GHL Doser 2.1

Instruction Manual

Valid from Firmware Version 1.27

As of 2019-01-16

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Congratulations on your Purchase

Thank you for purchasing our product and allowing us to help support your path to successful fishkeeping!

With a *GHL Doser 2.1*, you now own a highly professional piece of equipment that is more than capable of assisting you in your daily monitoring and maintenance routines.

We are confident that our product will help make your hobby more efficient, safe, and ultimately help you spend more time enjoying your aquarium or terrarium.

Enjoy Your Passion!

GHL Takes Care of the Rest

Get the Most out of your GHL Product

GHL products are well-equipped with simple and intuitive features. In order to get the most out of our products, we recommend you read our Programming Guide and Instruction Manual together. Doing so will provide you with the most profound details for using our product. These and other helpful documents can be downloaded from our website's download area (*Support->Downloads*). Visit our homepage at www.aquariumcomputer.com, our Support Forum or meet us on Facebook to become a GHL-Product expert and fully utilize the full range of functions offered from your device!

1 Safety Instructions

Please read these instructions carefully before operating the *GHL Doser 2.1*.

GHL products are built with maximum security and safety in mind. However, product safety for this device can only be guaranteed if you follow these guidelines.

Anyone who uses this device must become familiar with the following safety instructions and the operation of the device.

Failure to follow these instructions will void any warranty claims.

Be sure to read over the safety instructions provided by this Doser manual; including the respective manuals of other equipment manufacturers.

In this manual, the following symbols are used:

TIP

General note, tip or advice.

WARNING

Important note for operation, to avoid damage to the equipment, and for your safety.

DANGER

Warning that non-compliance can result in injury or damage to the device.

1.1 Safety of Children and Vulnerable Persons

WARNING

This equipment must not be used:

- By small children and vulnerable persons with limited physical, sensory or mental capabilities.
- By people who are unfamiliar with the functions of this product.

1.2 Intended Use

The *GHL Doser 2.1* is intended exclusively for use in the domestic area. *GHL Doser 2.1* may only be operated with GHL accessories.

Make sure to place the device away from splashing water, moisture or other liquids.

WARNING

Moisture indicators are placed inside the unit and will change color when exposed to excessive moisture.

Removing these indicators will void all warranty claims.

DANGER

- Make sure that the power cord is plugged into a grounded outlet; otherwise you could get an electric shock or cause a fire.
- Protect the power cable from damage (For example, twisting, kinking, clamping). Please also pay attention to the joints and connections to the device.
- Disconnect the power plug by pulling the plug, not the cable.
- Never attempt to disassemble, repair or alter the equipment by yourself.
- Do not insert sharp objects into the electrical contacts and ports.

DANGER

- If the unit falls into the aquarium or has been exposed to moisture or humidity, first turn off the power to the device via the fuse or circuit breaker, then pull the power cord.
- Never touch the power plug with wet hands.

- If the device has become wet or dirty, thoroughly clean and dry it with a dry cloth.

DANGER

- The device may not be operated if it has been damaged in any way (e.g. damaged power cord or plug, liquids or objects have gotten into the interior, device has been exposed to excessive moisture, the normal operation is disturbed, or the device has been dropped.)

For your own safety, please look at the hazard prevention and safety instructions in the chapters that follow.

2 General

2.1 About this Manual

These instructions apply to the *GHL Doser 2.1 Stand Alone* and *GHL Doser 2.1 Slave.*

2.2 Features

- LED Status indicator
- 2x *ProfiLux Aquatic Bus* Ports (Black Western sockets)
- 1x Level sensor port (Double allocation), *Stand Alone* only
- 1x USB/LAN Connection, *Stand Alone* only
- 1x GHL Control Pad Connection, *Stand Alone* only
- 1x Connection for power supply unit (24V DC hollow socket)
- 4x *Magnetic Stirrer* Connections

2.3 Scope of Delivery

Please check the contents of this box. The following items should be included:

- *GHL Doser 2.1*
- 24V Power supply
- Tube connectors
- Supplementary sheet

Please check to make sure all items are in perfect condition. In case of damage, immediately contact the dealer from whom you purchased the *GHL Doser 2.1*.

WARNING

A damaged *GHL Doser 2.1* or components may not be put into operation under any circumstances.

2.4 Important Operating Instructions

WARNING

To ensure safe operation, the following guidelines must be followed.

Disregarding these safety guidelines, will result in voiding your warranty. In which case, the manufacturer rejects any responsibility or liability for damage!

3 Connections of the GHL Doser 2.1

3.1 General

Applies to all connections:

WARNING

- Connect only original accessories from GHL.
- Do not use excessive force when plugging-in connectors. If a plug contact does not fit, it is imperative to check that you have chosen the correct socket.

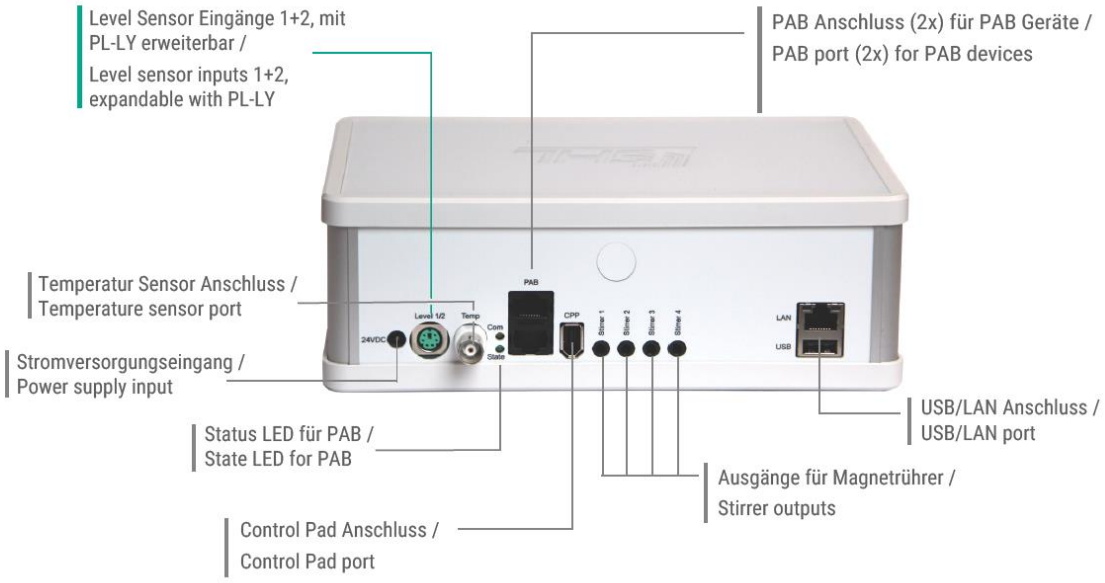
DANGER

- Incorrect connection (For example inserting a USB connector into a *PAB* connector) can lead to damaging the *GHL Doser 2.1.*
- A repair caused by this, is not covered under warranty and will therefore incur repair charges**.**

