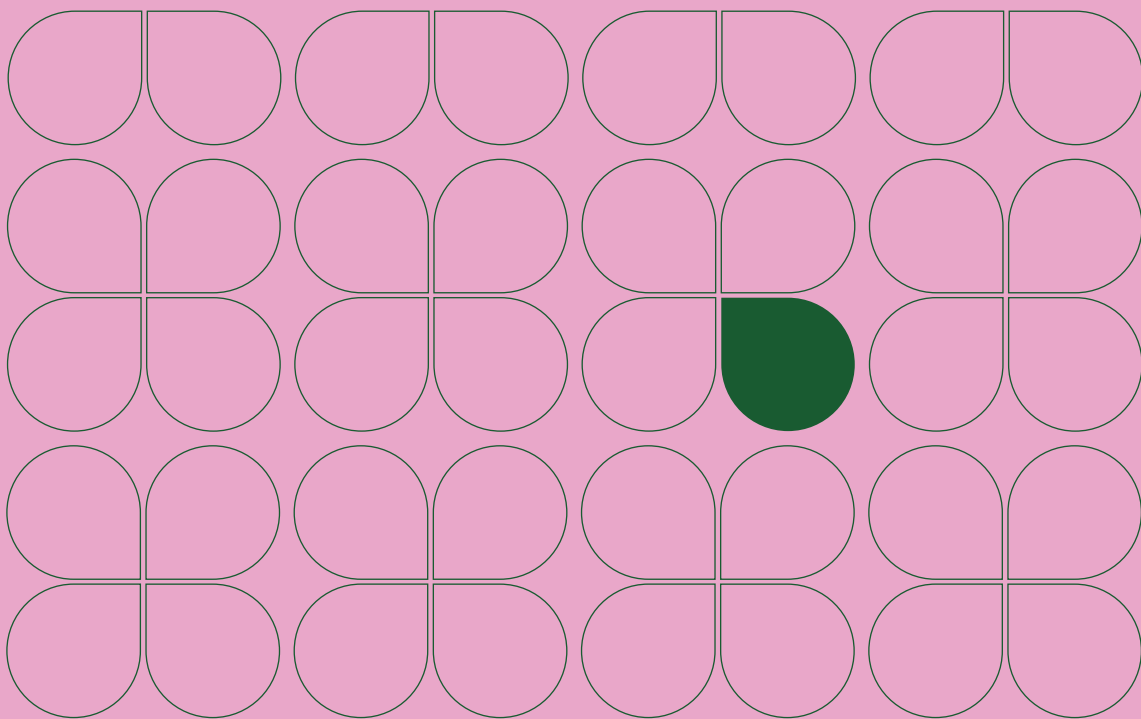


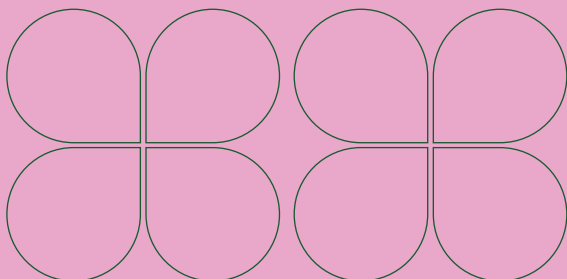
# BUILD YOUR **sorso**

Instruction manual

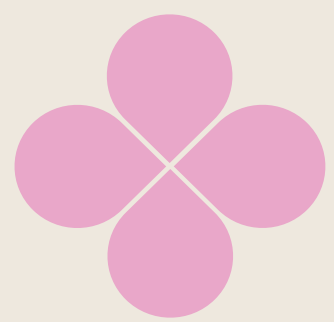


**Rachele Bardella, Alberto Cavallero**

POLITECNICO DI TORINO – A.Y. 2024/2025  
DEPARTMENT OF ARCHITECTURE AND DESIGN  
Master's Degree in Systemic Design  
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# Sorso Corto

## Why Sorso Corto

## An Open Design Coffee Maker

Sorso Corto is a portable coffee machine developed as part of an open design project, allowing you to make espresso coffee.

The goal was to design a fully autonomous coffee machine, eliminating the need to heat water separately, as is required by most portable coffee machines currently available on the market. To achieve this, it was necessary to incorporate batteries and choose a type of coffee that requires relatively little water to be heated. Espresso coffee was the ideal choice, as it only requires a small amount of water per cup. The decision to focus on espresso also necessitated the use of a pump to ensure proper coffee extraction at the required pressure.

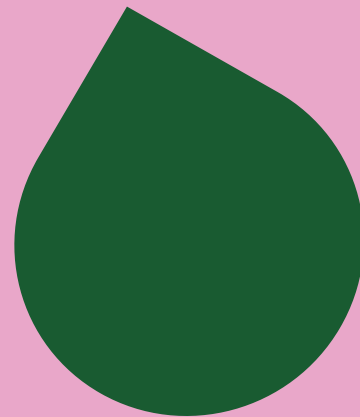
## How Open?

Sorso is a design project based on openness and the sharing of materials and knowledge, thanks to the community. On the website [www.sorsoofcoffee.it](http://www.sorsoofcoffee.it), in fact, a library with downloadable and uploadable pieces is available.

As far as Sorso Corto is concerned, it is a machine with a CC BY-NC-SA license: it is a Creative Commons license that enables reusers to distribute, remix, adapt, and build upon the material in any medium or format for non-commercial purposes only, and only so long as attribution is given to the creator. If you remix, adapt, or build upon the material, you must license the modified material under identical terms.



# What You Need



## Tools

### 3D printer

suitable for resin  
and polypropylene (PP)

### Drill

with drill bit for 4  
mm metal

### Soldering iron

#### other tools:

- electrician's scissors
- insulating tape
- wire
- heat resistant glue
- sandpaper
- cable ties 2,5 mm
- food-safe thermometer

## 3D Settings

#### PETG parameters:

- Layer height: 0.2 mm
- Perimeters: 2
- Infill: 15%
- Filament temperature: 215°C
- Bed temperature: 60°C

#### PP parameters\*:

- Layer height: 0.2 mm
- Perimeters: 2
- Infill: 15%
- Filament temperature: 230–250°C
- Bed temperature: 80–100°C (preferably with an adhesive like PP tape or a special adhesive spray for better adhesion)

\*Use minimal or no cooling fan and, if possible, print in an enclosed chamber to reduce warping and ensure consistent temperature stability.

# Bill of Materials

BLOCK	COMPONENTS (TO BUY)	PROPERTIES	QUANTITY
1	Batteries	3.7 Volt for each battery; rechargeable	4
1	Battery Management System (BMS)	Battery management system; protection board for 18650 lithium batteries in 4S configuration	1
1	Battery plastic case	Containing 4×18650 batteries	1
1	Electric cable	Copper and silicone; 1,5mm; lenght 2 m	1
1	Charger with connector	16.8V 2A	1
1	Switch on/off	20> Volts	1
1	Flask	100 ml, stainless steel	1
1	Heaters	PTG contact heater; 50W, 12 → 30 V c.a./c.c.	2
1	Thermal pads	6W/MK; thickness 1 mm; thermal silica gel	1
1	Wool roving fibers	10 g	1
1	Cork sheet	Thickness: 1 mm	1
1-2	Flask-pipe connector	Bi-conical metallic connector, the smallest as possible	1
14	Tubes	Copper tubes, external diameter 4mm, at least 40 cm	1
15	Tubes connectors	1/8 male-male tube connector	6
16	One way valves	Brass one way valve with female-female connections	2
17	Syringe	5ml, medical syringe	1
18	Moka gasket	Food-safe silicone rubber moka gasket (for 2-cup moka)	1
19	ESE filter and gasket		1

