Programming guide

for

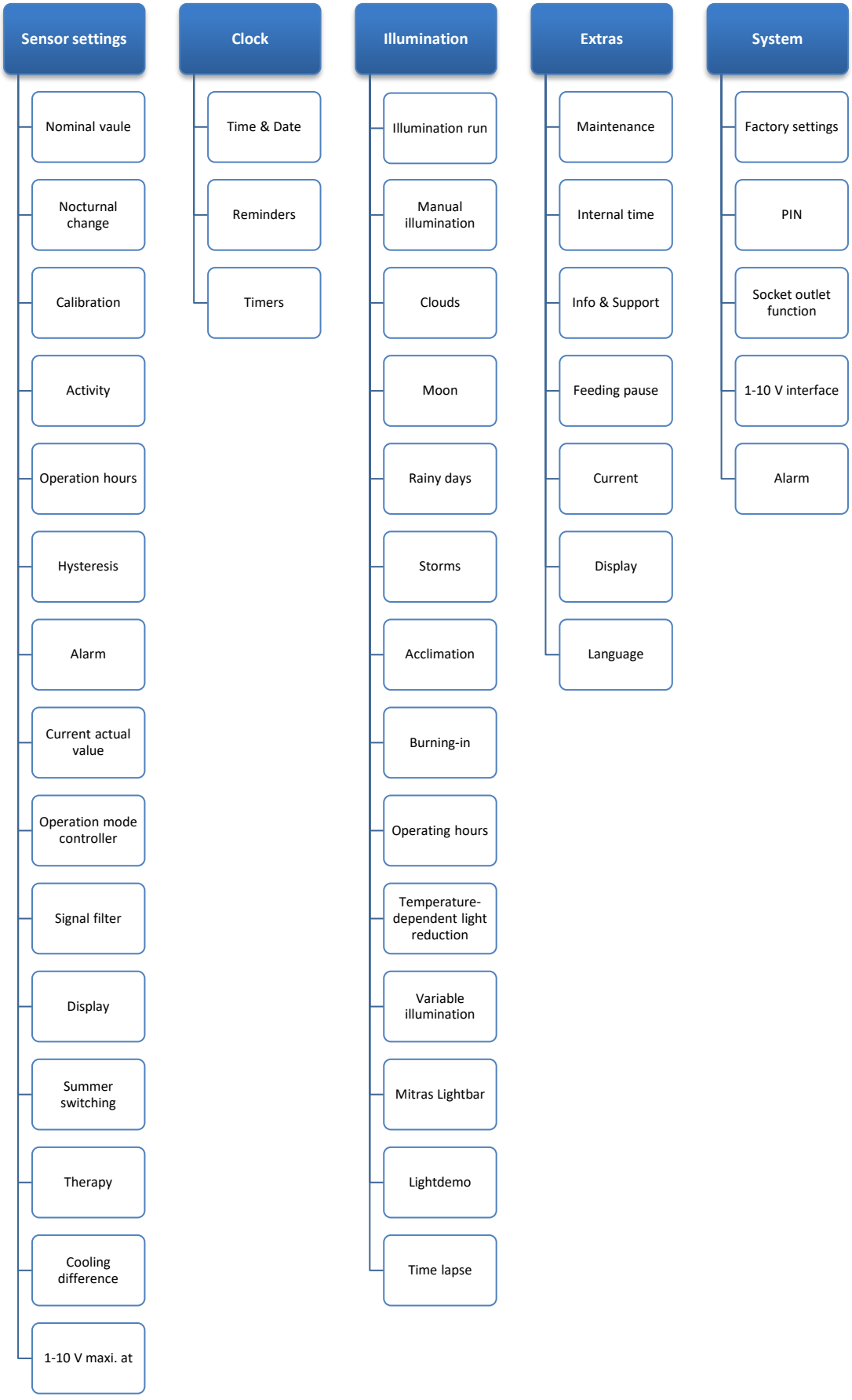
Aquarium computer, Pond computer and Terrarium computer

Models Light, Mini and Terra

Valid from firmware version 1.02

Contents

Below is an overview of the menu structure in *ProfiLux* when operating through the *ProfiLux* keypad:
(the structure in the PC-Software *GHL Control Center* is similar)



1 Preface

Please read these chapters thoroughly before you start to make settings. When you have understood the general operational concept, it will be easier for you to program the *ProfiLux* quickly and target-oriented.

This programming manual puts emphasis on the configuration via the keys at the *ProfiLux*, the operation via the PC-software *GHL Control Center* deviates in some points from this description. But the single settings have the same meaning at the device and also in the PC-Software.

The operation via the keys, the indications on the display of the *ProfiLux* as well as the connection of peripheral equipment (sensors, powerbars, lamps, etc.) are described in the separate operating manual of your *ProfiLux*-model, please read them also thoroughly.

This programming guide is valid for these *ProfiLux*-controllers:

- *ProfiLux Light*
- *ProfiLux Mini*
- *ProfiLux Terra*

The availability of certain functions and setting options described below depends on the ProfiLux model.

1.1 Safety hints!

Never leave your aquarium, terrarium or pond without supervision for a longer time!
The *ProfiLux*-system is able to support you in many tasks and can indicate error states, but it can't replace a regularly personal supervision and control on-site!
The maximum time span without personal supervision depends on how long your aquarium, terrarium or pond can endure an error state without getting damaged significantly.

Always keep in mind that every technology can fail and that malfunctions never can be excluded!
A power-cut, inappropriate settings, a damage (e.g. caused by water or overvoltage) or just an unexpected operating condition can lead to fatal damages!

The manufacturer refuses any liability for (consequential) damages or losses related to the use of the *ProfiLux* system as far as legally permissible!

1.2 Preface regarding operational concept

The operational concept of all *ProfiLux*-computers requires that you differentiate exactly between 2 groups of settings:

- Setting of functions
  e.g. settings such as pH-nominal value, light intensity run of a lamp or behavior of pumps belong here
- Setting of hardware
  e.g. the function of a switchable socket (shall this socket be assigned to an illumination, to a timer or to a temperature sensor) or the function of a 1 – 10 V-interface (shall this interface be assigned to an illumination or to a pump) belong here

This concept seems to be unfamiliar at a first glance, but it offers a maximum of flexibility. One of the advantages is that a function can be modified extensively independently from the here assigned hardware. This concept makes it possible that you can e.g. select another socket for switching your heater while the corresponding temperature settings remain unchanged.

As soon as you have taken this concept in, you will appreciate its advantages.

1.3 Examples for settings

Below are mentioned some typical examples for settings.

1.3.1 How do I set the temperature control?

1. Setting of the function: Set the required nominal value, see *2.1 Nominal value*.
2. Setting of the hardware: Set which switchable output (socket) is responsible for switching the main heater, the ground heater and the cooling (if existing), see *6.3 Switching output*.

1.3.2 How do I set the illumination?

1. Setting of the function: Set the illumination run according to your wishes, see *4.1 Illumination run*.
2. Setting of the hardware: Set which switching output (for non-dimmable lamps), see *6.3 Switching output*, or which 1 – 10 V-interface (for dimmable lamps), see *6.4 1-10 V* interface , shall react to this illumination run.

1.3.3 How do I set the current pump control?

1. Setting of the function: Set the pump groups and the current pumps, see *5.5 Current*.
2. Setting of the hardware: Set which switching output (for pumps that are not speed-controlled), see *6.3 Switching output*, or which 1 – 10 V-interfaces (for speed-controlled pumps), see *6.4 1-10 V* interface, shall react to the pump(s).

