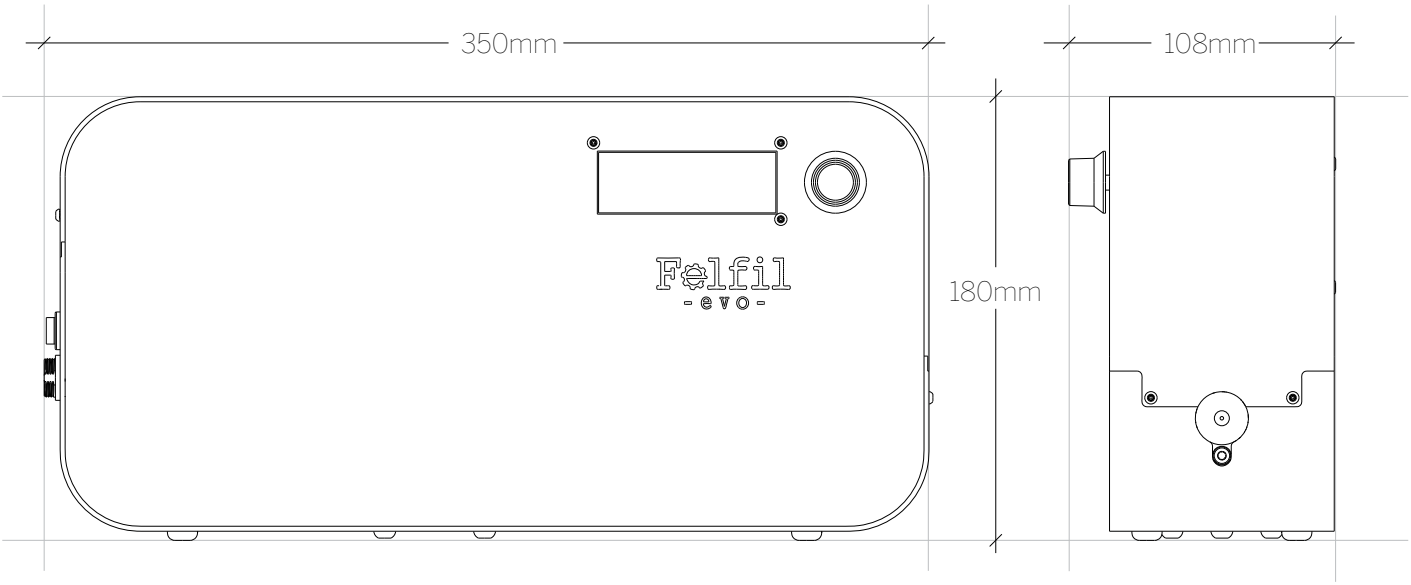
Felfil

- evo -

Complete Kit



Thank you and congratulation for choosing the Felfil Evo Complete Kit.

Felfil Evo is a plastic filament extruder, able to produce filaments for 3D printers starting from industrial pellets or plastics wastes.

The Felfil Evo Complete Kit includes all the components of the Felfil Evo project; In order to obtain optimal extrusion resutls, please follow the details of the complete project.

This guide is designed to allow you a good experience with Felfil Evo Complete Kit, please read this manual in all its parts before connecting and operating.

Felfil Evo is suitable for domestic, research or business use; it is wary of improper use.

electrical	input 12V
power usage	180W
weight	3,8Kg
temperature	max 250°C
gearmotor	up to 9 rpm

Warnings

Felfil S.r.l. does not assume responsibility and expressly disclaim liability for loss, injuries, damage, or expense arising out of or in any way connected with the assembly, handling, storage, wrong use or disposal of the product. Please, read this document before use Felfil Evo.

Any kind of modification will be at your own risk, and will result in the decay of the warranty. Felfil S.r.l. does not take any responsibility for damage occurred to people or object, caused by such modifications or improper uses.

- Do not use vinyl and PVC, they will produce toxic emissions.
- Do not eat or inhale neither the plastic pellets nor the extruded plastic.
- Do not use the extruder if any parts are missing or damaged. If you notice any damage to the unit, unplug the device immediately and contact the Felfil team for guidance.

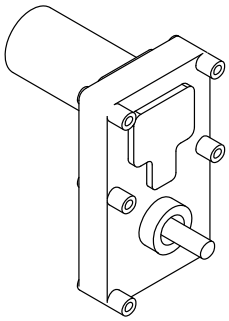
Use the device only with specified input power. Using the device with any other input power is likely to damage the electrical and/or electronic parts of the device.
Remind to keep the equipment out of children's reach.
Use this device only to extrude plastic filament for 3D printing. No other use has been tested.

Caution

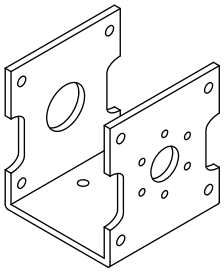
- Do not insert screws, nuts or materials unsuitable for extrusion in the catchment area.
- Do not insert your fingers in the feeding windows of the plasticizing screw located on the upper side of the pipe.
- Do not insert water in the extruder.
- Do not touch pipe, nozzle and resistor when the extruder is switched on, it may hurt you.
- Do not hit the extruder and its accessories or you could damage the extruder.
- Please, never try to extrude a plastic unless you are absolutely certain you know what type it is.
- Some polymers can undergo thermal decomposition resulting in potentially toxic fumes. So always use the Felfil Evo in a well ventilated area, or inprecence of a suction hood (not your bedroom or inside your house), and understand the thermal decomposition properties of the polymer you are extruding.
- Be sure to check in on it periodically.

The Felfil Evo Complete Kit is a first-generation, experimental piece of hardware. Treat it as such.
Basically, use common sense.
If you have questions, write us at support@felfil.com

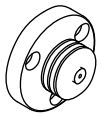
The Felfil Evo Complete Kit includes those components:



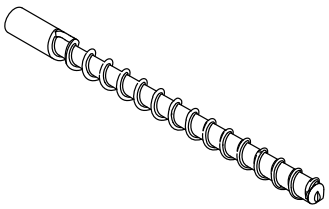
1X Gearmotor E1



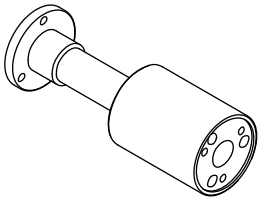
1X Structural Support P1



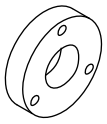
1X Nozzle T1



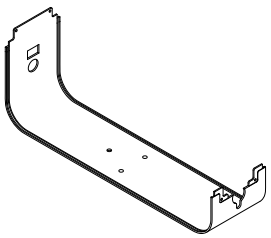
1X Extruding Screw T8



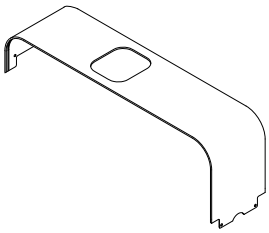
1X Melting Chamber T5



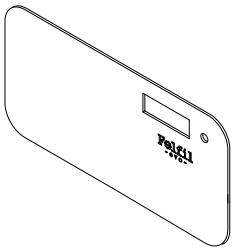
1X Teflon T7



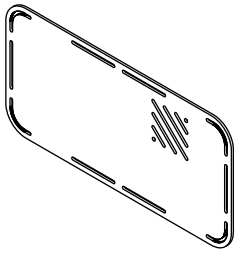
1X Lower Case C1



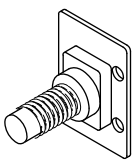
1X Upper Case C2



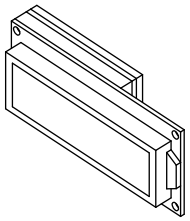
1X Front Panel C6



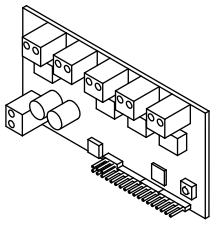
1X Rear Panel C7



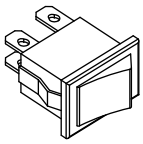
1X Encoder E5



1X Monitor E4

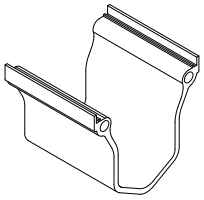


1X Felfilino E3

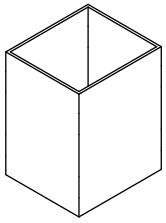


1X Main Switch E7

4X Feet C5

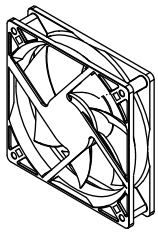


1X Low Hopper S2

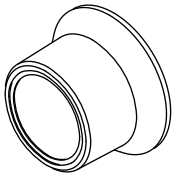


1X High Hopper S3

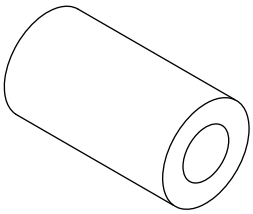
1X Termocouple E9



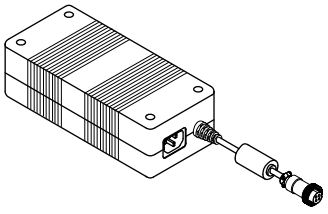
1X Fan C1



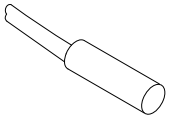
1X Knob E6



1X Insulant T9

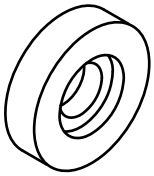


1X Power Supply A1



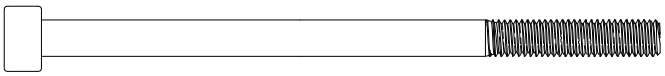
3X Cartridge Heater T4

1X O-ring T3



1X Gearmotor Cap P2

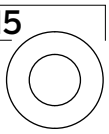
4X TCE **M5**x85



3X DE **M5**

3X TBE **M5**x16

4X WA **M5**



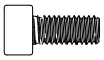
5X VCE **M5**x6

3X TCE **M4**x30

5X DE **M4**

2X TBE **M4**x20

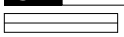
3X TCE **M4**x8



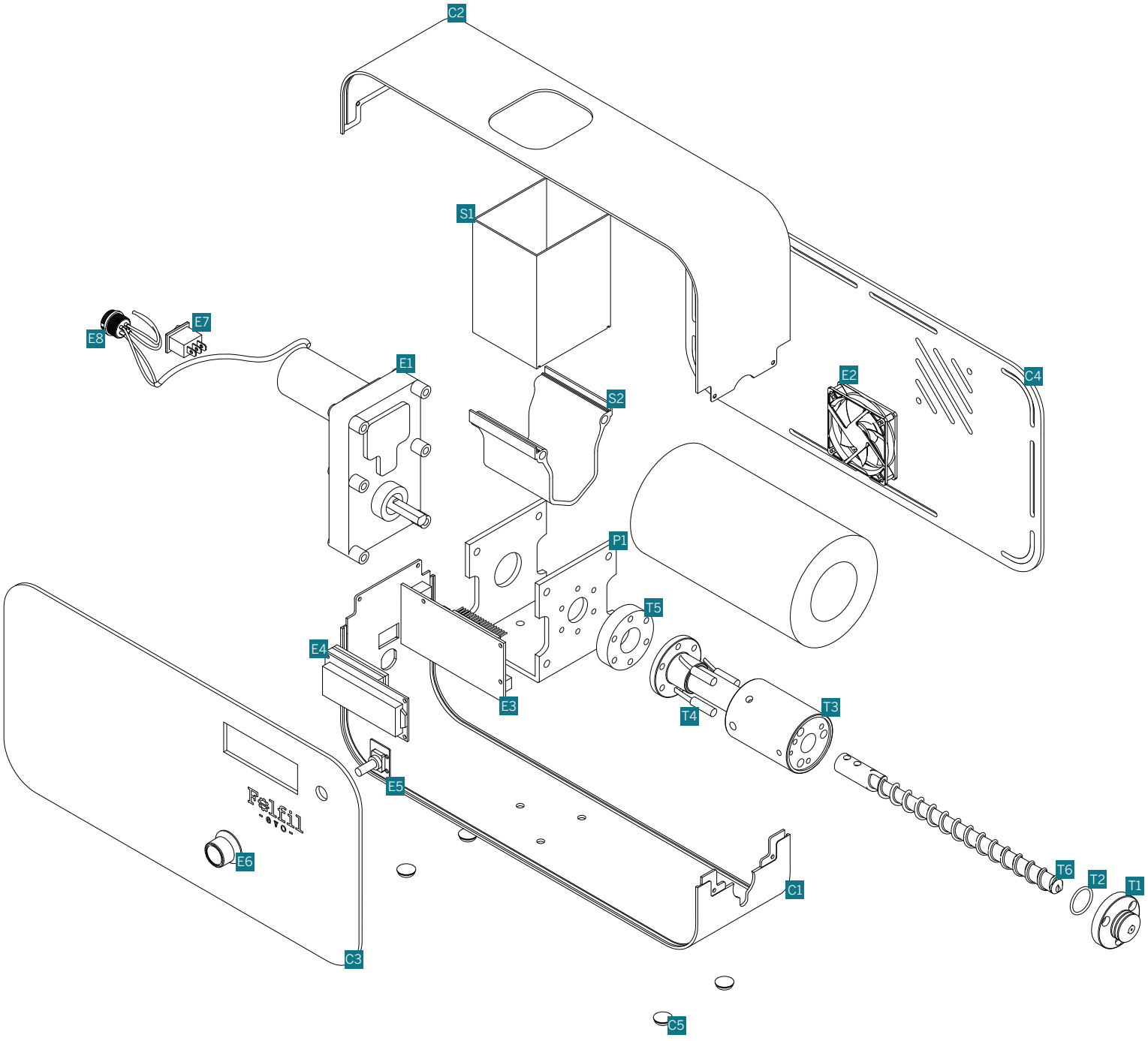
10X TBE **M3**x6

1X VCE **M3**x5

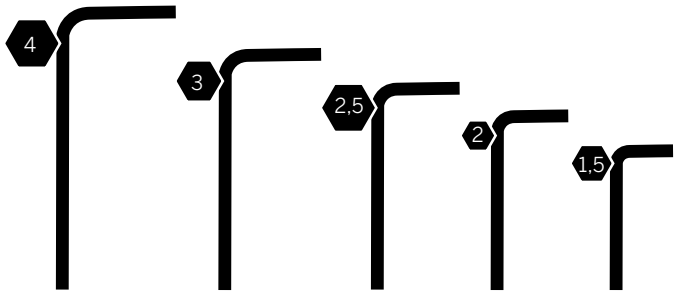
3X DIS. FF **M3**



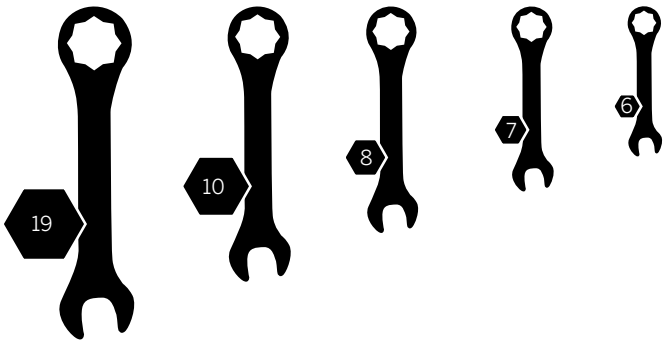
3X DIS. MF **M3**


C2
S1
E7
E8
E1
S2
E2
C4
P1
T5
E4
E3
T4
T3
E5
Ralfi
E6
T6
T2
T1
C1
C3
C5

Those are the tools you will need in order to assemble your Felfil Evo.
Tools are not included in the package.



