 **Open**  
**bioLab**  
**Graz**  
**Austria**



# Open OLGA Bioreactor

by Alexander Murer

Version 1.1:

The idea was to create a modular bioreactor based on off the shelf parts for biohackerspace use and beyond. I spent quite some time on planning how to built the OLGA Bioreactor as simple and robust as possible. All modules are standalone, so they can be updated, automated, removed or easily repaired. The volume is 1 liters and can be upgradet to 2 liters when you use a bigger acrylic mantle + 2 liters duran vessel. All media touching parts can be autoclaved. Thanks to Kilobaser for the support.

#### Reactor:

Vessel (Duran Mixing and connection wide mouth Cap GLS 80 with 4 connection ports; 10mm glass stirrer, 170€ )

[http://www.durangroup.com/fileadmin/downloads/laborglas/DURAN\\_Double\\_Walled\\_bottle\\_GLS\\_80-online-e.pdf](http://www.durangroup.com/fileadmin/downloads/laborglas/DURAN_Double_Walled_bottle_GLS_80-online-e.pdf)

Additional parts: silicone & ptfe tubes, caps, filter, steel tubes... (100€?)

#### Stirring:

Stirrer (Chincan, 350€)

[https://www.alibaba.com/product-detail/MS-40-20-Hot-Sale-Laboratory\\_60529782854.html?spm=a2700.7724838.2017115.1.3c93b0954LRFRH](https://www.alibaba.com/product-detail/MS-40-20-Hot-Sale-Laboratory_60529782854.html?spm=a2700.7724838.2017115.1.3c93b0954LRFRH)

Flexible coupling

#### Temperature module:

The OLGA Bioreactor uses a double mantle filled with water to heat the inner vessel. The inner vessel rests on 3 silicon rubber pieces, while a magnetic stirrer in the double mantle ensures even temperature. The hotplate comes with an attached temperature probe, which is inserted into the double mantle through a small hole on top. The bottom consists of 2 aluminium plates. One main plate and a much smaller one which has direct contact with the heat plate, to prevent the very hot heatplate from melting the acrylic. Use epoxy glue to connect everything.



Hotplate (170€)

<https://de.aliexpress.com/item/BX-2F-Digital-Magnetic-Stirrer-17x17cm-Hot-Pannel-Max-4000ml-Stirring-Capacity-Temperature-Control-110V-or/32554054746.html?spm=a2g0s.9042311.0.0.JOLCYZ>

Mantle (Acrylic)

<https://www.plexiglas-shop.com/DE/de/rohr-5tvmaegd8pg/plexiglas-xt-allround-farblos-0a070-gt-gzky5icjb4o~p.html>

Top (Acrylic)

<https://www.plexiglas-shop.com/DE/de/bodenscheiben-fedtydbbk2r/bodenscheiben-plexiglas-xt-allround-0a000-gt-6lppj7luyyy~p.html>

Bottom (Aluminium plates)

[https://www.fixmetall-shop.com/netGen/netGen.pl?lang=de&action=shop\\_kat&kategorie=29&produkttyp=blech](https://www.fixmetall-shop.com/netGen/netGen.pl?lang=de&action=shop_kat&kategorie=29&produkttyp=blech)

Silicone matt (~5mm, same as aluminium plates)

pH control module:

The cycle peristaltic pump constantly pumps media from the main vessel through the flow cell with the inserted pH probe. The smaller dosing pump, connected to a vessel with acid or base starts pumping when the controller measures a certain pH and when the timer is on an active cycle. The timer is used so that the dosing pump only pumps a certain time and then waits before it continues (for example: 1 second pumping then 10 second waiting). Mixing and pumping new media from the main vessel into the flow cell takes a while, so we need some delay on that. The device has 3 switches: 1.) general on/off 2.) pumps on/off, so they don't operate before you set a pH value on the controller 3.) fill tube, which activates the acid/base pump so you can fill the tube to avoid slow dosing when the system was just started.



Controller (Kedida pH Controller, 123€)

<https://de.aliexpress.com/item/KEDIDA-CT-6658-LCD-Industry-PH-Meter-PH-ORP-Controller/32801091676.html?spm=a2g0s.9042311.0.0.JOLCYZ>

Peristaltic pump 1 (Kamoer, 52€)

<https://de.aliexpress.com/item/precision-step-motor-peristaltic-pump-KCS-S/496872551.html?spm=a2g0s.9042311.0.0.TaHpLs>

Peristaltic pump 2 (6€)

<https://de.aliexpress.com/item/colour-mini-DC-Peristaltic-Pump-Micro-Self-priming-Mute-Liquid-Lab-Dosing-Analytical-Water-Pump-silicone/32821579069.html>