BLOCK	COMPONENTS (TO BUY)	PROPERTIES	QUANTITY
1	Outer shell top	3D printed; PETG *	1
1	Outer shell – block 1	3D printed; PETG *	1
1	Outer shell – block 2	3D printed; PETG *	1
1	Pod holder – lower part	3D printed; food-safe PP *	1
1	Pod holder – upper part	3D printed; food-safe PP *	1
1	Pod holder support	3D printed; PETG *	1
1	Syringe support	3D printed; PETG *	1
1	Outer shell – block 3	3D printed; PETG *	2
1	Tabs	3D printed; PETG *	6
1	Cups	3D printed; food-safe PP *	as needed

*	PETG filament	3D printed; PETG	300 g
*	Food safe PP/Resin	Suitable for food contact; heat resistant (min. 130°C)	70 g

Components

REFERENCE N.	COMPONENT
1	Outer shell top
2	Tab
3	Outer shell – block 1
4	Connector (of the charger)
5	Switcher on/off
6	Batteries
7	Battery case
8	Battery Management System
9	Flask
10	Connector flask-syringe
11	Heaters
12	Wool roving fibers
13	Cork sheet
14	Outer shell – block 2
15	Syringe holder
16	Medical syringe
17	Pod holder support
18	Pod holder – upper part
19	ESE filter and gasket
20	Moka gasket
21	Pod holder – lower part
22	Tubes, hose connector, one-way valves
23	Outer shell – block 3
24	Cup
25	ESE pod

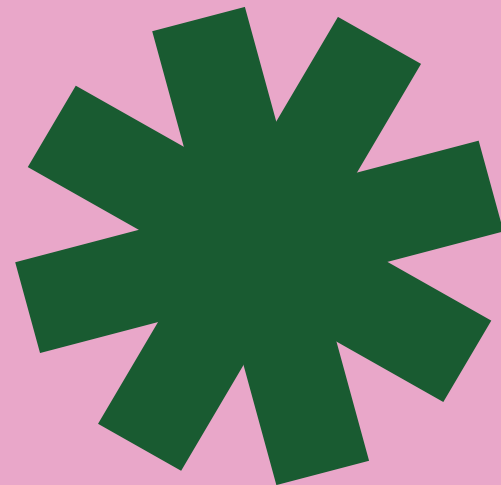
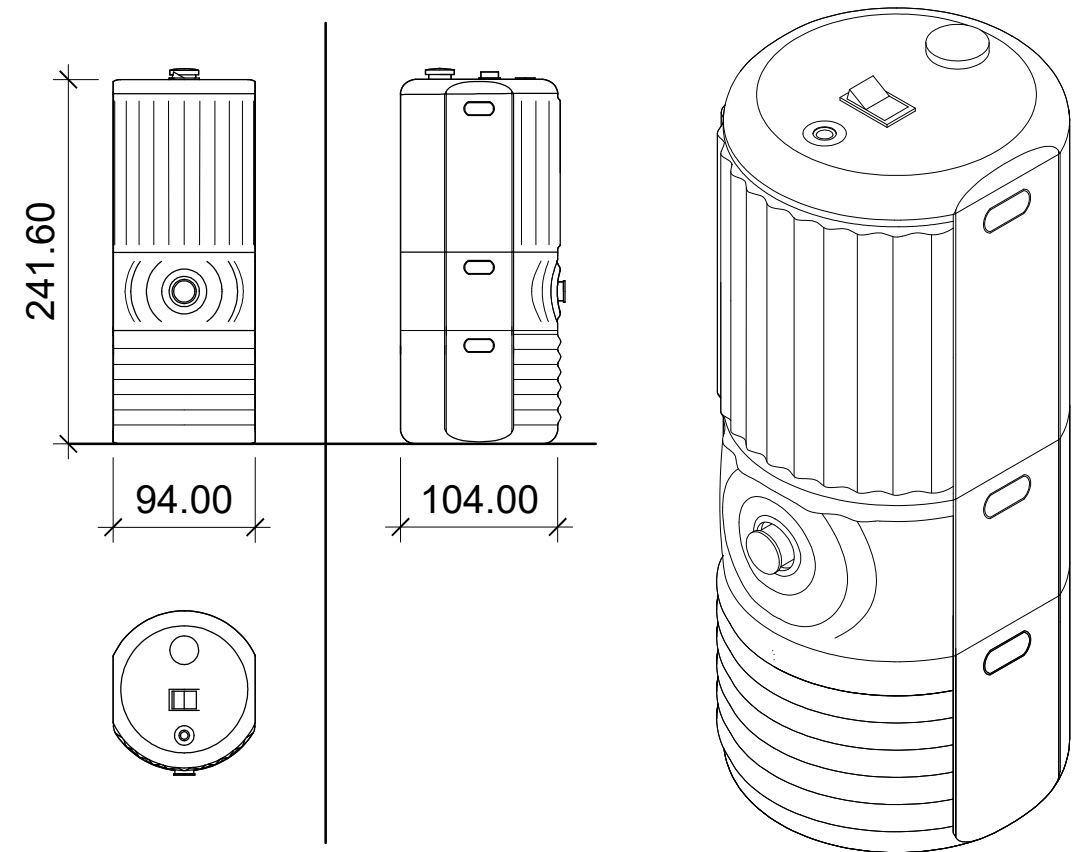


# Technical Drawings

## Sorso Corto

On this page, the technical drawings of the assembled machine are shown, while in the next pages the drawings of the 3D-printed pieces are presented, each accompanied by a brief description to provide further clarity on their design and function.

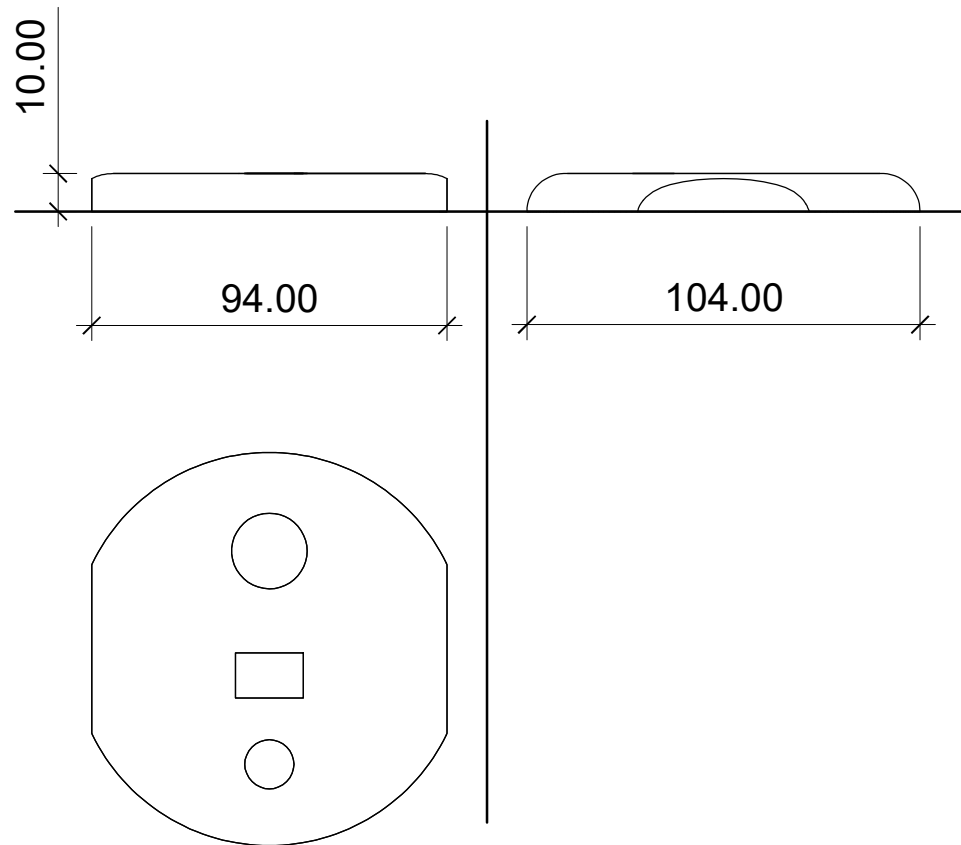
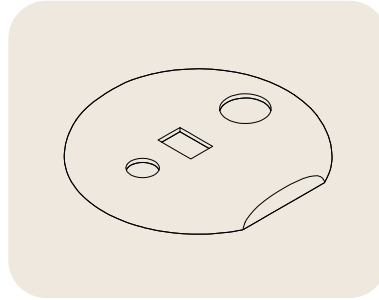
1:5 scale  
dimensions in mm



## Outer Shell - Top

The outer shell of the top is the upper closure of Sorso Corto, which completes the aesthetic of the machine. It is designed with the holes to host the flask cap, the switch and the charger connector.