hex wrench



combination wrench

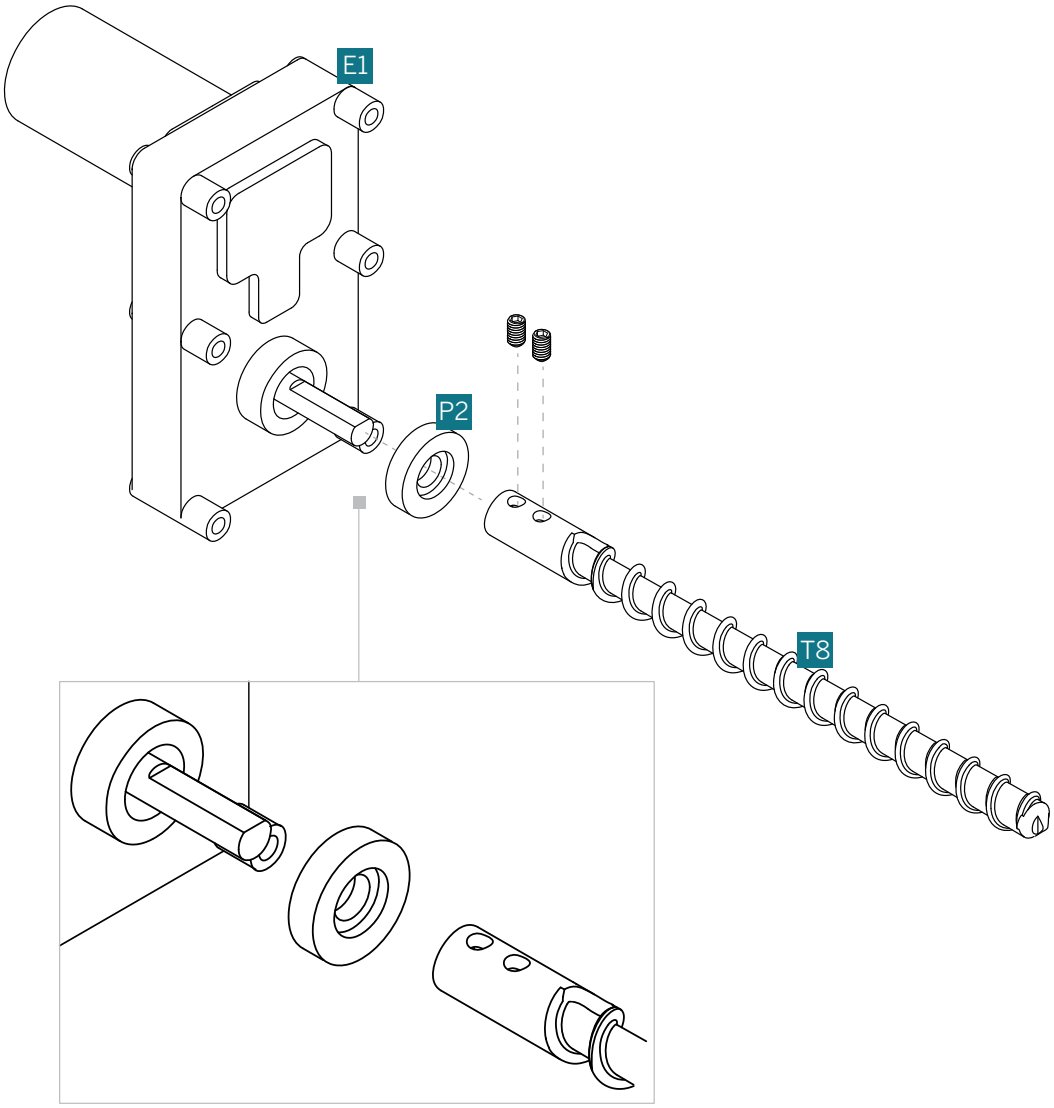
gloves

[Please, wear latex gloves while assembling, when you see this symbol]

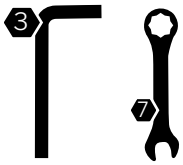
Tools

Small Parts

- Insert the screw **T8** and the engine cap **P2** into the gearmotor hub **E1** and close whit two grub screws, make sure the screws rest on the flat of the shaft
- The geramotor cap **P2** must be placed with the bigger hole on the right.
- ! The scew must go all way against the geramotor cap.



Tools

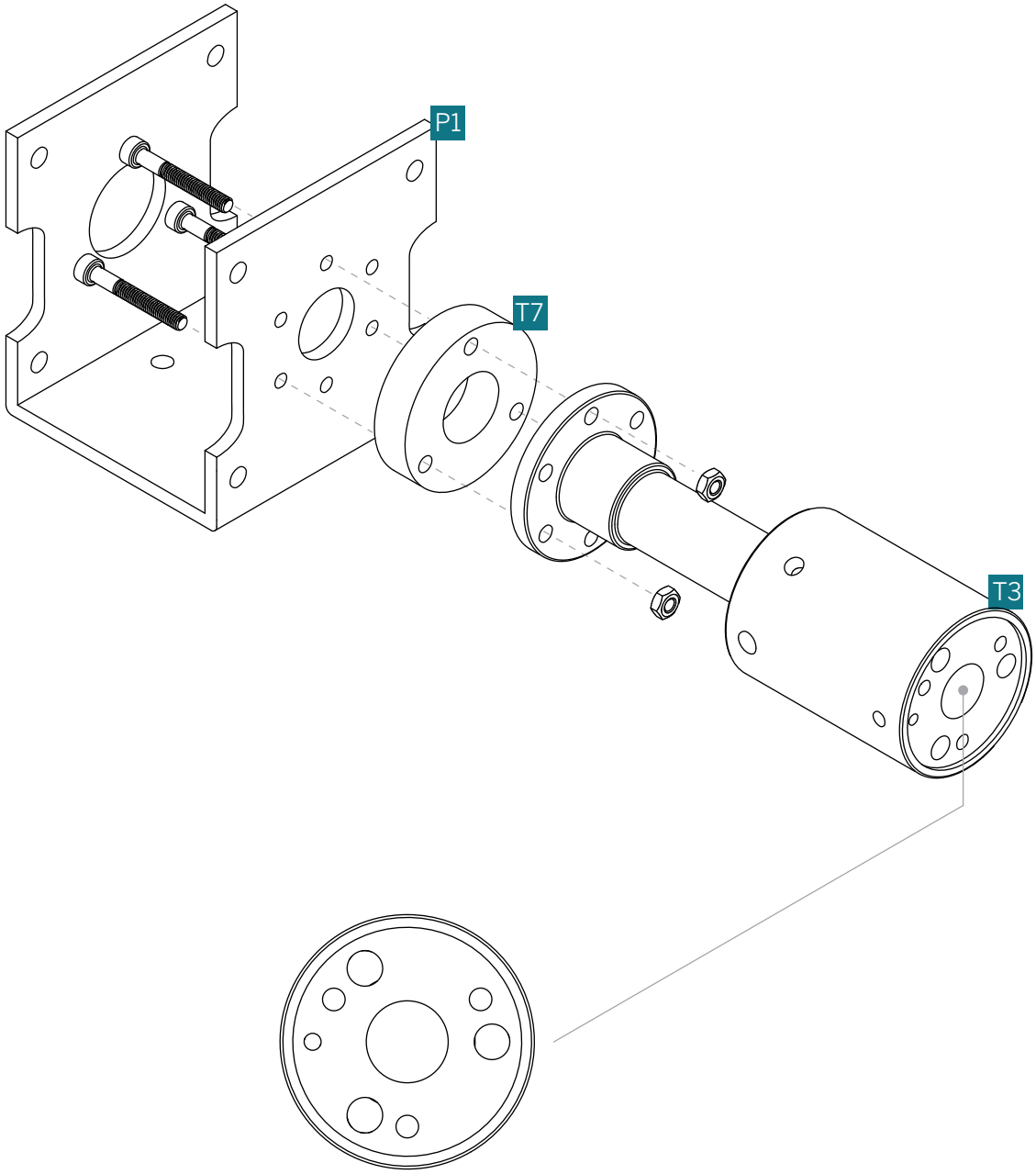


Small Parts

3X

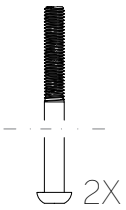
3X

- Screw the melting chamber **T3** and the teflon insulator **T7** to the structural support **P1**
- The **T3** component must be placed like in the zoom below.

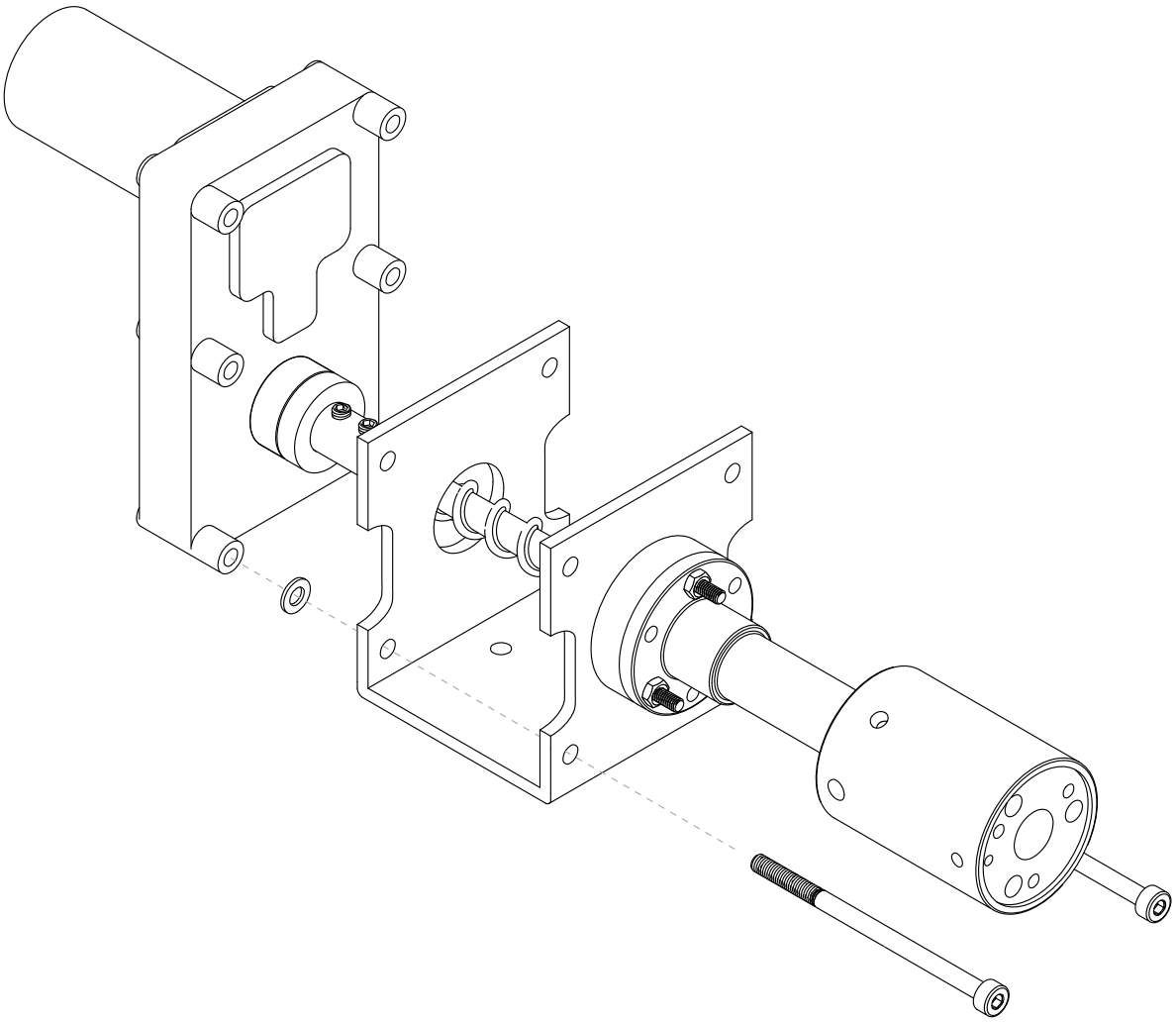


Tools

Small Parts



- Insert the extrusion screw **T8** trought the structural support **P1** and screw it to the gear-motor **E1** [put the four washers in front between **E1** and **P1**]
- Note: insert only screws in the bottom holes.



