A group with 3 pumps will result in this switch-on pattern:

Step	Pump 1	Pump 2	Pump 3
1	on	off	off
2	on	on	off
3	on	on	on
4	on	on	off

5	on	off	off
6	off	off	off
7	on	off	off

Etc.

- *Random* – Using a random generator, all, some or none of the pumps of this group are activated in continuous random variation. The duration of the activation can be set (see below).

3.16.5.4 Duration

In the modes *Sequence*, *Surge* or *Random* the duration for changing the on-states can be adjusted. The *minimum duration* and *maximum duration* can be entered. The duration will be calculated by a random generator between the set minimum and maximum. In the case the duration should always be constant then for the *minimum* and *maximum duration* the same value has to be entered.

The minimum and maximum permissible duration of activation can be set between 1 second and 6 hours. In the event that a switchable socket is to control the relevant current pump then the duration chosen should not be too small – otherwise damage may occur to the switchable socket or the pump!

3.16.5.5 Wave

The type of wave creation can be set for each group individually:

- *Sinus waves* (gentle increase and decrease in the flow rate of the pump)
- *Right-angled waves* (abrupt changes)
- *Right-angled waves short* (abrupt changes at high frequency)

Then the wave duration must be set in the range between 1 and 60 seconds (or 0.4s and 6s at *Right-angled waves short*). Naturally the technical capacity of the pump must be taken into consideration here. Waves cannot be created using non-variable pumps connected via switchable sockets.

Finally the *Random wave reduction* can be set between 0% and 100%. The larger the value the greater the variation in the size of the individual waves. At 0% each wave will attain the previously set maximum (wave size always the same), at 100% the size of the waves will fluctuate randomly between minimum and maximum.

3.16.5.6 Pump settings

For each pump these settings can be made:

- *Minimum* – minimum power (while wave trough or pump is inactive)
- *Maximum* – maximum power (while wave crest)
- *Night* – maximum power while nocturnal change
- *Thunderstorm* – maximum power while thunderstorm
- *Behavior while feeding pause* – options are: *uninvolved* (feeding pause doesn't affect this pump), *at minimum* (pump is operated with minimum power while feeding pause) and *off* (pump is shut off while feeding pause).

3.16.6 Display

Here you have the opportunity to configure the current values that are to be shown by the display during normal operation. If several different elements are selected then these will be displayed in succession. These settings will also affect the display of any ProFiLux View currently connected.

The following settings can be made via this menu:

- *Display duration* – the period for which the display will remain constant before the next value is displayed
- *Select simulation* – here you can select which of the simulation elements are to be displayed
- *Select controller* (ProFiLux Plus II only) – selects the controllers whose values and status are to be displayed (e.g. pH and temperature)
- *Time & date* – it can be selected if the current time and date will be displayed *never*, *always* or *rotating*.

3.16.7 Measurement data

ProfiLux (Plus) II can record measurement data. For this purpose it offers a storage system which can record up to a maximum of 600 measurements (configurable). The measurements are stored in the RAM (volatile memory) – the data will be lost in the event of an interruption in the line voltage supply!

In the event that the measurement storage is full then the oldest data will be overwritten.

A PC with our *ProfiLuxControl II* operating program is required for detailed analysis and additional processing of the measurement data. From Version 1.04 upwards it can extract measurement data and store them as text files, see also *10.6 Measurement data*. A simplified analysis of measurement data can also be performed directly by the aquarium computer, see the menu option *Analysis* below.

For each metered value and sensor one memory space will be occupied in the measurement storage.

The following sub-menus will be found under the menu option *Measurement data*:

- **Settings** – First of all input the maximum storage size (between 8 and 600) to be reserved for recording the measurement data. Reducing the maximum storage size, which is set ex-works at 600, is advisable only if you wish to limit the period of time for which measurement data will be recorded. See also the example below.
Next set the measurement period between 1 minute and 12 hours (after the expiry of this time the current values will be stored). And finally you can select which of the sensors present are to be involved in the measurement recording.
Any alteration in the settings may result in measurement data already stored being erased. Hence before any alteration in the settings you will first be asked whether the data are to be erased.
- **Erase measurements** – All measurements currently stored will be erased.
- **Status** – Displays first of all when the last measurements were recorded, then the storage status and how many measurement data have not yet been transmitted to the PC.
- **Analysis** – After you have selected the sensor whose measurement data are to be analysed the upper line of the display will show the average value and the lower line the minimum and maximum values. These three values will be based on all the data currently stored.

Example of calculation of the maximum duration of measurement data recording:

Size of the measurement storage 500 storage elements, measurement data from 2 sensors to be stored, storage to take place once every hour

-> Measurement period = $1\text{h} * 500 / 2 = 250\text{h} = 10.4\text{ days}$

Example of calculation of the setting for maximum storage size:

You would like to store the measurement data from 3 sensors (e.g. temperature, pH, and redox) every half hour, but the values in the storage should be a maximum of 2 days old so that minimum, maximum, and average values relate only to the past two days.

-> Maximum storage size = $24\text{h} / 0.5\text{h} * 3 = 144$

3.16.8 Language

The language ProfiLux uses to print texts can be set here.

Please note:

If ProfiLux II is set to German language this menu appears under "Sprache" (German expression for language)!

3.16.9 Dosing pumps

Settings for the dosing pump control can be done here. *ProfiLux* calculates the on-time of a dosing pump based on the flow rate of the used pump and the desired rate per dosing. The pump can be activated with an adequate programmed switchable socket (see *3.17.3 Socket function*).

A dosing pump unit from GHL is connected directly to an switchable socket output of the ProfiLux (e.g. S1-S4) and behaves like a conventional or digital powerbar, depending on the used output.

If more than one dosing per day is set ProfiLux splits these dosing operations evenly over the day. If more than one dosing pump is used ProfiLux tries to avoid that the pumps are activated in parallel.

First you have to select which of the 8 dosing pumps has to be set.

These settings are possible:

- **Flow rate** – The flow rate in ml/min has to be set here. If you are using a dosing pump from GHL the standard setting (60ml/min) can remain, otherwise here the flow rate of the given pump (see datasheet) has to be entered.

- *Dosings/day* – This defines how often the pump should be activated per day. Adjustable are values between 0 and 24, 0 deactivates this dosing pump.
- *Rate/dosing* – The amount for one dosing.

Hints:

- The dosing amount in one day is equal to the product of *Dosings/day* and *Rate/dosing*. E.g. 4 dosings per day with a rate per dosing of 10ml result in a dosing of 40ml in one day.
- Alternatively you can use a timer or a controller (e.g. pH-value or conductivity) to control a dosing pump.
- Because of tolerances the actual flow rate of a pump can be different to the specification in the datasheet. To obtain most precision we recommend to measure the actual flow rate (let the pump run for 1 minute and measure the liquid pumped in this time), then enter the result of this measurement under flow rate.

3.17 System

Special functions and settings are summarized here. The following sub-menus can be accessed when required.

3.17.1 Factory settings

After selecting this function you will be asked whether the default settings should be reinstated. If you answer Yes then all settings will be returned to their original status, as supplied!

The operation hour meters will not be reset.

3.17.2 PIN

A Personal Identification Number (PIN) allows you to protect the device from changes to the settings by unauthorized persons (for example, children). As supplied, the PIN is set to 0000. If the PIN is set to 0000 then all settings can be changed without entering a PIN. As soon as the PIN is changed from 0000 then the PIN must be input before any alterations to settings. This also applies to changing the PIN.

In the event that you have forgotten the PIN, proceed as follows:

Switch off the device (unplug the line voltage supply), switch on again (reconnect the line voltage supply) and at the same time, while the status and welcome display is visible, press **Esc** and **RETURN** **simultaneously**. You will then be asked whether the PIN should be deactivated. When you answer Yes the PIN will be returned to the original default status as supplied (0000 – deactivated).