1.3.4 How do I set the timer activities?

1. Setting of the function: Set first the required timer, see *3.3 Timer*.
2. Setting of the hardware: Set which switching output (socket) shall be controlled by this timer, see *6.3 Switching output*.

Summary: It is recommended to set first the function (illumination run, timer etc.) and after that the hardware (e.g. switching output and 1 – 10 V-interface)!

2 Sensor settings

Here you can make the settings which affect the sensors (except level sensors – their settings can be found beneath).

First select the sensor whose settings you would like to change. If you have connected several sensors of the same type, then the numbering is as follows: The firmly built-in connections in *ProfiLux* have the lowest number, the numbering of additional connections on extension cards increases with the number of the slot in which the cards are plugged in.

Attention!	The sensors for pH, conductivity, redox and oxygen must be calibrated before the first use and thereafter regularly (all 2 – 4 weeks)! Check in any case if all sensors show plausible values!

In the sensor settings you can choose among the following options:

2.1 Nominal value

Here you can set the nominal value (the value to which it shall be regulated). The nominal value and the current value (actual value) determine if it is regulated upwards or downwards.

Hint	Control downwards: If the nominal value is under-run, then the control downwards is switched off, if the nominal value is exceeded by more as a half hysteresis (see *2.6 Hysteresis*), the control downwards is switched on again. Control upwards: If the current value exceeds the nominal value, then the control upwards is switched off, if the nominal value is under-run by more as a half hysteresis, then the control upwards is switched on again.

Overview of the setting options for the nominal value:

Sensor type	Minimum	Maximum	Standard	Resolution
pH	4.5	9.5	7.0	0.1
Temperature	1.0 °C	36.0 °C	26.0 °C	0.1 °C
Humidity	2.0%	98.0%	60.0%	0.1%
Air temperature	0.0 °C	50.0 °C	28.0 °C	0.1 °C

Hint	When the nominal value is adapted, then, due to safety reasons, a possibly set nocturnal change is deactivated! This must be activated again afterwards, if necessary!

Hints for the temperature control	The heat dissipation of the illumination and the temperature outside can have an effect on the water temperature. If there is no possibility of cooling available, then it is possible that the nominal temperature is exceeded. Depending on the difference of the desired and the current temperature, the heaters resp. the cooling are switched. Here, the following states can occur: Heater and bottom heater on / Only bottom heater on / Everything off / Only cooling on *ProfiLux* is programmed in a way that the bottom heater takes precedence over the heater. This enables an optimal heating of the substrate. The heater is then switched additionally if the bottom heater alone is not sufficient anymore.

2.2 Nocturnal change

With this setting, you can determine if the value to which it shall be regulated shall be changed at night, as default setting, the nocturnal change is switched off. If you have activated the nocturnal change with `Yes`, then you can set afterwards the value by which the value shall be changed at night.

Overview of setting options for the *nocturnal change*:

Sensor type	Minimum	Maximum	Resolution
pH	-1.0	1.0	0.1
Temperature	-6.0 °C	-0.1 °C	0.1 °C
Humidity	1.0%	50.0%	0.1%
Air temperature	-30.0 °C	-0.5 °C	0.1 °C

Hint	Nocturnal nominal value = nominal value + nocturnal change

2.3 Calibration

This function serves for the calibration of the pH-sensor. All other sensors need not (and cannot) be calibrated.

Only if *ProfiLux* has been calibrated with the connected pH-sensor, correct values can be determined. The calibration is always necessary for new sensors. Also due to the aging process of a sensor, the calibration should be repeated from time to time (all 2 – 4 weeks). Please pay attention to the instructions of the sensor manufacturer. Before the sensor is dipped into a calibration fluid, the sensor has to be always dried carefully (blow out, shake, dry tissue)!

First the *Calibration tolerance* has to be entered (between 1 and 3) which is taken as a basis for the calibration. For old sensors it can occur that the measured value doesn't sufficiently stabilize and a calibration is not possible. Under certain circumstances, through an increase of the calibration tolerance it is possible to adjust this sensor although, of course at the cost of the accuracy of measurement. In principle, calibration processes should be carried out with the smallest possible calibration tolerance, this is normally 1.

Afterwards, for certain sensors you have the possibility to change the values to which it shall be calibrated.

Overview of the calibration values:

Sensor type	Calibration possible	Calibration values adjustable	Min. calibration value 1	Max. calibration value 1	Min. calibration value 2	Max. calibration value 2
pH	yes	yes	3.5	7.5	5.5	10.0

Now the calibration process itself follows.

First of all, you are asked to dip the pH-sensor into a calibration fluid with the first calibration value. A subsequent pressing of ***RETURN*** starts the measurement process. After completion of the measurement you are asked to repeat the same procedure with a calibration fluid with the second calibration value. Also here the measurement process has to be started with ***RETURN***.

When the calibration process has ended, you are asked if the data shall be stored. If no errors have occurred, you have to confirm here with *Yes*.

After saving the calibration data the calibration must be checked without exception!
Check on both calibration points if the correct values are displayed, therefore Immerse the sensor afterwards into both calibration fluids.

Use the sensor for controlling tasks only when the correct function and calibration have been proved without any doubts!

2.4 Activity

Here you can set if the sensor and the herewith related measurement recording and regulation shall be active (standard: *Yes*). If you set *No* here, then the regulation and sensor monitoring switches off and all switchable sockets connected with this sensor are deactivated. If this input is not used you should deactivate it, otherwise *ProfiLux* may assume a sensor defect and indicate an alarm. A deactivated sensor is displayed with *---* in the display.

2.5 Operation hours

In order to know how long a sensor has already been in use, there is a belonging operation hour meter. The operation hours are recorded cyclically every 1 h in the non-volatile storage. Through this, it is guaranteed that also in case of a power failure the operation hours are kept.

After the selection of the menu item *Operation hours* the operation hours of the sensor are displayed. After a few seconds have elapsed or a key has been pressed you are asked if the operation hour meter shall be *Reset?* A confirmation with *Yes* resets the operation hour meter to 0 h. This should of course only be done if the sensor is changed.

2.6 Hysteresis

The so-called hysteresis defines the interval between the switching points and is necessary to reduce the switching frequency. The here adjustable hysteresis covers the interval from the switch-on of the socket *Control downward* to the switch-on of the socket *Control upward* of the corresponding sensor.

For temperature sensors the here adjustable hysteresis covers the interval from the switch-on of the bottom heater up to the switch-off of the (main) heater, the switch-on of the cooler lies outside of the hysteresis so that the operation of bottom heater, heater and cooler at the same time is possible (see hint below).

The factory-provided hysteresis setting has normally not to be changed. A reduction of the hysteresis makes then sense if the regulation accuracy shall be increased. But through this, also the switching frequency is increased.

Example with a pH-sensor

Nominal value = 7.0 and hysteresis = 0.4

The downwards-socket switches on at 7.2 and off again at 7.0, the upwards-socket switches on at 6.8 and off again at 7.0.

You can recognize that the regulation oscillates around 7.1 resp. 6.9 and not exactly around the set nominal value (7.0). This is necessary to enable a use of the upwards- and downwards-regulation at the same time.

Overview of the setting options for the hysteresis:

Sensor type	Minimum	Maximum	Standard	Resolution
pH	0.05	1.00	0.30	0.01
Temperature	0.15 °C	2.00 °C	0.20 °C	0.01 °C
Humidity	0.2%	15.0%	2.0%	0.1%
Air temperature	0.2 °C	3.0 °C	0.5 °C	0.1 °C

Hint for temperature sensors

It depends also on the set hysteresis, when the cooling gets active. The switch-on point of the cooling depends furthermore on the cooling difference (see *2.14 Cooling difference) a*nd can be calculated as follows:

T = Nominal temperature + 5/6 * hysteresis + cooling difference

for a hysteresis of 0.2 °C results this: T = Nominal temperature + 0.167 °C + cooling difference.

