Instruction S-2. Instruction for the use of the OC-Manager 3.0

Supporting information

OC Lab 3.0

Open-Source Chromatography System for Citizen Science

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Instruction S-2. Instruction for the use of the OC-Manager 3.0

Table of contents

Table S-1. Bill of material for the construction of the OC-Lab 3.0

Parts	*Amount*	*Exemplary seller*	*Euro (+VAT)*
Movement			
Stepper motor Nema 14: 200 Steps, 35x36mm, 2.7 V, 1 A	3	www.reprap-3d-printer.com	39,99
Stepper driver Stepsticks A4988	3	www.reprap-3d-printer.com	17,49
Mechanical endstop boards kit (3 end stops)	1	www.reprap-3d-printer.com	8,25
GT2 pulley 20 teeths for 6-mm belt, Ø 5 mm	2	www.reprap-3d-printer.com	8,34
623ZZ ball bearing: 3x10x4 mm	4	www.reprap-3d-printer.com	1,34
Igus RJ4JP-01-08 linear bearing	8	www.motedis.com	9,6
GT2 Timing belt 6 mm, 1 m	2	www.motedis.com	3,02
Aluminum rod, Ø 8 mm, 280 mm	2	www.motedis.com	4,34
Aluminum rod, Ø 8 mm, 205 mm	2	www.motedis.com	3,11
Magnets, Ø 8 mm x 3 mm	12	www.amazon.com	6
Trapezgewindemutter - Flansch EBFM 8x1,5 rechts Rotguss	1	www.motedis.com	3,07
Trapezgewindespindel RPTS rechts TR 8x1,5 - L=500mm	1	motedis	12,37
Housing	2	www.motedis.com	6
Aluminum Profile 20x20 2NVS I-Type Slot 5, 270 mm (Y top), with machining M5 on both sides	2	www.motedis.com	5,95
Aluminum Profile 20x20 3N I-Type Slot 5, 270 mm (Y bottom), with machining M5 on both sides	1	www.motedis.com	2,8
Aluminum Profile 20x20 2NVS I-Type Slot 5, 215 mm (X top rear), with machining M5 on both sides	3	www.motedis.com	8,32
Aluminum Profile 20x20 3N I-Type Slot 5, 215 mm (X bottom and top center), with machining M5 on both sides	1	www.motedis.com	2,8
Aluminum Profile 20x20 2NVS I-Type Slot 5, 214 mm (X top front)	4	www.motedis.com	11,12
Aluminum Profile 20x20 2NVS I-Type Slot 5, 210 mm (Z edges), with machining M5 on both sides	2	www.motedis.com	5,51
Aluminum Profile 20x20 3N I-Type Slot 5, 210 mm (Z center), with machining M5 on both sides	Pack of 50	www.motedis.com	9,25

Table S-1. Bill of material for the construction of the OC-Lab 3.0

T-nut (sliding nut) (M5) with spring ball, with guidance I-Type Slot 5	Pack of 20	www.motedis.com	3,75
T-nut (sliding nut) (M4) with spring ball, with guidance I-Type Slot 5	Pack of 10	www.motedis.com	2
T-nut (sliding nut) (M3) with spring ball, with guidance I-Type Slot 5	Pack of 10	www.motedis.com	23
Cube connector 20-3D I-type slot 5 - 093W202N05R	2	www.motedis.com	1,85
Bracket 20x20 I-type Slot 5 including mounting set - 093W203N05S03	30	www.motedis.com	4,8
Screw M5 x 10, DIN 7380	10	www.motedis.com	1,45
Screw M5 x 6, DIN 7984	4	www.motedis.com	0,6
Screw M4 x 20, DIN 7984	4	www.motedis.com	0,6
Screw M4 x 5, DIN 912	10	www.motedis.com	1,53
Screw M3 x 6, DIN 7984			
		www.kunststoffplattenonline.de	
Panels - Alupanel aluminum brushed 3 mm	2	-	6
10,2x21	2	-	6
14,8x21	1	-	3
21.4x21	1	-	3
10,2x21.4			
		-	
Screws and nuts	pack of 10	www.motedis.com	1,49
Screw M3 x 10 DIN 912	pack of 10	www.motedis.com	1,49
Screw M3 x 12 DIN 912	pack of 10	www.motedis.com	1,49
Screw M3 x 25 DIN 912	pack of 10	local workshop	2
Nut M3	pack of 10	local workshop	1,49
Screw M2 x 10	pack of 10	local workshop	2
Screw M5 x 20	50	local workshop	

Table S-1. Bill of material for the construction of the OC-Lab 3.0

SPAX screw 1.5 x 10	pack of 10	local workshop	2
SPAX screws 2.5 x 10	100	www.motedis.com	9,45
Screw M3 x 8, DIN 912 or DIN EN ISO 7380			
Electronics	1	Rasppishop	57,9
Raspberry Pi 4 Modell B 4GB SDRAM	1	www.amazon.com	37,5
Arduino Mega 2560	1	www.amazon.com	33,25
Ramps 1.4 board	1	www.conrad.de	16
Power supply, 12 V, 5 A (Ramps 1.4 and LED board)	Pack of 20	www.conrad.de	7
Jumper wire female-to-female, 25 cm	Pack of 20	www.conrad.de	7
Jumper wire male-to-female, 15 cm	2	www.amazon.com	9,5
HDMI cable, 0,5 m	pack of 10	www.amazon.com	7
DC Power Jack Socket, 5.5 x 2.1 mm	1	adafruit.com	10
USB C Round Panel Mount Extension Cable - 30cm, Adafruit product ID 4218	1	adafruit.com	5
Micro B HDMI Round Panel Mount Extension Cable - 30 cm, Adafruit product ID: 4217	1	rs-online.de	9,31
Polymide Heizfolie 12 V/DC 48 W (L x B) 60 mm x 60 mm product ID 1484113 - 62	1	rs-online.de	2,7
NTC Thermistor, 100kΩ, 75mW, RS product ID 151-243	1	www.reichelt.de	0,07
Socket housing, 1x4-pin, Reichelt product ID JST XH4P BU	1	www.reichelt.de	0,17
Pin header, straight, 1x4-pin, Reichelt product ID JST XH4P ST	10	www.reichelt.de	0,3
Crimp contact, socket-XH, Reichelt product ID	1	Conrad	10
12v -2A Power Supply	1	Amazon	1,5
12v to 3.5v | 2W | Step-down Power Supply	1	Conrad	5,8
12v to 24v | 2W | Step-up Power supply	1	Amazon	4
Terminal Block Circuit 2x12			
Fluidics			

Table S-1. Bill of material for the construction of the OC-Lab 3.0

LEE VHS Series Valve	1	TheLeeCompany Part Number INKX0514100A	356,28
LEE MINSTAC 062 Atomizer 67.000 Lohm	1	TheLeeCompany Part Number IAZA1200167K	52,55
LEE Torque Wrench	1	Theleecompany Part Number TTTA3201243A	25,09
LEE MINSTAC 062 Safety Screen	1	TheLeeCompany Part Number INMX0350000A	49,07
LEE Spike & Hold Driver	1	TheLeeCompany Part Number IECX0501350A	168,81
LEE EFS - Adapter und Komponenten ADAPTER-062-F X LUER LOCK-F	1	TheLeeCompany Part Number TMRA3202950Z	16,16
LEE MINSTAC Tubing - Schlauch Schlauch mit 2 Fittings 062 MINSTAC .040" ID, L 30 cm, clear	1	TheLeeCompany Part Number TUTC4012930L	29,23
Braun Inkjet Solo 2ml	1	Braun Part Number 4606027V	5
		TOTAL vat included	**1173,85**
		VAT(19%)	223,0315
		Total Net	950,8185

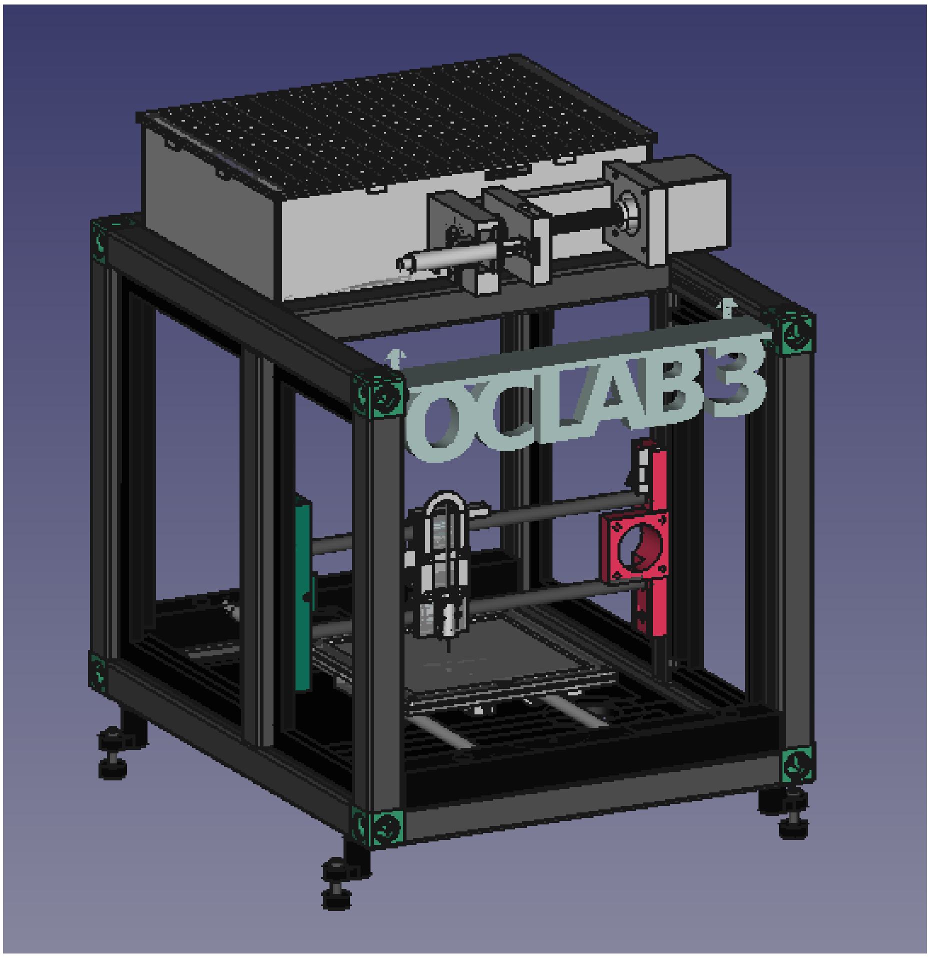
Table S-2. Volume per drop for different nozzles types opening the valve at 1400Hz

Nozzle type	***Volume [µL]***
NØ 0.25mm	0.109
NØ 0.19mm	0.062
NØ 0.13mm	0.028
NØ 0.10mm	0.017
NØ 0.08mm	0.008
NØ 0.05mm	0.004
AL 22000	0.056
AL 67000	0.019

Instruction S-1. Instruction for the assembly of OC-Lab 3.0

OC Lab v3.0

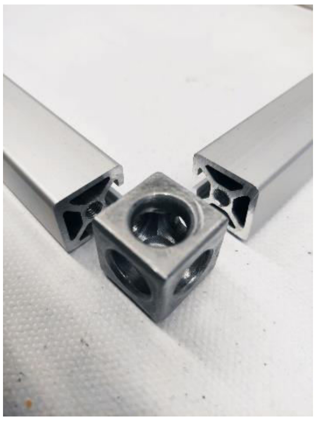
Assembly Guide



Structure

1. Base

Materials	***Qty***
Aluminum Profile 20x20 3N 270 mm	2
Aluminum Profile 20x20 3N 215 mm	2
Cube connector 20-3D I-type slot 5	4
Screw M5 x 10, DIN 7380	8



Procedure

Screw the M5 screws connecting the cube connectors to the ends of the aluminum profiles.