3.17.3 Socket function

The function of each switchable socket can be set individually. The sockets 1 to 8 in the ProFiLux Plus II (1 to 4 in the ProFiLux II) are an associated part of the computer. The number of sockets available can be increased by four using the expansion card *PLM-2L4S*. In such cases the additional sockets 9 to 12 (5 to 8) will be available. In addition two *PLM-2L4S* expansion cards can be integrated (possible only in the ProFiLux Plus II), and then the additional sockets 13 to 16 will be available.

Furthermore the connection of digital powerbars is possible, see 3.17.10 *Digital powerbars*. Using digital powerbars allows to control up to 24 switchable sockets independently. Not all the functions listed below are available in all ProFiLux models.

After selecting the socket to be programmed (1 to 24), the following settings are possible.

The individual functions are:

- *Timer*, subsequently the *number* of the timer has to be set (1 to 8)
- *Illumination*, subsequently the *number* of the illumination has to be set (1 to 8)
Here a socket can be assigned to an illumination channel. If the channel in question has a dimming setting of 0% then the socket will carry no voltage. With a setting of 1% to 100% it will carry voltage. This function is intended to interrupt the line voltage supply to dimmable fluorescent unit(s) which do not have an internal voltage cut-out at 0% or to switch non dimmable lamps on and off.
Dimmable fluorescent units from GHL do not require external switching and can be connected directly to a permanent line voltage supply as they are fitted with an internal cut-out. Hence no switchable socket is required for the operation of GHL dimmable fluorescent units!
- *Water*, subsequently the *number* has to be set (1 and 2)
The water-level regulation uses this sockets for switching magnetic valves or pumps.

- *Current pump*, subsequently the *number* of the pump has to be set (1 to 4)
The current simulation switches this socket on when the current pump is active. Important note: Every switching operation inflicts wear on both socket and pump. For this reason the time periods set for the current modes *Ebb/Flood* or *Random* should not be too short! Depending on the actual loading the socket should have a life of up to 10,000,000 switching cycles.
- *Dosing pump*, subsequently the *number* of the pump has to be set (1 to 8)
The dosing pump control activates this socket (or this channel of a dosing unit from GHL) during a dosing operation.
- *Programmable logic*, subsequently the *number* of the programmable logic has to be set (1 to 8)
The result of the programmable logic in question will be output at this socket. See 5.2 *Programmable Logic*.
- *Sum Alarm*
In the event of an alarm this socket is switched on.
- *Filter*
This port is effectively permanently switched on, except during the feeding pause.
- *Always on*
This socket is always switched on.
- *Always off*
This socket is always switched off.
- *Thunder*
This socket is switched on for short periods (around 800 ms) when the storm simulation creates a flash of lightning.
- *Water change*
This socket is switched on during the complete water change (at draining and refilling).
- *Variable illumination*, subsequently the *number* of the variable illumination has to be set (1 to 4)
This assigns a *variable illumination* (see 3.15.11 *Variable illumination*) to this socket.

Furthermore a socket can be assigned to a control loop. First one of the given controllers (sensors) has to be selected, e.g.

- *Temperature 1*
- *pH-value 1*

After selecting the controller that should switch this socket the function has to be more concretized.

In case of temperature controllers these options are given:

- *Cooler*
The temperature regulation uses this socket to switch the cooler.
- *Heater*
The temperature regulation uses this socket to switch a heater.
- *Bottom heater*
The temperature uses this socket to switch a bottom heater.
- *PTC*
This socket is switched on if the temperature regulation would like to heat or cool (so in both cases). With this you can make a here connected PTC which is already operated via a 1-10V-interface, completely electroless if there is no need to heat or to cool. In principle, a PTC can be supplied permanently with voltage and therefore doesn't need to be connected to a switchable socket, but through the shut-off you can save the standby-energy.
- *Alarm*
In the event of an alarm of this control loop this socket is switched on.

For all other controllers these options are given:

- *Control downward*
The controller uses this socket for downward adjustment, e.g. to switch a CO₂ injector (pH controlling).
- *Control upward*
The controller uses this socket for upward adjustment, alkalization (pH controlling).
- *Alarm*
In the event of an alarm of this control loop this socket is switched on.

After selecting a function these settings can be adjusted:

- *Blackout delay* – the time here set (0 to 60 minutes) determines how long this socket will be switched off in any case after starting the ProFiLux. This setting is useful if a device should be switched on again after it has cooled down, e.g. the switching on of an MH-lamp should be delayed after a power blackout.
- *Invert switching behavior* – after enabling this option the socket behaves the other way around: the socket is off when it should be on and vice versa. The inversion of the switching behavior is useful for example if a pump or solenoid should be switched off instead of been switched on.

3.17.4 1-10V interface

Each 1-10V interface can be configured individually. ProFiLux (Plus) II provides four associated 1-10V interfaces, L1 to L4 (in each case two to a port). Using the expansion card *PLM-2L4S* the number of 1-10V interfaces can be increased by two, and then the additional 1-10V interfaces L5 and L6 will be available. By using a further card (possible only in ProFiLux Plus II) two more interfaces, L7 and L8 are available.

After selecting the interface to be configured, first of all the function of the interface in question must be set. The following settings are possible:

- *Illumination*, subsequently the *number* of the illumination (= illumination channel, 1 to 8) has to be set.
This option is for connection of dimmable lights – e.g. with dimmable electronic ballasts or ProFiLux Moon. It is possible to assign any of the 1-10V interfaces to each illumination channel. This can be useful when, for example, the dimming cycle of two lights is to be changed, avoiding the need to reprogram the dimming curves.
- *Current pumps*, subsequently the *number* of the pump has to be set (1 to 4).
- *Not used*, this interface has no function
- *Variable illumination*, subsequently the *number* of the variable illumination has to be set (1 to 4)
This assigns a *variable illumination* (see 3.15.11 *Variable illumination*) to this 1-10V-interface.

Moreover a 1-10V interface can be assigned to a control loop. First one of the available controllers (sensors) has to be selected, e.g.

- *Temperature 1*
- *pH-value 1*

The selected controller outputs a voltage that is proportional to the deviation from the desired value (= difference of nominal value to current value).

Example temperature control:

When the temperature of the water exceeds the nominal temperature set, a voltage proportionate to the temperature discrepancy is output. The warmer the water is the greater is the voltage. Using this setting it is possible to regulate a controllable cooling system - e.g. our PropellerBreeze with electronic control *PropellerControl* – and thus operate it as economically and quietly as possible.

Next the control voltage of the interface in question can be set. As a rule the voltage range will be 1V to 10V, as the name of the interface suggests.

In practice it may be necessary to set the minimum control voltage (at 1%) (possible range: 0V to 4V). This can be for the following reasons:

- Not all tubes are equally suitable for dimming. The tube manufacturer can provide you with more information on suitability for dimming. The majority of problems occur in the lower part of the dimming range (up to around 10%), where it may happen that after a certain time (usually a few minutes) the tube simply switches off.
- Not all dimmable electronic ballasts behave in the same way. The lower dimming setting should normally be achieved at a control voltage of 1V, full light intensity at 10V. We have noticed that in the case of some electronic ballasts the light intensity doesn't alter further at a control voltage of less than 1.5V, while in other electronic ballasts the dimmable range extends to around 0.8V.
- The current pump relines voltage inactive although the current speed set is $\geq 1\%$.