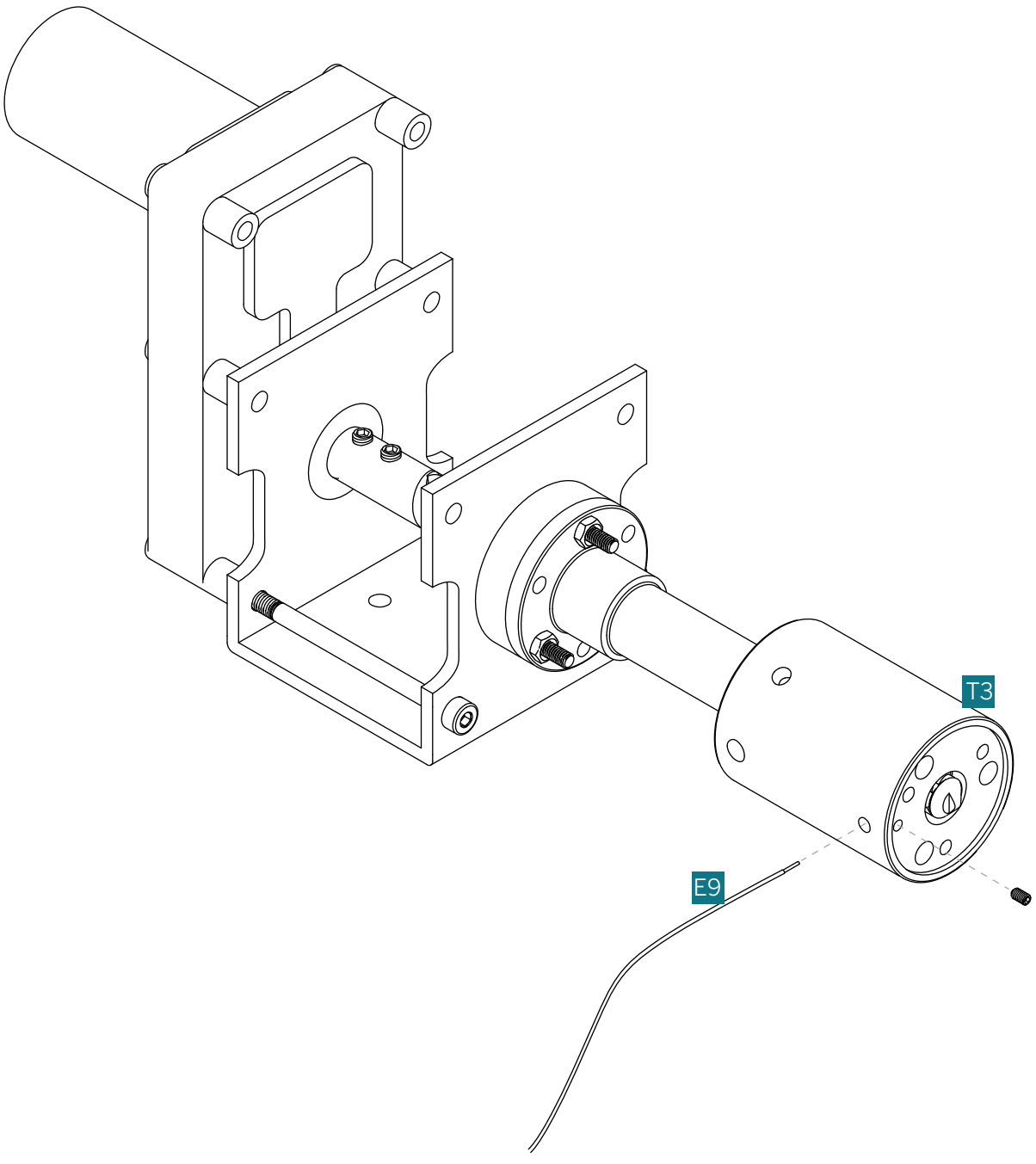
Tools

Small Parts

1X

Insert the thermocouple **E9** in its hole in Chamber **T3**; then block it with a M3 grub screw

! Please, be careful when you close the grub screw. You could damage the thermocouple.



Tools

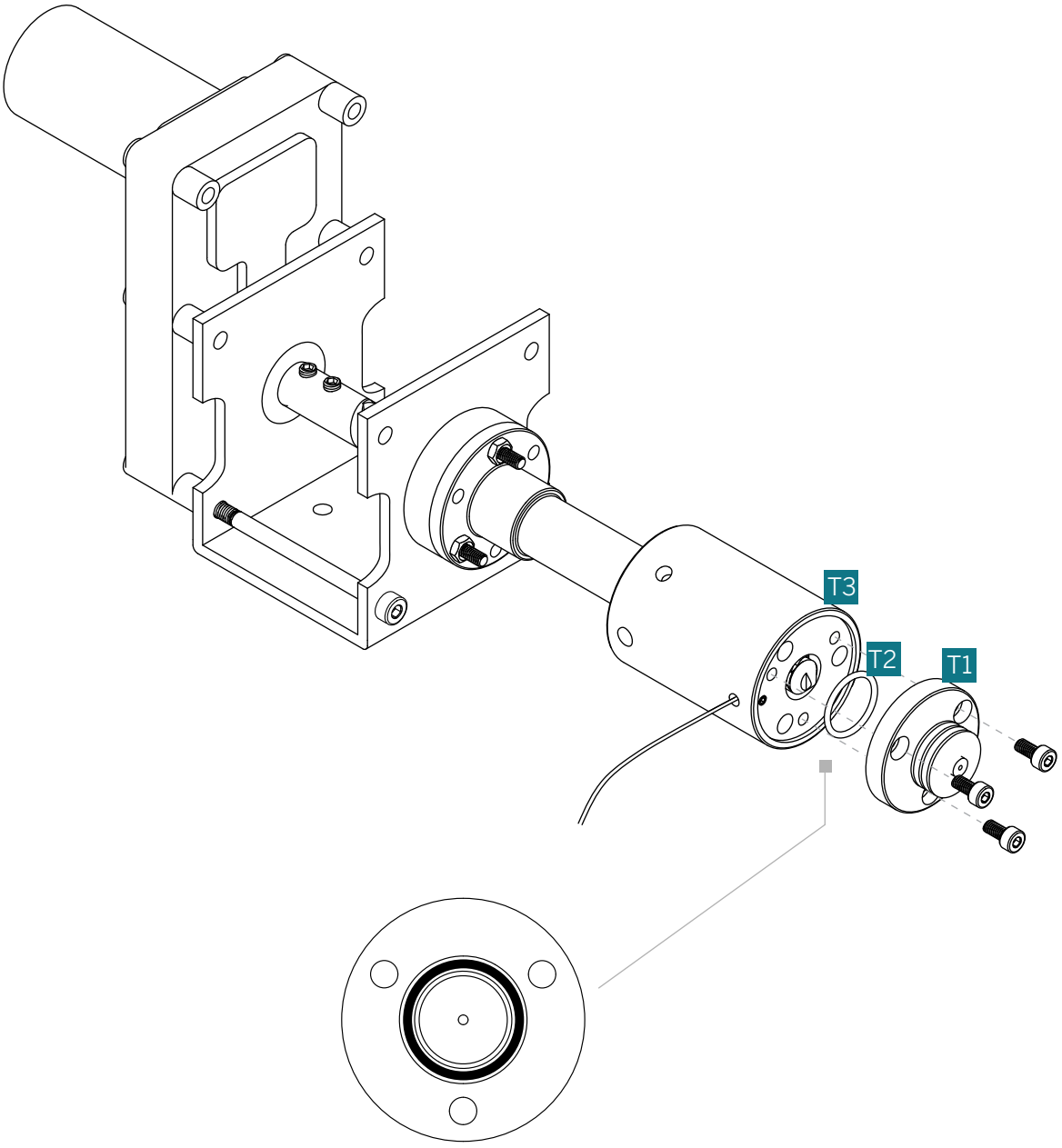
Small Parts

3X

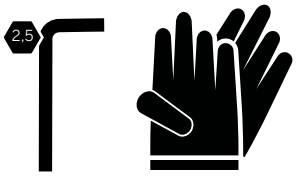
1X

Insert the O-ring **T2** in the guide and screw the nozzle **T1** to melting chamber **T3**

! Pay attention, be sure that the oring stay on its guide.



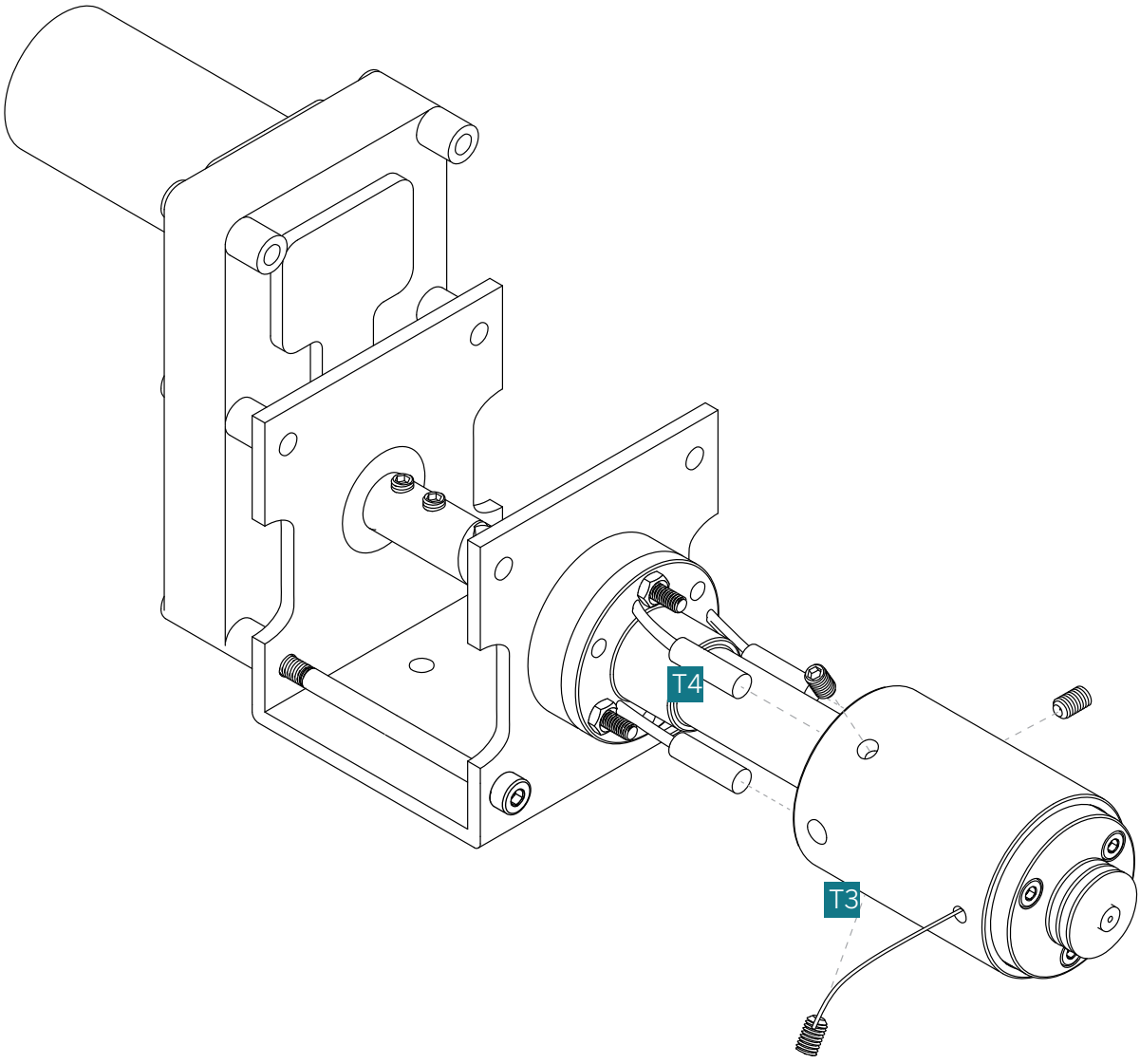
Tools



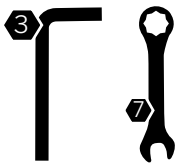
Small Parts

3X

- Cut the heater cartriges cables at about 30cm.
- Insert the three heater cartrige **T4** into the melting chamber **T3** and close them with grub screws
- ! Please, use gloves. The material could be crippling
- ! Pay attention. Ensure to fix the grub screws, or the heater could exit from the holes.

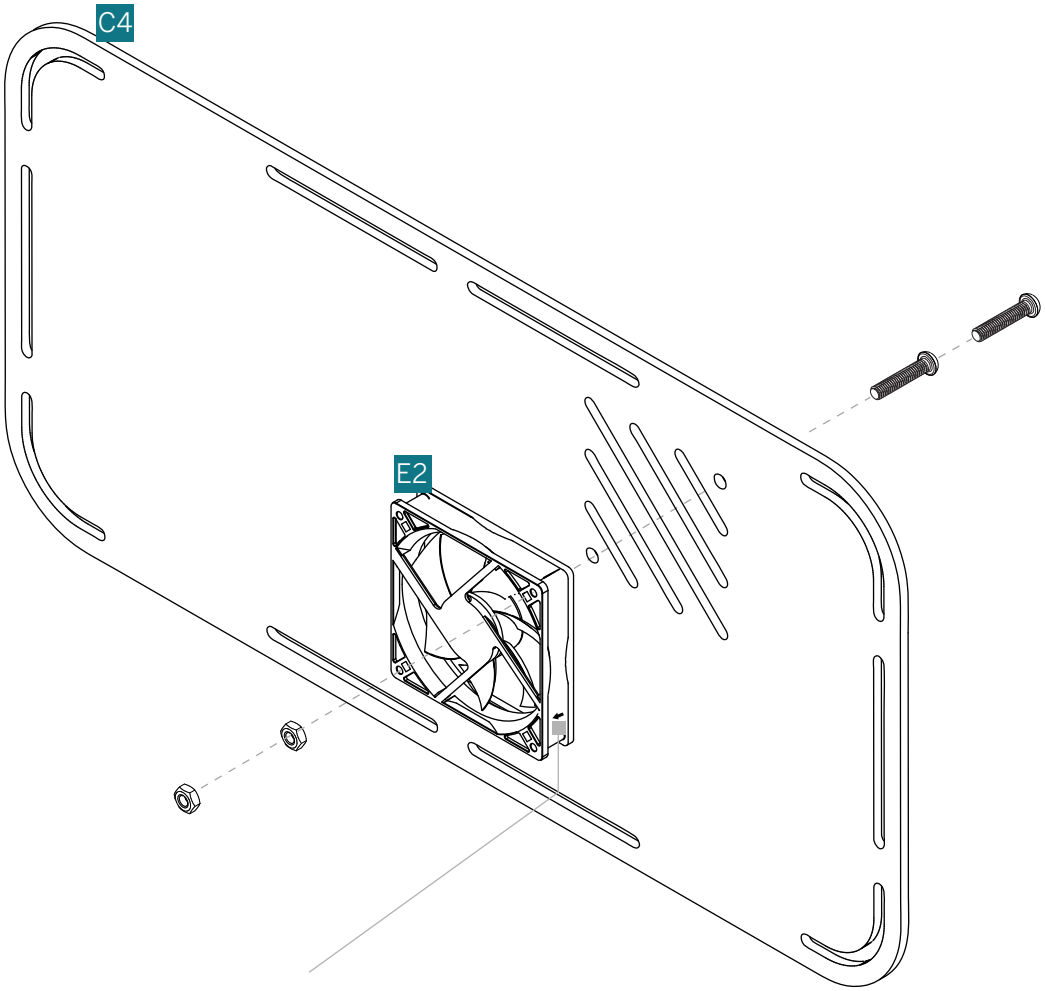


Tools



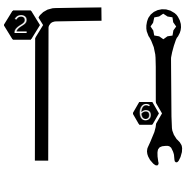
Small Parts

- Remove the plastic cover from the plexiglass.
- Fix the fan **E2** to the left lateral side **C4**
- ! Pay attention. The fun must blow air inside.