2. Sides

2.1 Corners

Materials	***Qty***
Aluminum Profile 20x20 2NVS	4
Screw M5 x 10, DIN 7380	4

Procedure

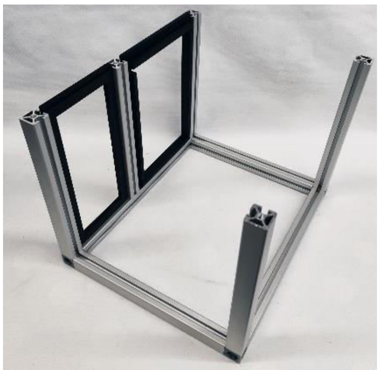
Screw the remaining side of the base connector cubes to the corner of the corner profiles.

2.2 Middle

Materials	***Qty***
Aluminum Profile 20x20 2NVS	2
Aluminum Profile 20x20 3N	2
3D Printed - Wall Support/Left Back	1
3D Printed - Wall Support/Left Front	1
3D Printed - Wall Support/Right Back	1
3D Printed - Wall Support/Right Front	1

Procedure

Slide the 3D prints from the corners into their corresponding places, then slide the aluminum profiles between the front and back 3D parts on each side. Between the 3D Printed parts slide the 3N Aluminum profile.

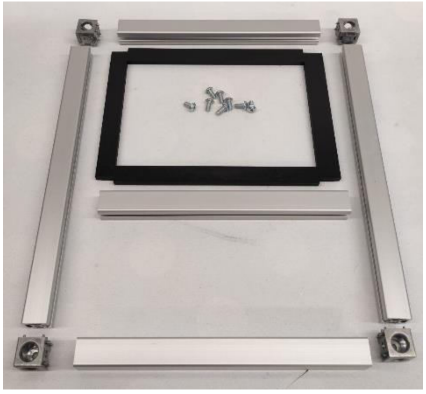


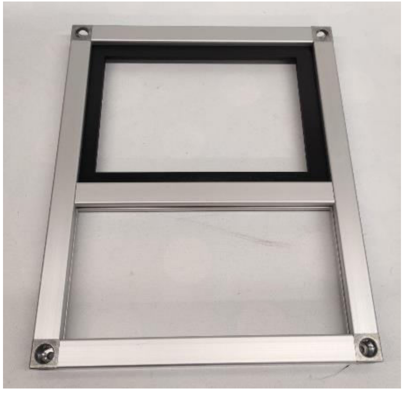
3. Top

Materials	***Qty***
Aluminum Profile 20x20 2NVS	4
Aluminum Profile 20x20 3N	1
Cube connector 20-3D I-type slot 5	4
Screw M5 x 10, DIN 7380	8
3D Printed - Electronics Box Support/Right Front	1

Procedure

Screw the 2 largest aluminum profile using the cube connectors. Slide the 3D print AND the 3N Aluminum profile. Screw the remaining aluminum profile. Finally, screw the top to the already built structure (sides and base). Optional: In order to have more stability, using 2 Bracket 20/20 and 4 M5 screws, connect the middle aluminum profile with the ones in the sides.





4. Feet

Materials	***Qty***
3D Printed - Leg	4
3D Printed - Feet	4
M5 Sliding T-Nut	4
M5 Nut	4
Screw M5 x 20	4
Screw M5 x 10	4

Procedure

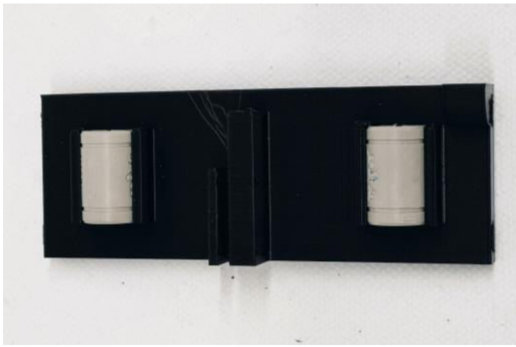
Insert the M5 nut into the groove of the 3D leg part and screw in the M5 x 20 bolt. Place the Sliding T-Nut into the aluminum profiles in the bottom of the structure and then screw in using the screw M5 x 10. Finally, place the foot on the end of the M5 x 20 screw.



5. Axes

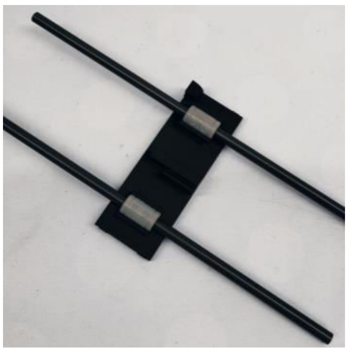
5.1 Y-axis

Materials	***Qty***
3D Printed - Y-axis-Back	1
3D Printed - Y-axis-Front	1
3D Printed or Alu - Plate Hold	1
Screw M5 x 10, DIN 7380	4
M5 Sliding T-Nut	4
Linear bearing	2
Ball bearing: 3x10x4 mm	2
Screw M2 x 20, DIN 7380	1
M2 nut	1
Aluminum rod, Ø 8 mm, 290 mm	2

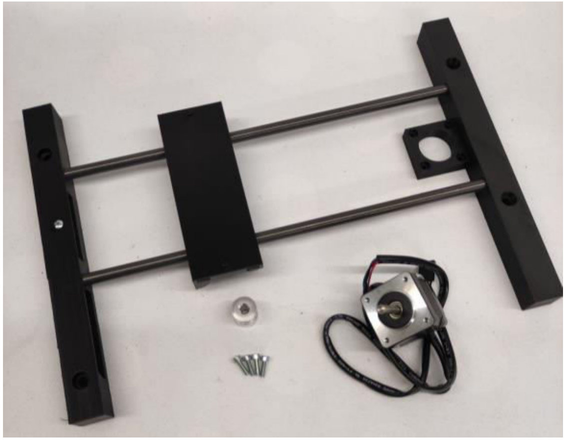
Procedure

Insert the linear bearings in the slots of the Plate Hold. Then slide the aluminum rods inside the bearings. Insert the ball bearing into the middle cave in the front axis piece. Pass the M2 bolt through them and use the M2 nut to retain them. Connect the front and the back of the axis.



5.2 Y-Motor

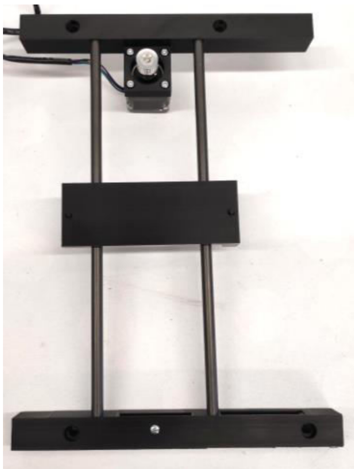
Materials	***Qty***
Y-axis	1
Motor NEMA N14	1
Timing belt 6 mm, 50 mm	1
GT2 pulley	1
Screw M2 X 15	4
Screw M3 X 20	4
M3 Sliding T-Nut	4

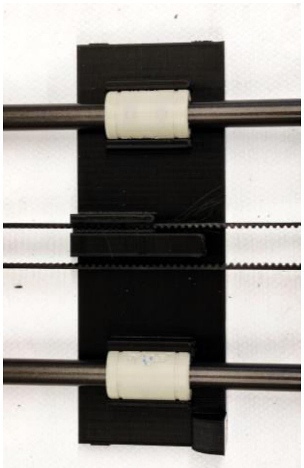


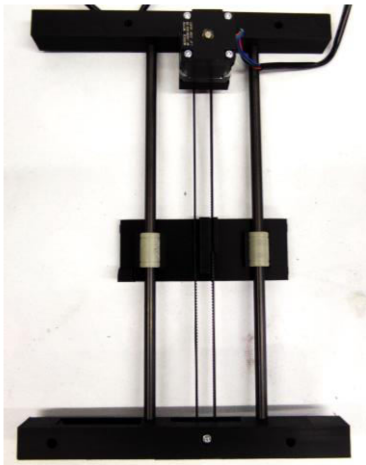
Procedure

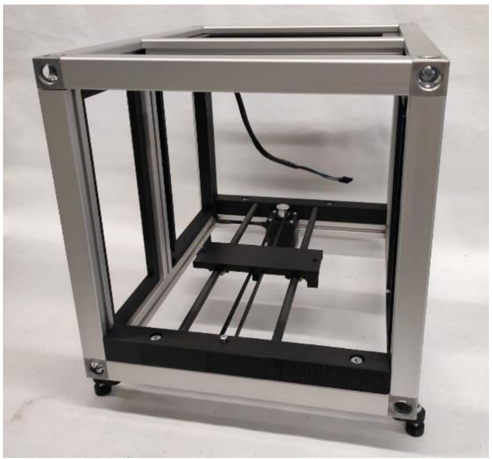
Screw the GT2 pulley to the motor and then the motor using the M2 screws to the rear of the Y-axis.

Run the timing belt between the motor and the ball bearing at the front of the Y-axis. Fasten the ends of the belt to the back of the plate hold. Finally, place the axle in the frame and screw it with the sliding T-nut and M3 screws.