2.7 Alarm

ProfiLux can monitor the current measured value of a sensor and in case of a too big deviation can react in different ways.

First you have to set if the alarm shall be enabled. If the alarm has been activated then the `Maximum deviation` of the actual value from the nominal value has to be entered.

Furthermore it can be set if in case of an alarm, the control shall be shut off: `Shut-off control?`

After the activation of the alarm, the corresponding actual value is compared permanently with the nominal value. If the deviation (exceeding or undercut) is bigger than set under `Maximum deviation`, an alarm is triggered. During the comparison of nominal with actual value, the *hysteresis* as well as the possible *nocturnal change* are automatically considered, for temperature sensors furthermore the *cooling difference* is considered.

During an alarm the red alarm-LED blinks and the buzzer is activated depending on the set mode (see *6.5 Alarm*). Furthermore a switchable socket can be programmed in a way that it is switched on in case of an alarm.

If the controller shut-off has been set for the alarm case, then in case of an alarm immediately all sockets are deactivated which are involved in the regulation of this sensor! The alarm settings should be made with highest caution. It has to be absolutely avoided that the alarm limits are exceeded during the normal operation!

Overview of the setting options for alarm limits:

Sensor type	Minimum	Maximum	Resolution
pH	0.5	3.0	0.1

Temperature	0.5 °C	5.0 °C	0.1 °C
Humidity	1.0%	20.0%	0.1%
Air temperature	1.0 °C	15.0 °C	0.1 °C

Example for the calculation of the lower and upper temperature alarm limit	Nominal value 26.0 °C, nocturnal change by -2 °C active, overall hysteresis 0.2 °C, maximum deviation 1.5 °C, cooling difference 2.0 °C, the outcome of this is: Lower limit = 26.0 °C – 2.0 °C – ½ * 0.2 °C – 1.5 °C = 22.4 °C Upper limit = 26.0 °C + 5/6 * 0.2 °C + 1.5 °C + 2.0 °C = 27.7 °C (5/6 because of the upper switching point of the cooling, see also *2.6 Hysteresis*)

Hint	In the case *ProfiLux* is indicating an indefinable alarm, then you should check if all unused sensor inputs are deactivated, see *2.4 Activity.*

2.8 Current actual value

Here the current actual value is displayed. The display is terminated with pressing any key.

2.9 Operation mode controller

You can set how the regulation shall work. For most of the cases the standard setting *Twoposition controller* is absolutely sufficient and therefore doesn't have to be changed. For some special cases the other operation modes suit to optimize the controlling behavior. The following operation modes can be chosen:

Twoposition controller
This is the common operation mode. At two switching points which are defined through nominal value and hysteresis, a belonging socket is switched on resp. off. See here also *2.6 Hysteresis*.

Pulse/Pause fixed
If the actual value differs from the nominal value by a half hysteresis, then the belonging switchable socket is switched on for an adjustable time (*Pulse duration*). After expiry of the *pulse duration* the socket is switched off again and remains off for at least the set *Pause duration*. After expiry of the *Pause duration*, the socket can be switched on again by the regulation if the actual value differs again (or still) from the nominal value by a half hysteresis, the switching cycle (pulse and pause) starts again.

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

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

For these operation modes you have to set then additionally:

Pulse duration
For this duration the corresponding socket is switched on (at the maximum). You can set a pulse duration between 1 s and 1 h.

Pause duration
This is the (maximum) time until the regulation can switch on again the belonging socket. You can set a pause duration between 1 s and 1 h.

The operation modes *Pulse/Pause fixed*, *Pulse variable* and *Pause variable* make then sense if the measured value reacts only slow and time-delayed to the regulation measures or if substances shall be added only in little doses.

Examples	pH-control: Feeding of acid into a pond to lower the pH-value Temperature control: Heating of the technical tank (temperature in the main tank follows time-delayed)

2.10 Signal filter

Here you can set how intensely the measuring signals shall be filtered.

Permitted values are in the range from 1 (maximum filtering) to 10 (minimum filtering), standard is 5 (average filtering). The stronger the filtering the more the display of the value is delayed. If the display of the measured value fluctuates a lot (e.g. because of an electromagnetic interference or because the measured value changes indeed very quickly), a stronger filtering makes sense.

2.11 Display

You can set for certain sensors how the measured value is displayed.

Overview of the display options:

Sensor type	Standard display	Display 2	Display 3
pH	pH	---	---
Temperature	°C (Celsius)	°F (Fahrenheit)	---
Humidity	% Rel. humidity	---	---
Air temperature	°C (Celsius)	°F (Fahrenheit)	---

Hint	Settings have to be made always independently from this in the standard display (e.g. in °C).

2.12 Summer switching

(only for temperature sensor)

With this you activate the summer switching and adjust it to your needs. As already mentioned before, it is possible that the water temperature exceeds the nominal temperature. In this case the bottom heater would remain switched off and there would be no circulation in the substrate.

Through the activation of the summer switching, the bottom heater is operated in a way that the water temperature is not substantially additionally increased. The summer switching is switched off as default setting.

After you have activated the summer switching with *Yes*, you can set the *Intensity* of the summer switching (5-30). This number corresponds to the turn-on time of the bottom heater in minutes for a temperature exceeding of 1 °C. The turn-on time is calculated by the computer depending on the temperature exceeding. For a lower temperature undercut, the turn-on time is increased. For an exceeding by more than 3 °C, the bottom heater will remain off in any case. The settings of the nocturnal change are considered. This intelligent and elaborate process has the advantage that you always achieve an optimal substrate circulation adapted exactly to your tank!

2.13 Therapy

(only for temperature sensor)

In case of a fish disease it can be useful to change the water temperature for a certain time. With the activation of the function `Therapy` for the set time (3 - 21 days) the temperature is changed by the requested value (decrease by 5 °C up to increase by 5 °C adjustable). The temperature change at the beginning and at the end of the therapy is effected gently (each within a day). If you have set an upper temperature limit for the heater due to safety reasons, you have to adjust this if necessary for the temperature increase.

2.14 Cooling difference

(only for temperature sensor)

If the cooling shall not get active within the usual regulation (adherence of the nominal temperature considering the hysteresis), but only delayed, then you can set with the `Cooling difference` to which extend the temperature has to exceed the nominal temperature until the cooling gets active. Adjustable are values between 0.0 °C (no delay, cooling gets active immediately in case of a nominal temperature exceeding) and 5.0 °C (max. delay, cooling gets only active in case of an exceeding of the nominal temperature by 5.0 °C). The `Cooling difference` has also an effect on the alarm monitoring.

2.15 1-10 V maxi. at …

(only for temperature sensor)

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

3 Clock

Here all settings are made that are related to the time.

3.1 Time & Date

For the understanding it is important to know that there are two clocks running in the computer. One of these clocks reflects the actual ("our") clock time. This is also the time which can normally be seen on the display. Furthermore there is a second (internal) clock running in the device which controls the automatic processes like dimming, nocturnal decrease, timers etc. Both clocks are running usually identically, except in case of an alteration of the actual time (e.g. in case of the automatic or manual change winter time/summer time). Then the internal clock is not changed immediately but over the course of the set days. For a setting of e.g. 10 days, it will be 60:10 = 6 minutes per day.

You can optimize the accuracy of the clock by entering a `correction per day` (from -59s to 59s). With 0 s (default setting) the clock runs without correction, otherwise once per day the adjusted seconds are added (resp. subtracted).