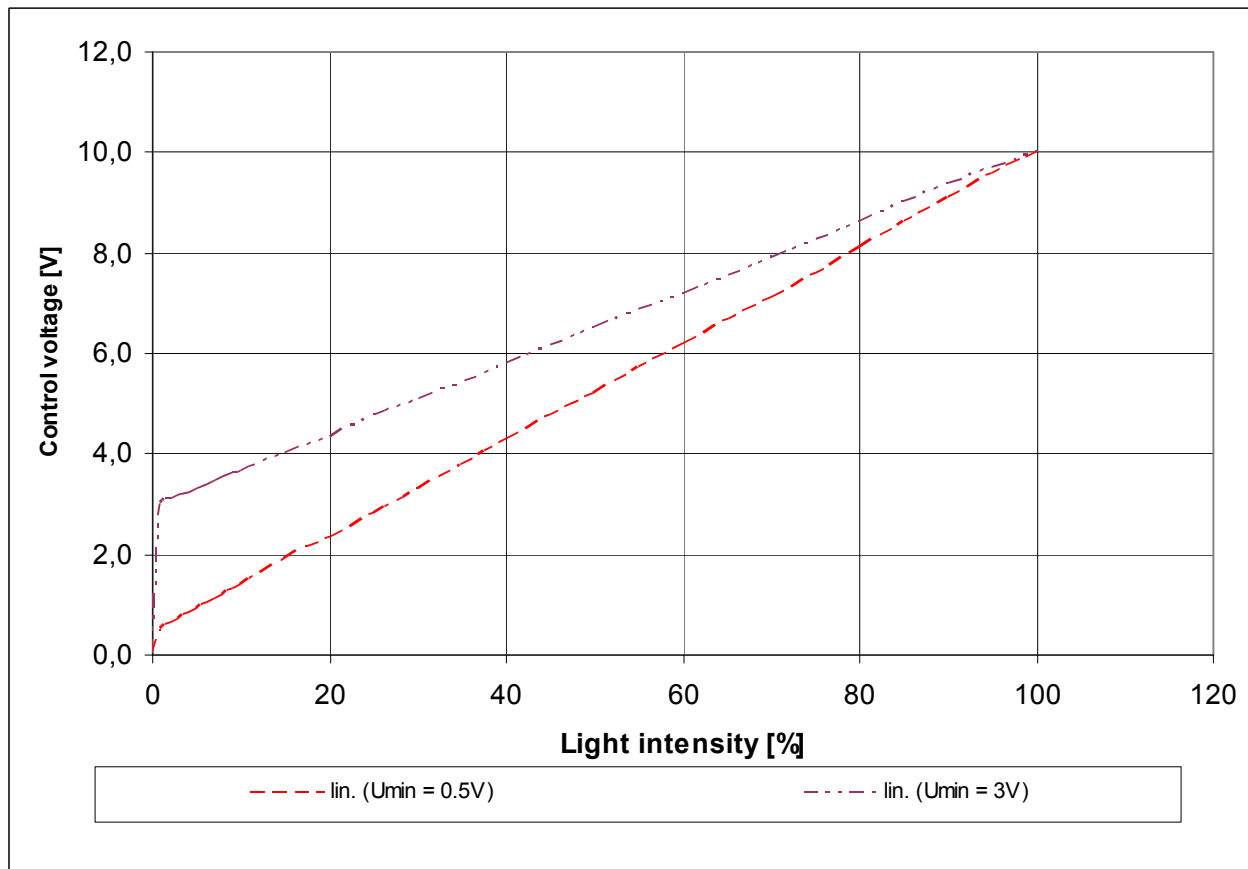
The maximum control voltage (at 100%) can be set between 4.5V and 10V, in order to solve the following problems, for example:

- With some dimmable electronic ballasts nothing more happens between 9.5V and 10V.
- The current pump is already operating at full rate at 8V.
- Moon light is too bright at 10V.

Notes:

- In order to achieve an optimal light intensity cycle the control voltage should be matched to the associated light, ie minimum light intensity and lower control voltage as well as maximum light intensity and upper control voltage should be precisely matched.
- When using our dimmable moonlight LEDs the voltage should be set at 0.8V.

The following graph shows various plots of control voltage relative to light intensity (logarithmic or linear at low control voltages of 0.5V or 3V):



In order to achieve an optimal dimming sequence the menu option *Manual light intensity* can be used to test whether the light intensity changes at the lower dimming values or the light switches off, and whether changes in the light intensity are still apparent at the upper dimming values. If necessary alter the control voltage and repeat the test.

3.17.5 Programming LED lights

These functions permit you to re-program a connected LED light from GHF (equipped with a microcontroller – doesn't apply to conventional LED lights). During the programming only the light to be programmed should be connected! The setting will be stored in the LED light (including in the event of line voltage supply interruption).

- *Swap channels* – the channel assigned in the light will be swapped. The default is for moonlight to be controlled by dimming channel 1 (/3), and sunrise by 2 (/4). After a channel swap the light will behave in the opposite way. This can be useful when, for example, a moonlight lamp and a together dimmable fluorescent unit are to be connected via a Y-splitter to the same port of the ProfiLux.
- *Lightning mode* – here you can configure whether the lightning lamp (if present) is to react to *All flashes*, *Flash 1*, or *Flash 2*. If only one lightning lamp is connected then *All flashes* should be selected. In the event that 2 lightning lamps are connected then one should react to *Flash 1*, the other to *Flash 2*. This will create a less violent effect, as a storm generated by ProfiLux doesn't always trigger both lightning lamps, but instead the location of the flashes is randomly generated.
- *Moon color* – this setting determines the color of your moon light (*deep blue*, *light blue* or *blue white*) and is possible for these LED lights only: *ProfiLux-Simu* and *ProfiLux-Moon*. NOT possible for: *ProfiLux-Simu-DB*, *ProfiLux-Simu-BW*, *ProfiLux-Moon-DB*, *ProfiLux-Moon-BW* and *ProfiLux-Sunrise*!

3.17.6 Configuring View II

Using this function the contrast of a connected *ProfiLux View II* can be configured. This function cannot be used for *ProfiLux View* (the older model).

3.17.7 Communication

This menu is used to configure all the settings that relate to communication (see also 5.1 *Networking*). **Most of these settings can only be altered on ProfiLux directly!**

- *Device address* – this is the address by which the aquarium computer is to be accessed by the PC operating program *ProfiLuxControl II* (or by any other aquarium computer networked with this one). **In the event that several aquarium computers are networked together they must have different addresses!** Otherwise there is no need to change this setting.

If more than one communication interface is present the next step is to select one of them. All subsequent settings are applied to the chosen interface only!

- *Baud rate* – This sets the connection speed of the interface (default 9600 baud). If several interfaces are present you must first specify for which one the baud rate is to be set. **The baud rate must match that of the device with which communication is to take place (e.g. a PC with *ProfiLuxControl II* or another aquarium computer)!** If the external display unit *ProfiLuxView* is to be connected then the setting must be 9600 baud!
Increasing the baud rate can be helpful if the link is short and free of interference. The link between PC and ProfiLux using our serial interface cable functions without problem even at 115200 baud. In the event of transmission problems, e.g. when using long and interference-prone leads, it may be helpful to reduce the baud rate.

In the event that the selected interface is a LAN- or WLAN-card one of the following actions can be executed:

- *Defaults LAN/WLAN* - The settings of the card are to be reset to defaults (IP, security, ...). This function might be necessary if settings or passwords are unknown and the card can't be configured any more.
- *IP of LAN/WLAN* – After choosing this option the IP-address can be entered. If this is a WLAN-card additionally it is possible to enter the SSID of your wireless network and to set if the connection mode should be *ad-hoc*. If *no* is selected the connection mode will be set to *infrastructure*. All other settings (excepting IP-address, SSID and connection mode) will be set to defaults.
- *no action*

3.17.8 Alarm

The operational mode of the alarm buzzer can be set here (only ProfiLux Plus II):

- *Buzzer off* – even in the event of an alarm the buzzer will remain off
- *Buzzer on* – in the event of an alarm the buzzer will be activated, independent of the time of day
- *Buzzer at set time* – in the event of an alarm the buzzer will be activated only during a particular period of time. The time period during which the buzzer is to be activated in the event of an alarm is set here.