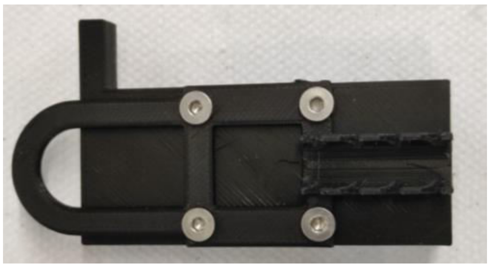




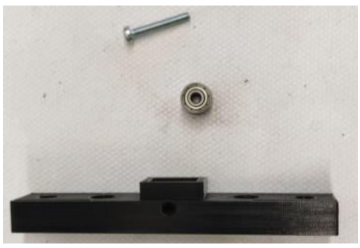
5.2 X-axis

Materials	Qty
Motor Nema 17	1
GT2 pulley	1
Screw M2 x 15	4
Ball bearing: 3x10x4 mm	2
Screw M2 x 25	1
Aluminum rod, Ø 8 mm, 205 mm	2
Linear bearing	2
Timing belt 6 mm, 50 mm	1
Screw M5 x 10	4
M5 Sliding T-Nut	4
Screw M2 x 5	4
3D Printed - X Axis Left	1
3D Printed - X Axis Right	1
3D Printed - X Hold	1
3D Printed - Valve Hold	1
3D Printed - Valve Coat	1

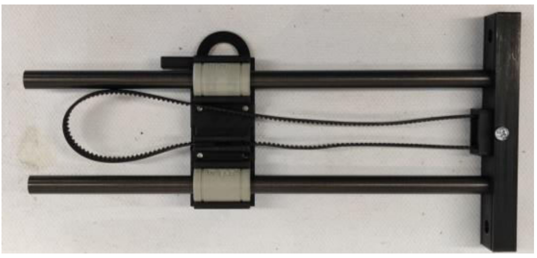
Using the M2 x 5 screws, fix the 3D printed valve hold to the 'x hold'. Place the linear bearings on the back of 'X hold'.

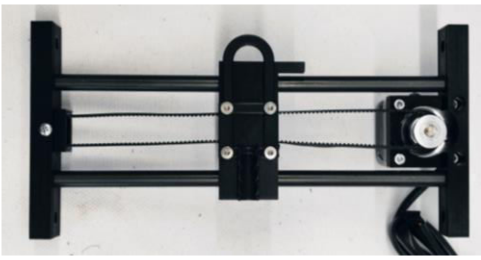


Inside the cavity of the 'X-Axis-Left' part, place the bearings and tighten them with the M2 x 20 and a nut.

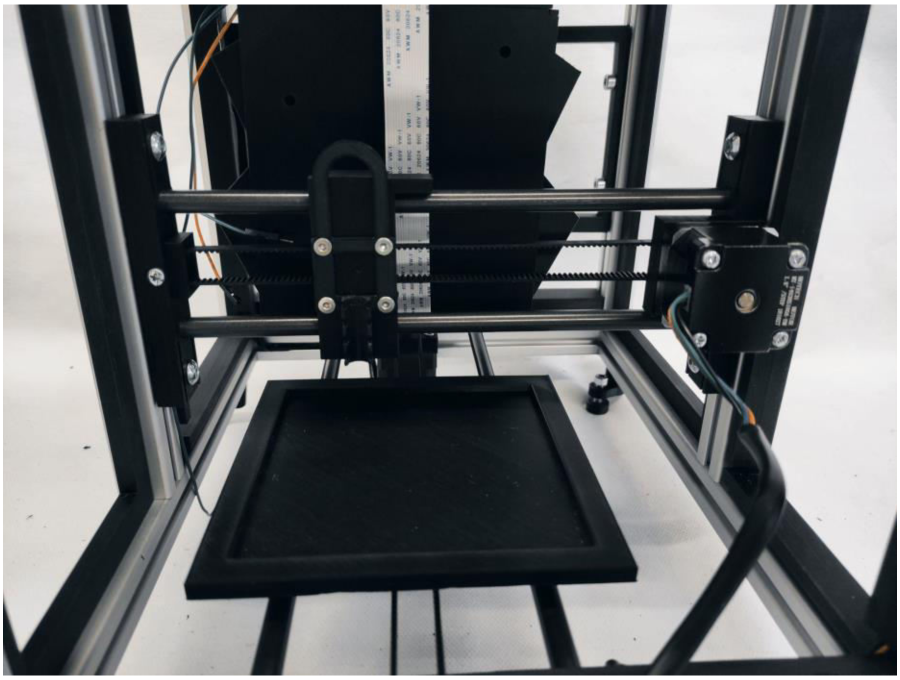


Place the timing belt and then the motor and attach it using M2 screws.



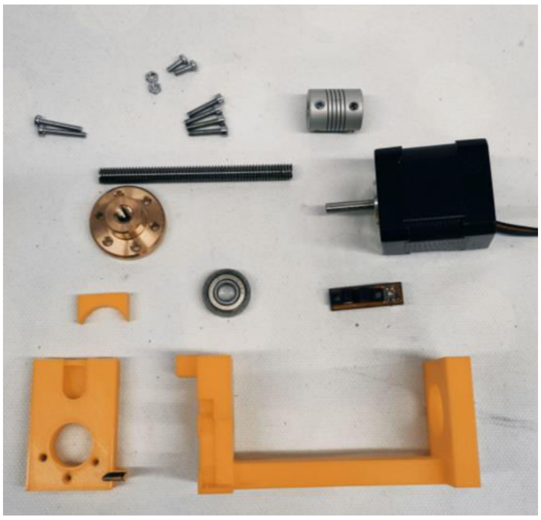


Finally fix the finished shaft to the frame, using m5 bolts and t-nut.



6. Syringe

Materials	**Qty**
Motor Nema 17	1
Trapezoidal threaded 8x1.5x120mm	1
Trapezoidal lead screw nut 8mm	1
Ball Bearing 608ZZ	1
Shafts clutch Mot D20L25, 5 / 8mm	1
Optical Endstop	1
Screw M2 x 10	2
Screw M2 x 15	4



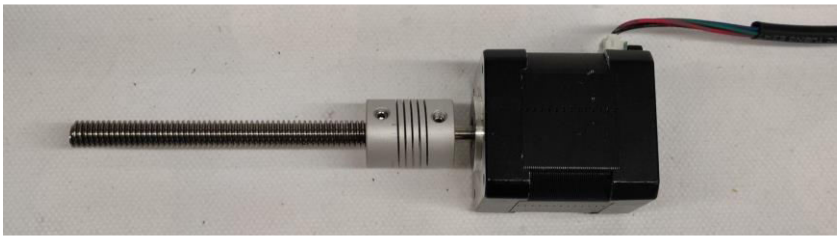
Screw M2 x 25	3
3D Printed - Pump Main Structure	1
3D Printed - Syringe Pusher	1
3D Printed - Bearing Cover	1

6.1 Front

Place the bearing on the front and the 3D printed cover piece on top of it. Insert both into the main structure.

6.2 Motor

Prepare the motor by fitting one end of the shaft clutch to the shaft and the other to the trapezoidal thread.



6.3 Pusher

Using 3 M2 screws, fit the pusher to the trapezoidal screw.

Fit nuts to tighten

6.4 Assembling

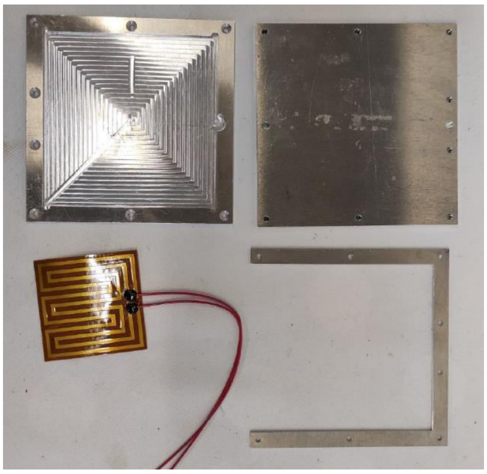
Insert the trapezoidal screw shaft into the main frame through the pusher. Screw the motor to the frame. Put the limit switch in place and adjust using 2 screws. Insert the trapezoidal screw shaft into the main frame through the pusher. Screw the motor to the frame. Put the limit switch in place and adjust using 2 M2 x 10 screws.

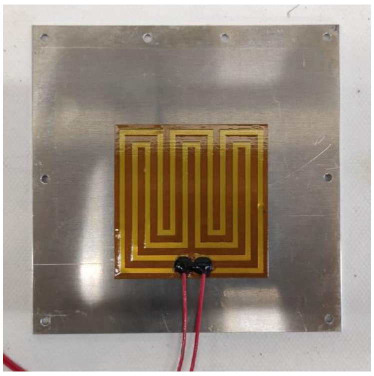
Finally, to screw using 2 M2 screws to the electronics box. (Discussed in the next section).

7. Plate Holder

7.1 Aluminum Plate

Materials	***Qty***
Aluminum Plate - Bottom	1
Aluminum Plate - Middle	1
Aluminum Plate - Top	1
Heating Mat	1
Screws Plate	6

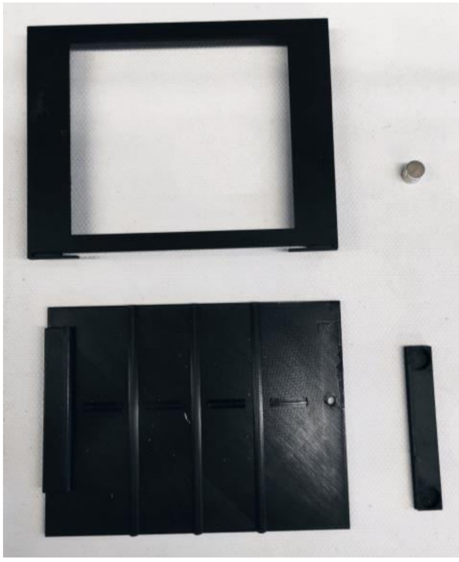




Glue the heating mat at the back of the "Aluminum Plate - Top". Then stack the bottom and middle and screw them.