Afterwards you have the possibility to define if the *ProfiLux* – clock shall change between normal time (MEZ) and summer time (MESZ). If this shall not be the case, then in your aquarium only the normal time will be valid (i.e. in summer the clock will go wrong by one hour, this makes possibly sense if you would like to avoid the clock change for your fishes and plants). If you would like a change, then you can set furthermore the number of days over which the time change is to be spread. The time can be changed manually by one hour, in this case the internal clock will be adjusted slowly within the set days. With this, you have the possibility to spread this one hour over several days and you will have a smooth clock change.

After this, you can set `Date` and `Time` manually. When storing the time you will also be asked if you would like to update the internal time (see above). If you confirm with `Yes`, the internal time is immediately set to the new time, otherwise the internal time will be adjusted smoothly as explained above. For the first setting of the time you should answer here with `Yes`, for a change of the clock due to summer time with `No`.

3.2 Reminder

The computer can remind you of activities that still have to be done. After expiry of a certain adjustable time (in days) you are reminded by a text that is indicated on the display, alternating with the standard display. The reminder is displayed until you mark it as done. If you have set a repeated reminder, the reminder will be displayed again after a new expiry of the time. An example for a reminder to be displayed repeatedly is the monthly change of the filter. A reminder that shall only be displayed once would for example be the time to let your fish breeding into your tank.

First the reminder memory has to be selected (1 - 4). If this reminder is currently ongoing, you can mark it as done, it will then no longer be displayed. Otherwise you will be asked next if this reminder shall be active. If you have activated this reminder with *Yes,* you have to set if you would like to be reminded repeatedly. Afterwards you have to enter in how many days you would like to be reminded. After setting the days please enter the text which shall remind you. After storing, *ProfiLux* displays as a confirmation when the next reminder will come about.

3.3 Timer

ProfiLux has 4 programmable timers. The switching outputs which shall react to the switching processes can be assigned as described under *6.3 Switching output*.

After the selection of the timer which you would like to program, the *Switching mode* needs to be set. You can choose among the following options:

Normal
This operational mode is used to program longer switching times (accuracy 1 minute).
The switching time is determined by entering the *Switch-on time* and the *Switch-off time*.

Short time
With this setting you can achieve short switching periods (1 s up to 300 s, accuracy 1 s). The switching time is defined through entering the *Switch-on time* and the *Duration*.

Event start
The timer starts a process like a feed pause. Here only the *Start time* has to be entered.

Cyclic
This mode allows very special switching sequences. Please note that this mode can only be selected and adjusted using our PC software!

In this mode the timer is alternately switched on resp. off after expiration of a certain waiting time.
The waiting time after which it is switched on is determined by a random generator within the limits of *minimum waiting time* and *maximum waiting time*.

If the waiting time shall always be the same, you have to enter the same value for both times. The waiting time after which it is switched off, is also determined through a *minimum waiting time* and a *maximum waiting time.*
A cycle consists of 1 to 4 pairs of switch-on and switch-off waiting times. After the last switch-off of the cycle, the cycle will start again. All waiting times can be set in the range from 1 s to 65535 s.

Example for a cycle with 2 switch-ons and switch-offs:

	min. wait time	max. wait time	result
switch on 1	10 s	20 s	after 10 to 20 seconds is switched on
switch off 1	60 s	60 s	after 60 seconds is switched off
switch on 2	300 s	1000 s	after 300 to 1000 seconds is switched on
switch off 2	1 s	30 s	after 1 to 30 seconds is switched off
cycle starts at the beginning again			

Thereafter you can enter the number of *Switching cycles per day* (0 up to 8; 0 means that this timer is not active).

After defining the *Switching cycles* you have to enter the *Day mode*:

Days of week
Here you have to set on which days of week the switching shall take place. A marked box means "Switching on this day of week active", a blank box means "inactive".

Interval of days
Here the number of days is set after which the switching cycle shall be repeated, 1 day means daily switching cycle. After this it has to be set in how many days the switching shall be started.

A timer can activate a feeding pause, see also *5.4 Feeding pause*.

4 Illumination

Under this menu item you will find all settings related to the illumination. *ProfiLux* can control 16 dimmable or non-dimmable lamps independently from each other. Lamps can be switched with our powerbar, dimmable lamps are furthermore controlled via the 1-10 V-interfaces.

Dimmable lamps

You can connect up to 2 dimmable light bars of *GHL* directly at the *ProfiLux* (using one of our splitters it can also be more than that). As an alternative, you can also connect our dimmable LED-Lamps, hanging lamps or other manufacturer's products and home-constructed units (connection via accessory *EVG-AP* or *LF-ABOX*). In total, they can have at maximum 4 independently dimmable lamps (lamp groups).

Dimmable lamps are connected at the L-ports (*L1L2* and *L3L4*). These ports dispose each of 2 1-10 V-interfaces and the corresponding shut-off signals. The interfaces *L1* up to *L4* are by default assigned to illuminations 1 to 4, see here also *6.4 1-10 V* interface.

Hints	In case of commonly dimmable light bars, *L1* (resp. *L3*, *L5*, etc.) controls by default both tubes of a light bar. Optionally, also commonly dimmable light bars are available which react to *L2* resp. *L4*. So it is possible to connect 4 commonly dimmable light bars with our splitters, which then react to all four 1-10 V-interfaces. You can program the run for each illumination separately. Through this, it is possible to achieve effects like sunrise or moonlight.

4.1 Illumination run

Here you have to select first which illumination shall be set. After selection of one of the eight illuminations you can set the type of the lamp, you can select *Dimmable* and *Non dimmable*.

Furthermore you are asked *Automatic on?*. If this shall not be the case, then this illumination is in the manual mode, otherwise the illumination run has to be defined subsequently.

Then you have to enter the *Number* of the *dimm-points* (for dimmable lamps) resp. of the *switch-times* (for non-dimmable lamps), for which you would like to set the light intensity (up to 12).

If it is a *dimmable* lamp then you have to set for each point of time:

Start – at this time the dimming process starts

Duration – the dimming process lasts as long as this, 5 to 480 minutes

Light intensity (0% - 100%) – Light intensity of the lamp at the end of the dimming process

Hint	The light intensity run between the single *dimm-points* is calculated automatically.

For a *non-dimmable* illumination you have to set for each point of time:

Switch on – at this time the lamp is switched on

Switch off – at this time the lamp is switched off

Finally you can also set which of the *Simulations* shall be active for this illumination. Mark *Rainy days*, *Clouds*, *Storms* and *Moon* correspondingly.

4.2 Manual illumination

This menu serves predominantly for test and diagnostic purposes. With the keys ***Left arrow*** and ***Right arrow*** you can select the illumination whose light intensity you would like to set, always 4 illuminations are displayed at the same time. With the keys ***Up arrow*** and ***Down arrow*** you can make the connected lamp brighter or darker, for non-dimmable lamps of course only 0% or 100% is possible.

With the key ***Sun*** the light intensity toggles between 0% and 100%.

On the left and the right next to the name of the selected illumination a symbol is displayed. The symbol has the following meaning:

Symbol	Meaning
↑	Only an upwards-dimming is possible, this is the case at 0%
↓	Only a downwards-dimming is possible, this is the case at 100%
↑↓	A dimming in both directions is possible.

You can end the manual setting with ***Esc***.

4.3 Clouds

ProfiLux can simulate passing clouds using a random generator. If a cloud passes, then all affected lamps are dimmed down for a short moment.

The *maximal waiting time* (0 s - 100 s) determines how long the maximal time between two clouds should be (with 0 s the cloud simulation is disabled).