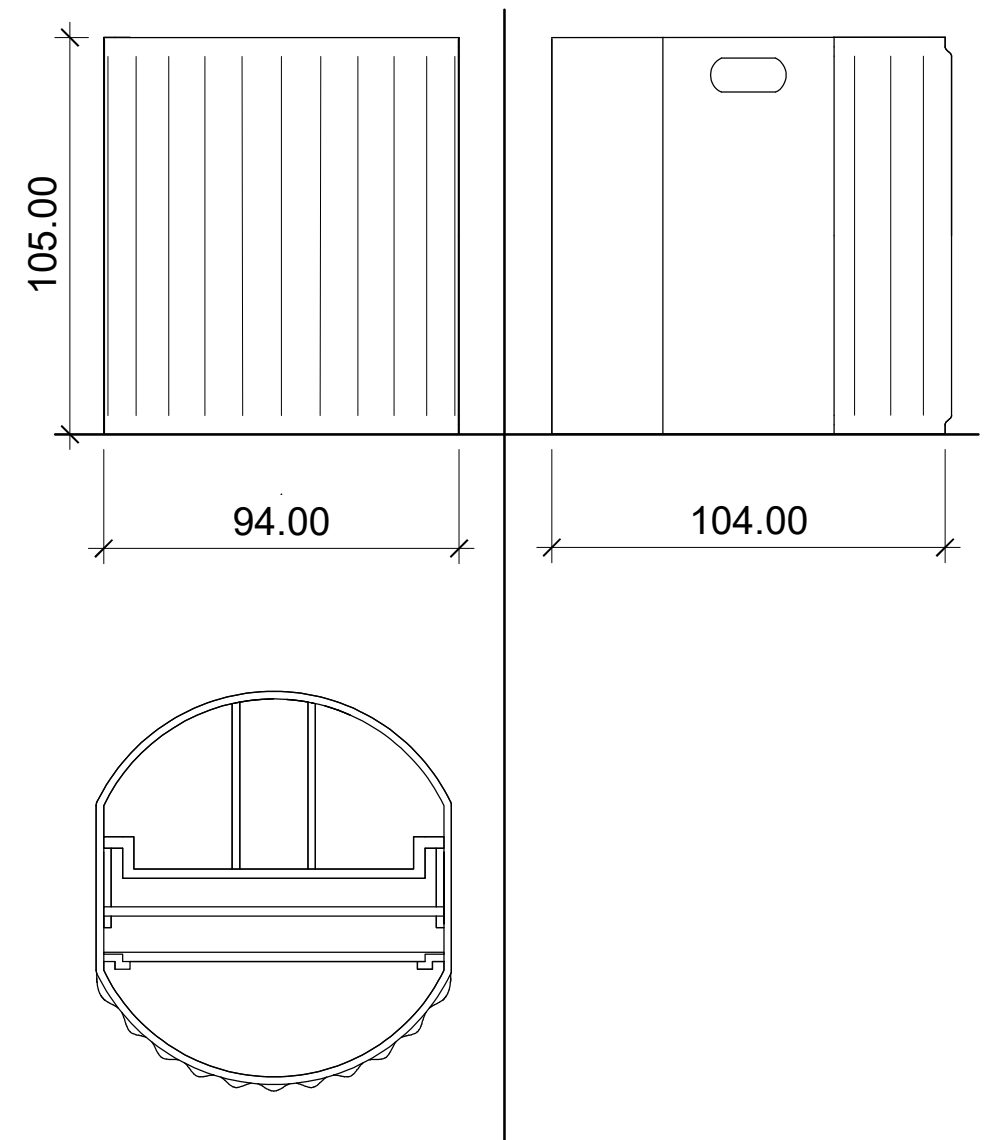
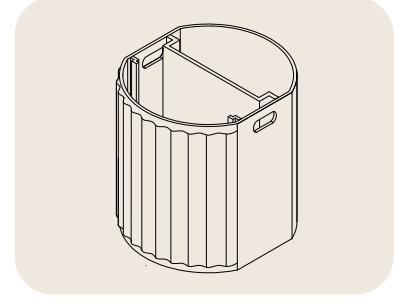
3D printed in PETG  
1:2 scale  
dimensions in mm



## Outer Shell - Block 1

Optimised to host the batteries, the flask and the heating system the outer shell of block 1 is designed with the right dimensions and elements to do so. The outer texture evokes the flow of the water that is heated in the inside.

3D printed in PLA  
1:2 scale  
dimensions in mm

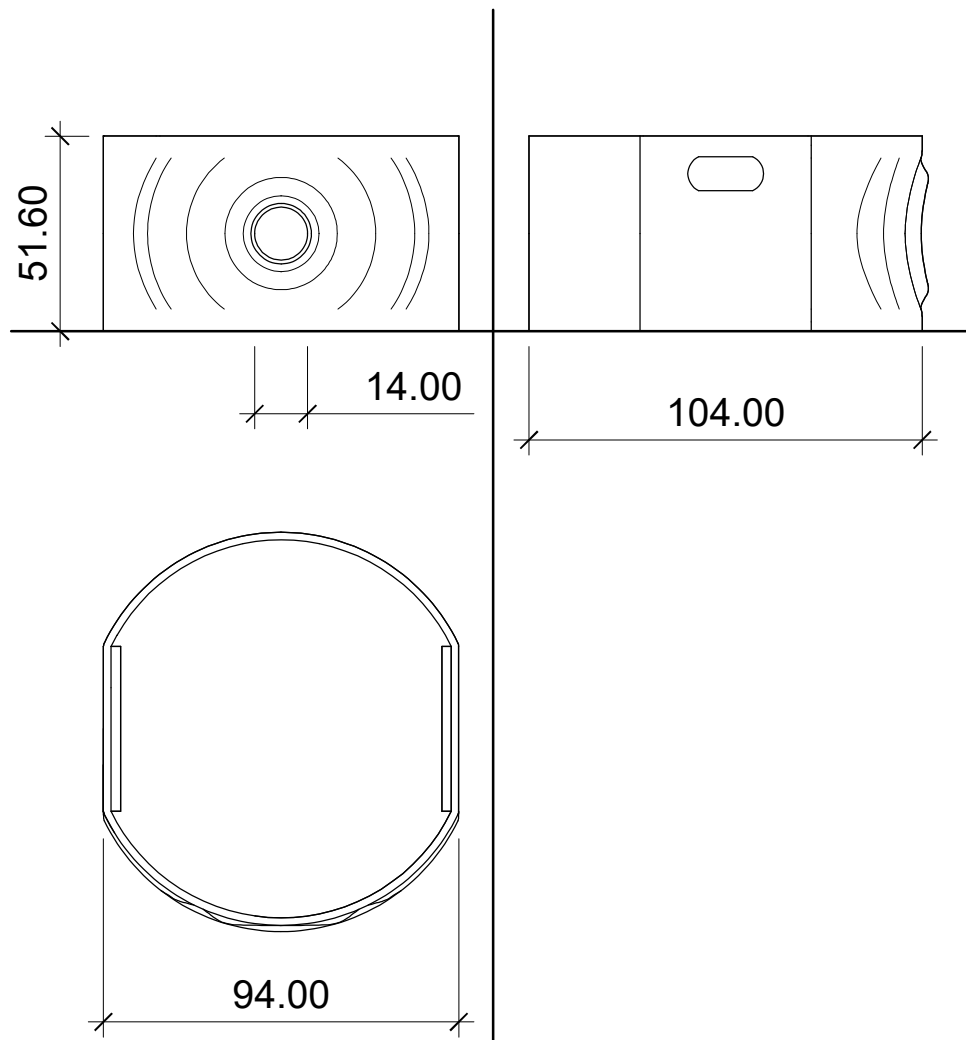
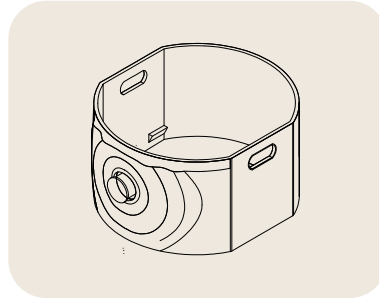