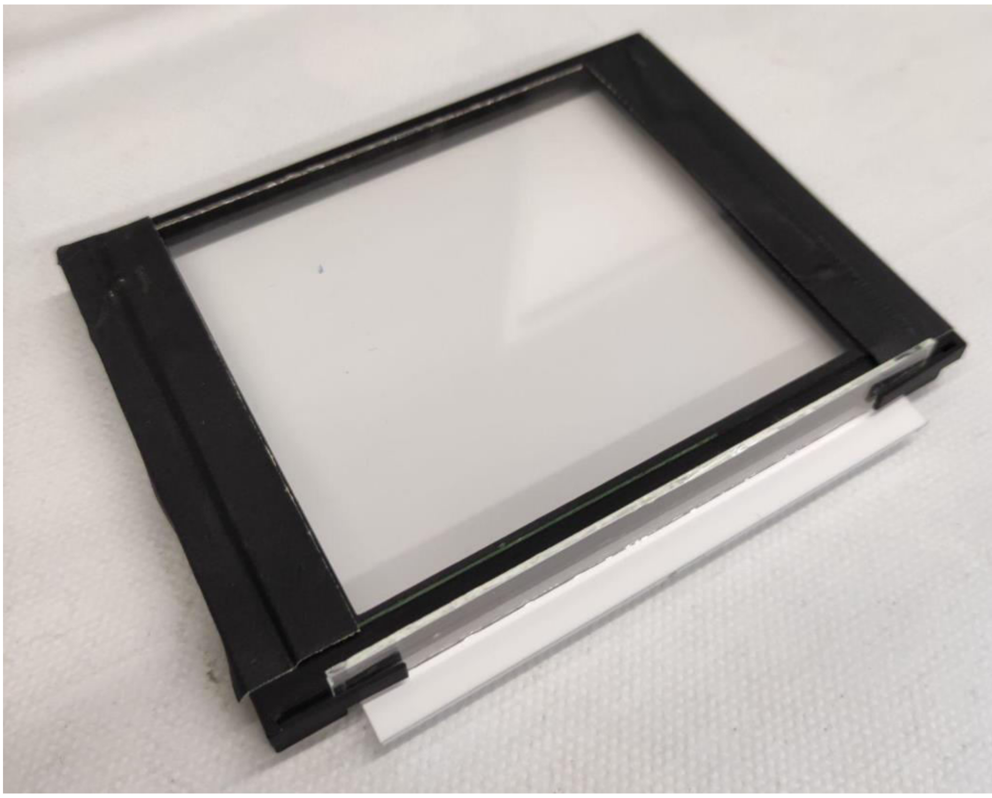
7.2 Development Chamber

Materials	***Qty***
3D Printed Development - Bottom	1
3D Printed Development - Cover	1
3D Printed Development - Push	1
Glass 8.5x10cm	1
Glass 1.5x12cm	1
Magnet 8x3mm	4



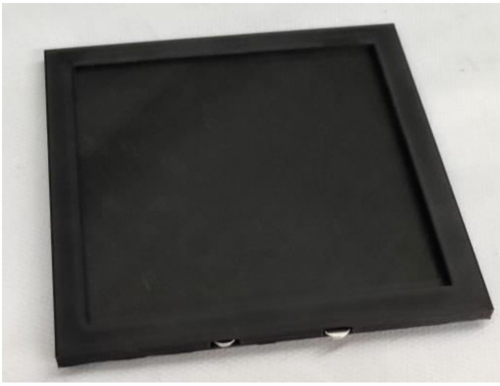
Glue the 8.5x10cm glass to the top of the development cover, then glue 2 magnets to the development push and 2 to the development-bottom, so that the magnets from the development-push and bottom attract.

The 1.5x12cm should be positioned in the front of the cover, so no fumes can't go out of the development chamber when it is in operation.



7.3 Sample Application Plate Holder

Materials	***Qty***
3D Printed SampleApp - Bottom	1
Magnet 8x3mm	4



Insert the magnets to the sides of the sample application plate holder.

7.4 Plates Positioning

Each of the plates have a corresponding position over the ‘Plate Hold’ use the holes under the Bottoms plates (Sample-App, Development Chamber) and the extrusion on the plate support to position them correctly

Electronics

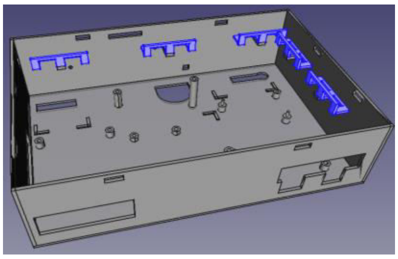
1. Electronic Box

1.1 Preparation

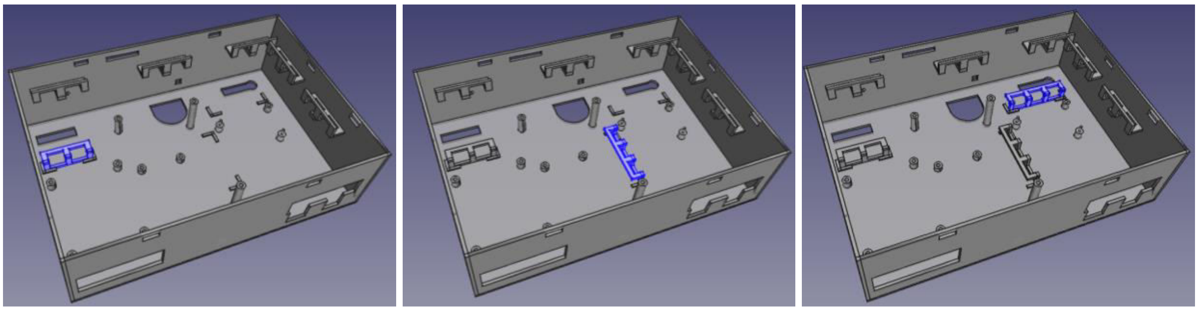
Materials	*Qty*
3D Printed - ElectronicBox	1
3D Printed - CableChannelWall	5
3D Printed - CableChannelBottomMiddle	1
3D Printed - CableChannelBottomRight	1
3D Printed - CableChannelBottomLeft	1
Super Glue	

Procedure

1. Using Super Glue, attach the 5 cable channels of the walls to their supports as shown in the picture.

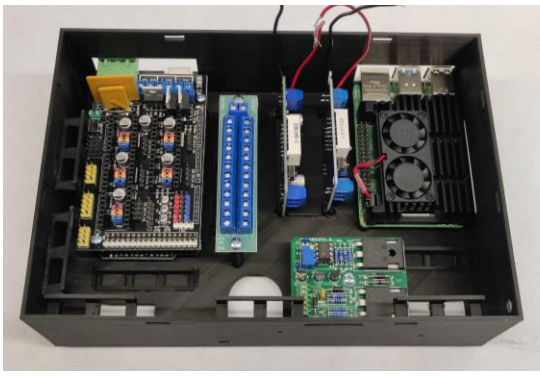


2. Glue the bottom cable channels as shown in the following sequence. Try to follow the reference print on the electronics box.

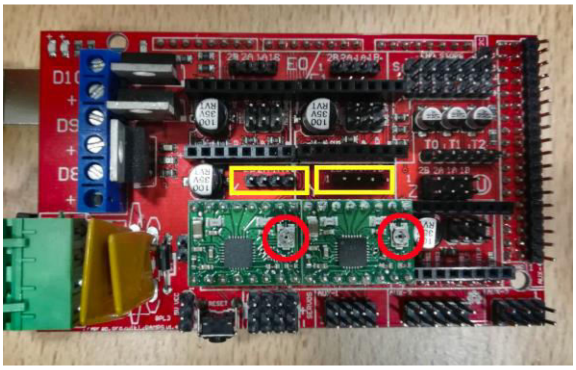


1.2 Placement

Materials	***Qty***
Arduino Mega 2560	1
Ramps 1.4v	1
Step-Up Power Supply	1
Step-Down Power Supply	1
Lee Spike and Hold Circuit	1
Power distributor V 2 x 12	1

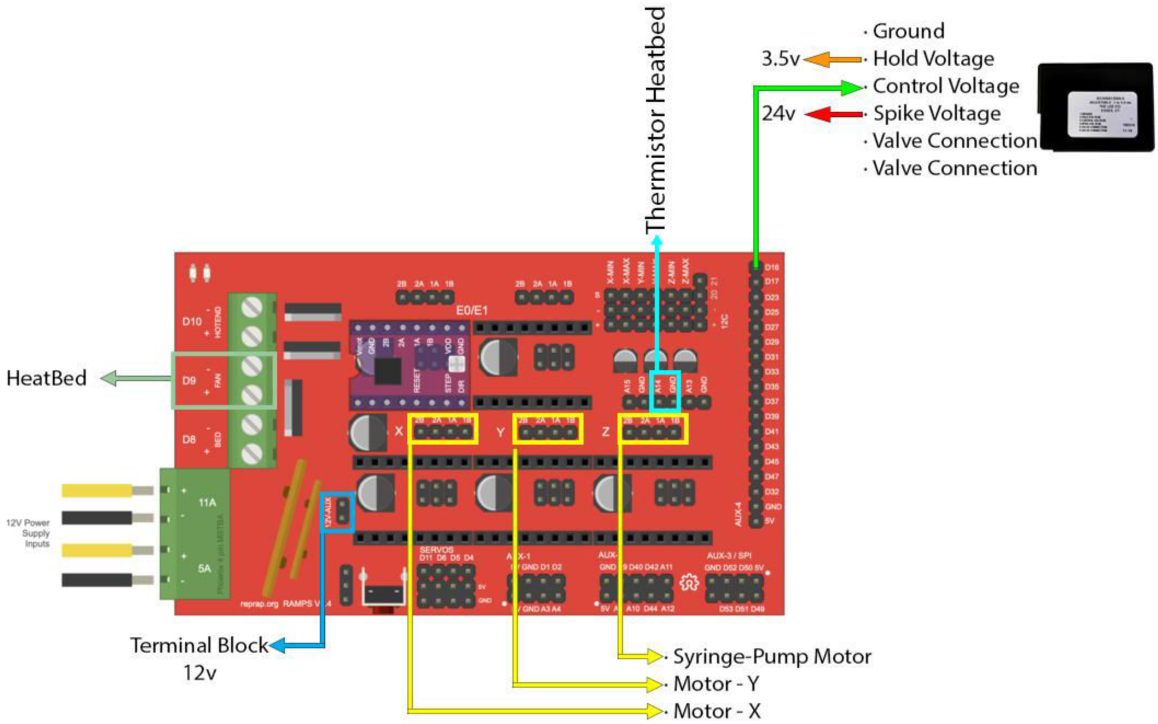


1.3 Connection



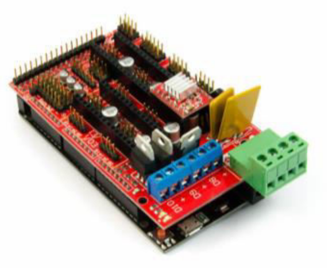
A4988 - Ramps

Stack 3 A4988 stepper drivers on top of the RAMPS 1.4 shield (XYZ). ***MAKE SURE THE ORIENTATION IS CORRECT AS SHOWN BELOW!*** The potential meter (outlined in red on the right picture below) should be facing away from the "D10 D9 D8" side on the RAMPS 1.4 shield



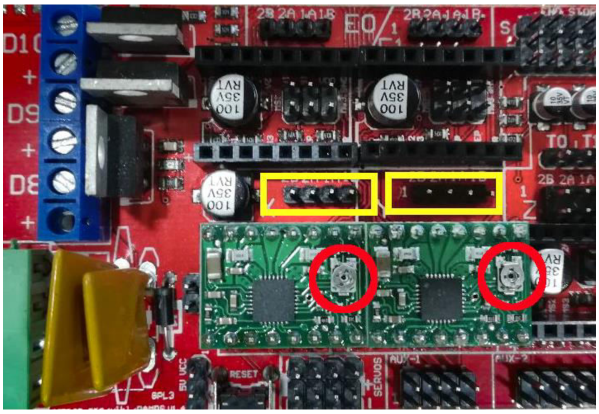
Arduino - Ramps

Stack the RAMPS 1.4 shield on top of the Arduino Mega 2560 board. The Mega 2560 board's USB side is directly under RAMPS 1.4 shields "D8 D9 D10" area.