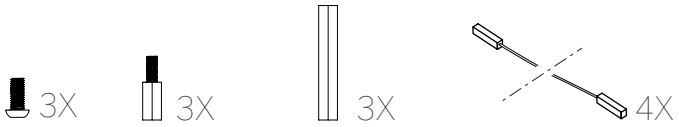


Place the fan with the arrow pointing in this direction

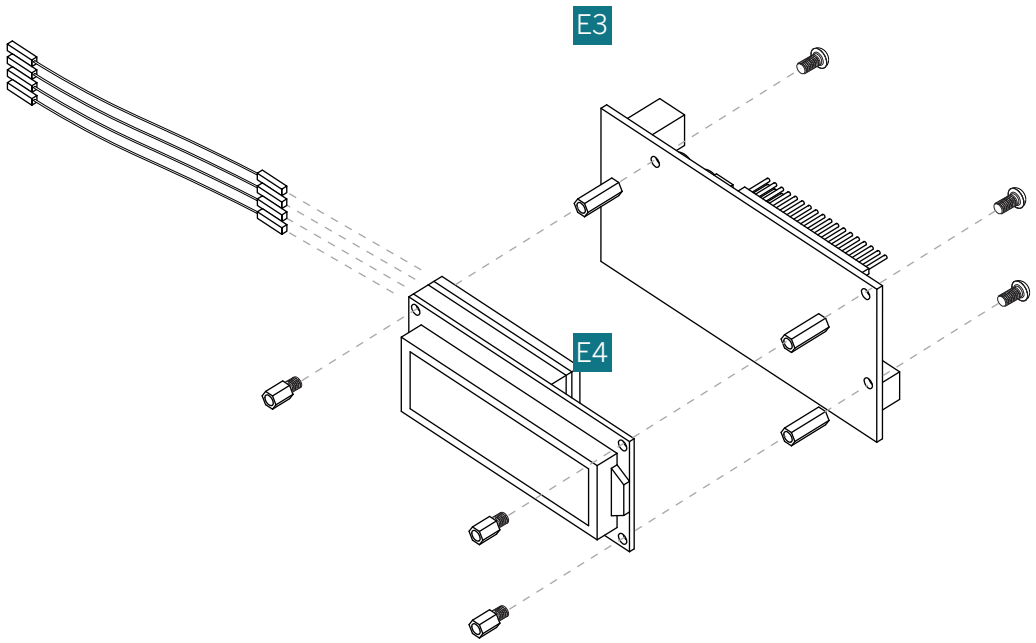
Tools

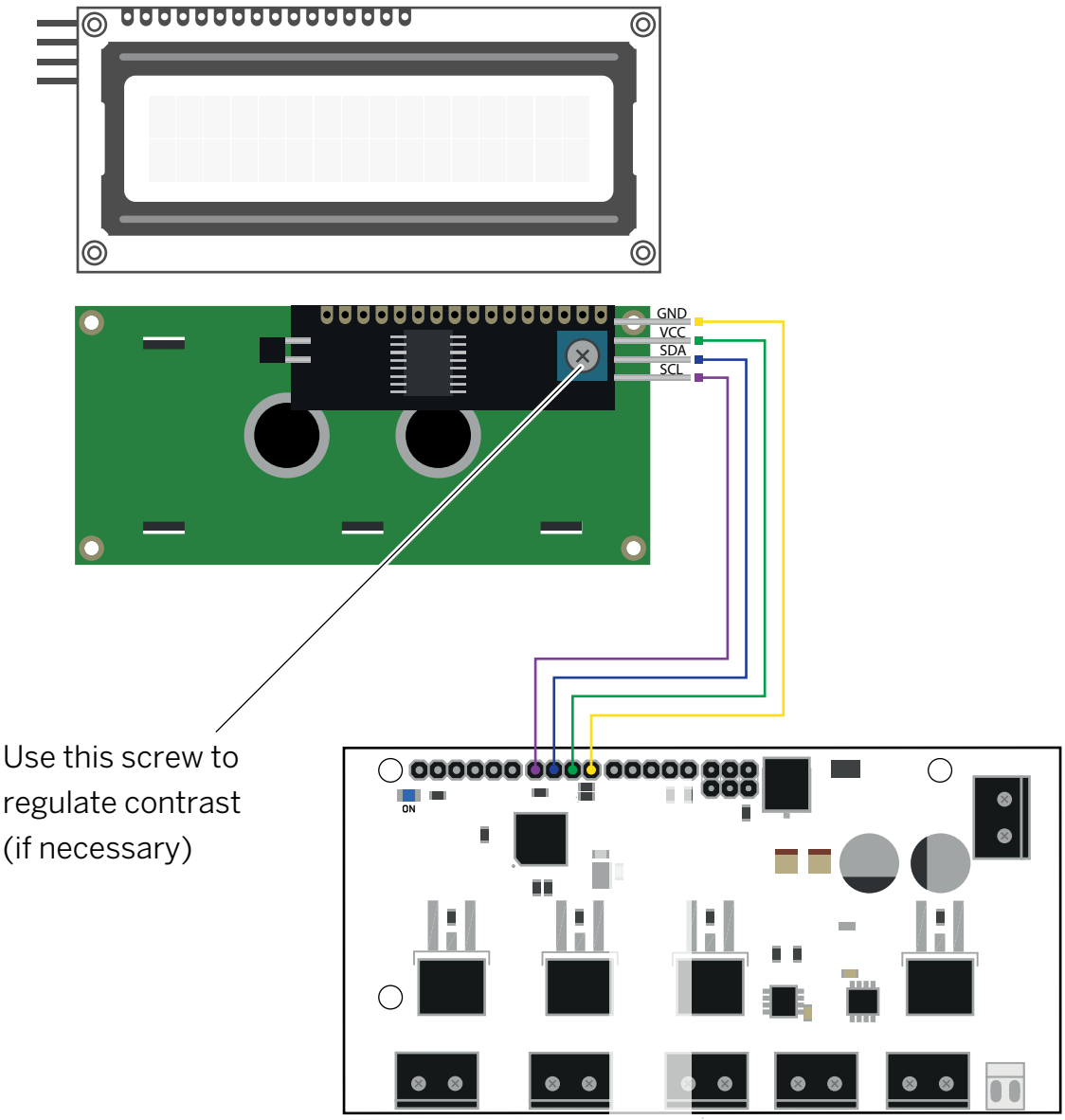


Small Parts



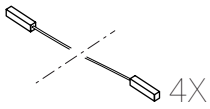
- Insert 4X electric wires in the display **E4**
- Fix the PCB **E3** whit the display **E4**
- Attention: if you cannot see anything on the LCD monitor, or it has a very low contrast, please regulate contrast by turning the screw on the back. [see the next page to identificate the screw]



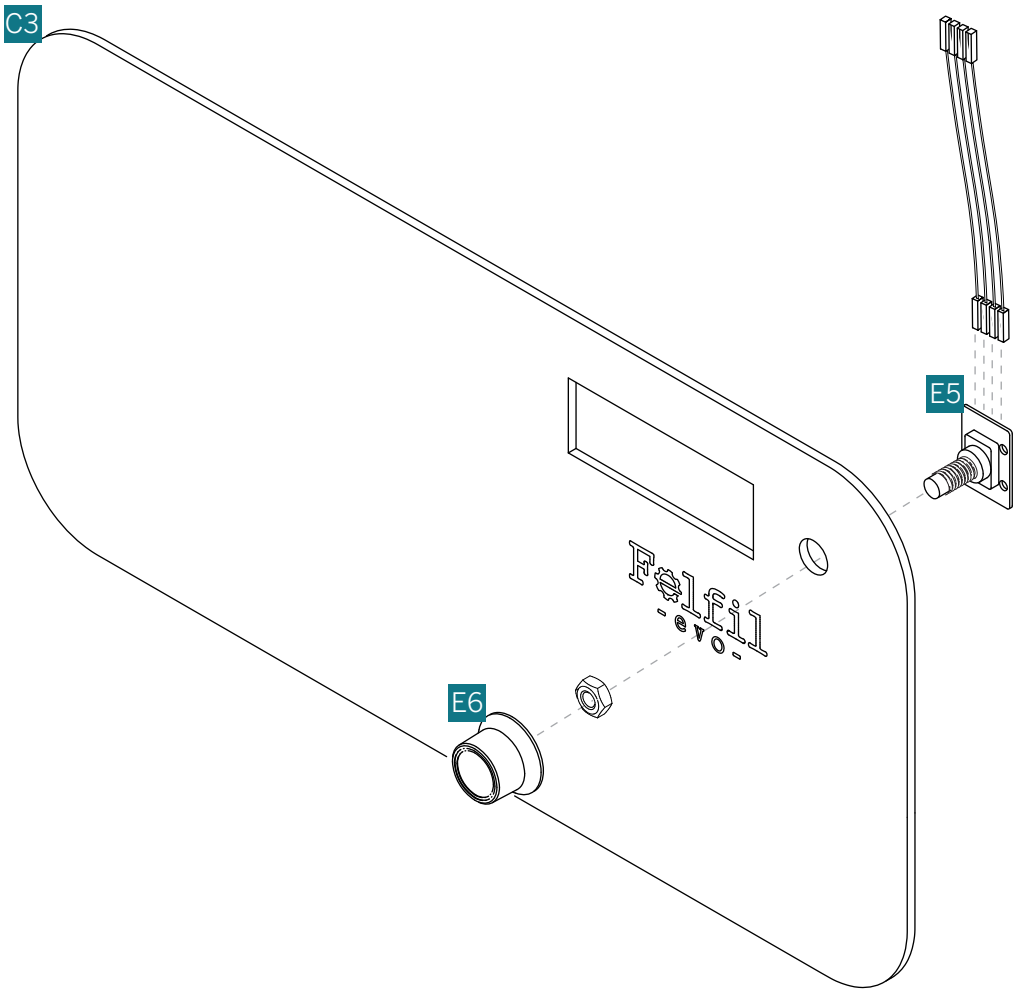

GND
VCC
SDA
SCL
ON
Use this screw to
regulate contrast
(if necessary)

Tools

Small Parts



- Remove the plastic cover from the plexiglass.
- Fix the encoder **E5** on the right lateral side **C3**, using it's nut.
- Push the knob **E6** on the encoder **E5**.
- Insert 4X electric wires in the encoder **E5**.