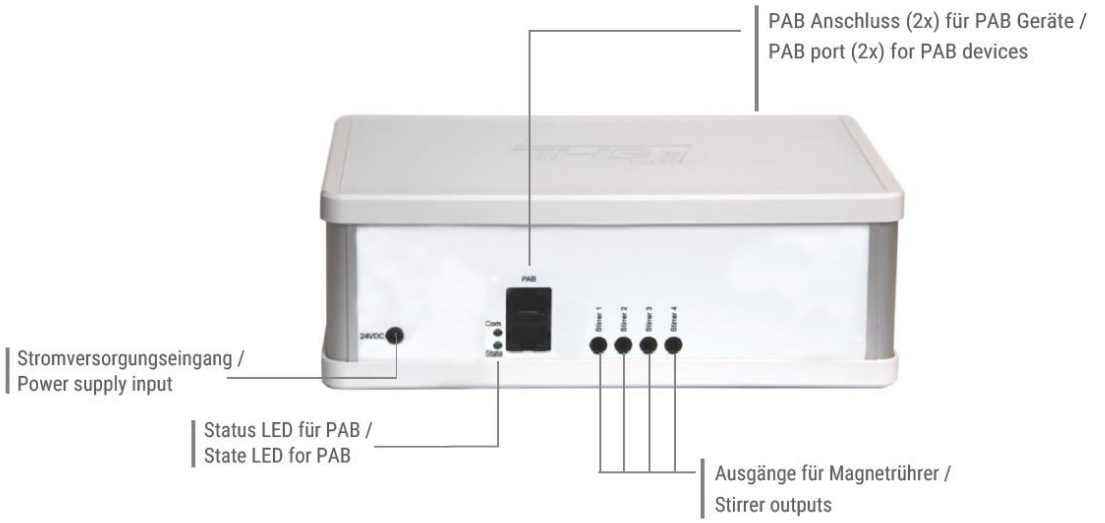
3.2 Connection Overview

The *GHL Doser 2.1* includes the following connection ports and displays:

Stand Alone:



Slave:



3.2.1 Level Sensor Connection (*Stand Alone* only)

Level sensors (D2.1 SA-only) are used for monitoring and maintaining set water levels. These sensors can be connected to the on-board Level port (**Green** Mini DIN socket). A single Level port can either accept a single sensor or two separate sensors. With a PL-LY splitter cable

(not included), two level sensors can be connected to a single Level sensor port and be independently controlled.

3.2.2 Temperature Sensor Input (*Stand Alone* only)

The white BNC socket is where a Digital Temperature sensor can be connected.

TIP

- Place the sensors in an area where water can constantly circulate around them.
- To prevent algae growth, it is best to place the sensors in a dark spot. For mounting, an open external filter would be a good place.
- To ensure proper sensor measurement, attach the sensor perpendicular to the water surface.
- Make sure that the cable connection of the sensor is not immersed in water under any circumstances.
- Many sensors are very susceptible to interference due to their low-level signals. To provide the most accurate measurements, please have enough distance between the sensors/cables and sources of interference. These can include: Electronic ballasts, power lines, pumps, consumer electronics, etc. False readings can be avoided by following these precautions.

3.2.3 PAB Ports

The **black** RJ45 Western sockets are where *PAB* devices can be connected. For example, additional Slave Dosers can be connected via the PAB-port. For more information, please refer to the "*Connection to PAB*" section.

3.2.4 USB Connection (*Stand Alone* only)

The *GHL Doser 2.1* can be connected to a PC via USB cable. This means that all settings can be configured comfortably using *GHL Control Center. GCC* software can be downloaded free of charge from our website's download area.

3.2.5 GHL Control Pad Connection (*Stand Alone* only)

A GHL Control Pad can be connected here.

3.2.6 Power Supply Input

24V DC hollow socket for connection to the power supply. Use only the original power supply for supplying power to the *GHL Doser 2.1* device.

DANGER

- Connecting a non-GHL branded power supply may lead to the destruction of the *GHL Doser 2.1*!
- A repair caused by this is not a guarantee and is therefore subject to a charge.

4 Activation

4.1 Installing the GHL Doser 2.1

The device must be protected from water at all times!

Mount the Doser in a water-protected area. When selecting the mounting material, make sure that you have adequate sizing and stability. Make sure that the unit cannot fall into the water during assembly or normal use.

If the device is placed inside an aquarium cabinet, make sure that it is placed in an area free from splashing water; moisture or liquids that can penetrate.

GHL Doser 2.1 as well as its accessories are destroyed by excess moisture or excess atmospheric humidity - Please observe the technical data and notes below!

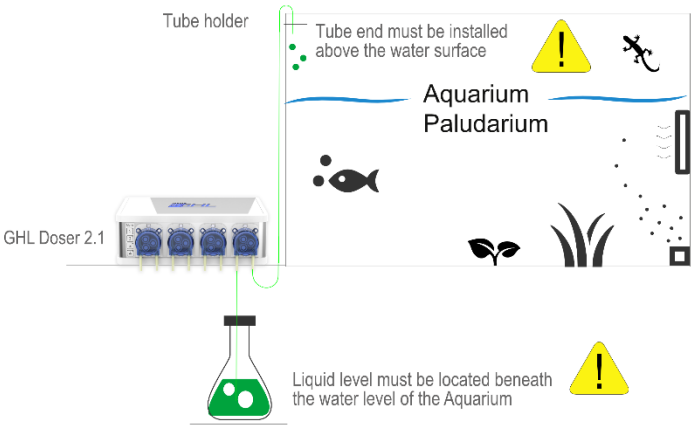
To ensure maximum safety and operation, the following regulations must be followed! Failure to follow the safety guidelines will result in VOIDING your warranty. The manufacturer rejects any responsibility or liability for damages resulting from misuse!

Powered equipment and water can become a dangerous combination if precautions are not taken. It is therefore essential to supply power to all mains-operated devices which are operated in the aquarium or in the vicinity of the device via a residual current circuit breaker!

In order to avoid any danger, all mains-operated devices must be disconnected from the mains; all plugs must be disconnected! When working in the basin, it can never be ruled out that a heating element, a pump, or a luminaire is defective.

As shown in the illustration (right), Dosers and dosing containers should always be positioned carefully to ensure that the dosing container contents do not drain into the tank,
- e.g. in case of unexpected events.

Optimal Doser Arrangement



In order to connect the dosing unit to the dosing containers, the peristaltic tubes of the dosing pumps must be extended. Select the tubing suitable for your application and attach it to the dosing pump tubing with the enclosed tube nozzles. Avoid tensile loading. The tube nozzles are suitable for tubes with an inside diameter of 2 and 4 mm.