## Outer Shell – Block 2

Designed to support the last elements of the machine to brew coffee, the block 2 outer shell has a hole in the front to host the syringe. The outer texture is a representation of the pressurized water in the inside.

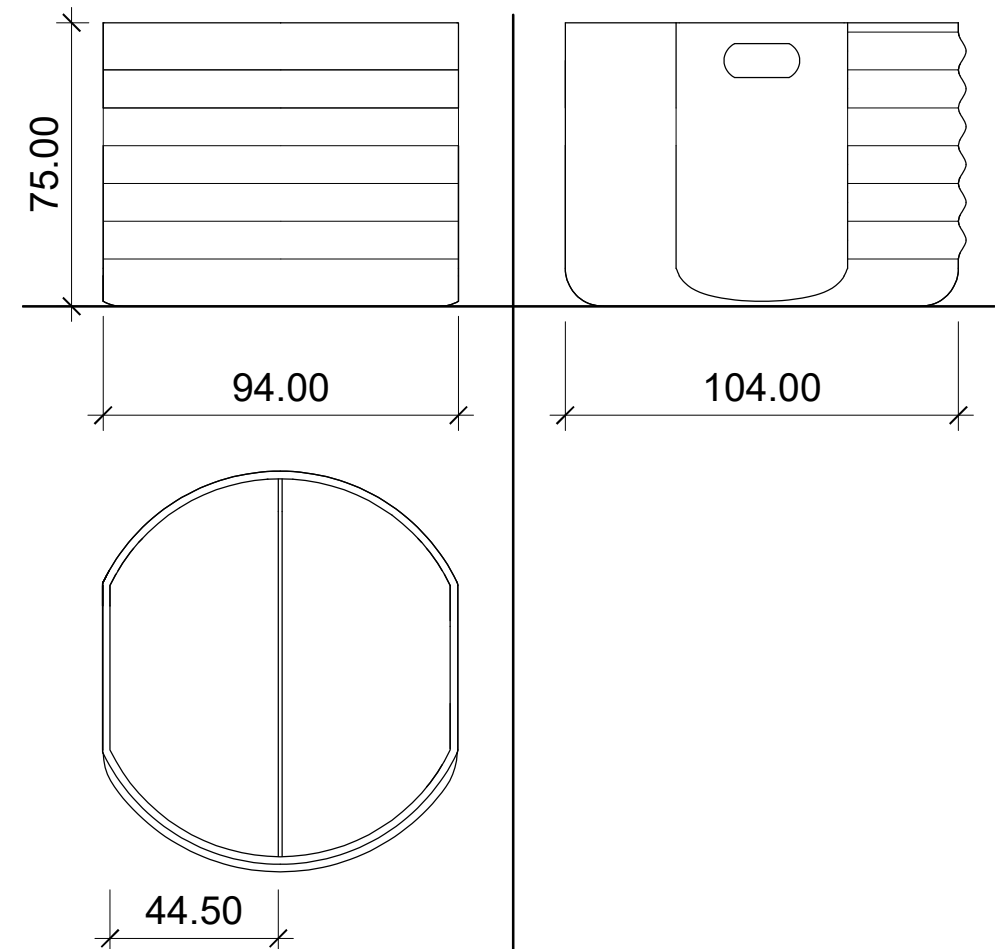
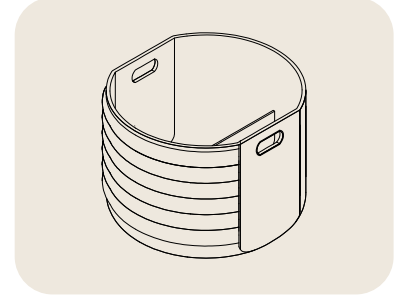
3D printed in PLA  
1:2 scale  
dimensions in mm



## Outer Shell – Block 3

The block 3 outer shell is the bottom part of the machine and what allows to close Sorso Corto while is not used. Its shape is optimized to keep the coffee cups, the ESE pods and whatever the user might need for their coffee.

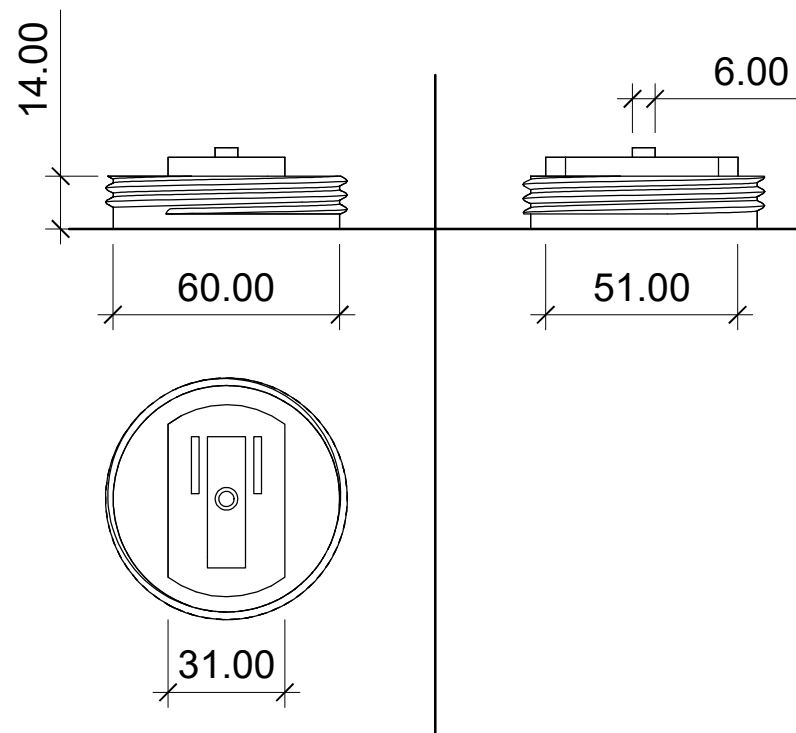
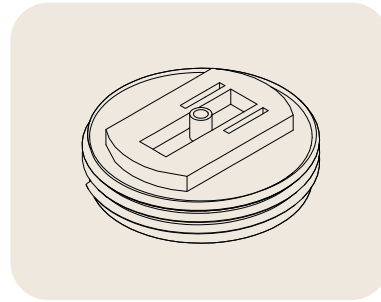
3D printed in PLA  
1:2 scale  
dimensions in mm



## Pod Holder – Upper Part

Intended to hold the ESE pod and connect it to the water flow system, the upper part of the pod holder is designed to let the hot water pass through it in the best way possible to make a good coffee.