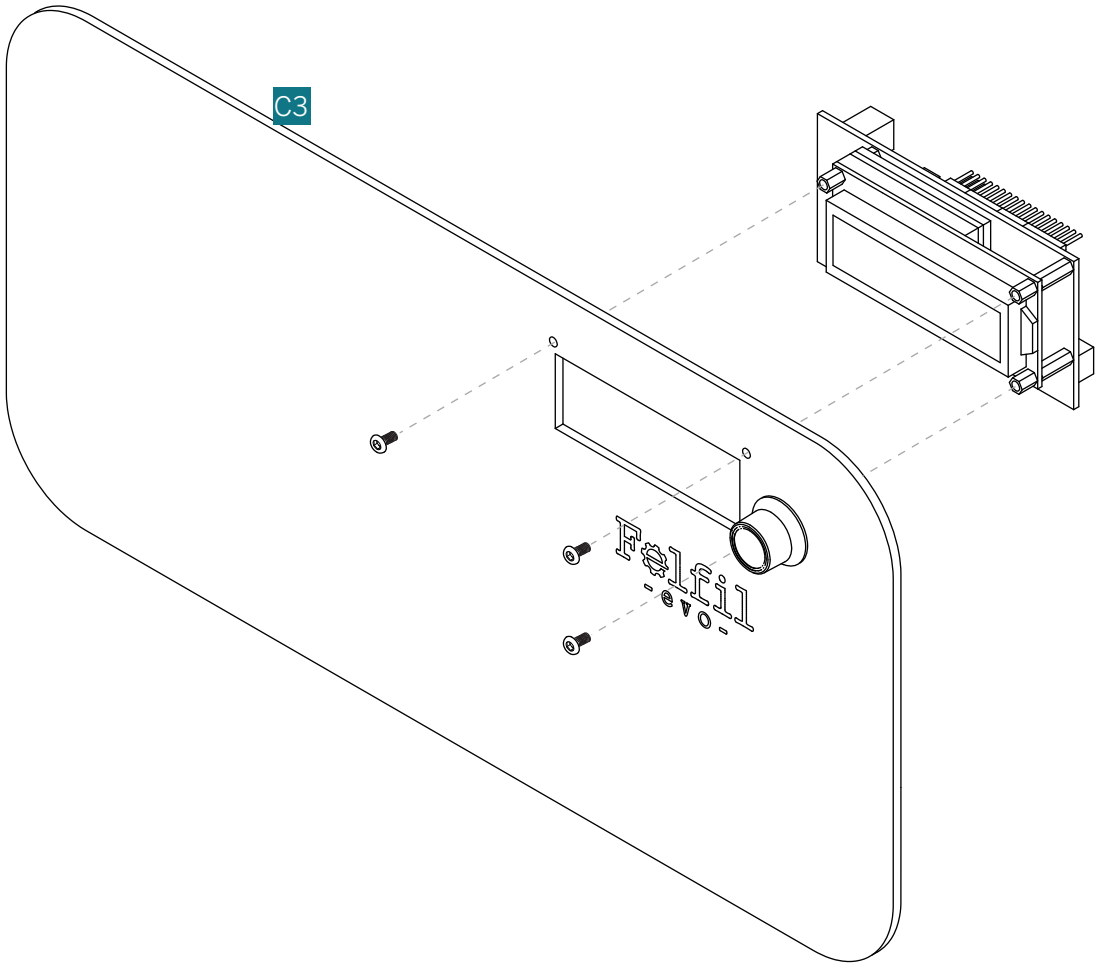


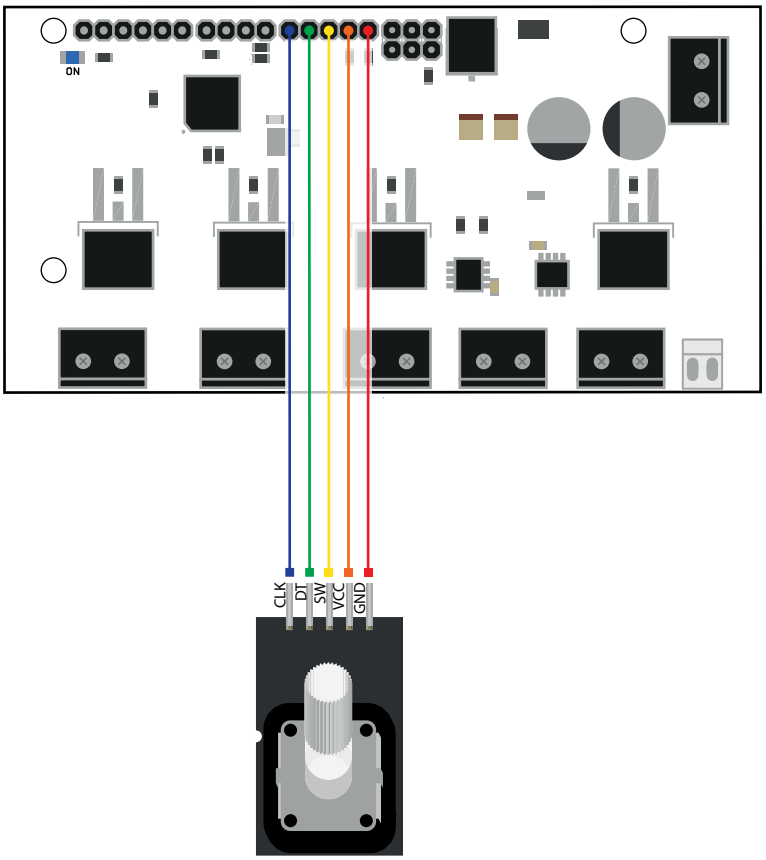
Tools

Small Parts

3X

Screw up the previous block to the lateral side **C3**

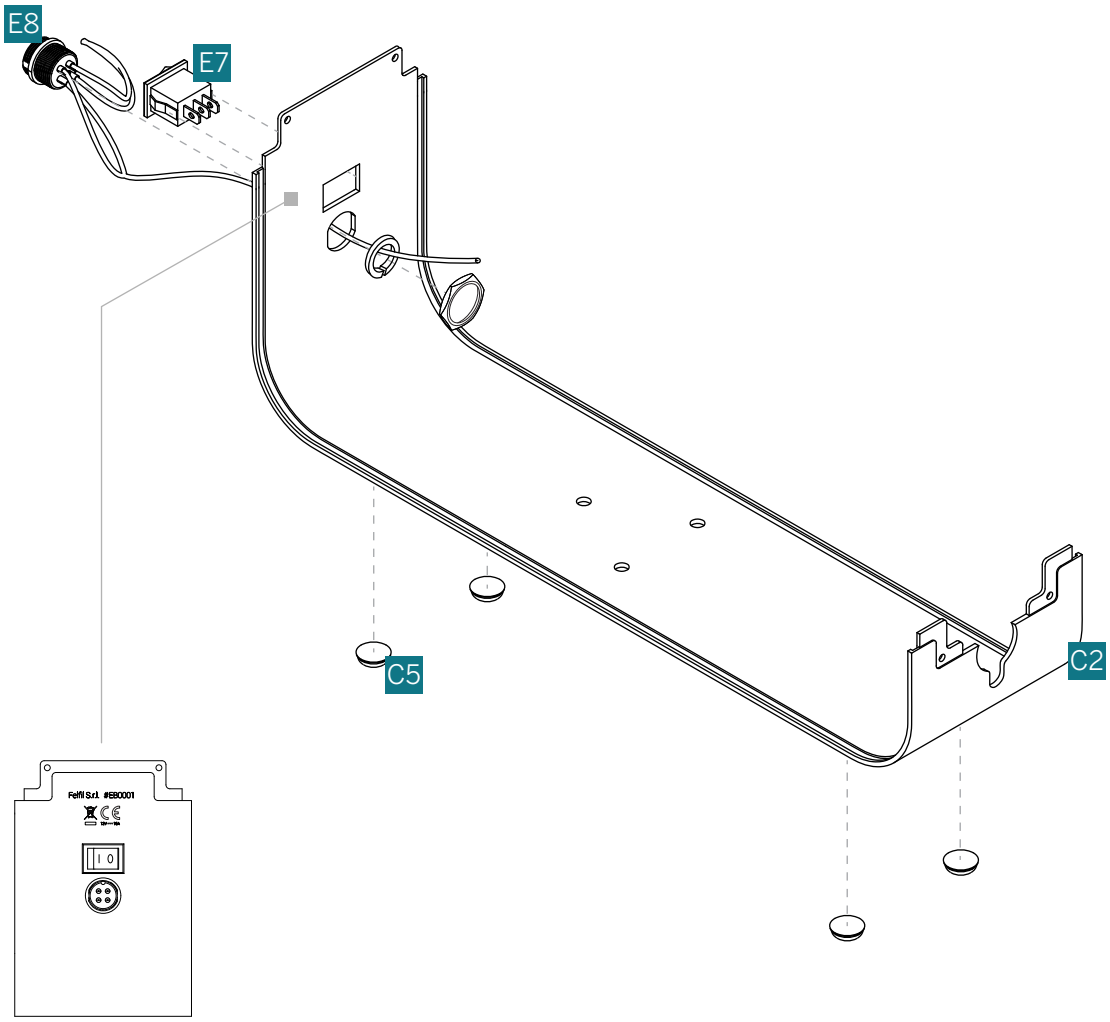



ON
CLK
DT
SW
VCC
GND

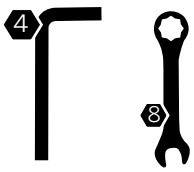
Tools

Small Parts

- [ ] If present, remove the protective film from the case **C2**.
- [ ] Insert the switch **E7** in the squared holes of **C2** (lower case)
- [ ] Insert the four feet **C5** into the holes of **C2**
- [ ] Insert the power supply connector **E8** into its hole of **C2**, then screw it using it's nut and spring washer



Tools

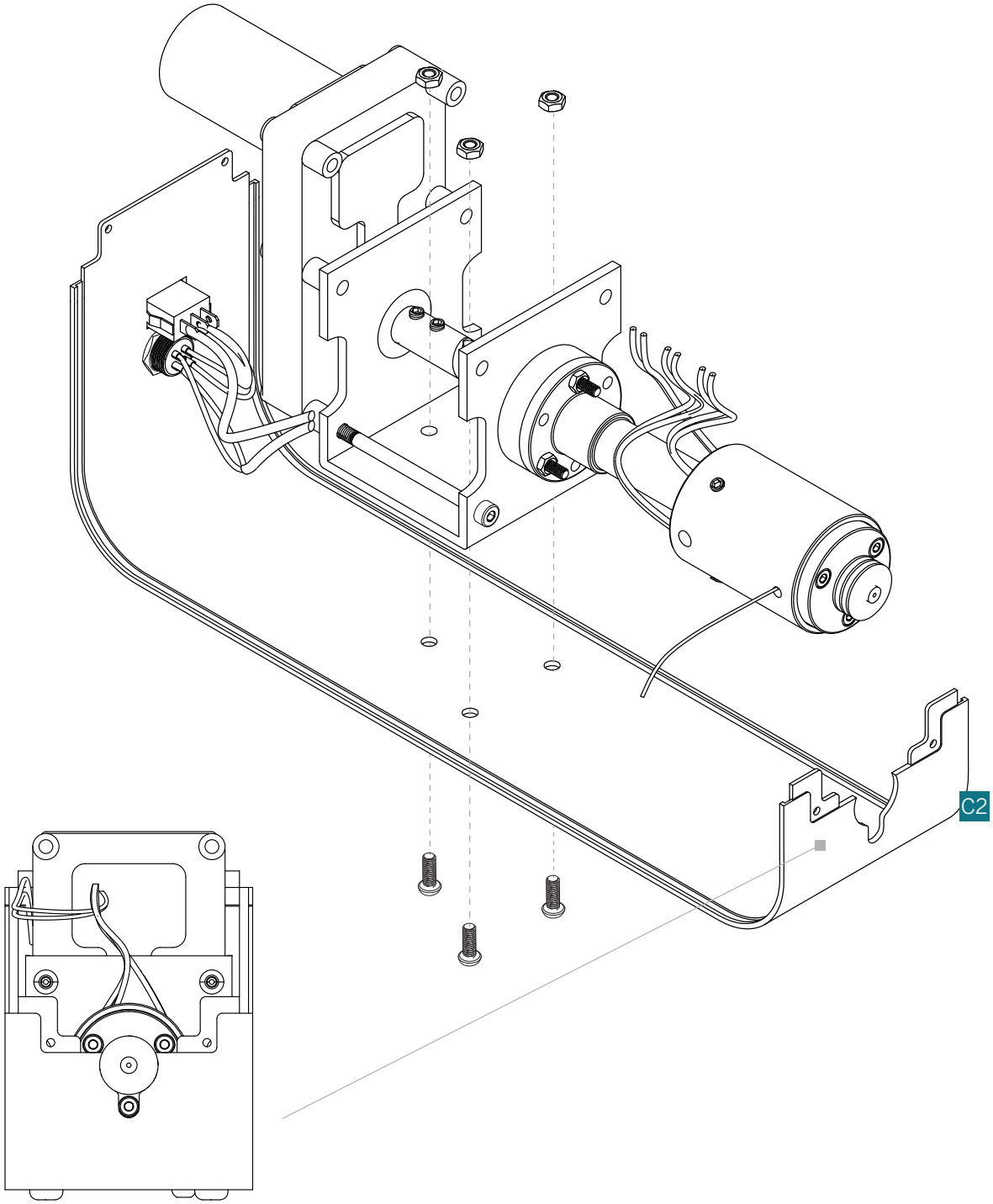


Small Parts

3X

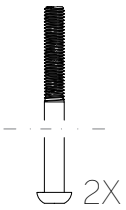
3X

- Fix the previous block at the lower case **C2**, using the screws (X3)
- The nozzle must be centered with its case hole.