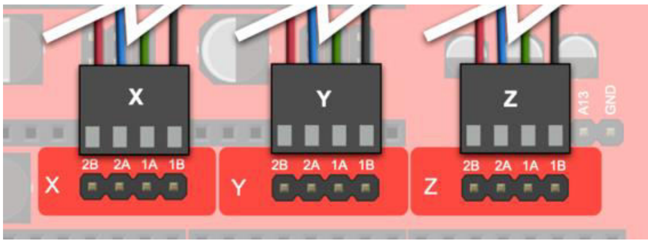
A4988 - Ramps

Next, stack the A4988 stepper drivers on top of the RAMPS 1.4 shield. ***MAKE SURE THE ORIENTATION IS CORRECT AS SHOWN BELOW!*** The potential meter (outlined in red on the right picture below) should be facing away from the "D10 D9 D8" side of the RAMPS 1.4 shield



A4988 - Motors

For the OC-Lab v3, we will need 3 motors, 2 for the axis x-y and one to control the syringe. So we will connect 3 in a row as shown in the image.



The motors must be connected to the pins marked in yellow in the picture above.

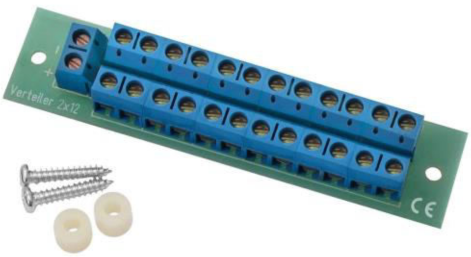
It is important that you connect each motor in the right position, as shown in the image on the side.

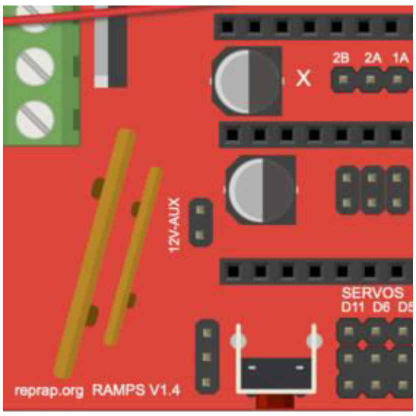
End stops - Ramps

The end stops should be connected to X-Min, Y-Min and Z-Max (X-, Y-, Z-).

Terminal Block - Ramps

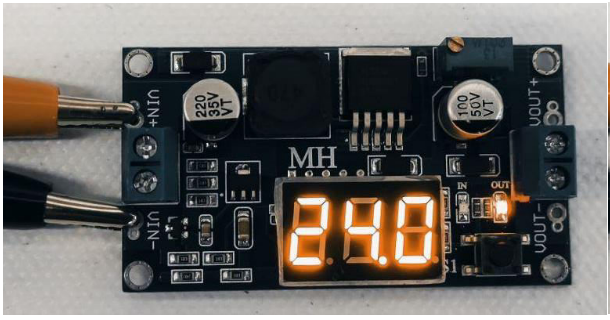
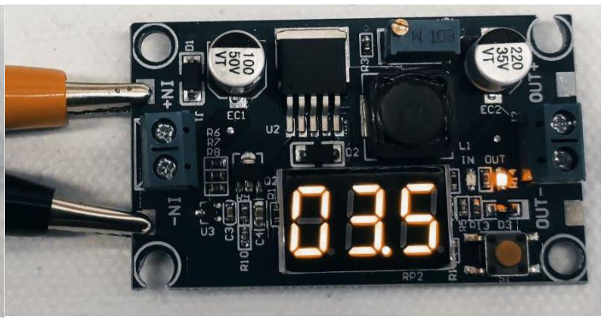
The terminal block circuit provides a constant 12v supply to all the devices connected to it. It gets the power from the ramps board 12v output, which is located near the a4988 stepper connector for the x-Motor. We need to connect the 12v and AUX ramps output to + and - respectively.





Step-Up & Step-Down power supply - Terminal Block

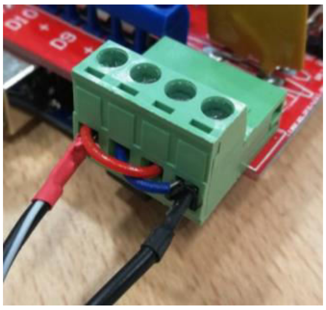
Before connecting them to the terminal block they must be calibrated to 3.5 and 24 volts. To do this, connect the input to a 12v source and move the potentiometer until the desired voltages are obtained.

After the calibration is finished, connect them to the terminal block.

Power Supply - Ramps

Place a bridge between the inputs of the ramps in order to get all 4 power connectors connected to the 12v power supply, which is going to get the energy from the line.



Spike and Hold circuit.

We resume the connection on the next table.

Spike and Hold Circuit	to Circuit and PIN
Ground	Output - (from Terminal Block)
Hold Voltage	Output + (from ***Step-Down Power Supply***)
Control Voltage	Pin 16 (from Arduino)
Spike Voltage	Output + (from ***Step-Up Power Supply***)

It is very important not to make a mistake connecting the "Hold Voltage" and "Spike Voltage", as this can damage the valve

In addition, we need to connect the two "Valve Connection" pins to the valve in no particular order.

Installation

The installation process is really simple. You just need to follow the next steps.To run "OC" you will need a Raspberry Pi with a fresh installation of Ubuntu Desktop 21.04 64-bit

Install git

Before we begin with the installation, we need to install git.

```
sudo apt-get update && sudo apt-get -y upgrade
```

```
sudo apt-get install git
```

Clone the git repository

The simplest way to clone a git repository is opening a Terminal (Ctrl+t), then go to the directory where you would like to have the folder that contains all the configuration files of your OC-LAB (and between those, it is included the OC-Manager files too)

E.g.

```
cd ~/Desktop
```

Finally, copy and paste the next command and press enter.

```
git clone https://github.com/ocmanager/oc-manager-v3.git
```

Execute 'install.py'

The next step is to execute a bash script which contains, the necessary softwares to run the OC-Manager. If you close the Terminal open it again (remember, Ctrl+t). Now go to the folder that contains the OC-Lab files, it is cd follow by the path to the folder.

```
cd /path/to/your/OC-files
```

Then execute,

```
python install.py
```

this will install:

```
docker
```

```
docker-compose
```

Now OC-Manager it's installed in your device.

1. User Manual

a. Access OC-Manager 3.0

To access OC-Manager 3.0v you need to open a tab in your explorer and enter to either:

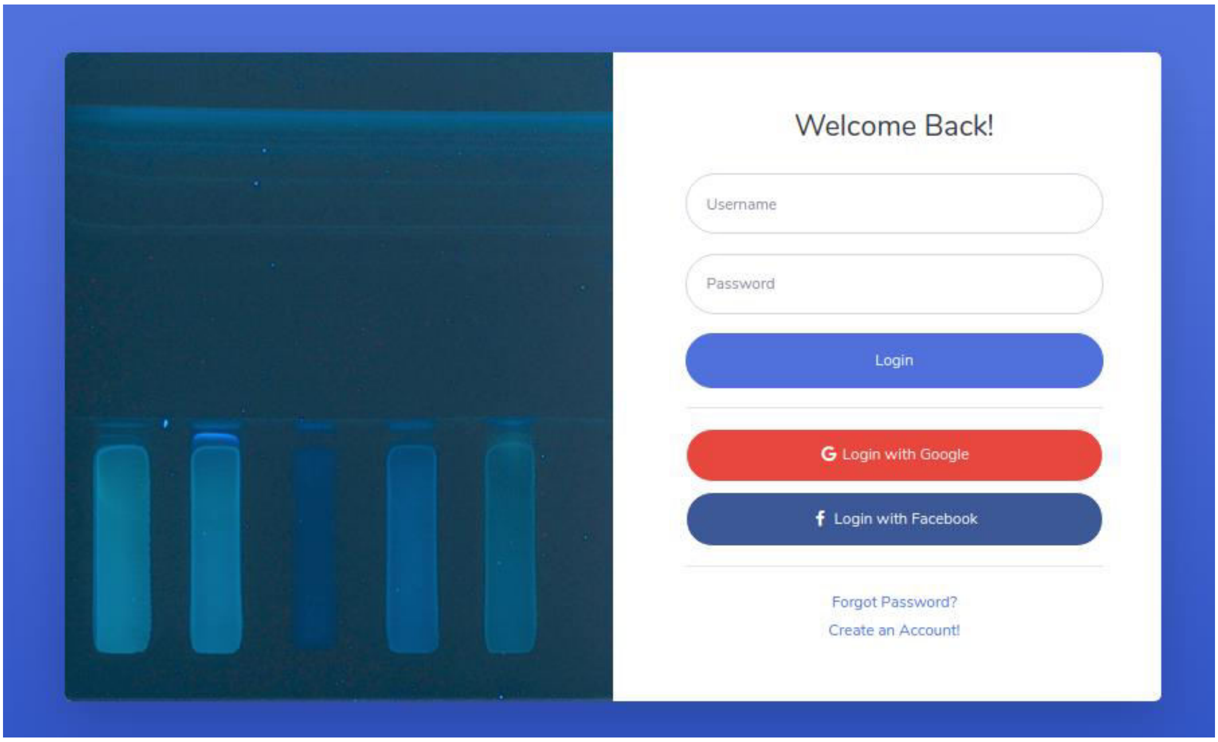
http://127.0.0.1:8000/

Instruction S-2. Instruction for the use of the OC-Manager 3.0

http://localhost:8000/

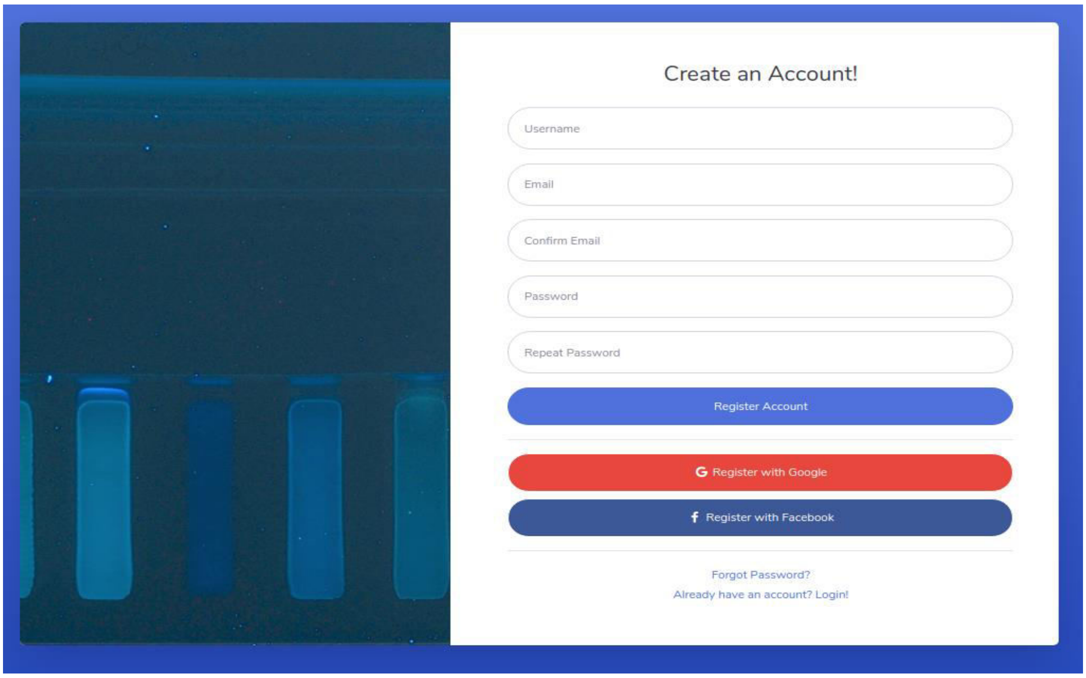
b. Register

The '***login screen***' of OC-Manager 3.0, will be displayed in your explorer.