Make sure the tube connections fit snug and cannot come apart - push the dosing tubes onto the tube nozzles as far up as possible and avoid pulling on them.

The pumps of the Doser are self-priming. To facilitate the suction of the dosing liquid, the tube leading into the dosing tank should be kept as short as possible on the suction side.

In order to prevent backflow through the siphon effect, the dosing tube in the tank should not reach directly into the aquarium water on the pump side.

Please also note the following notes:

DANGER

Make sure to run a drip loop for all cables and lines coming from the aquarium. Cables and tubing must be routed in a way that prevents water from entering electrical or electronic parts!

TIP

- Please ensure good access to the connections of the device
- Please consider the maximum cable lengths of the connected *PAB* cables, sensors etc. when selecting the installation site
- Additional sensor cable extensions (*BNC2 cables*) and PAB cables are available in different lengths to fit your needs. They are available online in our *GHL Store (For US customers, GHL USA Store)*.

WARNING

- To ensure proper operation, the connection cables should never be kinked, crimped, or positioned in an unsuitable way.
- The *Doser* must be positioned away and protected from splashing water and excess humidity!
- Splashing water/saltwater and or condensing humidity (e.g. occurring nearby the sump) will *destroy the devices – this voids all warranty claims!*

DANGER

Products that are already powered should never be pulled by the cable. This may cause malfunction or damage the connected products and the *GHL Doser 2.1*.
They should only be pulled by the plug connected to the power socket.

4.2 Connecting the Temperature Sensor

Connect the sensor connection cable into the corresponding BNC connector socket.

DANGER

- Sensor plugs must not be wet or damp when connecting to the socket.
- Do not use force.
- Only connect *Digital Temperature Sensors* from GHL to the temperature sensor socket of *GHL Doser 2.1*
- Always connect the sensors to the respective jacks, as this could damage the device or the sensors.
- A repair caused by this is not a guarantee and is therefore subject to a charge.

4.3 Connection to the Power Supply

Connect the *GHL Doser 2.1* using the supplied power adapter to the power supply. Insert the DC plug into the designated 24V DC hollow socket on the rear panel and connect the power connection cable with the plug to the power outlet.

DANGER

- Ensure that the mains voltage matches the voltage specified on the identification plate located on the bottom of the device.
- Connect the device only to a properly installed and grounded outlet with a minimum rating of 10 A.
- Never use a different voltage supply. Incorrect polarity or voltage can destroy the device.
- **Use only the supplied AC adapter**.

DANGER

- The connection of a power supply that is not part of the *GHL Doser 2.1* leads to the destruction of the *GHL Doser 2.1*!
- • A repair caused by this is not a guarantee and is therefore subject to a charge.

4.4 Connection of PAB-Devices

The *GHL Doser 2.1* includes two PAB-ports for connecting additional *GHL Doser 2.1 Slave, Maxi Doser Slave* or *KH Director* devices via *ProfiLux Aquatic Bus*.

4.4.1 What is the PAB

PAB is an interference free CAN-Bus-System which allows for extremely secure data transfer between all PAB devices such as additional *GHL Doser 2.1, KH Director, GHL Doser Maxi Slave* devices. The range can be up to 100 m (300 FT).

- PAB cables are not included and must be purchased.

TIP

- Be sure to obtain suitable PAB cables in the appropriate lengths to meet your needs.
- *PAB*-cables are available online at *GHL Store (EU) and GHL USA Shop (US)* in different lengths from 0.5 m up to 50 m.

4.4.2 How does the ProfiLux Aquatic Bus work

The system works according to the master-slave principle. The master unit is always *a GHL Doser 2/2.1 Stand Alone*, a *GHL Doser Maxi Stand Alone* or a *ProfiLux Controller* (starting from model ProfiLux 3), to which all other bus participants can be subordinated as a slave unit.

PAB devices are always connected in series. This means that all *PAB* devices must be connected to the *PAB* cables linearly with each other. The first *PAB* device is connected via a *PAB* connection cable with one of the *PAB* ports of the next party. The *PAB* works bi-directional; this means every *PAB* jack can be used for input or output. The next participant is connected again at the free *PAB* port of the previous participant, and so on.

The last device of the PAB therefore always has an unoccupied *PAB* connection.

The order of the devices can be freely selected. Also several *ProfiLux Controllers* can be connected to the bus.
The PAB provides a line connection via the single PAB participants from one end to the other. A ring or star topology of the *PAB* bus is not allowed.

DANGER

- *PAB* devices must always be linearly connected to each other.
- The last device on the PAB must always provide a free *PAB* port.
- Never connect the last two PAB devices through an additional PAB connection cable.
- Such a ring connection leads to malfunctioning and is not allowed.

4.4.3 Exemplary Connection of GHL Doser 2.1 with PAB Devices

4.5 Status Indicators of the GHL Doser 2.1

The *GHL Doser 2.1* includes two status indicator lights which are located on the housing cover and the back of the device. These lights provide system status information at a glance.

4.5.1 System-Status- LED on the housing cover

The LED-backlit GHL Logo in the housing cover of the *GHL Doser 2.1* lights up in different colors.

The various colors can show you at a glance, the condition of your aquarium.

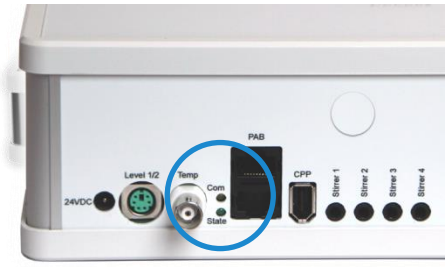
The color and blink codes shown depend on the particular *Doser* Firmware.

For the meaning of the blink codes, please refer to the Support-> FAQ section of our homepage www.aquariumcomputer.com.

DANGER

- Never leave your aquarium or terrarium unsupervised for an extended amount of time.
- The maximum amount of time without personal view depends on how long your aquarium, terrarium, or pond can survive without significant damage, even when errors occur.
- Always remember that technology can fail and therefore malfunctions can never be ruled out!
  Power failures, incorrect settings, damage (For example, by water or overvoltage) or simply an unexpected operating situation can lead to fatal damage.
- The manufacturer declines any liability for (consequential) damage or loss arising in connection with the use of the *GHL Doser 2.1*, as far as permitted by law

4.5.2 PAB Status LEDs on the Back Panel



Located on the back panel of the *GHL Doser 2.1*, next to the connection of the temperature sensor are another two LEDs that provide information about PAB connection status and PAB communication status.

The upper yellow LED indicates proper communication within the *PAB* connection. The lower green LED provides information about the status of the *PAB* communication.