Furthermore you can set the *minimal* and *maximal cloud duration* as well as the *maximal darkening* (10% - 95%). The random generator creates new clouds according to these parameters.

The cloud simulation works also with moon phase simulation at the same time and during a dimming process.

Please keep in mind that the cloud simulation has to be active for the desired illuminations, see *4.1 Illumination run*.

4.4 Moon

ProfiLux simulates the moon phases depending on the date. In reality the moon cycle is a very complicated issue. The periods from new moon to new moon vary, it is around 29.5 days on an average. Furthermore, the moon rising time, the distance to the earth and several other details are different every time. Also it is not the case that in case of half moon, the moon has 50% of its brightness. We reckon on 25%. The aim of our moon phase simulation is not to replicate these complicated processes in every detail. For us it was important to create a repeating succession of moon light intensities which illuminate the aquarium each evening a bit differently and which provides a certain rhythm which is to a large extent in accordance with nature. The moon phases are calculated in *ProfiLux* on the basis of the date and in a way that full moon and new moon always correspond to the actual (real) moon phase with a deviation of max. one day. We have also put emphasis on a simple operation that is easy to understand.

You can set from which point of time to which point the moon phase simulation is active. Please keep in mind that the moon phase simulation has to be active for the requested illuminations, see *4.1 Illumination run*.

For the selected illumination the following will happen during the set time period: the light intensity that a connected lamp has (defined by the set illumination run) is multiplied with the calculated moon phase brightness. The illumination run is though furthermore considered. For example at half moon (= 50% moon phase, results in 25% moon brightness) and a light intensity of 30% (defined by the illumination run) there will be a light intensity of 25% * 30% = 7.5%.

All illuminations, for which the moon phase simulation has not been activated, are not influenced and follow their usual illumination cycles. Outside the set simulation time no illumination is influenced by the moon phase simulation.

Through this method it is possible to operate a lamp during the day (outside the set simulation time) normally (no influence of the moon phase) and to link it in the evening (within the set simulation time) with the moon phase.

The *Start* and *End time* of the moon phase simulation should be selected in way that they include the nocturnal illumination interval of the affected illumination. If the illumination run of a lamp is e.g. programmed in a way that from 19:00 o'clock till 7:00 o'clock it shines as moon light, then also the moon light simulation shall be set from 19:00 o'clock till 7:00 o'clock.

The moon phase simulation works also during an activated cloud simulation and during a dimming process.

4.5 Rainy days

ProfiLux enables the programming of "rainy days". On a rainy day the light intensity is reduced by an adjustable value which can be helpful for avoiding algae.

You can set on which days of the week rainy days shall be simulated. Finally you can set the *Darkening* on a rainy day (0% - 100%).

The rainy day program considers also possible moon phase and cloud simulations as well as the corresponding illumination runs.

Please keep in mind that rainy day simulations must be active for the requested illuminations, see *4.1 Illumination run*.

4.6 Storms

ProfiLux can simulate a thunderstorm using special lamps with flash of *GHL* (e.g. *ProfiLux Simu*).

A storm leads to a slow reduction of light intensity. While it becomes more and more dark, the number of flashes increases. After the storm has reached its peak, the illumination is slowly increased up to normal light intensity, the flashes get less until the storm is finally over.

A storm can be started manually as often as requested or automatically up to 4 times a day. Furthermore there is the possibility to start storms at random.

In the menu Storms the storm parameters can be defined under *Settings*:

Darkening (0% - 100%) during a storm

Intensity (1 – 20) of the storm

Storms/day – so often there will be an automatic storm on one day (max. 4)

Days of week – only on these days of week there will be a storm

Start 1...4 – at this time the storm starts

Duration 1...4 – the storm lasts for this duration (1 to 60 minutes)

Random thunderstorm duration – if you would like to have storms at random then set here a duration (max. 60 minutes) for the random storm (if you enter here 0, then there will be no random storms).

Waiting time minimal and *maximal* – the random generator defines a waiting time within these limits (maximal 240 hours) until the next random storm is started.

In the menu Storms you can start a storm with *Manual start*. You have to enter here also the *Duration* (1 to 60 minutes). For the manually started storm, *Intensity* and *Darkening* out of *Settings* are used.

Please keep in mind that the storm simulation must be active for the requested illuminations, see *4.1 Illumination run*.

Hint	The signals necessary for a storm can only be produced by the onboard-1-10 V-interfaces (*L1* to *L4*). A „Storm lamp" should therefore not be connected at possibly existing additional 1-10 V-interfaces (e.g. extension card *PLM_2L4S*)!

4.7 Acclimation

The acclimation function offers an easy and comfortable option to vary the brightness of the illumination over some days automatically. This is very useful, especially when plants need to be adjusted to a new illumination or if new corals had been inserted.

After activating the acclimation these parameters can be set:

`start date` - the acclimation starts on this date

`start percent` - with this value all dimmable illuminations are multiplied at the begin of the acclimation

`end date` - the acclimation ends on this date

`end percent` - with this value all dimmable illuminations are multiplied at the end of the acclimation

During the acclimation a dimming factor will be calculated daily. The individual illumination curves are recalculated according to this factor.

Example: Start at 01/01/2015 with 50%, end at 01/03/2015 with 100%

All illumination channels are operated at this day (and before) with 50% of the normally set brightness, with 75% at the second day, with 100% at the last day (and also afterwards).

The start and end percentages can be adjusted as you like, this makes it possible to achieve an increase or a decrease within a certain time period.

Hint	The acclimation function can't be adjusted on the device itself at the moment, for this purpose *GHL Control Center* can be used

4.8 Burning-in

Fluorescent tubes need to be burned in before they can be used for dimming. *ProfiLux* offers a comfortable possibility to automate the burning-in. After the selection of the `Illumination`, at which the tube that has to be burned in is connected, the `Burning-in period` can be set between 0 h and 100 h. This illumination is operated then only with 0% or 100% until the operation hour meter (see also *4.9 Operating hours*) has reached the burning-in duration for this illumination (all dim settings from 1% are automatically output as 100%).

At 0%, it will furthermore be switched off again – the burning-in is made in stages. As default setting, the burning-in duration is set to 0 h, so the burning-in is deactivated.

4.9 Operating hours

Each illumination disposes of its own operation hour meter which keeps on running if the corresponding illumination is active (Light intensity higher than 0%). So you know at any time for how long the lamp is already in operation and can exchange it in time before the performance due to aging will be too low. The operation hour meter is also used by the burning-in program. The operating hours are every 1 h cyclically written into the non-volatile memory. So it is guaranteed that also in case of a power failure the operating hours are kept.

After selection of the menu item `Operating hours` the `Illumination` has to be selected. Afterwards the operating hours are displayed for this illumination. After expiry of some seconds or the pressing of a key you are asked with `Reset?` if the operation hour meter shall be reset. A confirmation with `Yes` resets the operating hour meter back to 0 h. This should of course only be made when the lamps are exchanged.

4.10 Temperature-dependent light reduction

With this, it is possible to reduce the illumination slowly (for dimmable lamps) or to switch it off (for non-dimmable lamps) depending on the exceeding of the nominal temperature.

When the reduced light intensity of dimmable lamps is calculated, then the current dimming run as well as possible simulations are considered. With the temperature-dependent light reduction you can avoid that a tank is additionally heated through the illumination - e.g. on hot summer days when also a possibly existing cooling is not able to provide a sufficient lowering of the temperature any more.

The following parameters can be set:

the determining `Temperature sensor`

the `Illuminations`, on which the temperature-dependent light reduction shall have an effect; e.g. LED-lamps can be omitted here since they emit nearly no heat at all

Temperature excess minimal – if the nominal temperature is exceeded by this value, then the reduction of the illumination intensity of the affected lamps begins, adjustable from 1 °C up to 5 °C – this setting is only relevant for dimmable lamps!