In addition it is necessary to activate the monitoring process and set the permissible deviation for the individual water parameters, see also 3.6.7 *Alarm* and 3.7.9 *Alarm*.

3.17.9 Virtual probes

Here so called virtual probes can be administrated. But what are virtual probes?

At the ProfiLux resp. at the corresponding extension cards, sensors for the registration of several values (e.g. temperature, humidity) can be connected to. To each of these sensors, a control circuit is related whose parameter (nominal value, hysteresis, nocturnal change, and so on) can be set. The controller of a sensor switches the corresponding sockets (e.g. pH upward and pH downward for the pH-value control or the heater, bottom heater and cooler for the temperature control).

Maybe it is necessary to relate several, different set control circuits to one and the same sensor. An example is the temperature control, where the bottom heater and heater shall be operated in consideration of a

nocturnal change, though the cooling shall not be affected by the nocturnal change (since you do not like to have an active nocturnal decrease).

The solution here is to create a "copy" (= virtual sensor) of the actual existing sensor. This virtual sensor and its belonging control circuit may be used just as a "normal" sensor. The measured value of the virtual sensor is of course always equal to the measured value of the "original sensor". Furthermore, a virtual sensor can not be calibrated.

Hint: At total, 8 sensors can be managed (Sum of the actually existing and virtual sensors).

In the menu virtual sensors, there are the following options:

- *New virtual probe*
Here, you can create a new virtual sensor. You have to chose a sensor from which a copy shall be created (e.g. Temp.-Sensor 1). After the storing, a virtual sensor (e.g. Temp.-Sensor 2) is available. The related settings (nominal value, hysteresis, and so on) are taken over (copied) from the original sensor
- *Delete virtual probe*
With this option, a virtual sensor can be deleted again.

Hints:

- After creation of a new virtual probe all probes will be newly numerated.
- In the menus of ProFiLux you can differentiate a virtual probe from an actual existing probe: The names of virtual probes are completely written in capital letters (e.g. "PH-VALUE 1").

3.17.10 Digital powerbars

Here digital powerbars and dosing units can be administrated.

First, you have to indicate if you like to use digital powerbars (or dosing units). If this is the case (in ProFiLux chose yes), the socket control output S1-S4 is set to digital data transfer, so that at this connection, a communication with digital powerbars and dosing units is possible.

If it has been set that digital powerbars shall be used, you can afterwards also chose between the following options:

- *Set numbering* - With this option, you relate numbers to the sockets of the digital powerbar (respectively to the pumps of the dosing unit). The first socket of the powerbar (respectively the first pump of the dosing unit) obtains the set start number, the next socket (or pump) this number + 1, and so on. If e.g. 10 is set as first number, then the sockets of an digital powerbar have the numbers 10, 11, 12, 13, 14 and 15. For this case the pumps of a dosing unit would have numbers 10, 11, 12 and 13. The set switch socket functions will then relate to these numbers, see also 3.17.3 *Socket function*. You can set start numbers between 1 and 19.
- *Set initial state* – (for dosing pump units is this function not available) With this option, the initial states (after line voltage voltage appears) of the separate sockets can be set. These states are also restored when the communication between ProFiLux and the powerbar is - due to any reasons - missing longer than 60 s, e.g. if the control line is removed or if the ProFiLux is defective. The digital powerbar controls permanently, if it is still getting commands from the ProFiLux. It could for example be reasonable, that you set your digital powerbar in a way that in case of a fault, the socket for the filter is on and the socket for the heater is off. So the water purification is guaranteed further on and an overheating is excluded.
- *no action*

Important hints:

- The setting *Use digital powerbars* has only an effect on S1-S4! All other connections for powerbars (e.g. S5 - S8) are furthermore only suited for standard powerbars, these connections can also not be altered.
- If the option *Use digital powerbars* has been activated, then with S1-S4 no standard powerbar can be actuated.
- A mixed operation of digital powerbars (at S1-S4) and standard powerbars (at the other powerbar connections, e.g. S5 - S8) is possible.
- When the *initial state* or the *numbering* shall be set, only one digital powerbar respectively dosing pump unit may be connected. If several devices would be connected during the programming, all would overtake the new programming!
- The numbering of digital powerbars and dosing pump units is freely selectable (see *Set numbering*). In contrast to that, the numbering of standard powerbars is determined by the fact to which output

they are connected. Sockets of one powerbar which is connected to S5-8, have for example always the numbering 5 to 8. Here, you have to keep in mind that no double assignment of numbers arises!

- The set numbering and initial states are stored permanently in the digital powerbar and therefore also remain when they are not connected to the line voltage.

3.17.11 Configure PTC

If you use our chiller and heater device *ProfiLux Temperature Control (PTC)* you can perform one of the following actions:

- *Swap channels* – if the PTC reacts on an odd channel (L1, L3, etc.) it will react on an even channel (L2, L4, etc.) after swapping the channels and vice versa
- *Silent Mode on* – the fan speed will be reduced which produces less noise, but the efficiency will be slightly lower
- *Silent Mode off* – the fans are operated normally

Hints:

- PTC can only be operated at the internal 1-10V-interfaces.
- During configuring the PTC no other devices must be connected at the internal 1-10V-interfaces.
- The configuration is stored in the PTC and will remain even without power.

3.17.12 DALI

DALI (Digital Addressable Lighting Interface) is a standardized digital interface for connecting corresponding devices (e.g. DALI-ballasts) via a data bus. Through a control line, up to 64 devices can be addressed separately, the devices are differentiated by means of their address.

The numeration of the DALI-devices is made fully automated by the ProfiLux on command. You have to set then only which device has to react on which illumination channel.

If a DALI-interface is existing then you can choose in the menu *DALI* among the following functions:

- *Minimal dimlevel DALI* – DALI-devices have a minimal physical dim position which is preset by the manufacturer. To achieve an optimal dim cycle, you should set this value here according to the used devices. According to the factory setting, 85 is set, this corresponds to the value of *Osram* DALI-ballasts. You can set values between 0 and 254.
- *New numbering* – With this function, to all connected DALI-devices is assigned first a new long address (between 0 and 16777215), afterwards, *ProfiLux* searches for all connected DALI-devices and assigns short addresses between 0 and 63. If *ProfiLux* has finished with the numeration, the number of all found devices is displayed. If not all devices have been found although the wiring is correct, then start *New numbering* once again.
You have to start the function *New numbering* only if you have connected new devices to the DALI-Bus.
- *Assign illumination channels* – With this function you assign to each connected DALI-device an illumination channel, this means that depending on the assigned illumination channel the light intensity is set in the corresponding device. After selecting this function, you can set with **Up/down arrow** to which device you would like to assign an illumination channel. The just selected device is then operated with a light intensity of 100%, all other devices (resp. their associated lamps) are switched off. Confirm the selection with **RETURN**, then you have the possibility to select the illumination channel (**Up/down arrow**, then again **RETURN**). After a short waiting time you can assign a new channel. When you have finished, press **ESC**.

4 Hardware modules

4.1 General

ProfiLux is expandable using modules. Up to three (in Plus) modules can be inserted in order to make possible the use of additional sensors, switchable powerbars, dimmable lights, etc.

A firmware update for the aquarium computer may be required in order to be able to use the modules. For further information see also the instructions supplied with each module.

In the event that you don't wish to make the necessary assembly yourself we can do this for you for a small charge (if necessary along with a firmware update).

Important hint: In *ProfiLux Plus II eX* it is not possible to use measurement cards (e.g. PLM-pH) in slot 0 (this is the slot next to the piggyback board)! This slot can only be used for intelligent cards (e.g. PLM-2L4S) or communication cards (e.g. PLM-LAN).