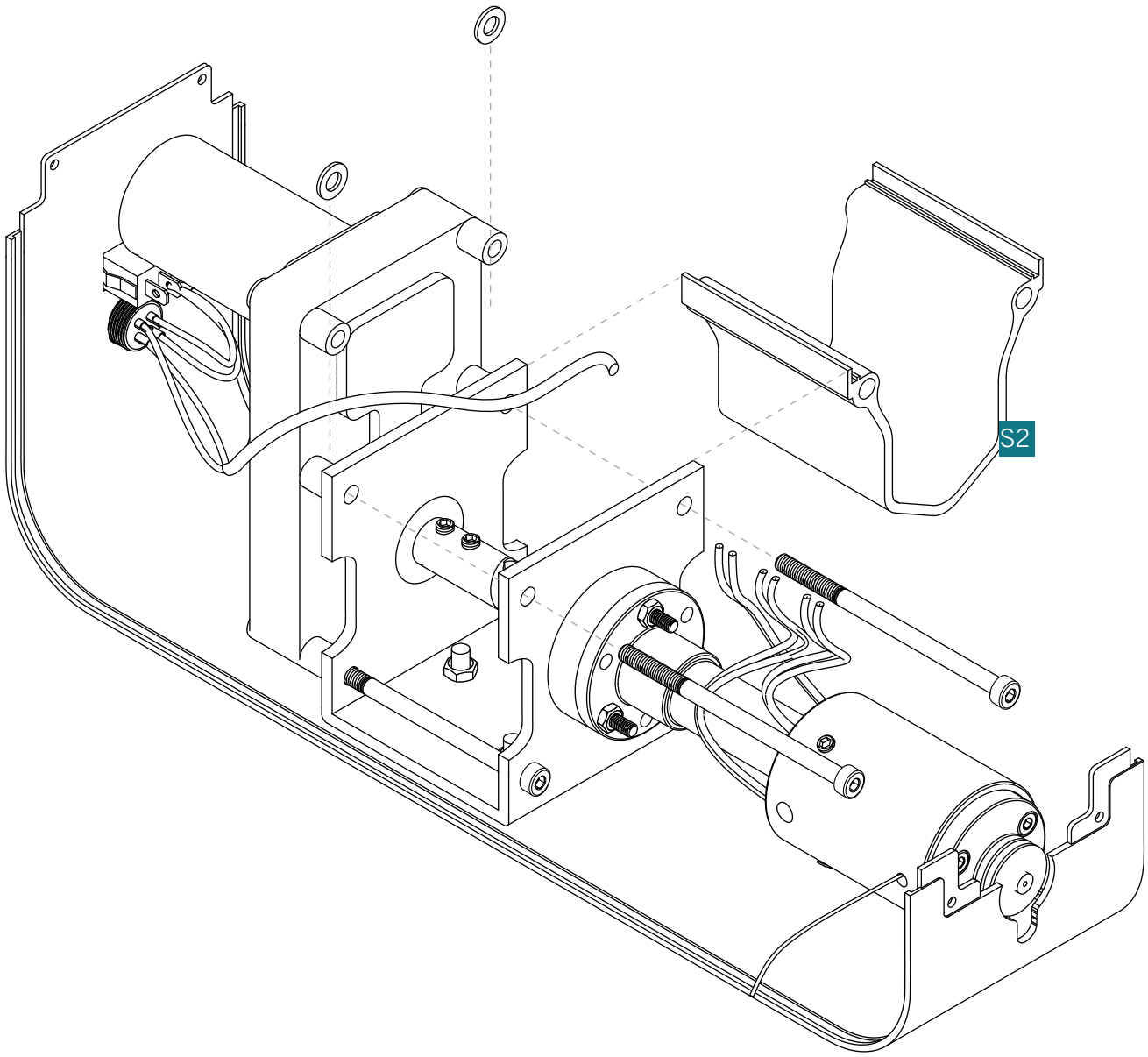


Tools

Small Parts



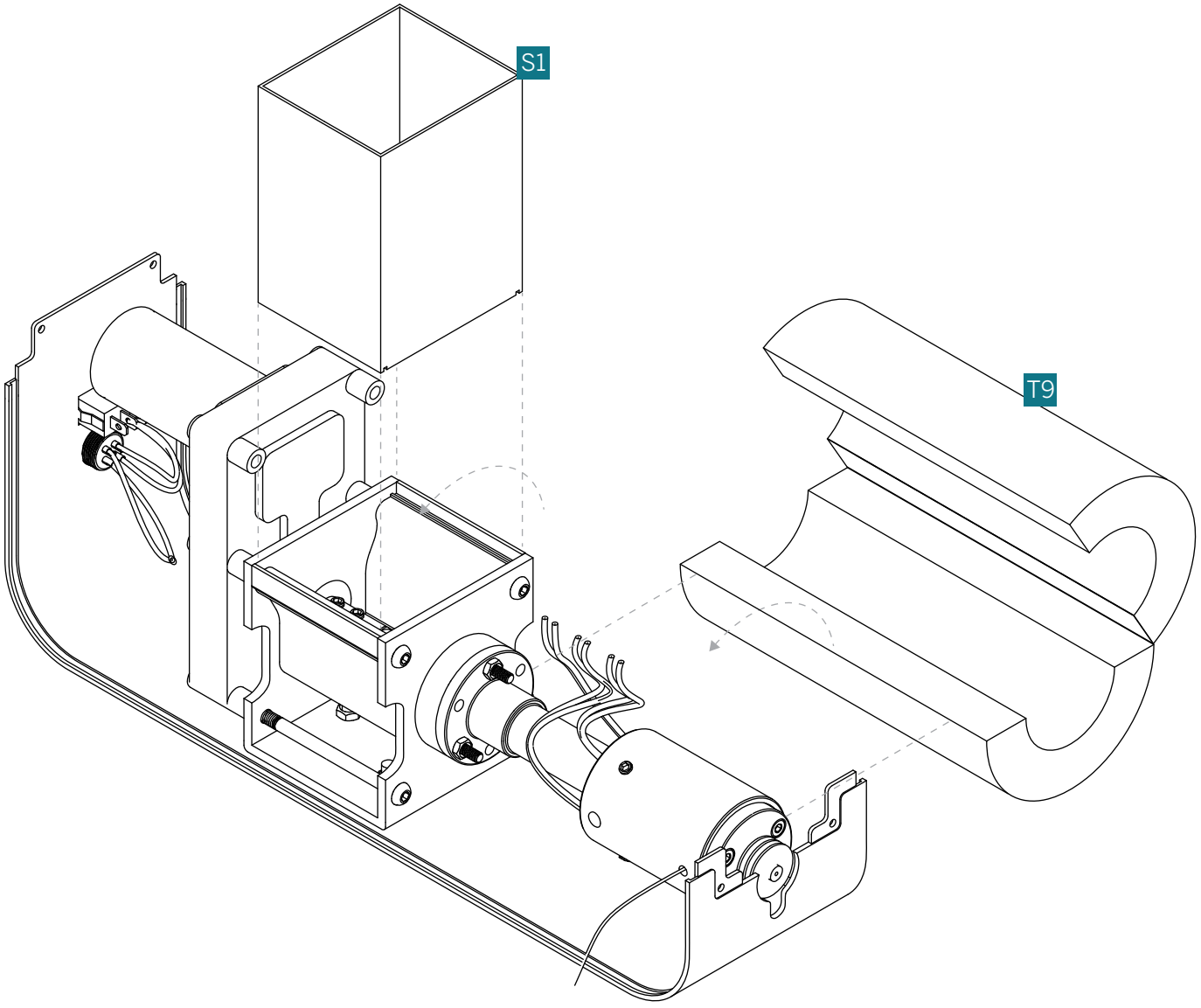
- Insert the Low Hopper **S2** in **P1** from its side.
- Fix the screw (X2) to the gearmotor. [Whit this operation you will block the **P1**, **S2** and **E1** parts
- Do not close too much the screw. Stop when you reach the structural support.



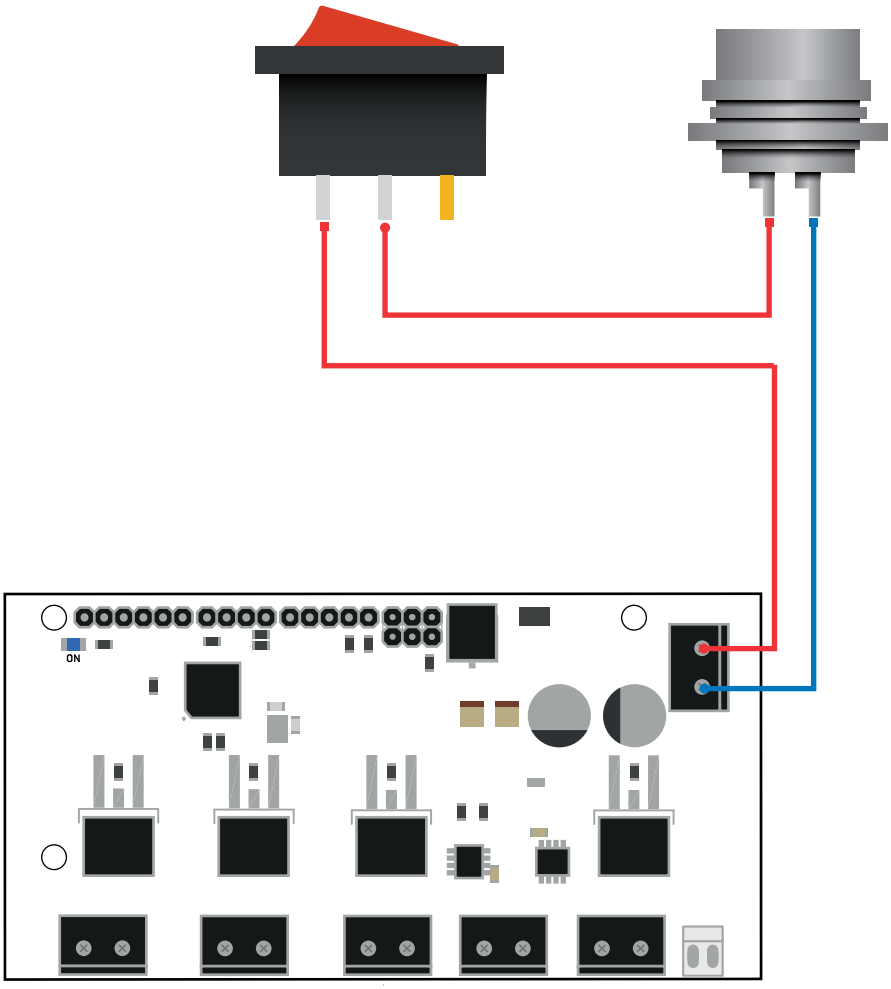
Tools

Small Parts

- Insert the insoulant **T9** around the melting chamber **T3**
- Insert the Upper Hopper **S1** on **S2** guides.
- ! Please, use glowes. The material could be crippling



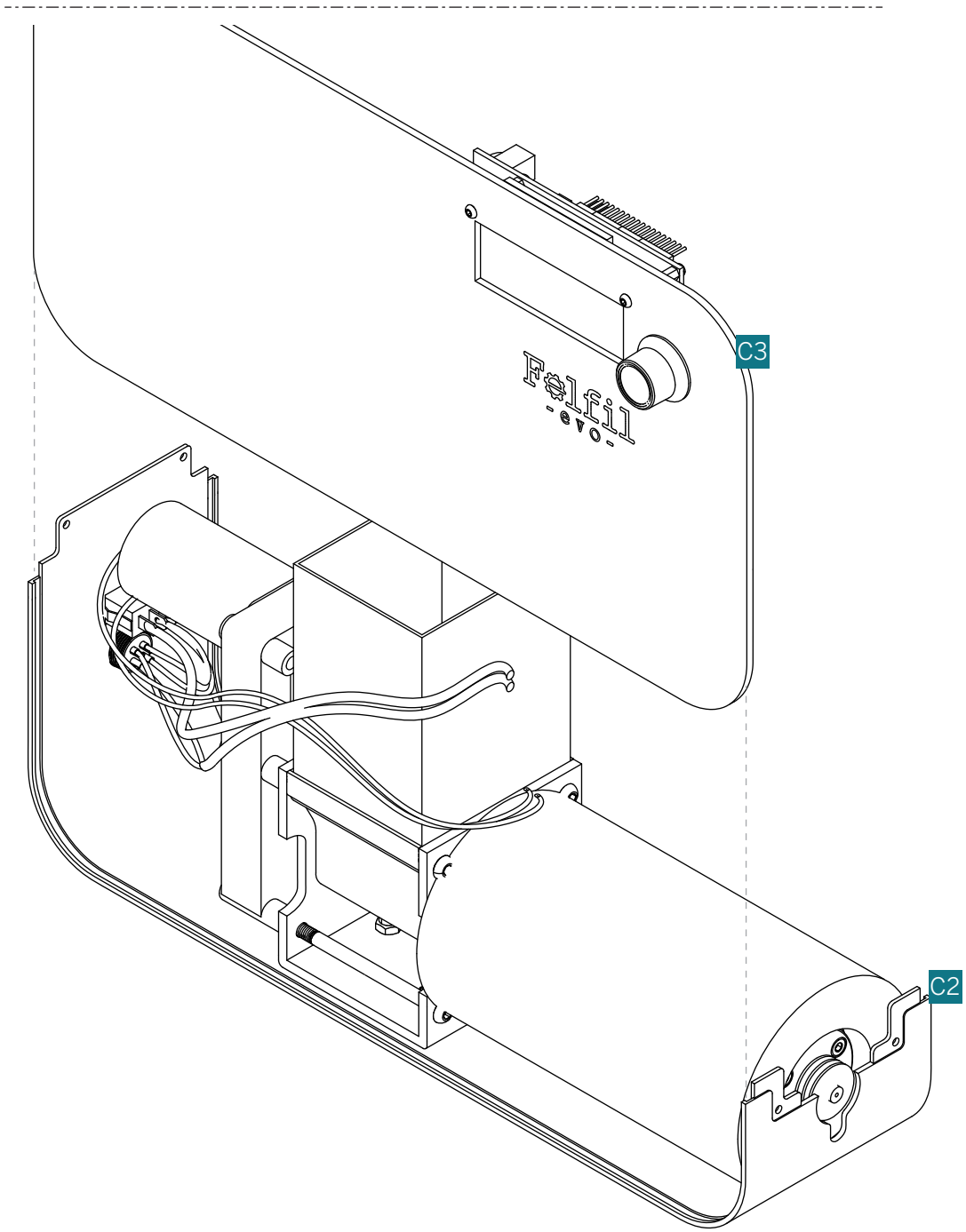
! Pay attention. Do not invert the power cables order, or you will burn the electronic PCB.



Tools

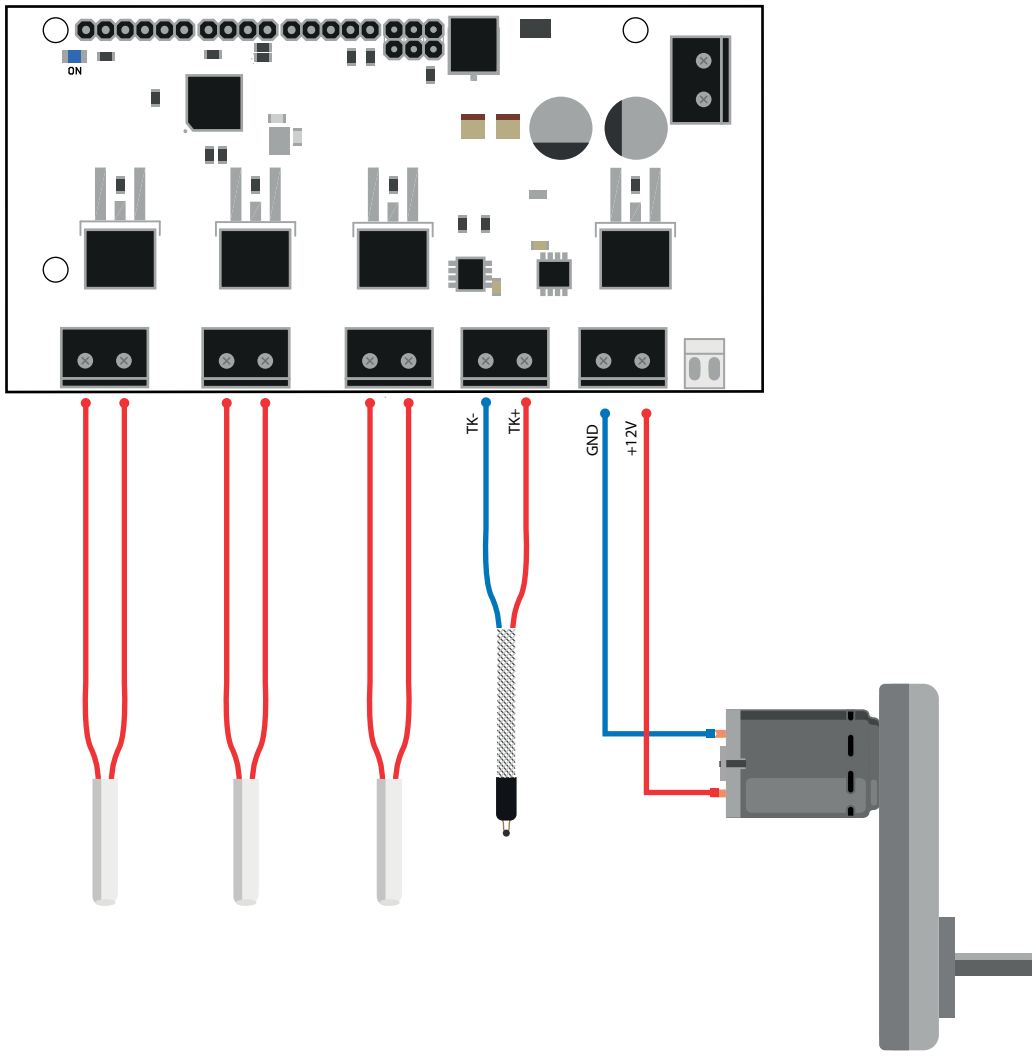
Small Parts

Insert the lateral side **C3** in the specific guide of the lover case **C1**



! Pay attention. Do not invert the gearmotor cables order, or the screw will turn anticlockwise.