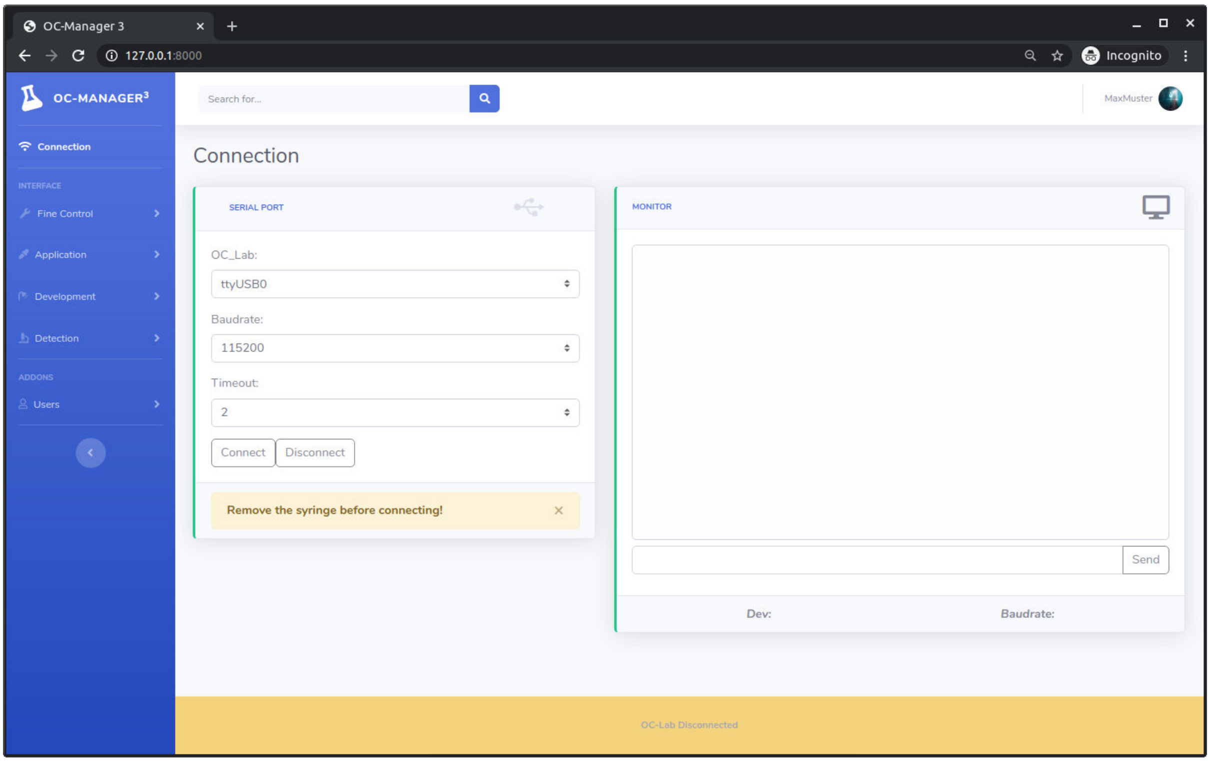
To create an account, click 'Create an Account' on the bottom region of the login screen.

After doing this, the '***Register screen***' will be shown. Please fill all the fields in order to create a new Account, afterwards press Register Account. If every field was filled with valid data the '***Connection Screen***' should be visible by now



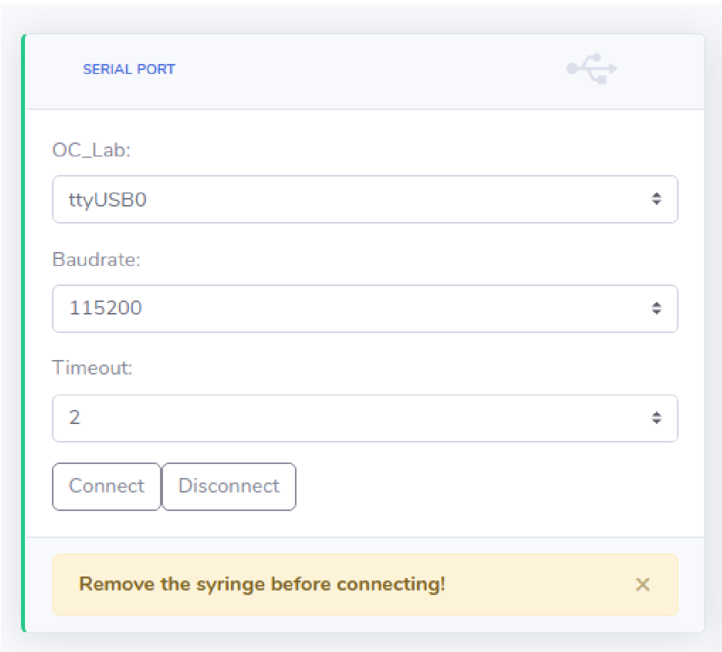
.

c. Connection



The connection screen is used to connect to the OC-Lab v3, the machine will communicate via USB with the app. All interaction between the App and OC-Lab will be visible in the monitor window.

To Connect with the OC-Lab first select the device on the OC_Lab's drop-down list.



The baud rate or Symbol rate, is related with the connection speed, a slow baud rate will slow down the speed of reaction of our system, if it is set too high, it could produce errors in the messages received and sent. Please leave it in default option, 115200. *More here.*

The timeout is the maximum time in seconds that the app will wait to give a response. Please leave it in default option, ***2.*** More here.

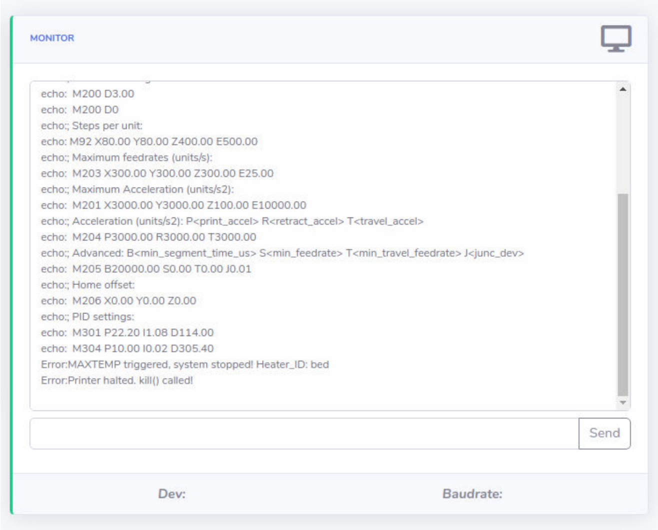
After setting every field,

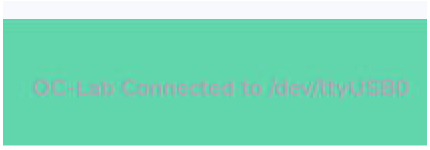
it is important to remove the syringe from the syringe pump

So that the machine can measure the reference pressure.

Please press the Connect button to send a connection request to OC-Lab. The successful established connection is notable because the app will start printing the text sent by the machine on the '**Monitor card'** on the right, and also because the Connection Bar down below the screen will turn to green and it will display the name of the device to which the app has been connected.

This bar is visible on every screen of the app.

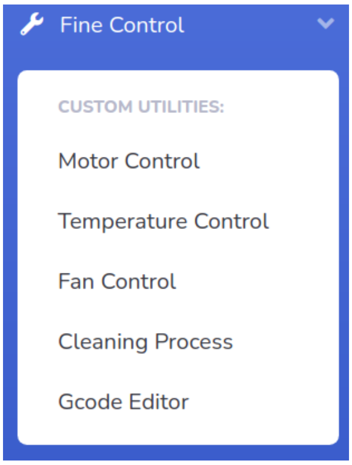




After following the previous steps the connection should have been established and the machine will be ready to work. You can test it by sending 'G28' to the machine using the dialog box located in the bottom of the monitor card, after the machine receives this command, it should start moving.

d. Fine Control

On the left side of your window' explorer, a blue panel with all the different tools of OC-Manager should be visible. One of them is ***'fine control***', which if you click on it, you will see a dropdown list with the following tools.



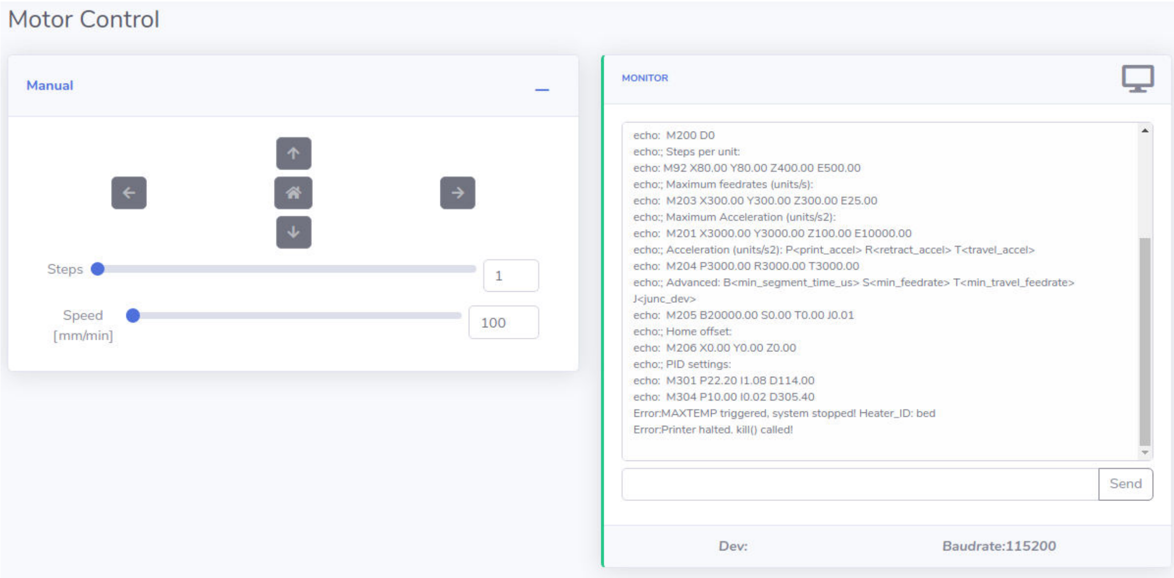
1. Motor Control
2. Temperature Control
3. Fan Control
4. Cleaning Process
5. Gcode Editor

1. Motor Control

Motor control is a simple interface to move the motors a certain amount of mm at a certain speed, the motors will move in a specified direction by clicking on the arrows.