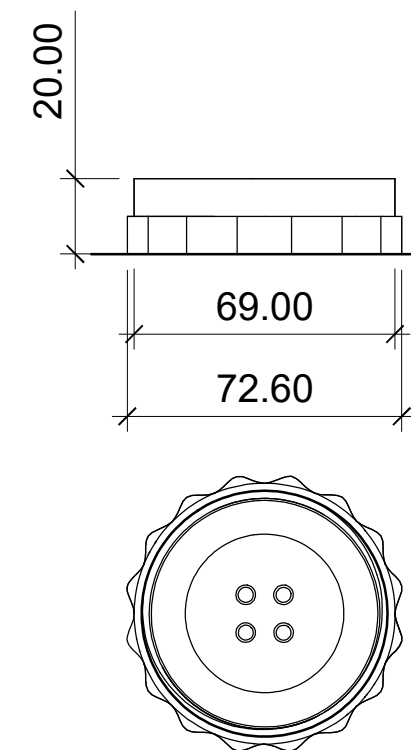
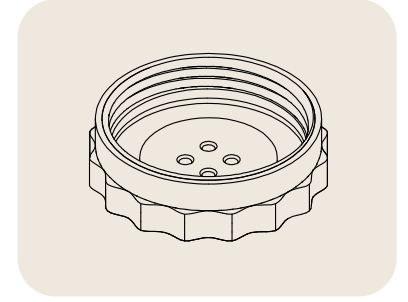
3D printed in food-safe material  
1:2 scale  
dimensions in mm



## Pod Holder – Lower Part

The lower part of the pod holder is developed to enclose and secure the ESE pod and permit the right brewing of coffee thanks to the holes in the bottom. Its shape is designed to have a better grip while closing it.

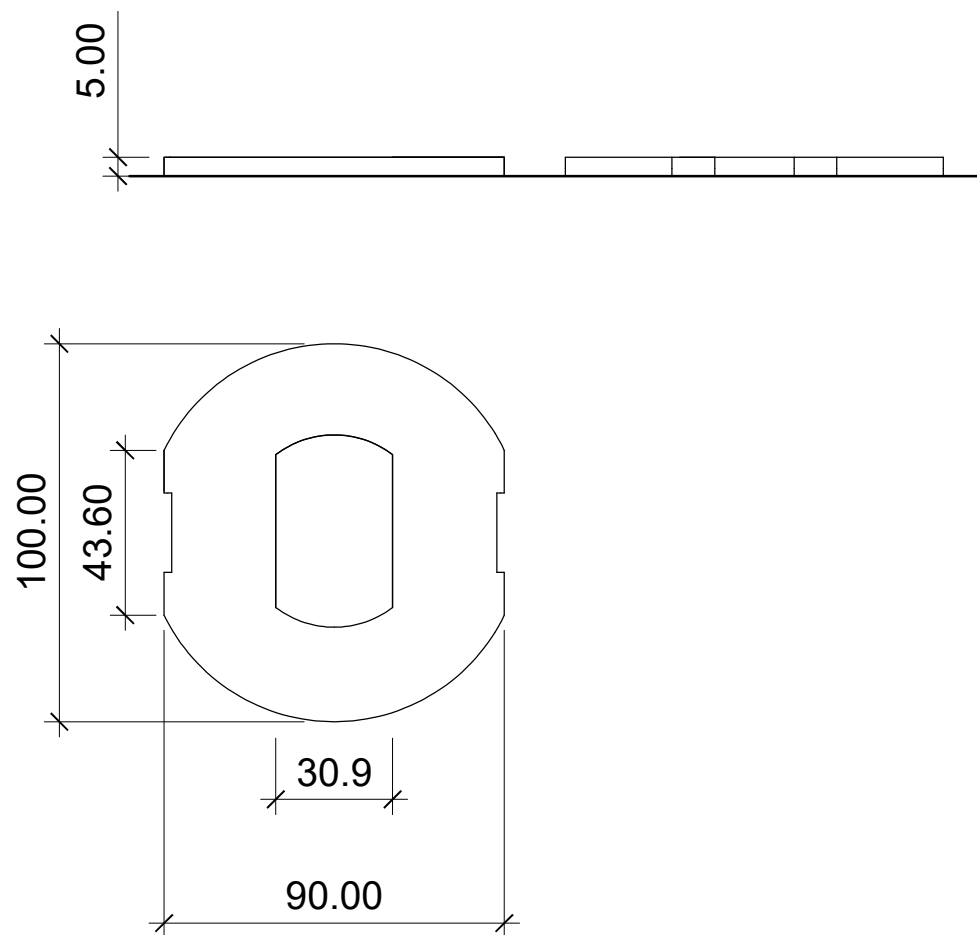
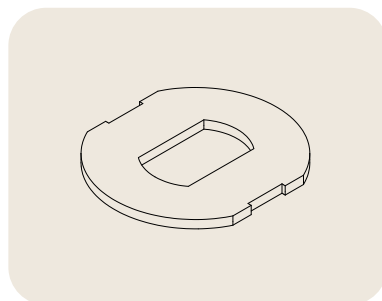
3D printed in food-safe material  
1:2 scale  
dimensions in mm



## Pod Holder Support

Designed to keep everything in the right place, the pod holder support is a flat component placed over the upper part of the pod holder inside the block 2 outer shell.

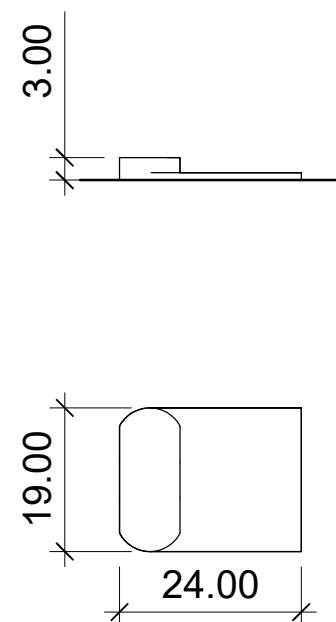
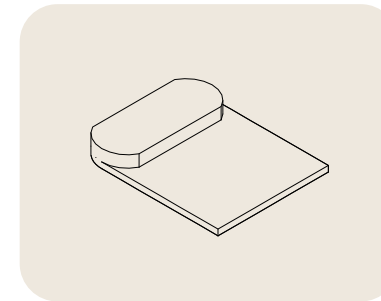
3D printed in food-safe material  
1:2 scale  
dimensions in mm



## Tab

Designed to make more accessible the opening and closing of Sorso Corto, the tabs are like a continuation of the different sections of the machine.