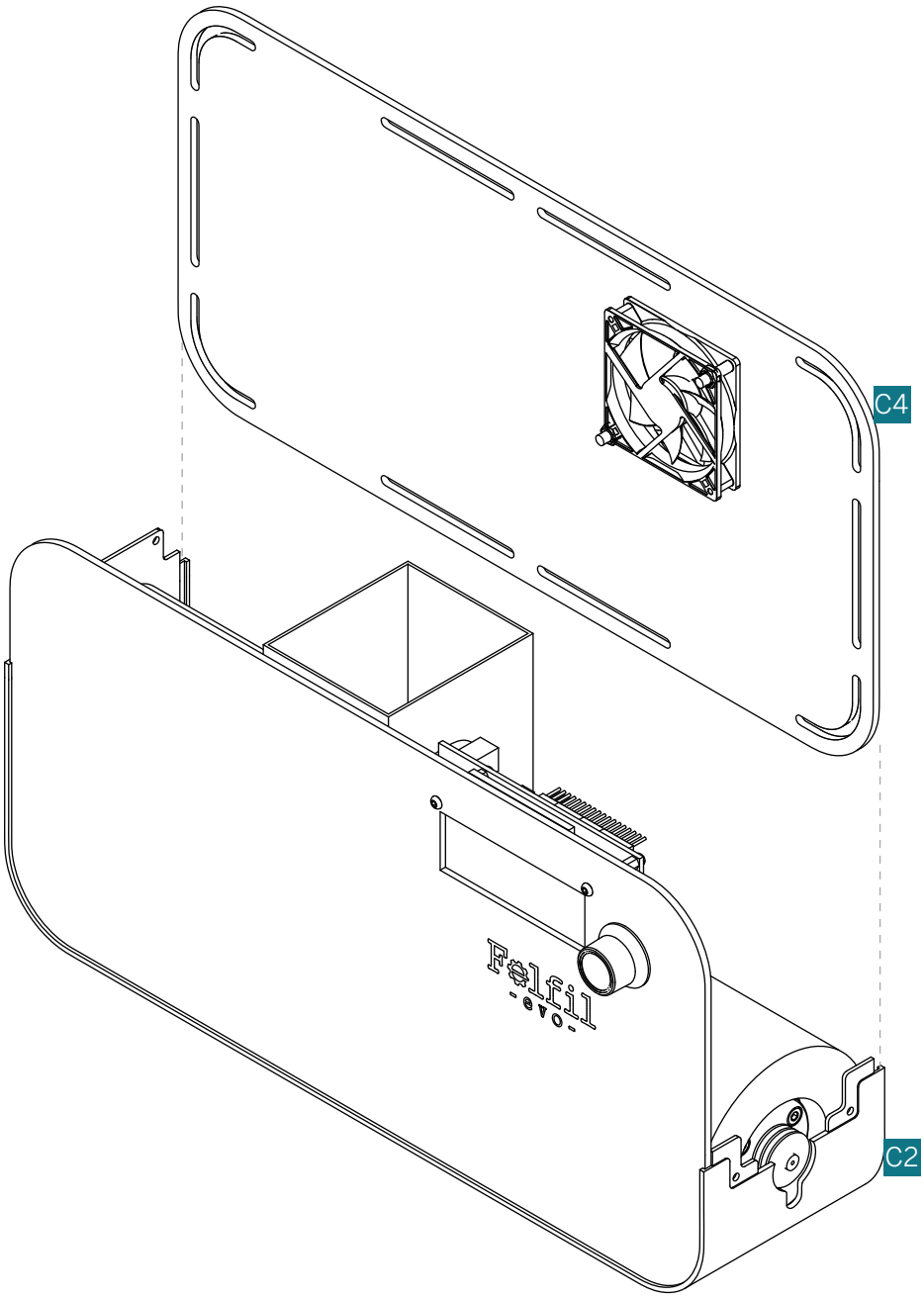
! Pay attention. Do not invert the thermocouple cables order, or the temperature will be always displayed on 0°C.

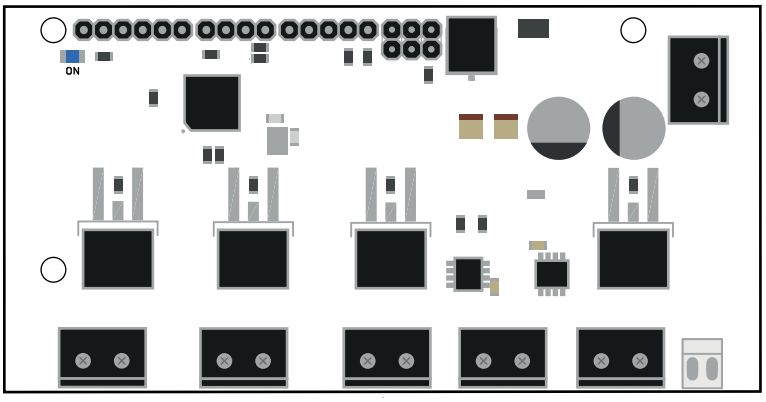


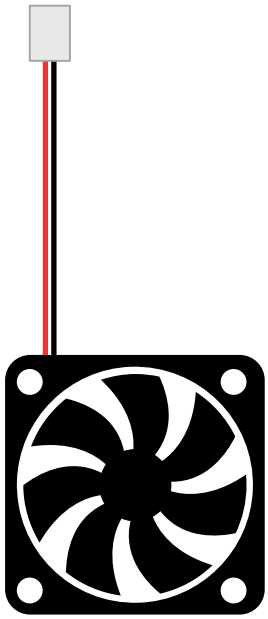
Tools

Small Parts

Insert the lateral side **C4** in the specific guide of the lover case **C1**




ON

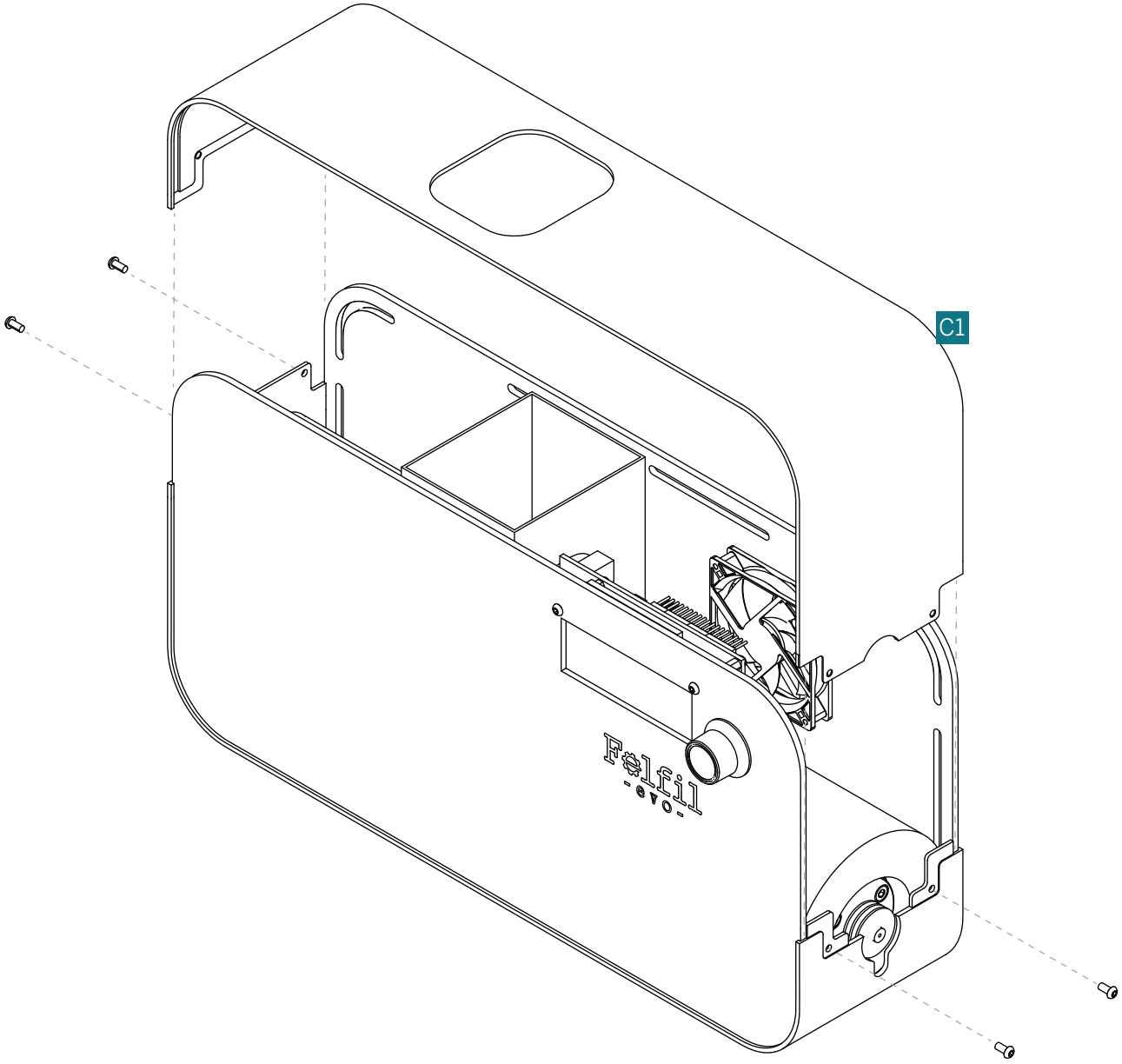


Tools

Small Parts

4X

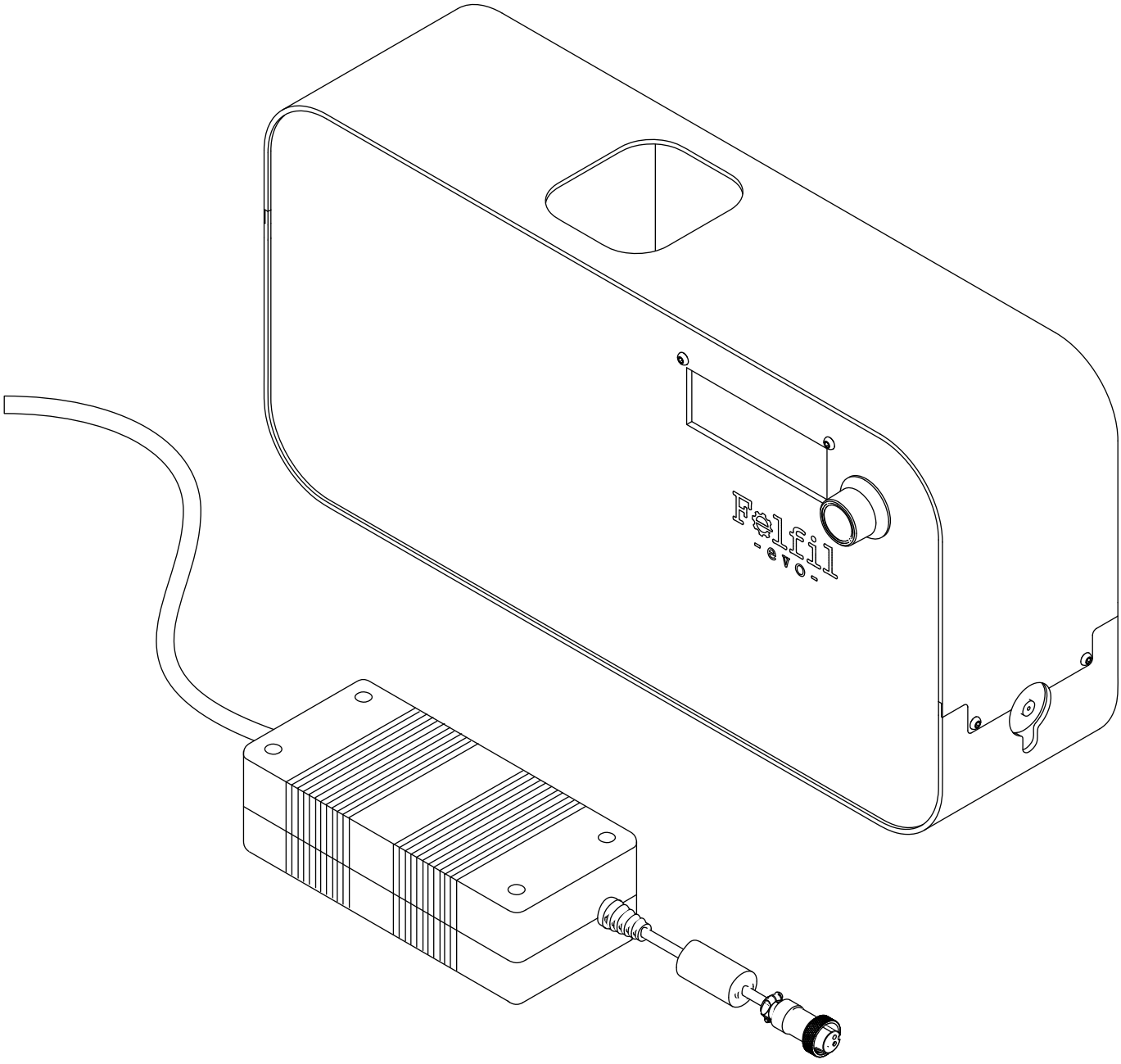
Close the extruder with the upper case **C1** and fix it to the lower case **C2**



Tools

Small Parts

Connect the power supply.

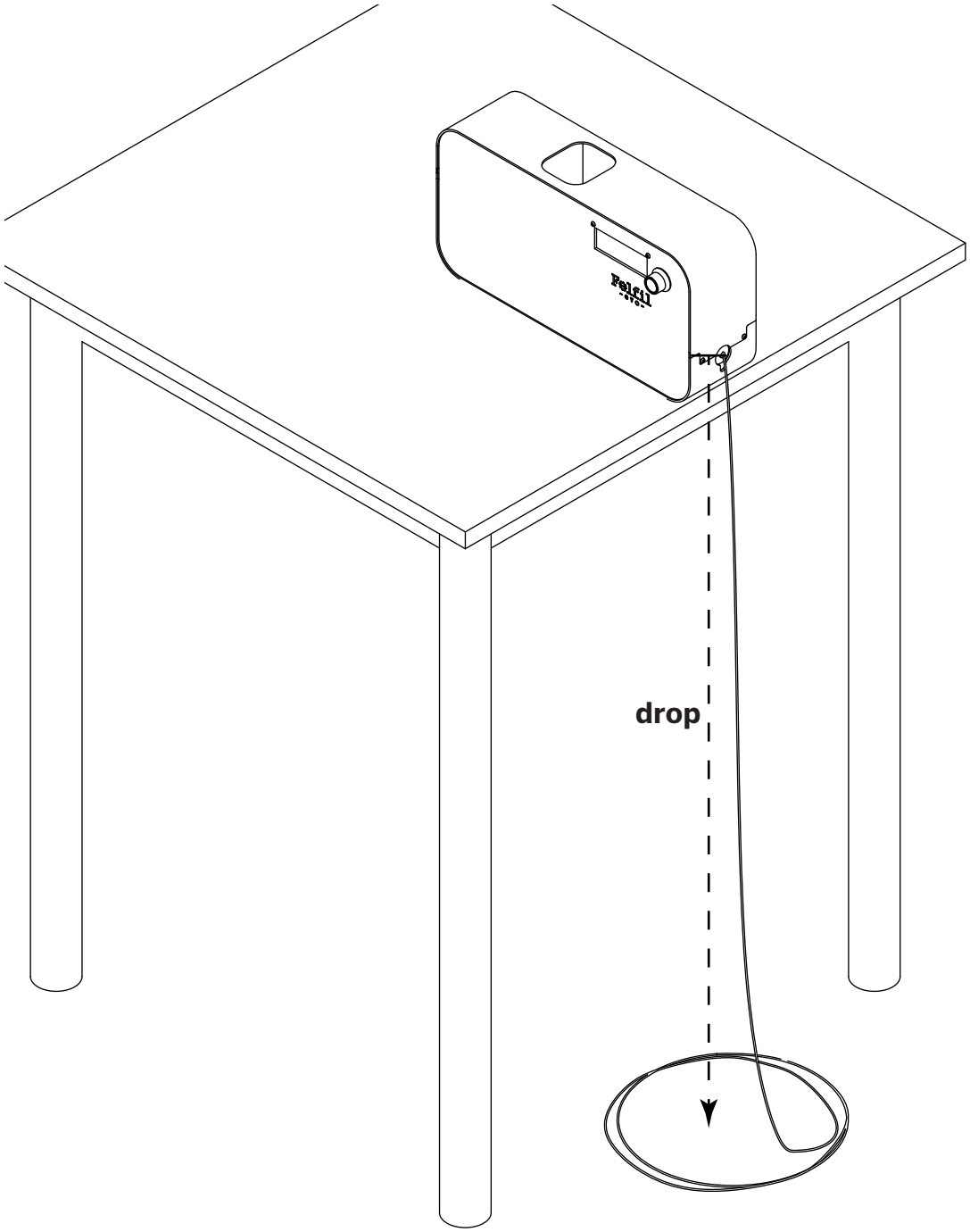


In order to obtain the best quality filament, Felfil Evo is designed to be placed on a common and stable table and to extrude on the floor.