Status	Meaning

Yellow LED flashes	*GHL Doser 2.1* receives *PAB* commands
Green LED is ON	*GHL Doser 2.1* is ready for operation
Green LED flashes quickly	*GHL Doser 2.1* is started, firmware update
Green LED flashes every second, yellow LED is OFF	*GHL Doser 2.1* has not received PAB commands for more than 30 seconds
Both LEDs are OFF	*GHL Doser 2.1* has no supply voltage

5 Operation

5.1 General Operating Instructions

The pumps of the Doser are automatically assigned to dosing channels 1-4. The integrated controller can control up to 16 pumps independently. If an additional slave unit has been connected, its pumps must be assigned to channels 5-8.

5.1.1 Dosing amount

The amount of fluid that can be dispensed by a single pump is determined by the selected motor speed. Depending on the chosen speed, the Doser 2.1 metering pump can dispense about 8 ml up to 45 ml of dosing liquid within 1 minute.

5.1.2 Maintenance

The pumps are largely maintenance-free. It is sometimes advisable to clean the inside of the pumps from dust and other contaminants.

Tubes, pumps and motors are wear parts, the life time depends on the use frequency, flow quantity and environmental conditions.

DANGER

- The pumps must never be lubricated in any way!
- When malfunctions (e.g. insufficient flow, losing prime, leakage, increased operation noise) or mechanical damages occur the wear parts must be replaced.

  Due to the maintenance-friendly design all wear parts can be replaced easily, all wear parts are available as accessories.

5.2 Operation on the device

The buttons on the front of the device allow for manual operation of the pumps. This allows you to quickly top up, vent the tube or suck in liquid.

5.3 Operating the Device via the Software GCC

Full device settings and functions are accessible via the software *GHL Control Center (GCC)*, which is available for download free of charge in the download area (support-> downloads) of our homepage www.aquariumcomputer.com.

5.3.1 Requirements

You must use the appropriate *GHL Control Center* software version which supports the firmware of the respective *GHL Doser 2.1.*

GCC supports the following operating systems: Microsoft Windows Vista® and Windows 7®, Windows 8®, Windows 10®.

A connection to the *GHL Doser 2.1* can be established via the following PC interfaces:

- USB
- WLAN/LAN

5.3.2 GCC General Information

With the *Load* button, the settings of the *GHL Doser 2.1* are read out and the program displays are updated. With *Save*, the settings you have made in the program are transferred to the device.

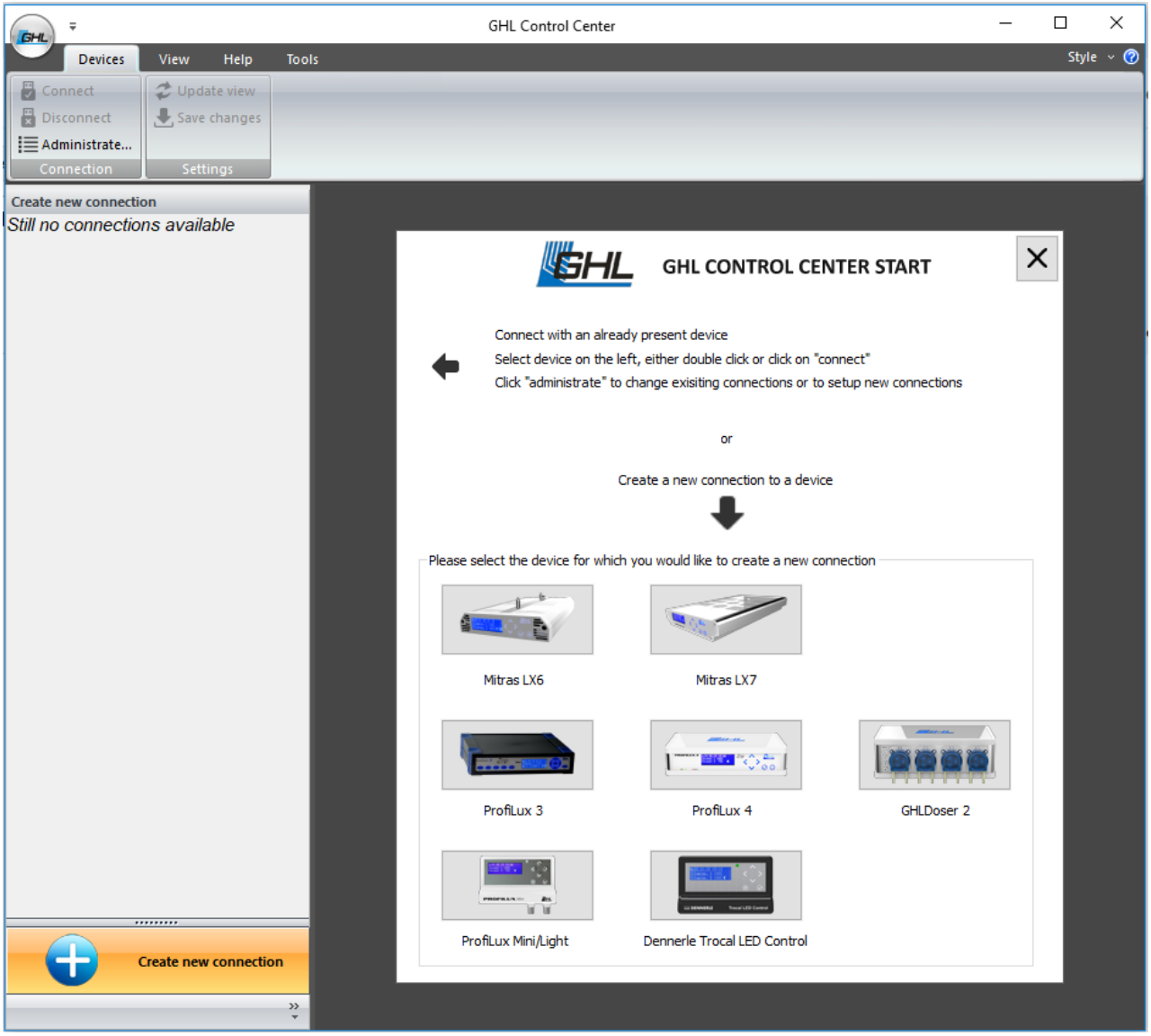
5.4 Connection between the GHL Doser 2.1 and PC

Two steps must be taken before your Device can be operated with a PC:

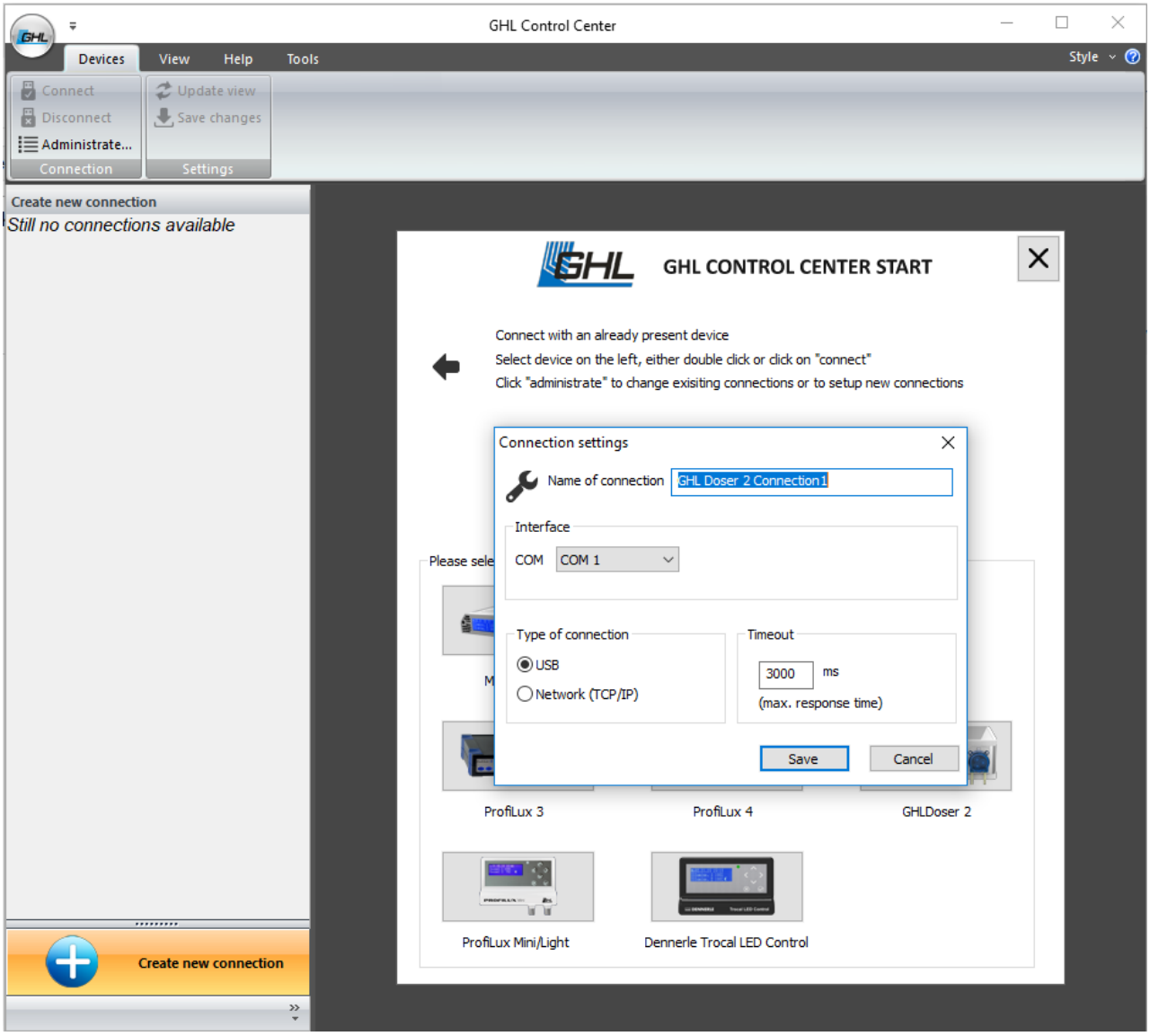
- PC and Doser must be connected with a cable via USB
- The PC program *GCC* must be set up

Open the application and connect to your device by following the illustrated steps:

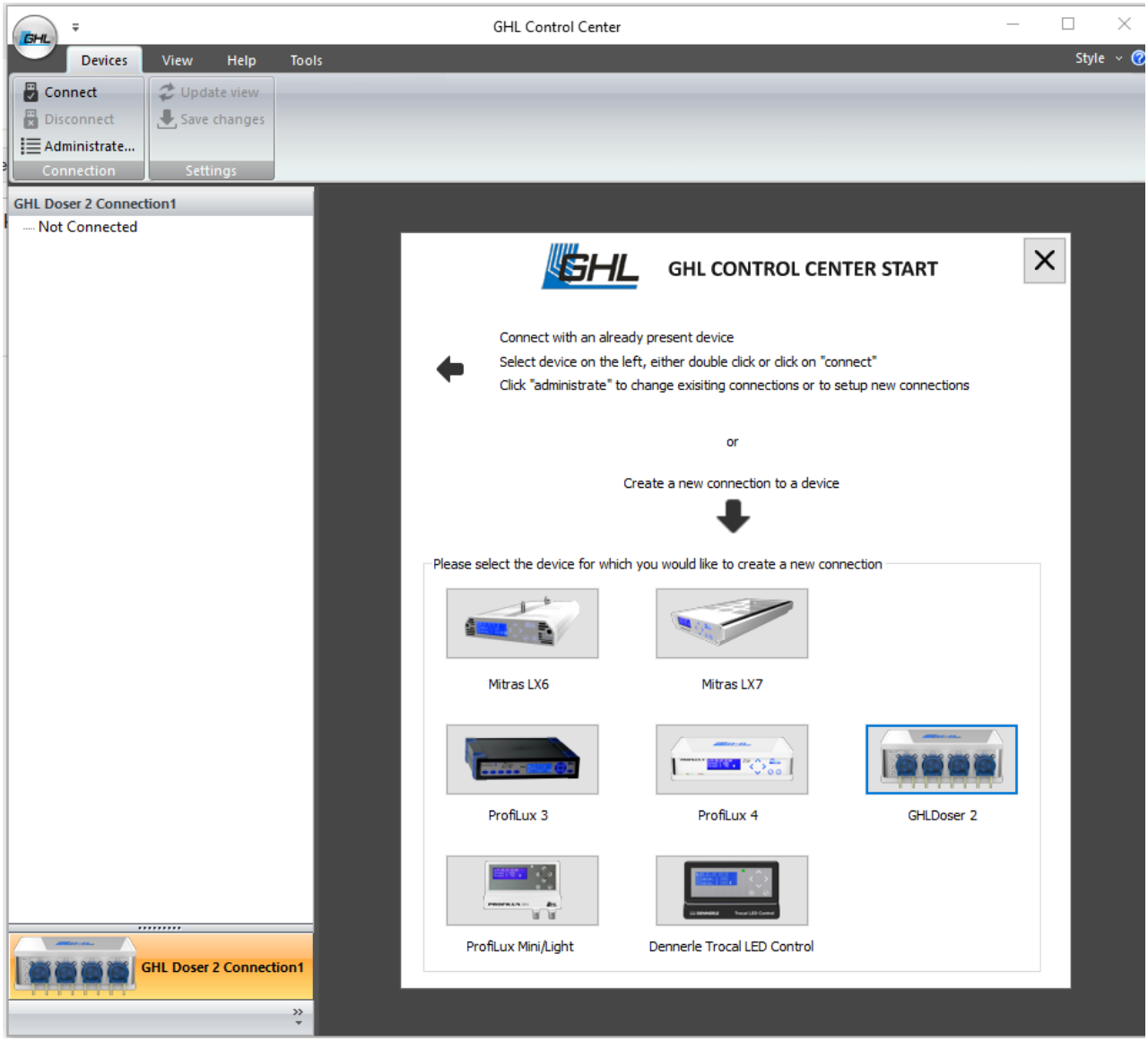
1) Select your device



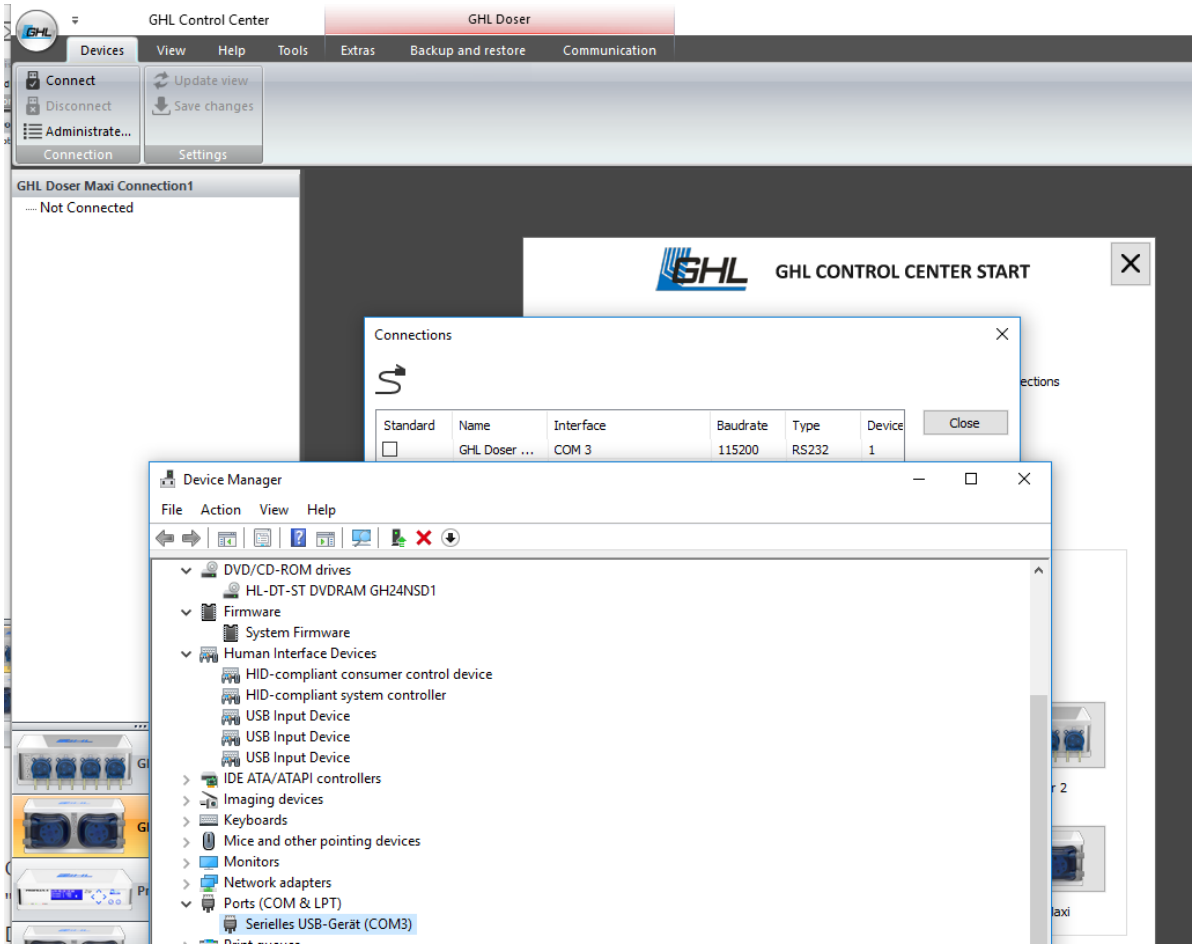
2) Then click SAVE



The device is now visible in the sidebar:



3) Get the "GHL Virtual Communications Port" for your device by clicking "Administration" -> "Connections" -> "Device Manager"
   Depending on the operating system of your computer, you may see "USB Serial Port" or "GHL Virtual Communications Port" displayed.

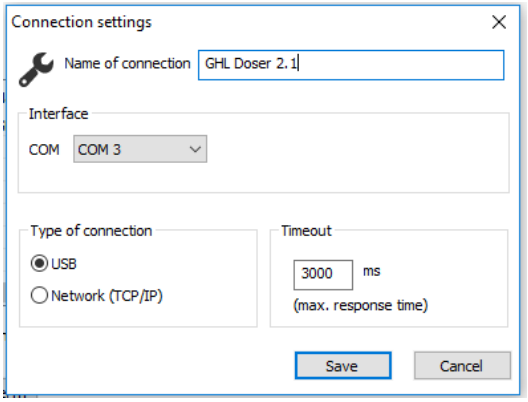


In the illustrated example, this is "*COM3*".

Close the "*Device Manager window*" and click "*New*".

Then select your device.

The "*Connection settings*" window pops up automatically.



Now enter any connection name (For example, "GHL Doser 2.1") and set the previously determined port (*COM3*) via the selection window (<Auto>). Press "*Save*".