The firmware 4.06 supports the following cards

Module name	Function
PLM-2L4S	2 additional 1-10V interfaces for the connection of additional dimmable lighting or variable-output current pumps, plus connection of an additional switchable four-port hub. Important note: The relevant functions (e.g. dimming channel) must be set before you can use the new 1-10V interfaces! For further information see 3.17.4 1-10V interface. The same also applies for a new switchable four-port hub, see 3.17.3 Socket function.
PLM-4L	4 additional 1-10V interfaces for the connection of additional dimmable lighting or variable-output current pumps. Important note: The relevant functions (e.g. dimming channel) must be set before you can use the new 1-10V interfaces! For further information see 3.17.4 1-10V interface.
PLM-Redox	A galvanically isolated input for a redox electrode.
PLM-RS485	Serial RS485 interface for constructing networks and/or the transmission of data over longer distances. After installation of this card an additional COM port will be available in addition to the onboard RS232 interface (COM1). If necessary, test the settings under <i>Remote control</i> and <i>Communication</i>.
PLM-pH	A galvanically isolated input for a pH electrode.
PLM-CondS and PLM-CondF	A galvanically isolated input for a conductivity electrode. PLM-CondS measures in the range 0 – 100 mS (salt water), PLM-CondF measures in the range 0 – 2000 µS (fresh water).
PLM-USB	USB interface for connection to a PC. After installation of this card an additional COM port will be available in addition to the onboard RS232 interface (COM1). If necessary, test the settings under <i>Remote control</i> and <i>Communication</i>.
PLM-CondS-Redox und PLM-CondF-Redox	A galvanically isolated input for a conductivity electrode and a galvanically isolated input for a redox electrode. PLM-CondS-Redox measures in the range 0 – 100 mS (salt water), PLM-CondF-Redox measures in the range 0 – 2000 µS (fresh water).
PLM-pH-Temp	A galvanically isolated input for a pH electrode and an input for an temperature probe.
PLM-CondS-pH und PLM-CondF-pH	A galvanically isolated input for a conductivity electrode and a galvanically isolated input for a pH electrode. PLM-CondS-Redox measures in the range 0 – 100 mS (salt water), PLM-CondF-Redox measures in the range 0 – 2000 µS

	(fresh water).
PLM-LAN and PLM-WLAN	Interface for LAN or WLAN
PLM-Humidity-Temp	An input for a combined air humidity and air temperature probe.
PLM-Oxygen	A galvanically isolated input for a oxygen probe.
PLM-pH-Redox	A galvanically isolated input for a pH electrode and a galvanically isolated input for a redox electrode.
PLM-DALI	A galvanically isolated DALI-interface.

If you installed a measurement card: Don't forget configuration and calibration!

The insertion of a module requires great care! Make sure that

- the aquarium computer is first disconnected from the line voltage supply (unplugged);
- there is no damage to the electronics from static electricity (earth/discharge yourself, use an earthed workbench);
- the housing is treated with care.

4.2 Opening the housing

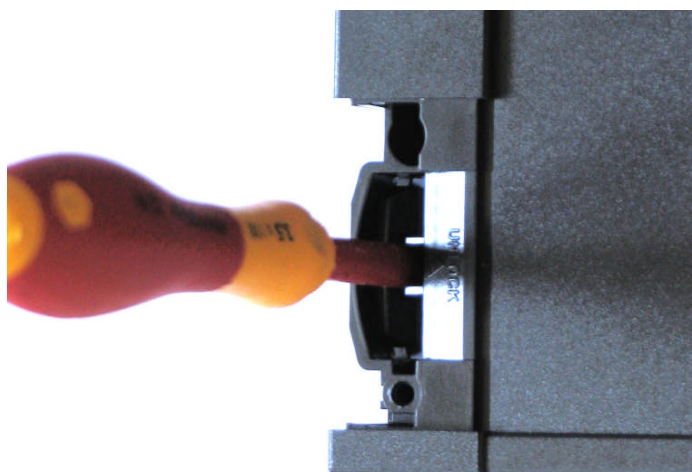
Before you can insert a module it is necessary to open the housing.

Warning: All the steps described below should be performed gently, without resorting to force!

First remove the 8 cover caps (4 above, 4 below). There is a small opening in the side of each cover cap. Insert the blade of a small standard screwdriver into this to free the cap. See also the illustration below:



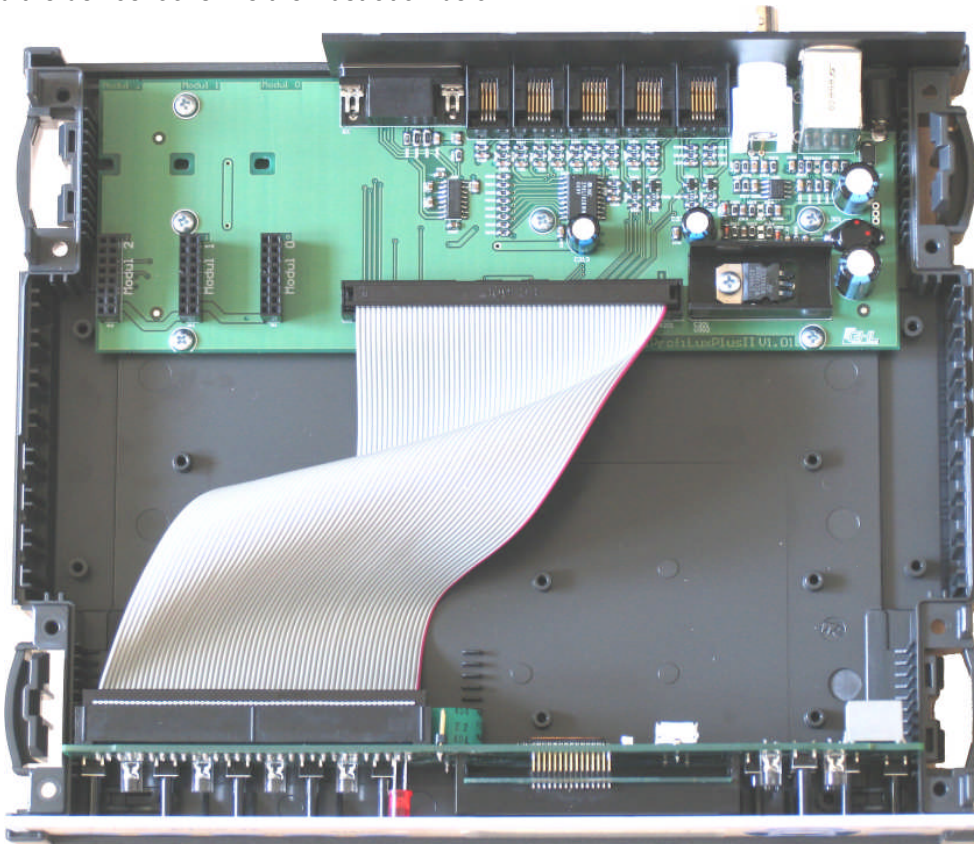
After all the cover caps have been removed the upper half of the housing is removed. The join between the two halves of the housing is only a push-fit, and the housing can be opened by releasing the 4 spring-clips. This is most easily done by pushing a round, approximately 5mm diameter object into the housing closures from above. In the illustration below a screwdriver is being used.



Tip: The job is particularly easy if all 4 housing closures (or at least 2 on one side) are released simultaneously.

Slowly and carefully lift off the upper cover of the housing, making sure that the front plate relines voltage in the lower part of the housing!

Once opened the device looks like the illustration below:



The sockets into which the modules are plugged can be seen top left.

4.3 Inserting a module

The new module can be plugged into the socket of choice. When plugging in make sure that all the contact pins of the module are inserted into the relevant holes of the socket. None of the contact pins must be “left out”! It should be possible to plug in gently, without using force!

4.4 Closing the housing

Now the housing can be closed again.