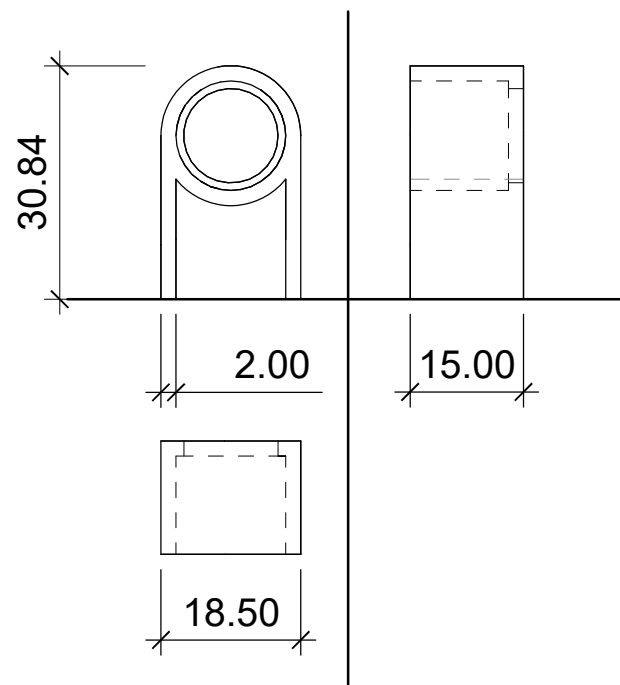
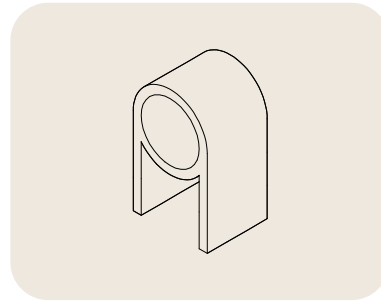
3D printed in PLA  
1:1 scale  
dimensions in mm



## Syringe Holder

The syringe holder is what makes it possible to keep in place the syringe while it is used to create the right pressure in the water flow system. It stays connected with the upper part of the pod holder.

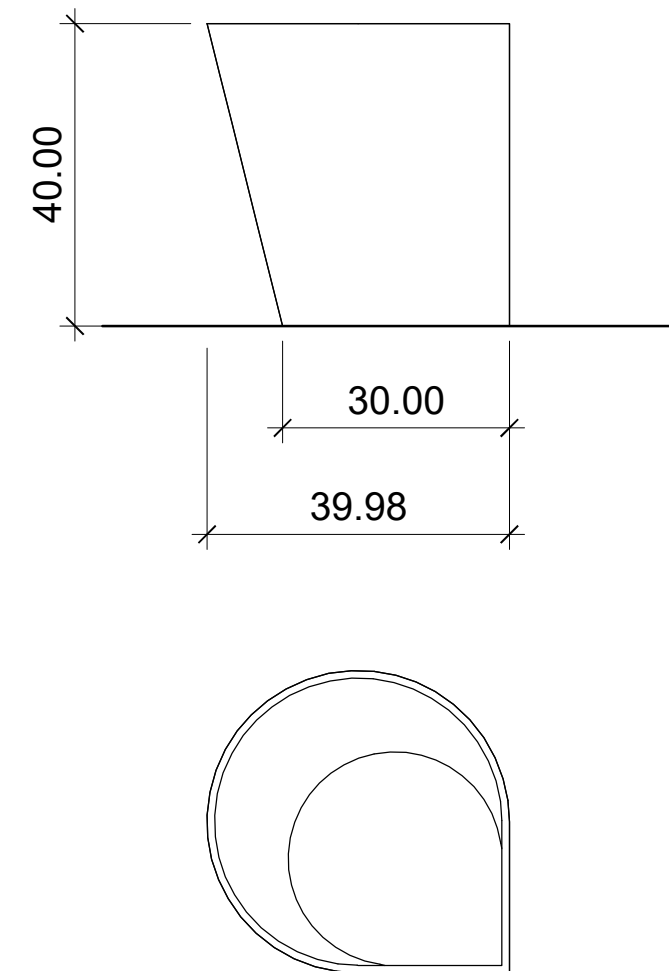
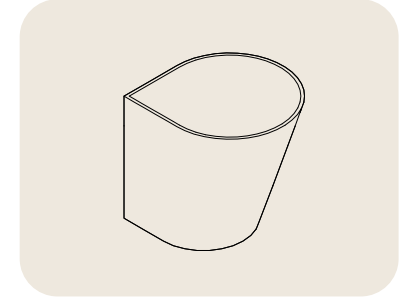
3D printed in PLA  
1:1 scale  
dimensions in mm



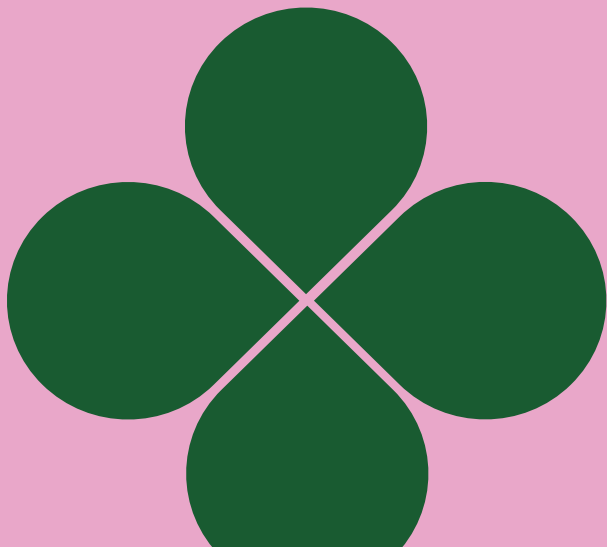
## Cup

The cup is designed to fit perfectly inside the block 3 outer shell. It is also optimised for the user to pour the right amount of water inside the flask, thanks to its shape and dimensions.

3D printed in food-safe material  
1:1 scale  
dimensions in mm

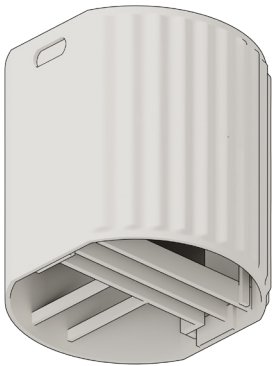


# Assembly

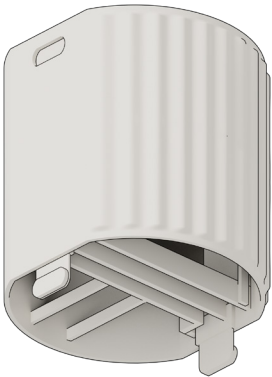


Block 1 – Heating water

1.a

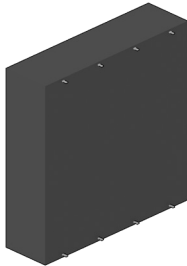


1.b

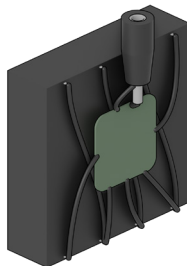


Insert the tabs into their designated slots. If you wish, apply a bit of glue to ensure they stay in place.