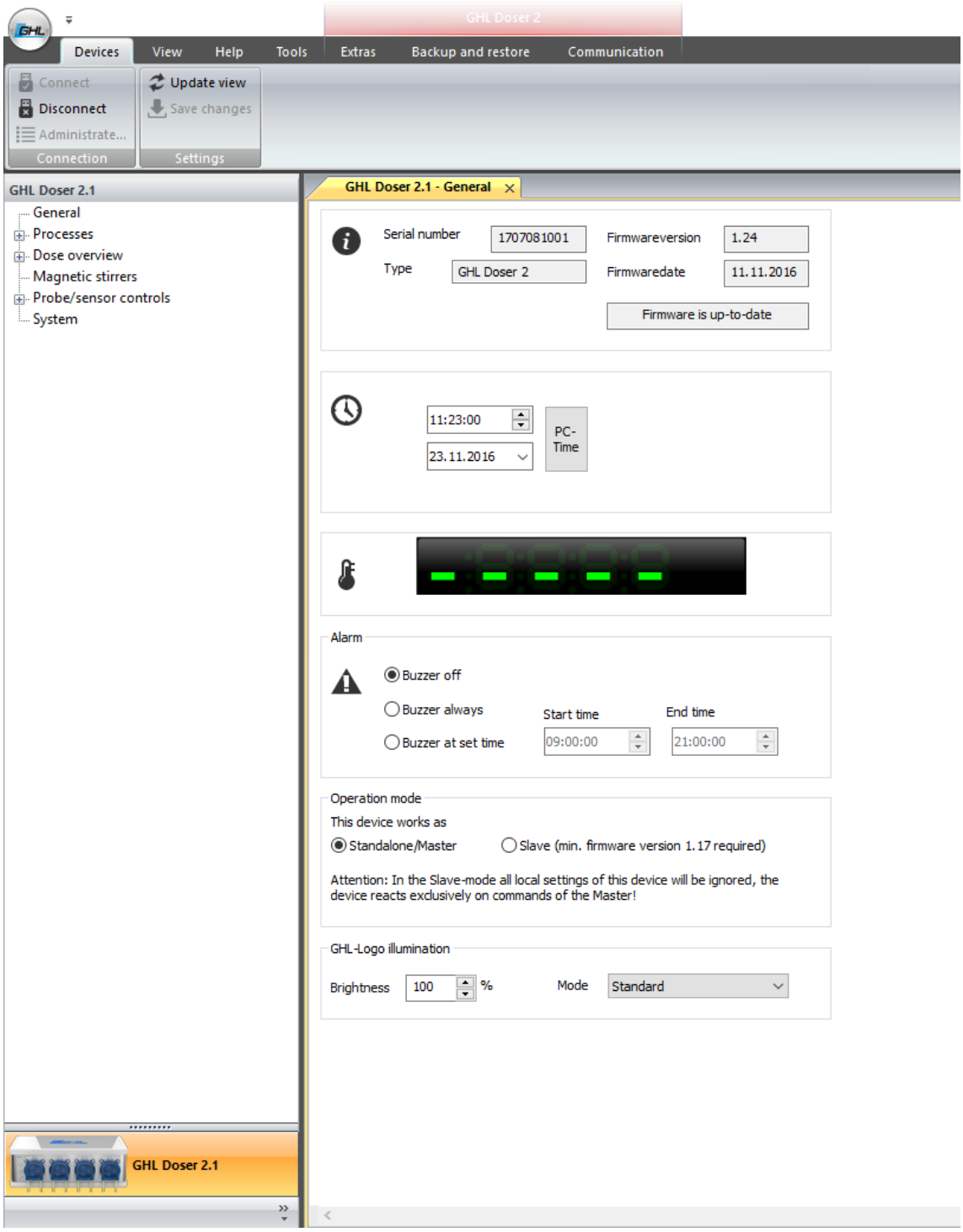
Close the Connections Window.

Connect to the *GHL Doser 2.1* by double-clicking the device in the sidebar or by pressing the "*Connect*" button in the upper ribbon bar.

A connection between the device and your PC will be established.

Once connected, you can view the menus of the *GHL Doser 2.1*, in which you can make all desired settings.

The available setting options are displayed in a tree structure in the sidebar.



The connection can be disconnected by pressing the "*Disconnect*" button in the upper ribbon bar.

DANGER

- If you have made or changed settings to your device via *GCC*, you must save those changes by clicking the "Save changes" button, **before you disconnect your device**. Otherwise your changes will not be transferred to the device.

6 Assign further PAB Devices to the Stand Alone

GHL Doser 2.1 is modular and can be extended with additional *Slave Dosers* and *the KH Director*.

A total of 16 pumps can be controlled independently of each other.

Before adding additional *GHL Slave Dosers* or the *KH Director* to the *GHL Doser 2.1,* a firmware update may be required.

6.1 Requirements

For proper operation, it is important that the *Stand Alone Doser* as a master unit can clearly identify and assign all *Slave Dosers* and the *KH Director*.

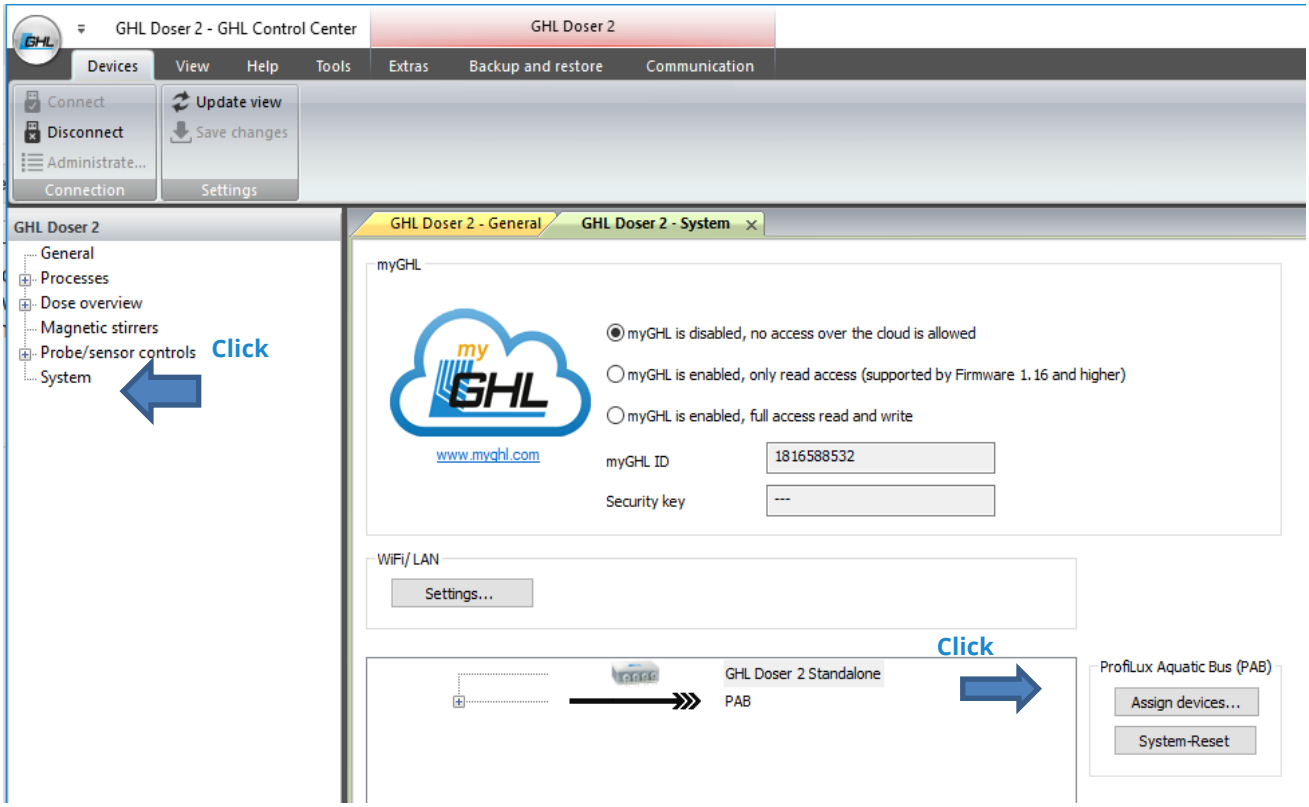
Make sure that the *GHL Doser 2.1* and all other PAB devices are powered ON. Download the free program *GHL Control Center GCC* in the download area at www.aquariumcomputer.com Then connect your *GHL Doser 2.1 Stand Alone* to GCC.