First carefully replace the upper half of the housing, making sure that the front plate and the rear plates slide cleanly into the slots provided, if necessary adjusting their position slightly. Again do not use force!

Finally replace the 8 cover caps.

4.5 Commissioning

Now the main supply can be reconnected. ProfiLux (Plus) II recognises new hardware automatically and after a successful system test will make the new functions available.

After switching on the device will display the message *Examine hardware* If a card is found the ProfiLux will indicate this. The number of the slot (socket) in which the module was found, the module name, and if appropriate the firmware version of the module, will be displayed.

5 Special functions

5.1 Networking

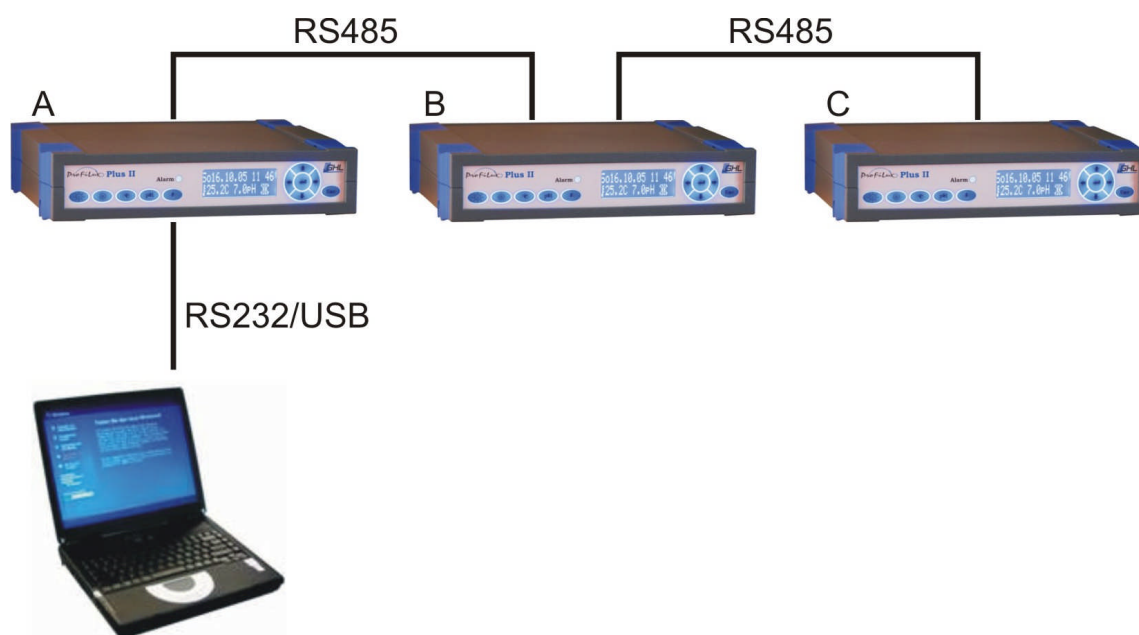
Several ProfiLux aquarium computers can be networked together (see also **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.** and 3.17.7 *Communication*). Networking offers the following options:

- Each aquarium computer within a network can be remotely controlled by another.
- All the aquarium computers in the same network can be controlled by a PC (e.g. with the PC operation program *ProfiLuxControl II*) via a single connection.
- One aquarium computer (ideally one fitted with a DCF receiver) can be configured as the time source for the other ProfiLux computers in the network.

5.1.1 Requirements for a network

- Each ProfiLux must be equipped with a networking interface (e.g. with the interface card PLM-RS485), and these interfaces must all have the same transmission settings.
- Each ProfiLux must be assigned its own separate address

5.1.2 Example configuration



The three aquarium computers can be connected together using RS485 interface cables. The router function is activated in ProfiLux A, the PC can communicate with all three via RS232/USB from A. C is the time source, and the addresses are set to 1 to 3.

5.2 Programmable Logic

ProfiLux offers manifold setting options for nearly any application. However there might be situations the user needs specific functions which are not covered by the standard functions of ProfiLux. Example: During feeding pause the heater should be switched off, otherwise it should be switched according to the temperature.

In this case the user can create a function to switch the socket in question using the programmable logic. Since the usage of the programmable logic is more complex than the standard functions of the ProfiLux and they can only be used reasonably if the user has some basic knowledge about Boolean logic these settings cannot be made on the ProfiLux directly; these settings must be done in the PC program *ProfiLuxControl II*, version 4.00 upwards. This program and further information regarding programmable logic can be found at our website.

6 Additional accessories

6.1 ProFiLux View

The compact ProFiLux View external display unit can be used to display all the data from the ProFiLux in an additional place. This can be useful when, for example, the aquarium computer is installed in a cabinet and its display is not readily visible. A further advantage over the associated display of the ProFiLux is that more data can be displayed simultaneously.

ProFiLux View is connected via the serial interface of the ProFiLux and also receives its power supply from the computer – an additional power supply is not required.



The day of the week, date, and time of day are displayed on the top line. The remaining three lines show the sets of data selected under 3.16.6 *Display*. If more than three sets of data are selected for display then they will be displayed in succession.

The switching status of the switchable ports 1 to 8 is shown at the right-hand side of the display. If a number is shown this denotes that the switchable socket in question is currently active. The absence of a number indicates that the relevant switchable socket is not active.

For ProFiLux View are optional mounting parts available; e.g. gooseneck mount with sucker or with screws.

Note: ProFiLux View should be connected only when ProFiLux (Plus) II is disconnected from the main supply! Hence first unplug the main supply lead of the ProFiLux, then connect ProFiLux View, and finally reconnect the main supply lead.

7 Guarantee

The device is guaranteed for two years from the date of purchase. The guarantee applies to defects both in the materials used and arising from errors during manufacture.

We guarantee that the products supplied conform to the specifications cited and that the products are free of material and/or manufacturing defects. The accuracy of the operating instructions is not guaranteed. No liability is accepted for injury, loss, or damage of any type resulting from incorrect operation or from unsuitable siting of the aquarium computer and/or accessories. In addition the guarantee does not cover injury, loss, or damage arising from incorrect connection. All liability for direct or indirect injury, loss, or damage, consequential loss, and third party liability is excluded insofar as the law allows. There is no guarantee that our product package will meet the requirements of the purchaser. The guarantee will be invalidated in the event that the original product is damaged or modified.

8 Additional information

8.1 Help and information

Help and information is available in the first instance from your dealer. In the event that you have internet access then you can also find tips and suggestions on our website at www.aquariumcomputer.com. You will also find links to various forums on our website.

8.2 Firmware updates

The firmware for our ProFiLux II aquarium computer is constantly being developed further. If you wish to use new functions or modules not supported by your current firmware you can program your aquarium computer with the latest firmware.

There are two ways of doing this:

- Send the computer to your dealer or to GHL and have it re-programmed (a charge will be made for this).
- Perform the update yourself. For this you will require the latest firmware and the PC program *ProFiLuxControl II*, both downloadable free of charge from our website, as well as our serial interface cable. Further information can be found under *10.7 Firmware update*.

9 Technical Data

Input voltage	12V DC
Current	400 mA
pH metering	BNC input for pH electrode, accuracy pH 0.1, metering range pH 3 to pH 11
Temperature metering	Mini DIN socket for the temperature sensor supplied, accuracy 0.1 °C, metering range 15 °C to 38 °C
Control of powerbar	2 x 4 switchable channels
Control of dimmable lamps	2 x 2 dimming channels, each with a 1V-10V analogue output for light intensity regulation and switching
Dimensions	Height x Width x Depth = 58mm x 240mm x 198mm
PC interface	RS232, with additional signals
Module sockets	1 / 3 (Plus)

10 The PC Program

10.1 Requirements

From firmware version 4.06 upwards the use of the *ProfiLuxControl II* PC operation program, version 4.06 upwards, is required. The latest version can be downloaded from our website.