Temperature excess maximal – if the nominal temperature is exceeded by this value, then the affected illumination is completely switched off, adjustable from 2 °C to 10 °C, has to be at least 1 °C higher than the *Temperature excess minimal* – this setting is only relevant for dimmable lamps!

Shut off limit – if the nominal temperature is exceeded by this value, then the non-dimmable lamps are switched off. You can adjust a value between 1 °C and 10 °C. These lamps are only switched on again if the programming of the corresponding illumination run defines again a switch –on (lamp was switched off according to the programming, e.g. at night – and is switched on again, e.g. in the morning). A decrease of temperature itself doesn't lead to a new switch-on, this makes especially sense for gas discharge lamps, since they shouldn't be switched on and off again all the time. This setting is only relevant for non-dimmable lamps!

Example for dimmable lamp

Nominal temperature = 26.0 °C, min. temperature excess = 2.0 °C, max. temperature excess = 4.0 °C, this results in the following table

Actual temperature	Light reduction by	Actual temperature	Light reduction by
28.5 °C	25%	29.5 °C	75%
29.0 °C	50%	30.0 °C	100% (off)

4.11 Variable illumination

This function enables the using of different illumination runs for one lamp on different days of the week.

You can define 8 variable illumination programs. After selection of the program (1 to 8), for each day of the week (Monday to Sunday) you have to set which *illumination run* (1 to 8, see *4.1 Illumination run*) shall be used on *Monday* to *Sunday*.

Example

You would like to have for the illumination from Monday to Friday other settings than for Saturday and Sunday, so you need 2 different illumination runs.

First you set both illumination runs (e.g. illumination run 1 for Monday to Friday and illumination run 5 for Saturday and Sunday) according to your wishes.

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

Finally you choose the function *Variable Illumination 1* as function for the corresponding 1-10 V-interface (see *6.4 1-10 V interface*) resp. for the corresponding switchable socket (*see 6.3 Switching output*).

4.12 Mitras Lightbar

Here you can adjust the max. output power of the connected *Mitras Lightbar* LED lights.

4.13 Lightdemo

The *lightdemo* is used for demonstration purposes. After selecting the number of demo channels the *lightdemo* will be activated and the chosen illumination channels will be dimmed up and down in turn.

With the keys the *lightdemo* can be varied:

Arrow up and down - color change faster resp. slower

Arrows left and right - change the color pattern

Return - freeze the actual color pattern, another click restarts the automatic cycle

Esc terminates the *lightdemo*.

4.14 Time lapse

The *time lapse* can be used for test and demonstration purposes. With this function you can view the adjusted illumination run in *time lapse*.

There is a manual *time lapse* (indicated by an *M* top right) as well as an automatic *time lapse* (indicated by an *A*). You can toggle between both modes by clicking of ***Return***.

In the manual *time lapse* you can set the *time* you want to simulate, the light will be shown according to it.

During the automatic *time lapse* the time is incremented permanently; you can set the speed for the *time lapse*. Adjust the *duration* in seconds for the simulation of 24h.

Esc terminates the *time lapse*.

5 Extras

Here special functions and settings are summarized. You can choose the following sub-menus.

5.1 Maintenance

During maintenance of the aquarium it can be preferred to set explicitly the switching state of certain switchable sockets or the light intensity of lamps. An example would be the switch-off of heaters, setting the current to a minimum and setting a dimmable light bar to 80%. To achieve a maximum of flexibility, the settings of the maintenance function refer directly to the hardware (switchable sockets and 1-10 V-interfaces) and not to the control and regulating functions (e.g. temperature control or illumination).

In the menu *Maintenance* you can set the maintenance parameters.

Select affected 1-10V interfaces
Here the 1-10 V-interfaces can be selected, which shall be affected during the maintenance. All non- selected interfaces will continue working as usual and program-controlled.

Adjust affected 1-10V interfaces
For the 1-10 V-interfaces selected before you can set here which voltage in percentage they shall output during the maintenance.

Select affected socket outlets
Here you can set which sockets shall be affected during maintenance. All non-selected sockets will continue working as usual and program-controlled.

Adjust affected socket outlets
For the sockets selected before the switching state (on or off) during the maintenance can be set.

Select affected Mitras Lightbar LEDs
Here the LEDs can be selected, which shall be affected during the maintenance. All non- selected LEDs will continue working as usual and program-controlled.

Adjust affected Mitras Lightbar LEDs
For the LEDs selected before you can set here the brightness in percentage they shall output during the maintenance.

Maximum length maintenance

This time (up to 240 minutes) defines, after which duration the maintenance has to be switched off automatically. The automatic switching off after a certain time avoids that the maintenance stays active permanently when the user forgets to switch it off again. If the maintenance should last unlimited you have to enter here 0.

The maintenance program is activated in the menu *Maintenance* with *Start*. While the maintenance program is active a blinking hammer symbol is displayed. The maintenance program is stopped in the menu *Maintenance* with selecting *Stop*.

Hint	During maintenance the alarm monitoring of all sensors is switched off!

5.2 Internal time

This function serves to display the internal clock time (see 3 *Clock*). This function serves only for diagnostic purposes, settings cannot be made here.

5.3 Info & Support

After selection of this menu item, then information concerning the software version, type and our webpage are displayed successively (automatically after expiry of a certain time or after a key is pressed).

5.4 Feeding pause

You can set the `Length feeding pause`; as long as this, the feeding pause will last which was started manually with the key ***Esc*** or automatically by a timer. To avoid a disturbance of the microbiological climate of your filter, you should not choose this time longer than absolutely necessary (ca. 5 to 10 minutes). The feeding pause duration can be adjusted between 0 and 120 minutes (0 means that this feeding pause isn't used).

Furthermore you can set which effect the feeding pause shall have:

`Stop filter?` – with the selection of `Yes` the switchable socket with the function *Filter* (1 to 4, depending on the feeding pause you are editing here) will be switched off during the feeding pause

Then it can be defined, if a `timer` should activate this feeding pause, after selection of `yes` you can select a `timer` which should start this feeding pause.

If a timer should activate this feeding pause then the feeding pause is activated as long as this timer is active. The feeding pause remains furthermore active for the time set under `Length feeding pause`. This makes for example then sense, if with this timer controls an automatic feeder or a dosing pump.

The behavior of the current pumps during the feeding pause can be defined in the settings of the current pumps (see *5.5.3 Pump settings*).

You start a feeding pause by pressing the key ***Esc***. If more than one feeding pause is used (only possible with *ProfiLux 3*) thereafter the wished feeding pause has to be selected. The feeding pause can be aborted by pressing ***Esc*** again***.***

5.5 Current

ProfiLux can control (current) pumps in many different ways, the following pumps are suited to be controlled:

- Pumps with an analog control signal input (mostly 1-10V-interface), e.g. from *Tunze®*, *IKS®* or *Abyzz®*, these pumps are connected to a 1-10V-interface of *ProfiLux* (for the connection to *ProfiLux* you need the corresponding accessory)
- Some low-voltage pumps, e.g. *Koralia®* from *Hydor®* (with our module *PumpControl1*)

Furthermore, non-adjustable pumps can be switched via switchable sockets, *see 6.3 Switching output*. These can of course only be switched on and off but can't be controlled.

The current control is organized in groups, one group consists of one or several pumps. The settings can be made separately for each group and for each pump. The group settings define the pumps belonging to the group, the operational mode and the time settings (depending on the operational mode).

For each pump you can make individual settings such as wave duration, minimal or maximal speed or the behavior during feeding pause.