DANGER

- When assigning devices in an existing system, the numbering of the pumps may change (for example, by rearranging the order of the slave devices, re-connecting the PAB cables to another port, etc.).
- Therefore, please make sure that critical devices and functions are deactivated prior to the assignment.
- Only if all pumps have been correctly assigned and checked again see under. 6.3 "Pump numbering", the deactivated devices may be put back into operation.

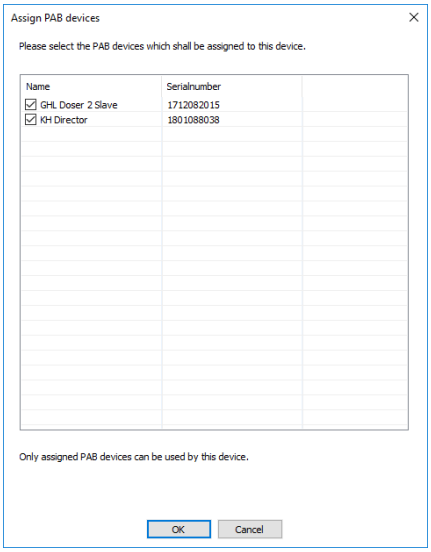
6.2 Assignment

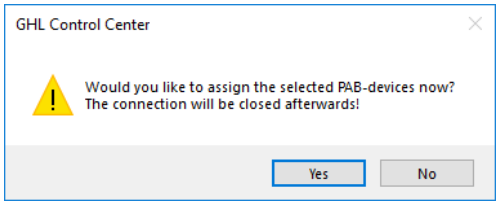
If all *PAB* connections and the power supplies of all devices is ensured at the *PAB*, further *Slave Dosers* can be assigned to the Stand Alone Doser. To do this, click on System in the *GCC* menu and select the menu item *Assign devices*.



The Stand Alone Doser searches all devices connected to the PAB and then displays the serial number of the devices found. Then select the serial numbers of **all** devices that should be assigned to this *Stand Alone Doser* and confirm with *OK*.

The order of the devices determines the numbering of the pumps.

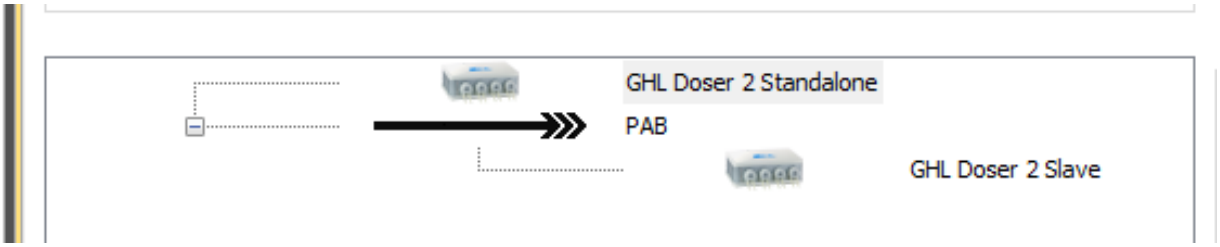




In order to complete the assignment, the connection of the Doser must be disconnected with the *GCC*. Confirm the separation with *Yes*.

Then restore the connection of your *Stand Alone Doser* with the *GCC*, then select the System item again and press the plus sign.

The devices connected via PAB to the Doser 2.1 SA are displayed:



The *Slave Doser* was added to the *Doser 2.1*. In addition to the 4 pumps of the *Stand Alone Doser*, the further pumps of the newly assigned *Slave Doser(s)* are now also available.

6.3 Pump numbering

If additional *Slave Dosers* are to be operated, make sure that one number is not assigned more than once, when numbering the pumps.

DANGER

- If you change resources (add, remove, or exchange of Slave Dosers) you always must newly assign them to the *GHL Doser 2.1*, so that all sensor inputs and pumps can be recognized and accepted by the *GHL Doser 2.1 Stand Alone*.
- To avoid damage, you must control the numbering of the pumps before restarting and adjust them if necessary.
- Only when all pumps have been correctly numbered and checked can the devices be put back into operation.

7 Warranty/Liability

You have a 2-year warranty beginning from invoice date. This applies to material and manufacturing defects.

We guarantee that the supplied products correspond to the specifications and that the products do not have material resp. manufacturing defects. For the accuracy of the manuals, we do not guarantee damages of any kind which result from improper operation or from an unsuitable environment. Furthermore, we do not take over warranty for damages that are caused by a false connection or excessive humidity. We assume no liability for direct damages, indirect damages, consequential damages and third-party damages as far as it is legally permitted. We do not take over guarantee that our product package corresponds to the requirements of the buyer. Our warranty expires if the delivered original product is damaged or modified.

8 Additional Information

8.1 Help and Information

For help or further information, please visit our *Support Forum* at www.aquariumcomputer.com or contact your retailer.

8.2 Firmware-Update

The firmware of your *GHL Doser 2.1* is constantly being further developed. If you want to use new features that are not supported by your current firmware, you can update your *Doser*.

DANGER

- Be sure to back up your data **before** updating!

  You can use the menu item
  "*Backup and Restore*" -> "*Transmit all settings from GHL Doser to file*"
  and load them again after the successful update via "*Transmit from file to GHL Doser*".

For the update, you need the latest firmware and the PC program *GHL Control Center*, both of which can be downloaded free of charge from our homepage www.aquariumcomputer.com in the download area (*Support-> Downloads*), as well as our USB cable.

Instructions for updating firmware can be found from our homepage.

9 Technical Data

The device and its accessories may only be used indoors. Moisture or excessive humidity can lead to malfunctions or damage.

Power supply	Wide range power supply 100 – 240 VAC (50 – 60 Hz), < 0,6 A
Input voltage	24 VDC
Environmental conditions	Operating temperature: 0°C - 40°C / 32°F – 104°F Humidity: Max 80% rel. Humidity non-condensing
Current consumption	2.500 mA max.
pH measurement	BNC input for pH sensor, accuracy 0.1 pH, pH range 3.0 to 10.5 pH
Temperature measurement	BNC input for the supplied digital temperature sensor, accuracy 0.1°C (33.8°F), Measuring range 0.0°C to 40°C (32°F – 104°F)
PC connection	USB Port
PAB ports	2
Dimensions	220 mm (8.66”) x 150 mm (5.9”) x 75 mm (2.95”)

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