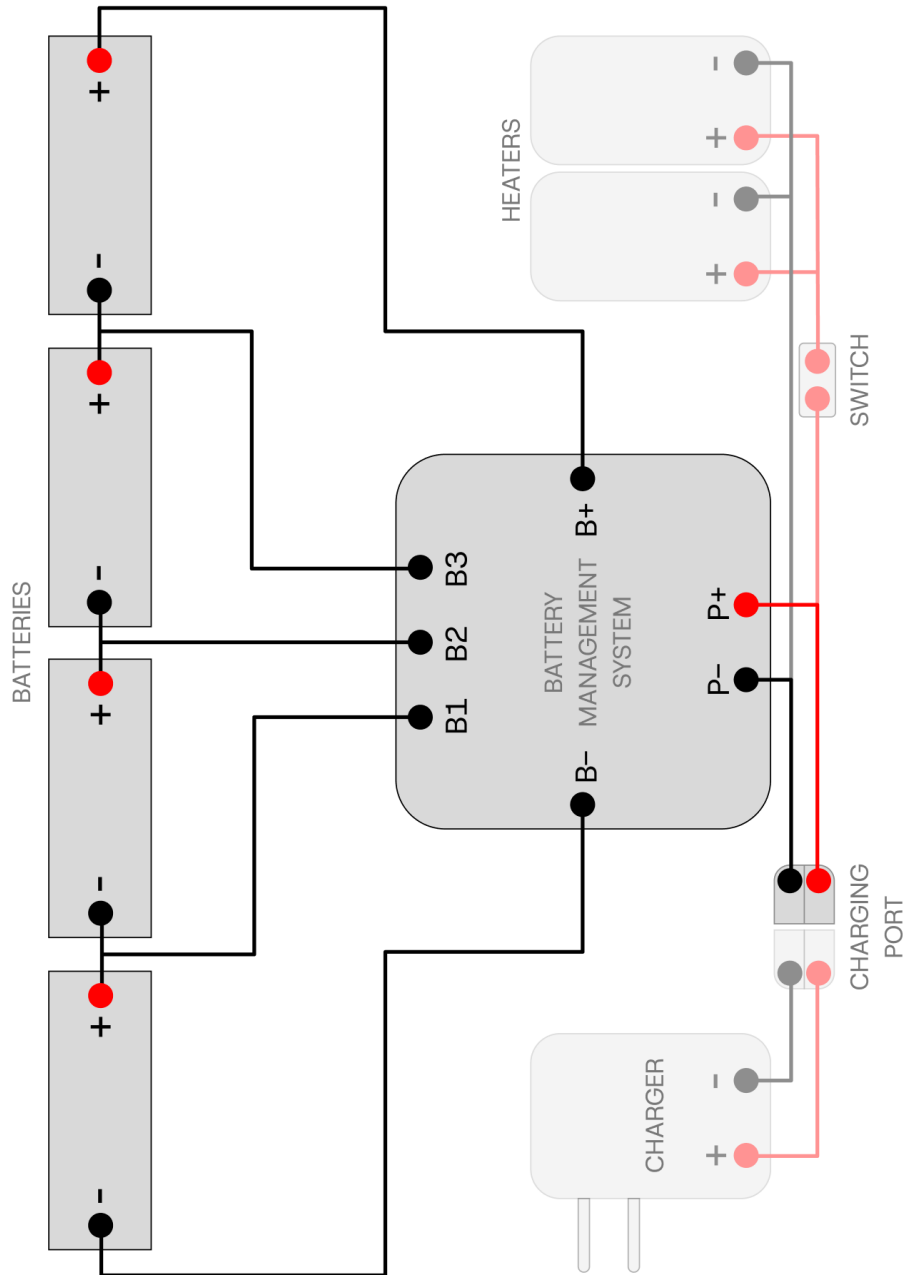
2.a



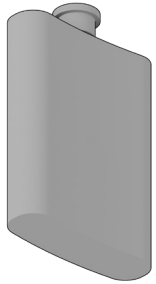
2.b



Solder the BMS to the battery case and the connector according to the wiring diagram shown on the next page.



3.a



3.b

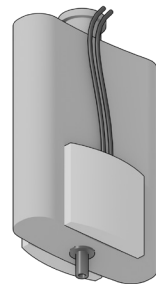


Drill the bottom of the flask using a 3 mm metal drill bit.

3.c

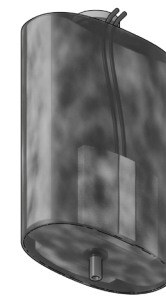


3.d



Attach the heaters to the flask using the thermal pads. Cut the pads to the size of the heaters to ensure maximum heat transfer. Put the connector over the hole and sol it in place with plenty of glue. Then, glue the printed connector to the hole.

3.e

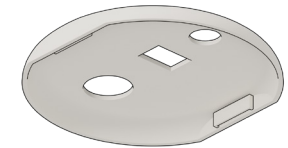


3.f

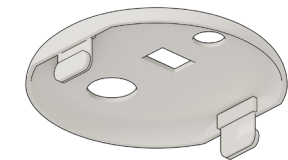


Wrap the flask with wool roving and then with sheets of cork, including the bottom. Secure everything with electrical tape.

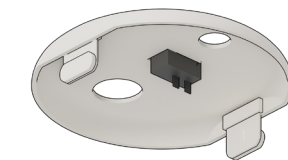
4.a



4.b

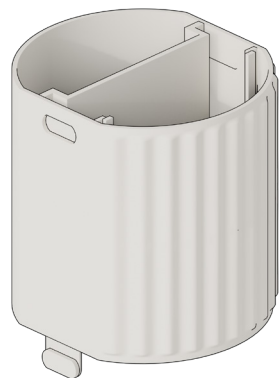


4.c

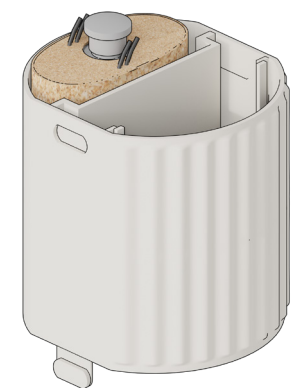


Insert the tabs into their designated slots. If you wish, apply a bit of glue to ensure they stay in place. Then, insert the switch into the designated hole. If you wish, apply a bit of glue to ensure it stays in place.

5.a



5.b



Carefully place the flask into the designated compartment, the one that is smooth on the outside, without the texture.