It can be run under the Microsoft Windows 2000®, Windows XP® and Windows Vista® operating systems.

The connection to ProfiLux can be established with these PC interfaces:

- RS232 interface
In the event that no RS232 interface is present a USB-RS232 converter can be used instead.
- USB
An USB-connection can be established via our card PLM-USB.
- LAN/WLAN
With the card PLM-LAN (or PLM-WLAN) a (cableless) connection to a network is possible.

Even if you have no ProfiLux connected, you can still inspect the functions of the program by activating the *Demo mode* option under the *Extras* menu.

10.2 General

By clicking on the *Load* button you can read off the ProfiLux settings and the program displays will be updated. By clicking on *Store* any settings configured using the program can be transmitted to the ProfiLux.

10.3 What you can and cannot do

Using the PC program you can effortlessly use the PC mouse and keyboard to configure all the settings normally input directly via the ProFiLux keys.

The following exceptions apply:

- Therapy program
- Sensor calibration
- Reminder confirmation

There are special windows for *Dimming Curves*, *Lighting scenarios*, and *Measurement data*.

The *Dimming Curves* window provides a graphic representation of the light intensity sequence throughout the period that any lights are active.

The *Lighting scenarios* window offers a quick and easy method of testing different combinations of light intensities in order to find the optimal lighting settings for your aquarium.

Under *Measurement data* you can configure the measurement data recording program and export data to a file, see also 10.6 *Measurement data*.

Another useful function, the loading and storing of settings, is explained in detail below.

10.4 Connecting ProFiLux and PC

Two steps must be performed before your ProFiLux can be operated in conjunction with a PC:

- The PC and ProFiLux must be connected via an interface cable, using the RS232 port and our ProFiLux-Ser cable
- The PC program must be installed

Always use the special ProFiLux interface cable to connect PC and ProFiLux.

Warning: It is not possible to use a standard RS232 extension cable, as our interface transmits additional signals!

By clicking on *Connect* the link between ProFiLux and PC is created. But first you must check whether the COM port of the PC is correctly set and reset it if necessary. In addition the transmission speed (= baud rate) of the PC (and of *ProFiLuxControl II*) and the connected ProFiLux must match, see 3.17.7

Communication. Furthermore the device address, which is set to 1 as standard, can be changed. In the event that the device address of the connected device is unknown, click on *Start search* – this will interrogate all addresses between 1 and 30 until a device answers.

Once the link has been successfully created *ProFiLuxControl II* will interrogate the connected aquarium computer and display all the settings applicable to the model and firmware version in question. The link can be broken again by clicking on *Break link*.

In the event that your PC doesn't have an RS232 interface it is possible to use a USB-RS232 converter or a card PLM-USB instead.

10.5 Storing and loading settings

The ProFiLux II aquarium computer offers a large number of settings options. Finding and configuring the optimal settings can be very time-consuming. Anyone who wishes to make sure his settings are securely stored, for example in order to reset them after a firmware update, can make use of the following functions in the program menu option *File*. The ability to load and store settings is also of interest to dealers setting up our aquarium computer for their customers: once settings have been arrived at for a particular type of aquarium they can be quickly and accurately replicated.

10.5.1 Storing settings

Either sensor data (= control settings and calibration data) or the settings for the connected ProFiLux (Plus) II are stored in a file (file extension *.par*).

So how does the extraction of the settings or sensor data from the ProFiLux work?

The PC program uses *Parameter definition files* (file extension *.def*) in order to establish what possible settings exist in and/or are to be extracted from the connected ProFiLux (Plus) II. These files can be found in the program directory of *ProFiLuxControl II*. The *Parameter definition file* appropriate to the relevant ProFiLux (Plus) II firmware version must already be in existence. For example, the relevant file for the ProFiLux Plus II firmware version 1.02 is named *ParaList_V102_ProfiluxPlusII.def*.

10.5.2 Loading settings

This deals with the loading of settings or sensor data from a file (file extension *.par*) and writing them to the ProFiLux (Plus) II. A warning is displayed in the event that the file originates from a ProFiLux (Plus) II with a different firmware version to that of the destination device. Settings originating from a device with an earlier firmware version than that of the destination device can be loaded without problem. There can, however, be problems in the reverse situation.

A message is displayed in the event that problems occur during the transmission of the settings to the ProFiLux (Plus) II. If the message is ignored then the transmission of the remaining settings continues.

If the device type (ProFiLux II or ProFiLux Plus II) is not compatible the process is halted completely.

During the loading of sensor data the series number is checked in addition. In the event that this doesn't match then only the control settings, but not the calibration data, are loaded. This prevents calibration data for another device being loaded (which would make no sense), but the remaining sensor data can be loaded.

Essentially all settings found in the file will be transmitted to the connected aquarium computer. In the event that only a part of the settings is to be transmitted, the file can be edited accordingly. This involves deleting the lines of the file containing settings that are not to be transmitted. These files can also be opened using a simple text editor.

10.6 Measurement data

The ProFiLux Plus II-aquarium computer can record measurement data, see also 3.16.7 *Measurement data*.

Using Analyse & Store all newly available measurement data can be read off from the ProFiLux and stored in a text file. In so doing ProFiLux Plus II notes the time the data were retrieved so that the same data aren't retrieved more than once. Before the data storage is implemented you have the option of specifying a choice of format for the data export. The standard settings are well suited to the subsequent import of the file into Microsoft Excel®.

In the event that an existing file is selected for storing the new data, the latter will be appended to the data already present, as long as the existing file contains compatible information. These text files can subsequently be opened using Microsoft Excel® in order to process the data.

10.7 Firmware updates

Please read this chapter carefully and in full before performing a firmware update!

WARNING

A firmware update is an invasive procedure on the device and is undertaken entirely on the responsibility of the person who performs the update. GHL accepts no liability for any problems that may occur! You can have a guaranteed update performed by GHL or a certified partner (a charge will be made for this).

During a firmware update the settings you have made and the sensor data (including calibration data) will be reset to the factory defaults! For this reason before performing a firmware update you should always store these data (under the *File* menu, *Store settings* and *File, Store sensor data*)! In addition we recommend that the calibration data for the individual sensors and all operation hour meters are noted. After the firmware update the stored data can be loaded back into the ProFiLux (*File* menu, *Load*). You should then monitor the values measured in order to check their plausibility.

IMPORTANT

ProFiLux recognizes if all settings had been set to defaults. For security reasons ProFiLux will deactivate all automatic functions in this case. To reactivate all controls you have to select *Activate controls* (with **arrow down** or **arrow up** in the main menu) and confirm with **RETURN**. Alternatively you can reactivate controls with *ProFiLuxControl II*. Of course you should do this after ensuring all settings are OK!

New firmware can be installed on the aquarium computer via the serial interface using *ProFiLuxControl II*.

The firmware can be downloaded from our website, but make sure you obtain the correct version (there are different versions for ProFiLux II and ProFiLux Plus II up to firmware version 2.03, from 3.00 beginning all models have same firmware)!

If the aquarium computer already has firmware version 1.08 or higher then the update can also be performed via the USB connection provided a PLM-USB expansion card is fitted. Using all earlier firmware versions an update is possible only via the RS232 interface!

Unlike in the case of firmware updates of earlier ProFiLux models it is **not** necessary to open the housing and plug in a jumper!

Click on *Download* in the *File* menu. You will then be asked to select the file containing the new firmware. Make sure you select only the firmware file appropriate to your ProFiLux model! After successfully analysing the file the aquarium computer will display the question *Download now?*. After answering *Yes* you should then confirm the message displayed by *ProFiLuxControl II* with *OK*. The download will then begin and the firmware will be updated. When the process is completed your ProFiLux (Plus) II will be restarted.