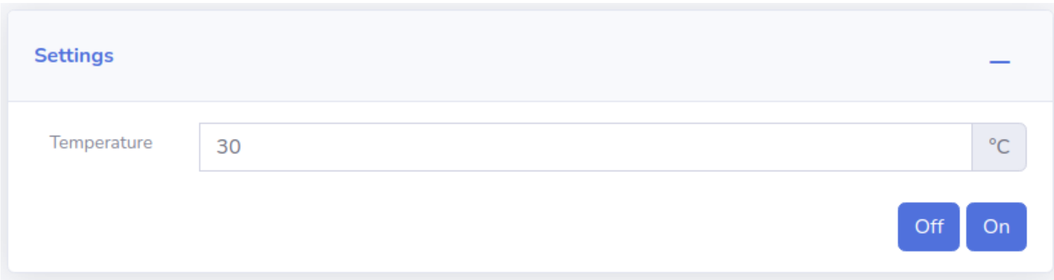
We can also use the monitor to send G-codes. More related G-codes [here]

The ***'home button'*** between the arrows will move the apparatus into the absolute zero position respective to x and y. This is the position in which both endstops are pressed.



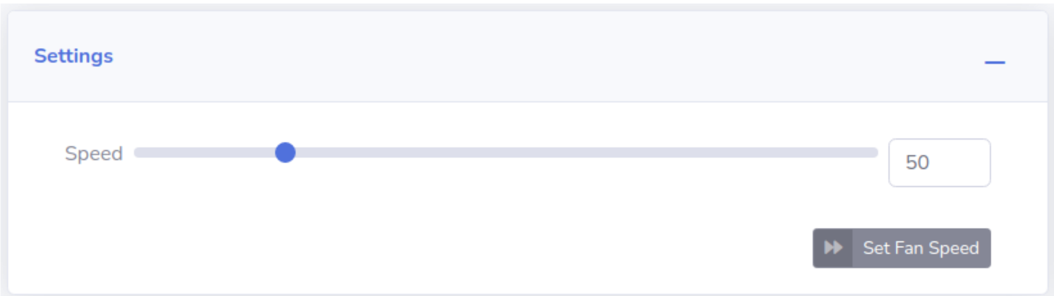
2. Temperature Control

If the heating foil is installed, this window allows the user to heat up the plate hold up to 90°C. Set the desired pressure in the field and activate the heating by pressing the 'On' button. The heating will now be checked every 4 seconds. The communication will be visible at the monitor screen. By pressing the 'Off' button the heating can be deactivated.



3. Fan Control

The Fan Control page is used to turn on and control the speed of the fan in the front of the electronics box. The slider has a range of 0 to 255, where 255 is the maximum speed and 0 is off.



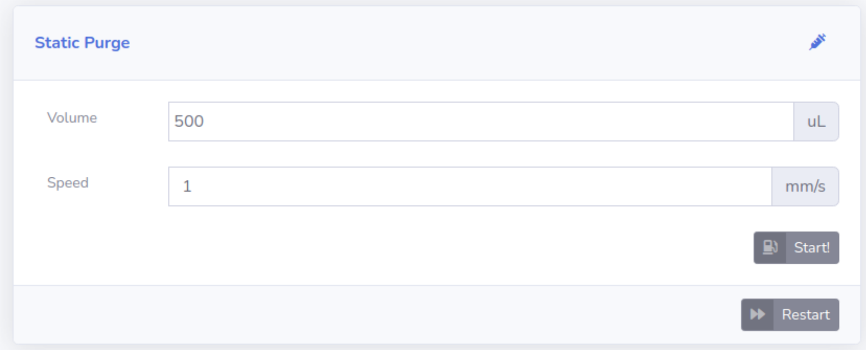
4. Cleaning Process

The cleaning process is a method to clean the system. It consists of two static cleanings and one dynamic cleaning.

The static cleanings are simple extrusions of the liquid in the syringe while the valve is opened. This eliminates most dirt in the system.

The dynamic cleaning is a sweep of the valve's open frequency, while the pump is pressurizing the system.

a. Static Purge



The syringe must be filled with the cleaning solution. To load the syringe press the ***'syringe load'*** button, the popup ***'syringe load window'*** will open. Fill the text field with the amount of liquid that is in the syringe, then press ***'move'.***

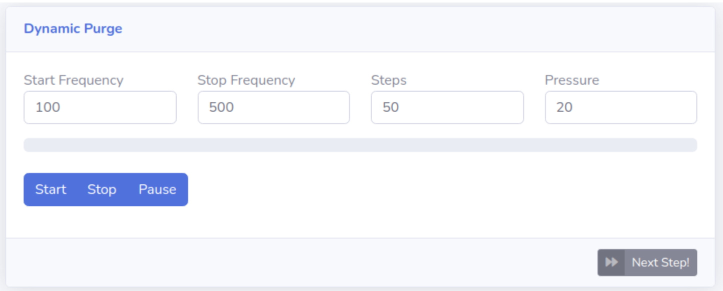
You can also load previously saved volumes.

b. Dynamic Purge

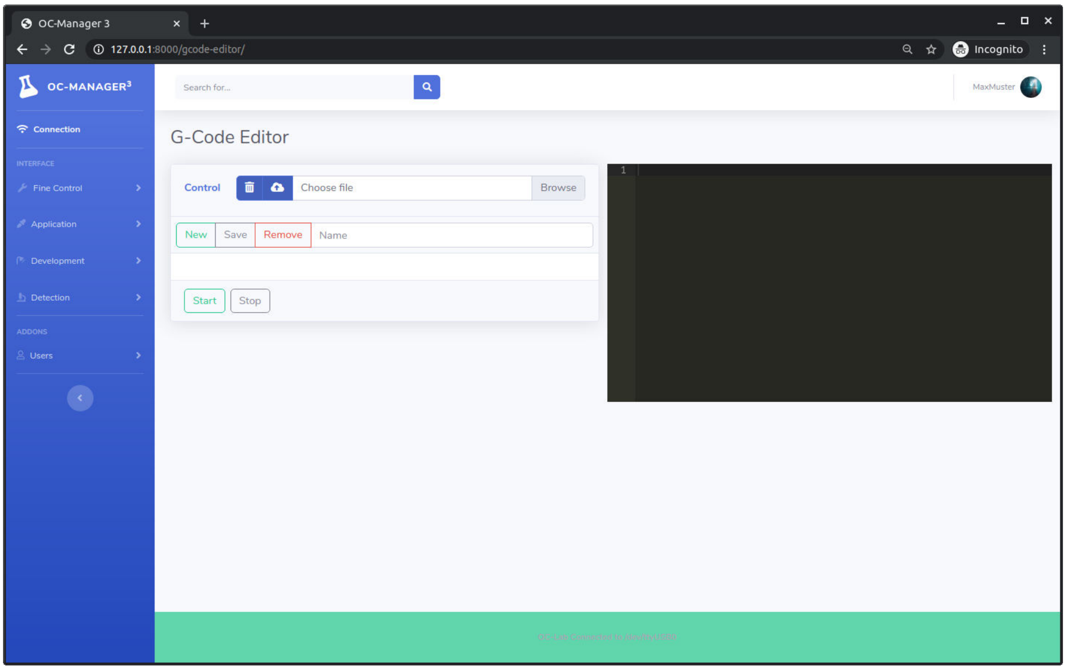
The dynamic purge will activate the pump while the valve is opened at a certain frequency during 5 seconds.

After the 5 seconds have passed, the process will be repeated at a frequency equal to the previous one plus the ***'Step'***.

This will be repeated until the '***Stop Frequency'*** is reached.



5. G-Code Editor

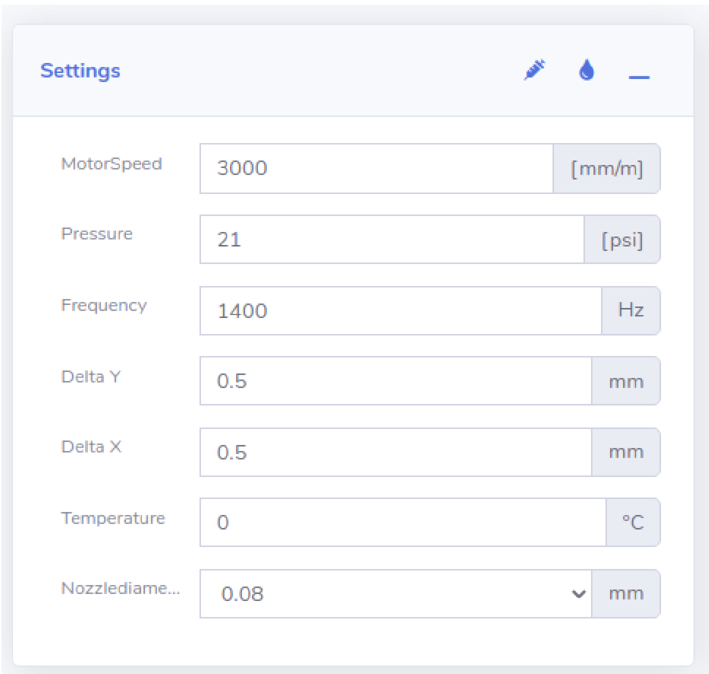


In simple words G-code is the language that OC-Lab understands. More [here]()

The G-Code editor allows to create new G-code files and also to execute them. Files can be created, saved, loaded, removed and also uploaded.

e. Sample Application

The Sample Application page is utilized to configure and apply the samples. There are multiple forms that can be configured.



1. Settings

The Settings window configures all the parameters related to movement of the system.

MotorSpeed	Sets the speed of the movement of the motors.
Pressure	Sets the pressure to be reached before any opening of the valve.
Frequency	Sets the time the valve is opened while applying. The frequency is $\frac{1}{Time_{valveOpen}}$.
Delta Y	Sets the minimum movement between applications in the Y direction.
Delta X	Sets the minimum movement between applications in the X direction.
Temperature	if it differs from 0, the heating is turned on. The machine will wait until it reaches the settled temperature before starting.
Nozzle diameter	Select the nozzle you are using. Will affect the volume calculation.