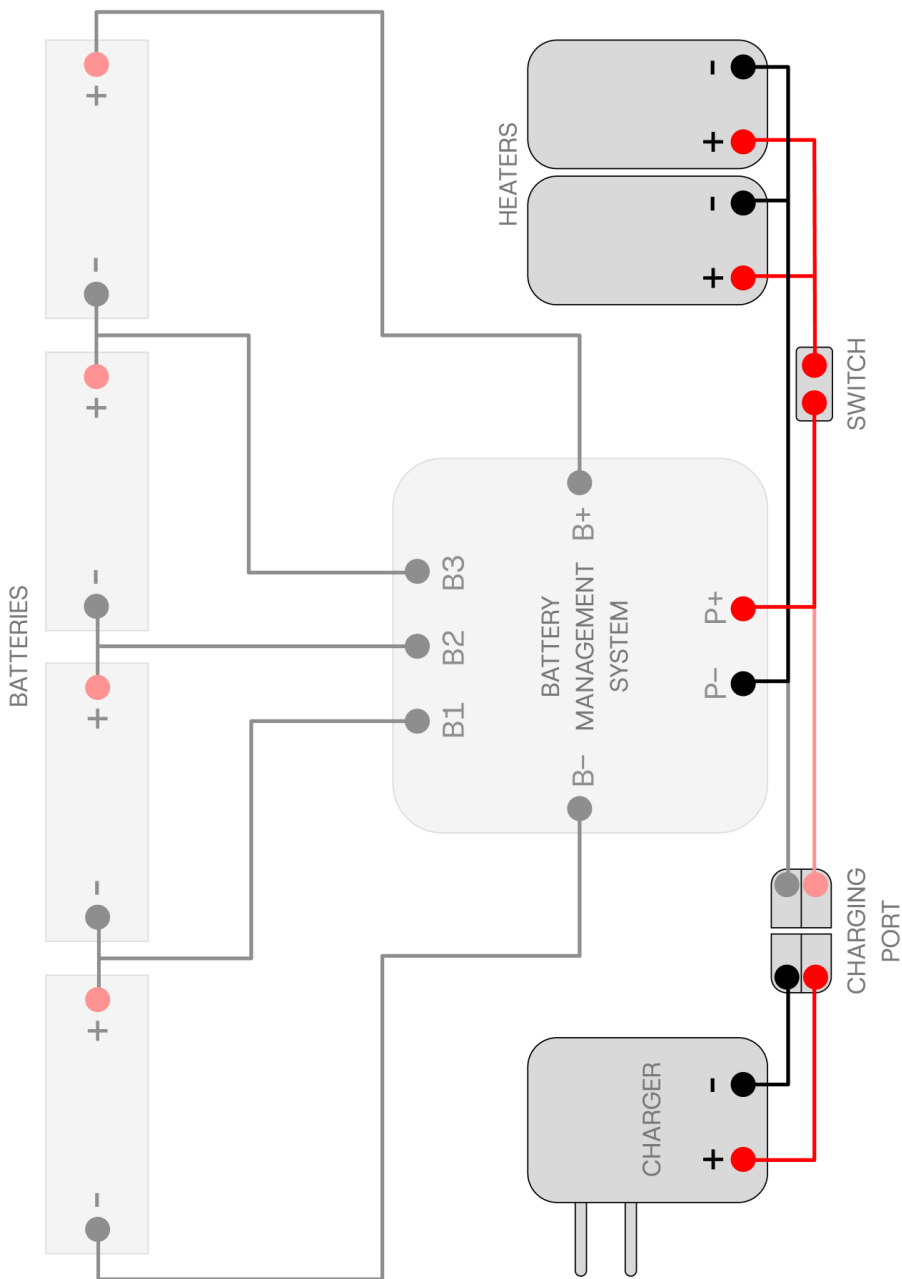
5.c



5.d



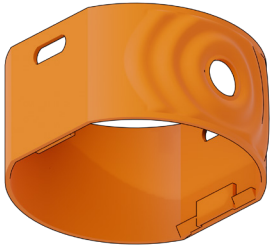
Carefully place the battery system into the designated compartment with the textured exterior. Place the cover with the tab mechanism. Remember to solder the wires to the switch as shown in the next page's diagram and insert the charging connector into the cover's hole. You can glue it to keep it in place.



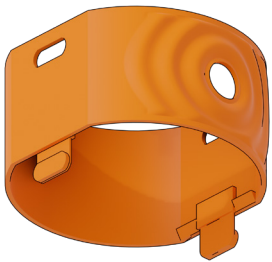


## Block 2 – Making pressure

1.a

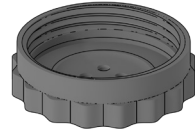


1.b

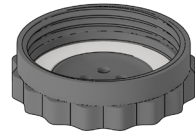


Insert the tabs into their designated slots. If you wish, apply a bit of glue to ensure they stay in place.

2.a



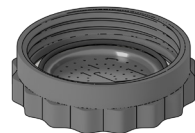
2.b



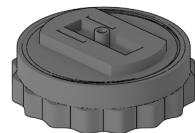
2.b



2.b

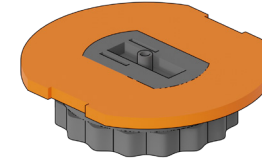


2.c

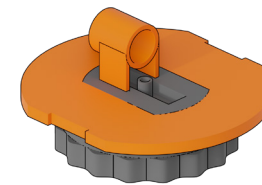


Place the moka gasket, then insert the ESE pod filter and the ESE gasket. Screw the mechanism.

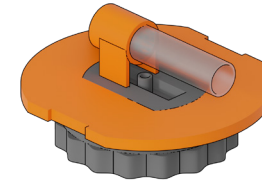
2.d



2.e



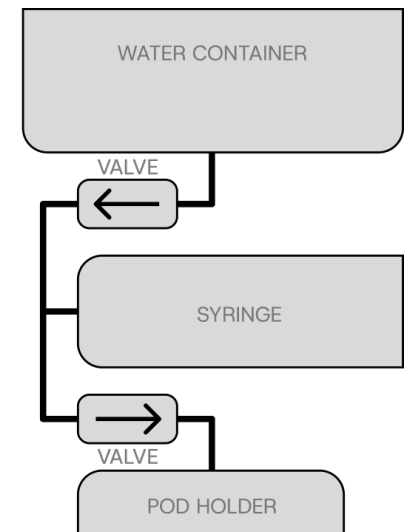
2.f



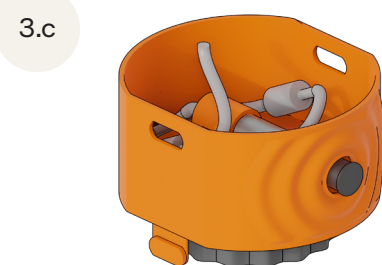
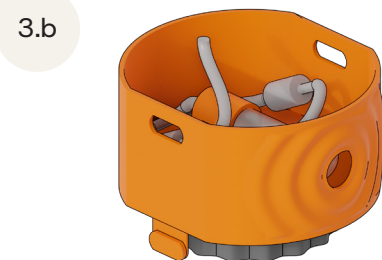
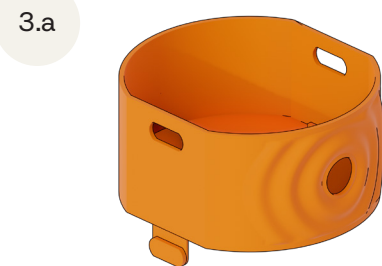
2.g



Place the assembled pod holder in the circular support and glue them. Add the syringe holder and the syringe using some glue to ensure they stay in place. Finally, connect the pipes and the valves as shown in the diagram.



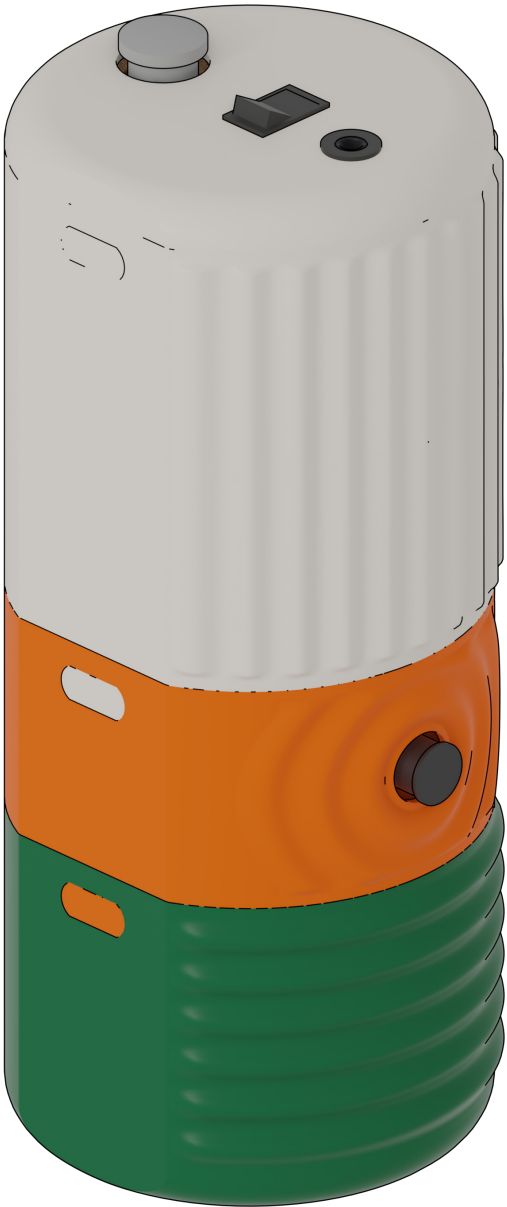
Block 3 – Keeping coffee



Place the previous components in the shell and add the piston of the syringe.



Place the cups and the posd in the outer container.



# Maintenance



## Some tips to better maintain Sorso

To ensure the longevity of your Sorso Corto machine, you should follow some easy yet essential maintenance tips.

### Cleaning

Clean removable food-contact parts regularly with warm water and mild soap, avoiding abrasive sponges. Avoid washing the parts in the dishwasher, as very high temperatures can damage some components. After use, wash the food-contact parts with water and let them dry before reassembling the machine.

### Storing

Store the machine in a dry place when not in use, away from water.

### Replacing parts

Since the machine is built with a “components approach”, if any part stops functioning, it will be sufficient to replace that/those specific component(s).

### Batteries

Lastly, keep the batteries and charger away from water.

Thank you for building Sorso!

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