Important note: In order to install a new firmware version *ProFiLuxControl II* must first delete the old firmware. If the subsequent firmware download then fails for any reason the device will no longer have any firmware! And it will no longer be possible to attempt a further firmware update with *ProFiLuxControl II*, as the aquarium computer will also be without firmware and unable to react to *ProFiLuxControl II* commands.

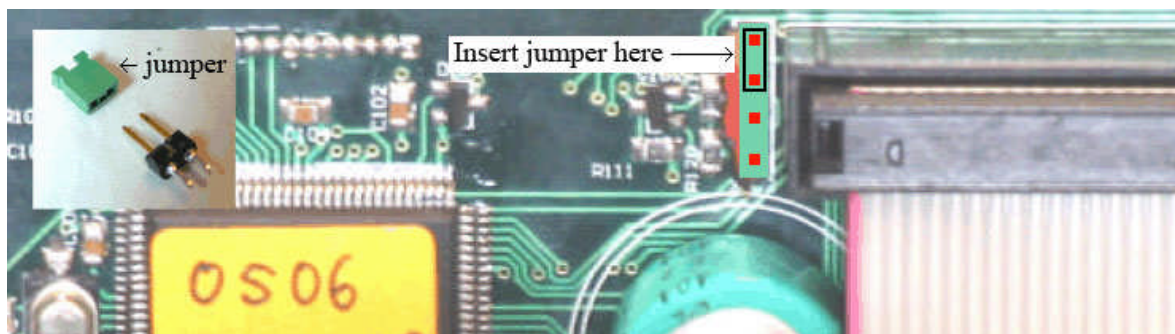
Hence it is absolutely essential to take note of the following during the download:

- Never interrupt the firmware download (e.g. by exiting the program, shutting down Windows, turning off the PC...)!
- Never interrupt the main power supply!
- Never disconnect the link to the PC!

In the event that something does nevertheless go wrong during the download (e.g. because there was a power outage in your area or your little girl tripped over the cable) you can repeat the download using the Fujitsu utility program also downloadable from our website. This will not be quite as easy as you will have to open the housing, but it does work!

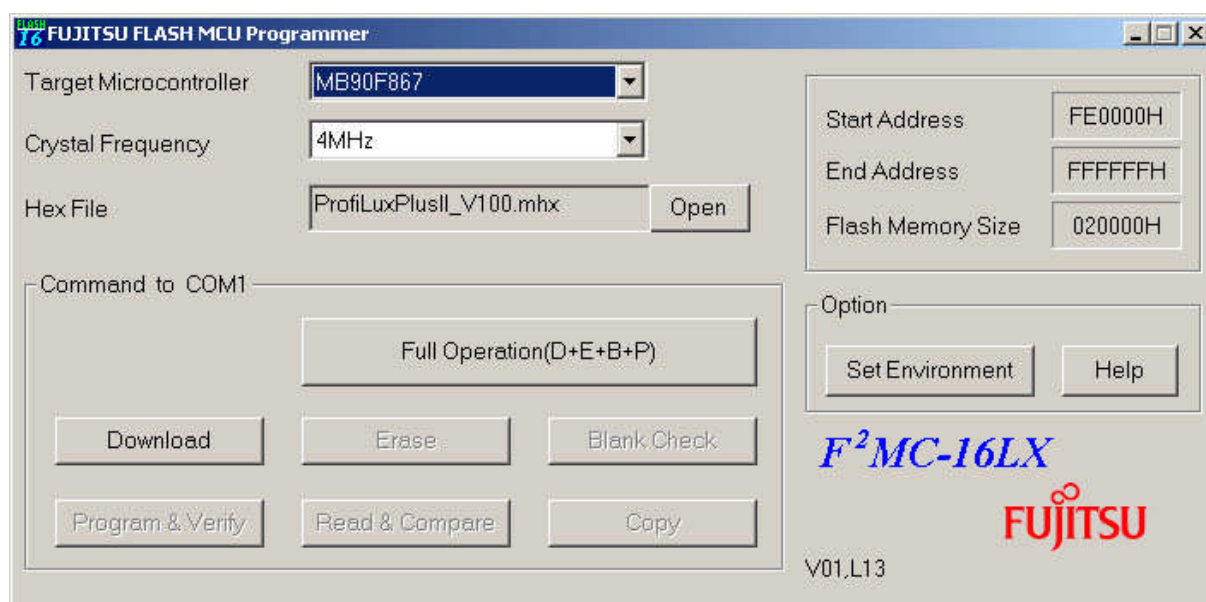
In the case that this is necessary, the following procedure should be executed:

- Download the file **FMC16LX.zip** and unpack the archived files it contains into a directory. No installation is required.
- It is now necessary to open the housing (first disconnect the main supply). Opening and closing the housing is described under *4 Hardware modules*.
- Fit a jumper. The contacts (a 4-pin male connector) to which the jumper must be attached, can be found on the front (upright positioned) plate, above left near to the large plug:



The jumper must be plugged such that the upper two contacts (pins 1 and 2) are short-closed.

- Connect the PC and ProFiLux (Plus) with the serial cable from GHL – no other cable can be used!
- Restore the main supply (plug in the main lead). Nothing will be shown on the display at present – ProFiLux (Plus) II is now in download mode.
- Run the program **flash.exe** from the directory created earlier. On starting the program the following dialogue will be displayed (possibly with different settings):



You must now set:

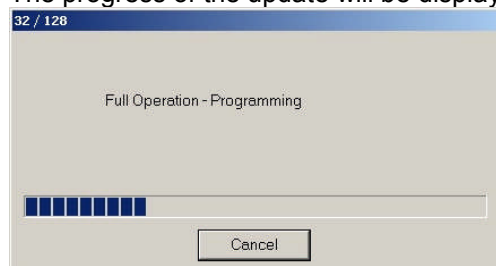
Target Microcontroller	MB90F867
Crystal Frequency	4MHz
Hex File	ProfiLuxII_Vxxx.mhx for ProfiLux II or ProfiLuxPlusII_Vxxx.mhx for ProfiLux Plus II (xxx is used here to represent the software version number). The correct file can be selected by clicking on Open .

If necessary the interface number (COM1 ... COM4) should be set under **Set Environment**.
When all the settings have been duly made the firmware update can be started by clicking on **Full Operation(D+E+B+P)**.

Next respond to the following message with **OK** (a reset will have already been performed):

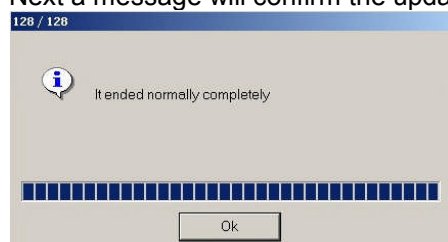


The progress of the update will be displayed as follows:



Warning: Under no circumstances click *Cancel* or interrupt the main supply at this stage!

Next a message will confirm the update has been successful. Again, confirm with **OK**.



- End the program.
- Disconnect the main supply again.
- Remove the jumper.
- Close the housing.
- Restore the power supply to the ProfiLux (Plus) II. The device should now display the Profilux model (ProfiLux II or ProfiLux Plus II) and the new firmware version number.

The firmware update is now complete.

It may happen that during the self-check process the device recognises incorrect settings data and loads the standard default settings as a result. In the event that the device doesn't automatically reset the settings to the default values, you should in any case load these ex-works settings and then reload your own previous settings, as there is no guarantee that the data storage will remain uncorrupted after a firmware update.

Additional notes regarding the update using FlashLX:

- If the download hasn't worked then first check the settings of the FlashLX program (Processor, Clock, File, and COM).
- Failure of the download can also result from the processor not being in download mode. In this case power up the device (with the jumper in place) immediately before the download (at the message "Please Reset...").
- A PC with an associated serial interface (COM) should be used for the programming. In most cases USB converters cannot be used for the download because of different timings, even when communication with our *ProfiLuxControl* program otherwise works without problem.