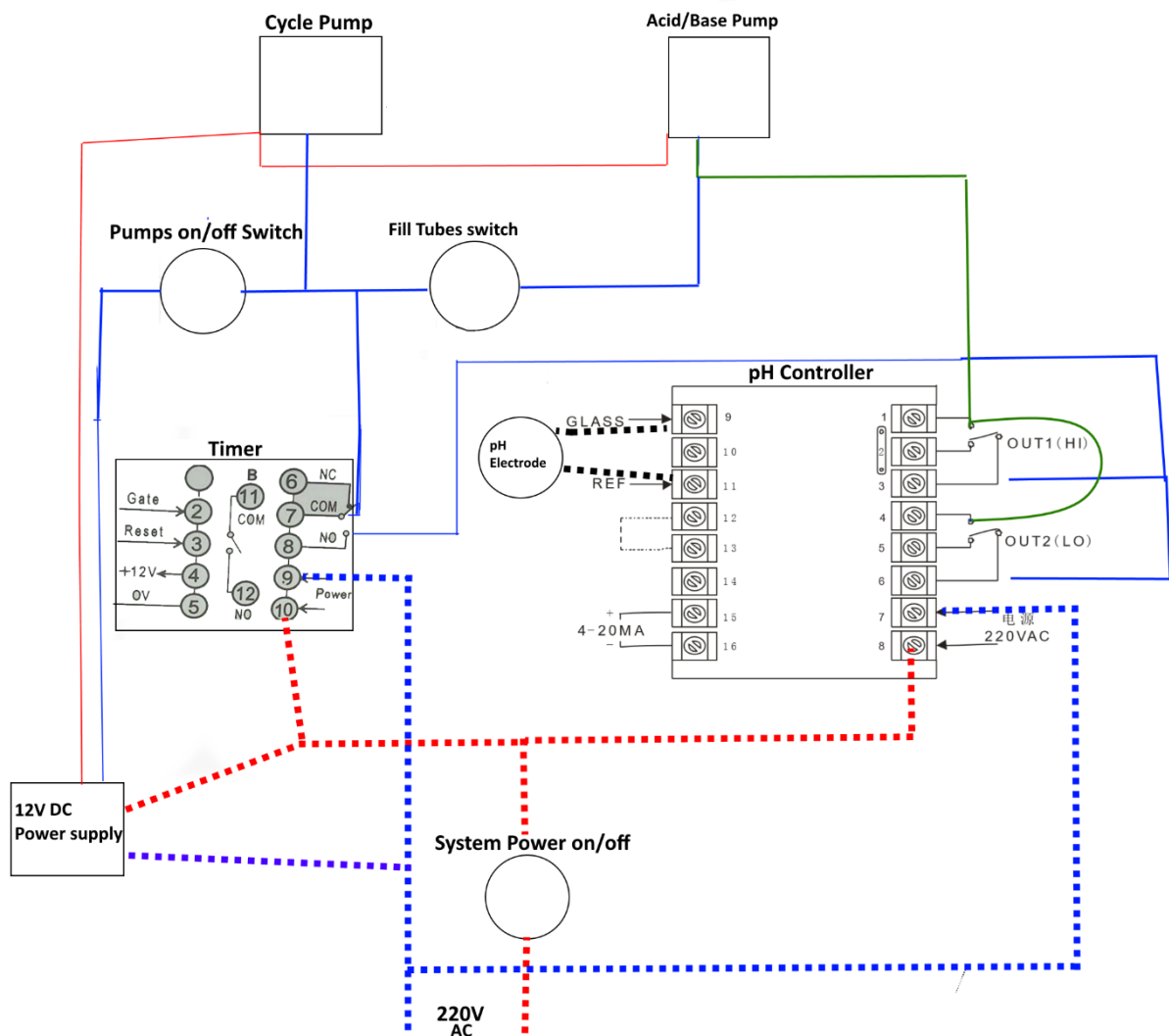
Timer (Inkbird Timer 23€)

<https://www.amazon.de/Inkbird-Zeitschalter-Zeitschaltuhr-Relaisschalter-Zeitsteuerung/dp/B008KV65MS>

Flow through cell (Sentek, 45€)

<http://www.sentek.co.uk/products/accessories-consumables/flow-through-cell/>

pH Probe (~50€)



Air module:

A small air pump presses air through a sterile filter into the main vessel via a ptfе tube to the bottom of the vessel.

Flowmeter:

<https://de.aliexpress.com/item/High-quality-0-1-1-5L-oxygen-air-flow-meter-gas-flowmeter-with-copper-connector/32290568531.html?spm=a2g0s.9042311.0.0.J0LCYZ>

Air pump (5€)

<https://de.aliexpress.com/item/New-DC-12V-Micro-Air-Pump-Electric-Pumps-Mini-Vacuum-Pump-Pumping-Booster-For-Medical-Treatment/32797393859.htm>

Filter, PTFE in-line (30€)

[https://shop.bartelt.at/info562\\_LLG-Inline-Filter\\_lang\\_DE.htm?UID=550059bc6574000000000000](https://shop.bartelt.at/info562_LLG-Inline-Filter_lang_DE.htm?UID=550059bc6574000000000000)