Hint	With "Pump active" it is meant that the pump fluctuates continuously between min. and max. current speed and through this produces waves, a socket assigned to the current pump is then switched on. "Pump inactive" doesn't explicitly mean that the pump is off, but that it runs with minimal power, a socket assigned to the current pump is then switched off. The group settings define when and how long which pump in this group is active, the pump settings determine the behavior of the pump while it is active or not active.

You can program 2 independent groups. One group consists of up to 4 pumps that can be controlled independently from each other.

5.5.1 Nocturnal change

For the current simulation you can set a *Nocturnal change* of the pump power. If the *Nocturnal change* is activated, then afterwards *Start* and *End* time have to be entered. Within these times the pumps are operated with the power that has been set for the night. The nocturnal change affects all pumps in all groups.

5.5.2 Group settings

Per group you can set the following parameters:

5.5.2.1 Operational mode

Here the operational mode is to be set for one group. The single groups may have different operational modes.

Off – the pumps of this group are permanently off.

Permanent – the pumps are permanently active and operate synchronously.

Permanently alternating – The pumps are permanently active and operate alternating, i.e. if pump 1 runs with max. speed, pump 2 runs with min. speed and the other way round.

Sequence 1 – Here, always exactly one current pump of this group is switched on alternating. The duration for the change from one pump to the next one can be set, see below. When the last pump of this group was active, the cycle starts again with the first pump of this group. If this group consists of 2 pumps, then the ebb-tide-simulation is generated. If only one pump belongs to this group, it is switched on and off alternating.

Example	For a group of 3 pumps the following switch-on pattern results:

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 are not switched one after the other, instead of that, they are activated in an alternating order.

Example

For a group of 3 pumps the following switch-on pattern results:

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 are switched on one after the other until all pumps are active, then the pumps are switched off again in the same order until all are off. The time until the switching state changes again can be set (see beneath).

Example

For a group of 3 pumps the following switch-on pattern results:

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 are switched off in the inversed order in which they had been switched on before.

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 belonging to this group are activated in a continuous random variation. The time until the switching state changes again can be set (see beneath).

5.5.2.2 Assign pumps

Here you can set which pumps shall belong to this group. One pump may not be assigned to several groups.

5.5.2.3 Tide duration

In the modes *Sequence*, *Surge* or *Random* you can set the time after which the switching state of the pumps shall change again. Here you have to set a *Minimal* and a *Maximal tide duration*. The time after which there shall be a new switching state, is determined by the random generator in the range of these two times. If the time shall be always the same for *Minimal* and *Maximal tide duration* then the same value has to be entered.

The *Minimal* and *Maximal tide duration* is to be set between 1 second and 8 hours. If a switchable socket shall control the corresponding current pump, then the tide duration may not be chosen too small – otherwise a too often switching can lead to damages of the socket or the pump!

5.5.2.4 Wave

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

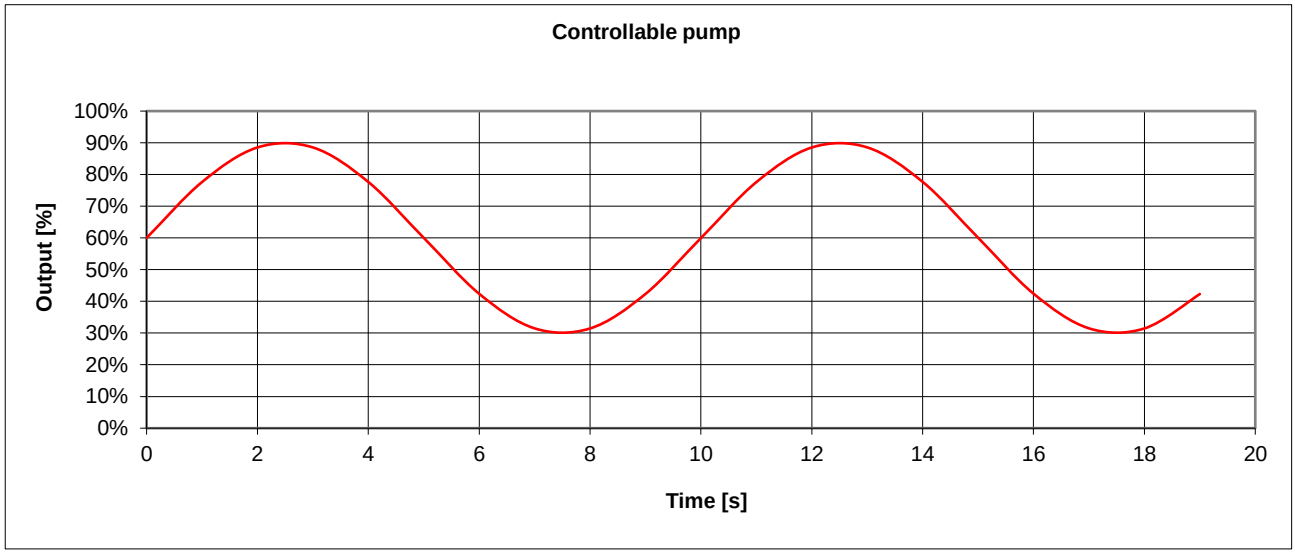
Sinus waves – gentle accelerating and slowing down of the pump

Right-angled waves – abrupt changes

Then the *Minimal* and *Maximal wave duration* in the range of 0.4 and 60 seconds is to be set. The random generator determines for each wave a duration within these limits. If all waves shall have the same duration, then you have to enter the same values for *Minimal* and *Maximal wave duration*. For the wave duration of course also the technical possibilities have to be considered. Waves don't have an effect on non-controllable pumps which are connected via switchable sockets.

Finally you can set the *Random wave reduction* from 0% to 100%. The bigger the value, the more different the single wave crests become. For 0% each wave crest reaches the maximum (wave crests are always the same), for 100% the wave crests fluctuate at random between minimum and maximum.

The graph below shows as an example the flow pattern of a controllable pump (settings: *Minimal* = 30%, *Maximal* = 90%, *Wave duration* = 10 s, *Wave form* = *Sinus*):



5.5.3 Pump settings

For each pump the following settings can be made individually:

Minimal – minimal power (during a wave trough or if pump inactive)

Maximal – maximal power (during a wave crest)

Night – maximal performance during *nocturnal change*

Storms – maximal performance during a storm

Behavior while feeding pause – adjustable is *Pump uninvolved* (Feeding pause don't affect this pump), *Pump at minimum* (pump is operated during the feeding pause only with minimal power) or *Pump off* (pump is switched off during the feeding pause).

5.6 Display

Here you have the possibility to set which current values shall be displayed during normal operation on the display. If several elements are selected, then these are displayed alternating. These settings influence also the display on a possibly connected *ProfiLux View*.

In this menu the following setting options are available:

Display duration – for this time the display remains constant until the next value is displayed

Select illumination – here you can select which of illumination channels shall be displayed

Select controller (only if measurement inputs are available) – selection of controller whose values and states shall be displayed (e.g. pH-value and temperature)

Select miscellaneous– selection of miscellaneous elements which shall be displayed (e.g. moon phase, level, flow-sensor or EHEIM)

Time & Date – you can set how the current time and date shall be displayed: *Never*, *Always* or *Rotate*.

5.7 Language

Here the language in which *ProfiLux* outputs texts can be set.

Attention	If *ProfiLux* is set to German language, this menu is displayed under *Extras*, *Sprache* (German expression for *Language*)!

6 System

Here all system functions and settings like e.g. the hardware configuration are summarized. The following sub-menus can be selected.