2. Parameters

The Parameters define all the different settings related with the plate and the bands properties.

It is important to note that all the different parameters listed below are limited to each other. E.g. A plate with a size parameter of 100 mm cannot be solved if the offset is set to (Left=50mm, Right=50mm), because there will be no room for the bands to be built.

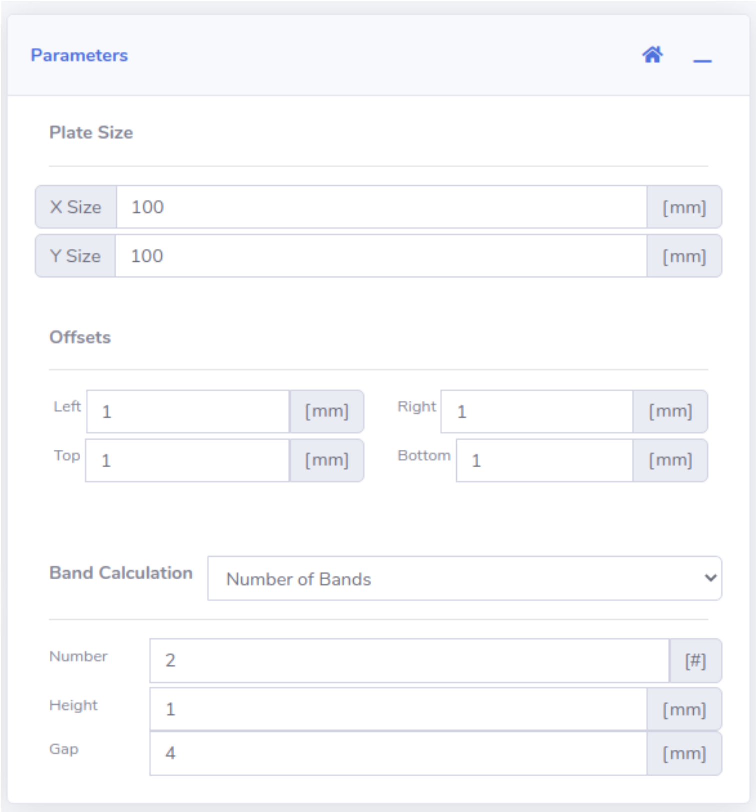
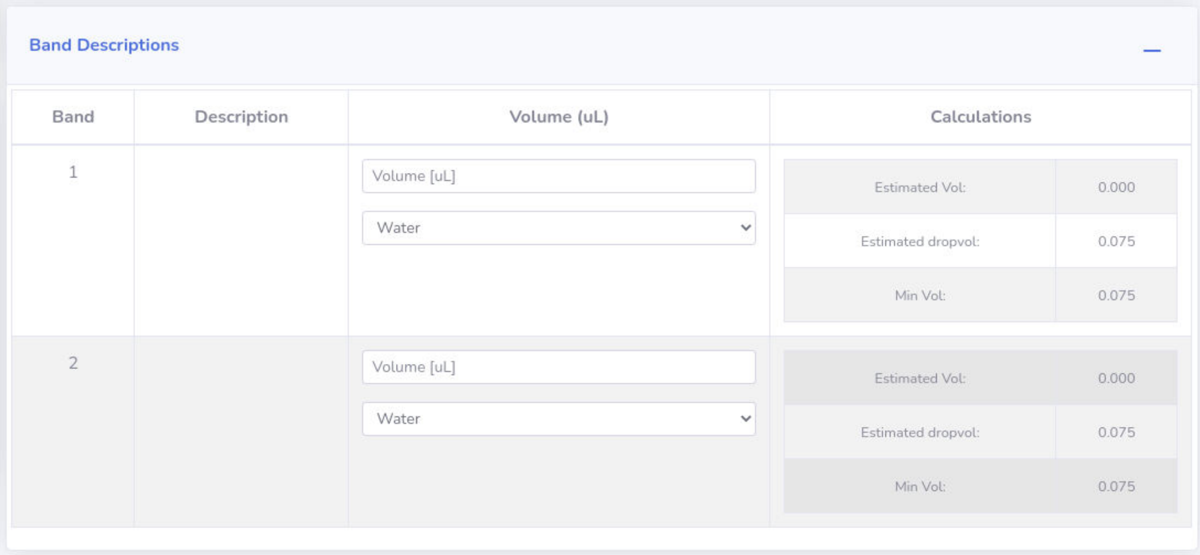


Plate Sizes	Sets the sizes of the plate (X, Y)
Offsets	Sets a margin on the plate in each possible side. (Left, Right, Top, Bottom)
Band Calculation	Number of bands: will create as many bands as specified in ***'Number'*** field
	Length: will create as many bands as possible with the set ***'Length'***
Height	Sets the height of the bands, taking steps of the already configured ***'Delta Y'***, 0 will apply 1 single row.
Gap	Sets the min distance between the bands. This may be increased in order to achieve the number of bands set

3. Bands Description

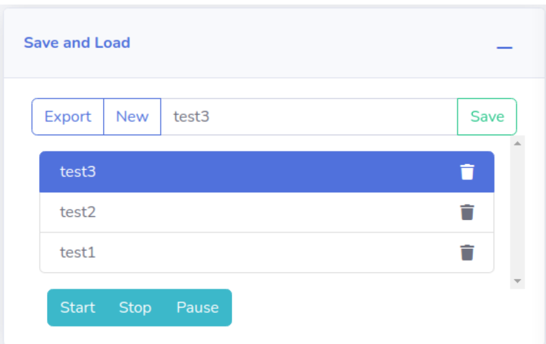
After filling in the above settings, the band description section will display a table with as many rows as bands that have been drawn. In the table the properties related with each band can be settled.

Instruction S-2. Instruction for the use of the OC-Manager 3.0



Band	Displays the band number to which the row refers.
Description	A text box to write a comment or a name to identify the band. It has no effect on the application process.
Volume	The desired volume to be applied in that band must be set. ***The estimated volume*** that will actually be applied is shown, as well as the ***estimated drop volume***. ***The estimated volume*** ejected will always be a multiple of the drop volume. ***The Min Vol***, is the minimum volume that needs to be applied to fulfill a band.
Type	It is used to calculate the drop Volume, therefore the estimated volume. The type must be set with the main component of the sample (Acetone, Water, Methanol) if it's not listed, the specific density and viscosity can be manually filled choosing the **'specific'** option.

4. Save and Load



The properties can be edited, saved, loaded, from and to the database.

To save please fill the text field and press save. To load only click over one of the already saved applications and all the different properties will be automatically filled. The properties can also be updated by changing them and filling the text field with the same name as the application you want to edit.

To create a new application press “New”. After you are finished filling your desired properties, press “Save”.

5. Control

After filling in all fields manually or by loading them, the application process starts after pressing ***‘Start’*** on the control menu. It can also be paused and stopped, with ***‘Pause’*** and ***‘Stop’***

It is important to note that the application process will stop after the following Gcode command is finished and not immediately.

f. Development

‘Development’ has common properties with ***‘Sample App’.*** The differing ones will be explained. For the commons, please refer to the previous section.

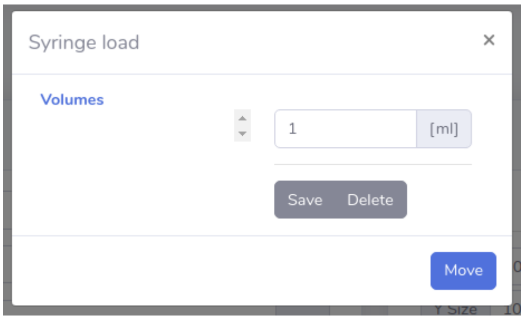
First place the ‘Development chamber’ on top of the plate.

1. Settings

Pressure	The minimum pressure to reach before the valve is opened.
Temperature	Sets the temperature of the plate during the Development. (May delay the start of the process).
Nozzle diameter	Sets the nozzle to be used. Has no influence on the calculation.

Syringe load

After pressing the syringe icon located in the top-right corner, the ***'Syringe load screen'*** will open. Refer to 'Static Purge' for more detailed information.

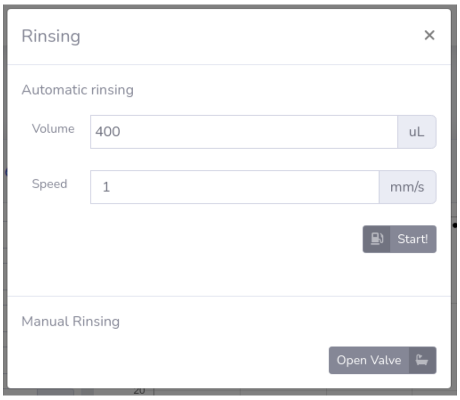


Rinsing

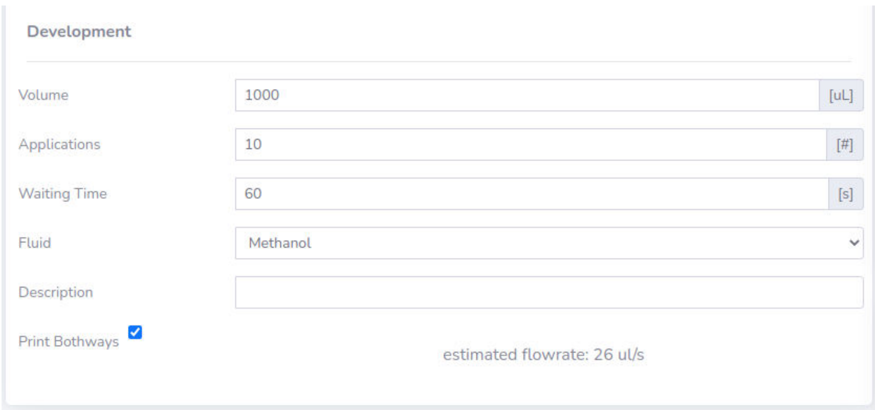
After pressing the drop icon located in the top-right corner, the ***'Rinsing screen'*** will open.

Rinsing is a quick way to remove easily cleanable dirt from the hydraulic system between applications or developments when no highly polluting solvents have been used.

You can rinse automatically a certain volume by pressing Start or open the valve and rinse manually pressing the Syringe.



2. Parameter



For detailed information on Plate Sizes and Offsets refer to Parameters on 'Sample Application'.

Volume	Total amount of volume ejected in the development process
Applications	Sets the number of applications in which the total volume will be applied.
Waiting Time	Sets the sleep time between each Application
Print Bothways	If this option is checked, the fluid will be ejected on the way back also.

Fluid	Sets the main fluid that is used for the development. (Methanol, n-)

3. Save and Load

Works similar to the Sample Application. It also has the option to export and import a file with the configurations.