6.1 Factory settings

After selection of this function you are asked if the factory settings shall be restored: *Factory settings now?* If this is accepted, all settings are reset to their delivery status! The operating hour meters are not reset.

6.2 PIN

A personal identification number (PIN) serves to protect the device from setting changes through unauthorized people. As default setting, the PIN is set to 0000. If the PIN is set to 0000, all changes can be made without entering the PIN. As soon as the PIN differs from 0000, for each setting this PIN has to be entered. This is also the case if the PIN is changed.

If you have forgotten your PIN	Switch off the device (remove voltage supply), switch it on again (connect voltage supply again). Directly after that, still while the status and greetings display can be seen, press ***Esc*** and ***RETURN*** at the same time. Afterwards you are asked `Clear PIN?`. After confirmation with `Yes` the PIN is again in the delivery status (0000 – deactivated).

6.3 Switching output

At switching outputs switchable devices, e.g. powerbars or dosing pumps are connected.

The function of each switching output can be set individually.

After selection of the socket, the function is to be set first.

`Timer`	afterwards the `Number` of the timer is to be selected This switching output is controlled by the corresponding timer.
`Illumination`	afterwards select the `Number` of the illumination With this you can assign a switching output to an illumination. For a dim setting of the corresponding illumination of 0% it is switched off. For 1% to 100% it is switched on. This function serves to switch off light bars which don't provide an internal voltage shut-off at 0% or to switch non-dimmable lamps via the power cable. Dimmable light bars of *GHL* don't need an external shut-off and are directly connected to a permanent power supply, since they are provided with a internal shut-off. For the operation of dimmable *GHL*-light bars there is no switchable socket necessary!
`Current pump`	afterwards select the `Number` of the pump The current simulation switches this switching output on if the corresponding current pump is active. Important hint: Each switching process means stress for the socket as well as for the pump. Because of this, the times in the current-modes *Sequence, Surge* or *Random* may not be set too short! According to the connected load the sockets have a life cycle of up to 10.000.000 switching cycles.
`Sum alarm`	In case of any alarm this switching output is switched on.
`Filter`	This switching output is generally permanently switched on, except during the feeding pause.
`Always on`	This switching output is always switched on.
`Always off`	This switching output is always switched off.
`Thunder`	This switching output is switched on for a short time (ca. 800 ms) when the storm simulation generates a flash.
`Thunderstorm`	This switching output is switched on during a thunderstorm and can be used for instance to switch on a raining device in a terrarium.
`Maintenance`	This switching output is switched on during maintenance.
`Variable illumination`	afterwards select the `Number` of the variable illumination Herewith you can assign a *Variable Illumination* (see *4.11 Variable illumination*) to a switching output.

Furthermore, a switching output can be assigned to a control loop. For this, you have to select first one of the available controllers (sensors), e.g. *Temperature 1* or *pH-value 1*.

After selecting the controller which shall influence this switching output, the function has to be concretized furthermore.

For temperature controllers you can select among these options:

`Cooler`	The temperature control uses this switching output to switch the cooler.

Heater	The temperature control uses this switching output to switch a heater.
Bottom heater	The temperature control uses this switching output to switch a bottom heater.
Alarm	In case of an alarm of this controller the socket is switched on.

For all other controllers, you can select among these options:

Control downwards	The control uses this switching output for the downwards-regulation e.g. to decrease the pH-value.
Control upwards	The control uses this switching output for the upwards-regulation to e.g. increase the pH-value.
Alarm	In case of an alarm of this controller the switching output is switched on.

After selection of a function you can make furthermore the following settings:

Blackout delay – for the time set here (0 to 60 minutes) the switching output remains switched off in any case after the switch-on of the *ProfiLux*. This setting is useful if this switching output switches a device which must first cool down before it is switched on again, e.g. if the re-switching of a MH-lamp shall be delayed after a power failure.

Invert switching behavior – if this option is activated, then the switching output behaves exactly inversely: if it shall be switched on, it is switched off and the other way around. The inversion of the switching behavior is e.g. then useful if pumps or magnetic valves shall be switched off instead of on through the level regulation.

6.4 1-10 V interface

Each 1-10 V-interface can be configured separately. *ProfiLux* disposes of four firmly built-in 1-10 V-interfaces *L1* to *L4* (always two combined in one port). With the extension card *PLM-2L4S* or *PLM-4L* the number of 1-10 V-interfaces can be increased.

After selection of the interface first the function has to be set.

Illumination	afterwards select the *Number* of the illumination Here the dimmable lamps are then connected – e.g. with dimmable ballasts or *ProfiLux Moon*. So it is possible to assign each illumination one arbitrary 1-10 V-interface.
Current pump	afterwards select the *Number* of the pump This interface is then used by the current simulation.
Always off	This interface has no function.
Variable Illumination	afterwards select the *Number* of the variable illumination Herewith you can assign a *Variable Illumination* (see *4.11 Variable* illumination) to this interface.

Furthermore you can assign a 1-10 V-interface to a control loop. For this you have to select first one of the available controllers, e.g. *Temperature 1* or *pH-value 1*.

The selected controller outputs then a voltage that is proportional to the control deviation (= deviation from nominal value to actual value) at this interface.

Example temperature control	If the water temperature exceeds the set temperature, then a voltage is output that is proportional to the temperature control deviation. Simply expressed: the warmer the more voltage. With this it is possible to control a controllable cooler – e.g. our *PropellerBreeze* with the control electronics *PropellerControl* – and so to operate it as energy-saving and as low-noised as possible.

Afterwards you can set the *Minimal* and *Maximal voltage* of this interface. Usually the voltage range is 1 V to 10 V, as the name of the interface already indicates.

Possibly it can be necessary to set the minimal voltage (at 1%) (possible range: 0 V to 4 V). This can have the following reasons:

Not all tubes are equally suitable for dimming. Further information concerning the dimming suitability can be obtained from the tube manufacturer. Most of the problems occur in the lower dimming range (up to ca. 10%). Here it can happen that the tube simply switches off after a certain time (mostly few minutes). Solution: Increase of the *Minimal voltage*.

Not all dimmable ballasts behave in the same way. The lower dim setting should normally be reached at a voltage supply of 1 V, full light intensity at 10 V. We have noticed that the light intensity doesn't change anymore for some ballasts for a voltage supply under 1.5 V, for other ballasts the dimmable range goes to ca. 0.8 V.

The current pump stops although the set current speed is >= 1%.

The maximal voltage (at 100%) has to be set between 4.5 V and 10 V, to solve for example the following problems:

For certain dimmable ballasts there is no further light intensity change visible between 9.5 V and 10 V.

The current pump operates with full power already at 8 V.

The moonlight is too bright at 10 V.

Hint	To achieve an optimal light intensity course, the control voltages should be adapted to the connected lamp, i.e. minimal light intensity and lower voltage supply as well as maximal light intensity and upper voltage supply should fit exactly together.

To achieve an optimal course of the dimming you can test in the menu *Manual Illumination*, if for the lower dimming values the light intensity changes or if the lamp shuts off and for the upper dimming values if there are still differences in the light intensity that can be seen. If necessary, the *Minimal* and *Maximal voltage* have to be changed and have to be tested again.

6.5 Alarm

Here the operation mode of the alarm-buzzer can be set (only models with built-in buzzer):

Buzzer off – also in case of an alarm the buzzer remains off

Buzzer on – in case of an alarm the buzzer gets active, independent from the clock time

Buzzer at set time – in case of an alarm, the buzzer gets only active for a certain time. Here the time range is to be set in which the buzzer is active for an alarm.

Additionally, you have to make the corresponding alarm settings for each sensor, see also *2.7 Alarm.*