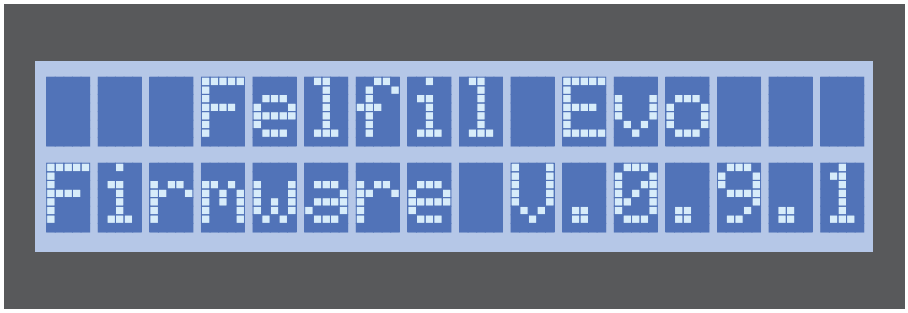
The height of extrusion is called drop, and tipically is about 80cm.

Moreover, with some materials,it will be useful to reduce or to increase the drop in order to obtain more constant diameter of the filament; typically PLA need this treatment.

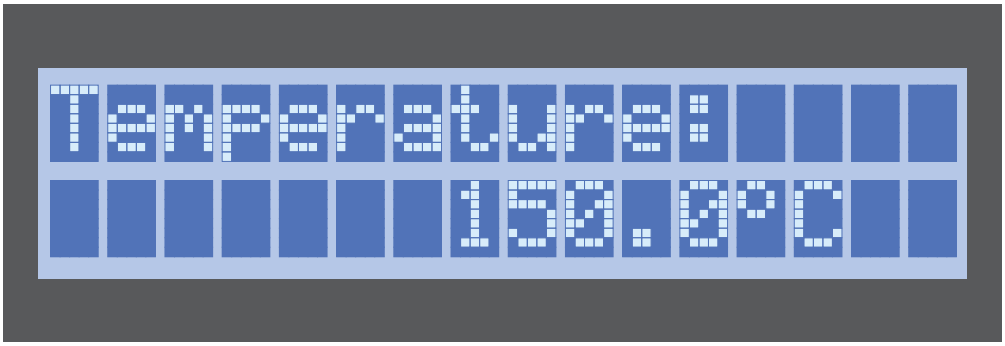
So, if your filament is quite inconstant or get stretched too much, try to reduce or increase this value.



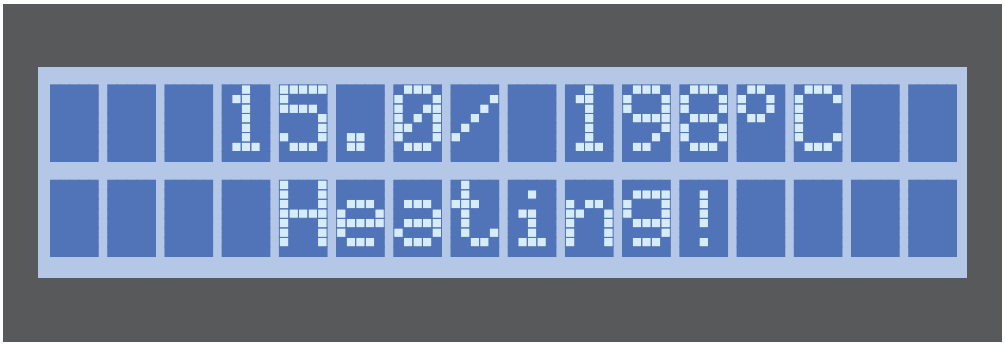
- Plug the AC power cord into an electrical outlet.
- Set the power switch to the [I] position
- The Felfil Evo will display welcome text on the LCD panel. This is the beginning of the script that will guide you through the extrusion.



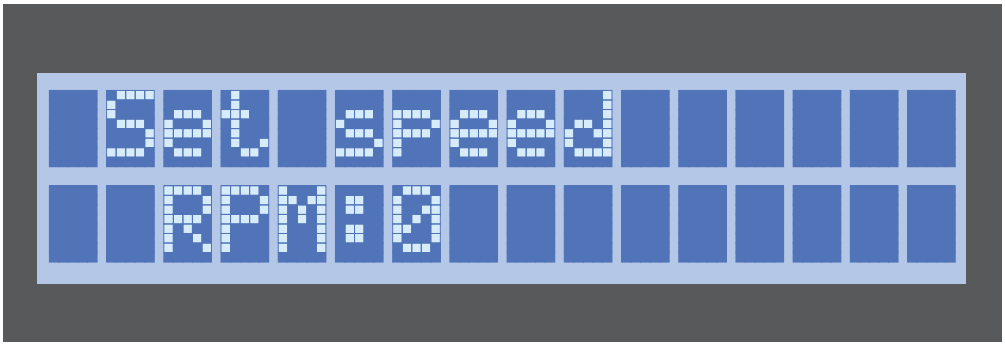
- In the first step you can set the temperature turning the kno E6 .
  Then press the knob to confirm



- Felfil Evo is heating, wait untill it reaches the setted temperature



- Now you can set the screw rpm. Press the knob to confim.

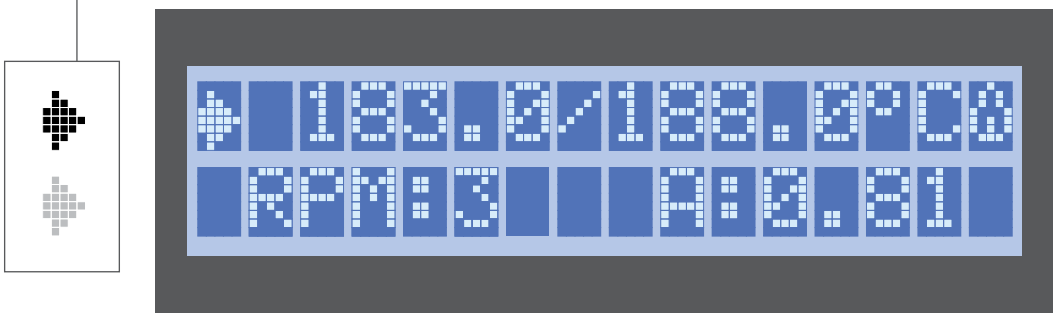


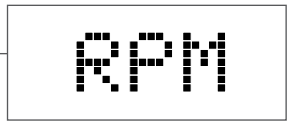
This is the user interface when Felfil Evo is running.
The LCD contains all information about the extruding.

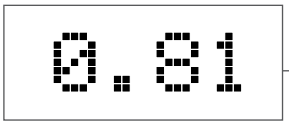
Current Temperature:
indicates the current temperature in the chamber.

Set Temperature:
indicates the temperature the PID is heading for.

Arrow:
switch between 2 functions:
- set temperature
-set engine rpm







Engine speed:
indicates the set engine rpm: you can set this value from 0 to 9.

6 rpm is a quite safe and efficient value.

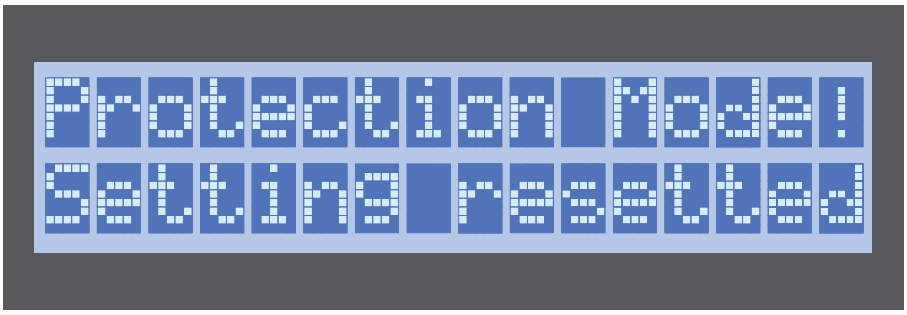
Electrical Absorption
Indicates the electrical current absorbed by gearmotor in Amperes.

Felfil Evo automatically cut off the power when the absorption is over 1,8A.

Keep pressed the knob in order to reset all settings.

When the sceen below appears, it's because Felfil Evo goes on protection mode. This usually occours when the engine torque is too high, in order to avoid failure for engine and mechanics.

Usually this is due to a too low temperature in the melting chamber, or a too high speed of extrusion.
However when the block occurs, please set the temperature to 200°C, and wait about 20 minutes, to be sure that the material in the chamber is properly melted.



Press the knob, and you will be able to restart the process from "set tempereture".

Usage

For a correct usage of Felfil Evo Complete Kit please follow these suggestions:

- Place it on a flat and stable surface before operating (a table is quite good);
- Do not place anything near Felfil Evo, it requires unrestricted airflow, for cooling, proper operation and to protect the electronic components from overheating;
- Do not operate the machine for more than 4 hours. After that cycle, please could it down for 2 hours;

- The extruding screw must turn clockwise.

The first meters of filament will be dirty, and may have some metal shavings in it. Do not use this filament in your 3D printer. Extrude all the pellets that were in the hopper, if filament still looks dirty after this step, extrude more pellets to further clean the system.

Please pay attention:
- If the nozzle is not correctly tightened, plastic may exit, producing smell.
- If you recognise smell of burning plastic, immediately stop extrusion, open Felfil Evo and check that everything is ok.
- If the cartridge heater seems to be ruined, please substitute with a brand new one, in order to avoid any potential short-circuit.

If you have any problems using Felfil Evo filament extruder, contact support@felfil.com.

Maintenance

Felfil Evo needs some occasional maintenance:
when you have finished to extrude, empty the hopper leaving the filament extruder running for few minutes.
Use always gloves while working on still hot components.
Remove the three nozzle screws only when these are cold.

In this section you can find some information about the plastic.

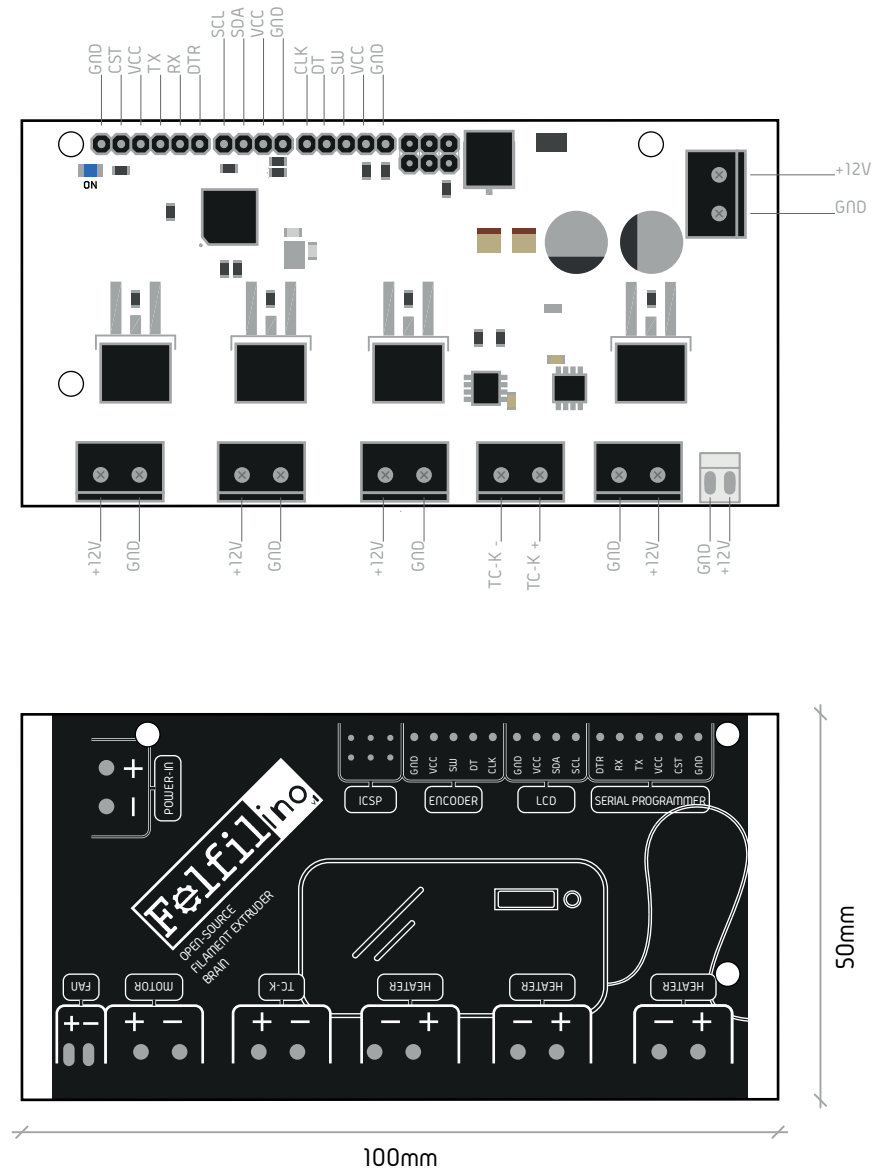
When using commercial pellets, rely on the maker's identification of the type of plastic. When using recycled plastic, check the markings on the item(s) to determine which type of plastic you are using.

Do not mix types of plastic, as this may affect processing times, both in the extruder and in the printer.

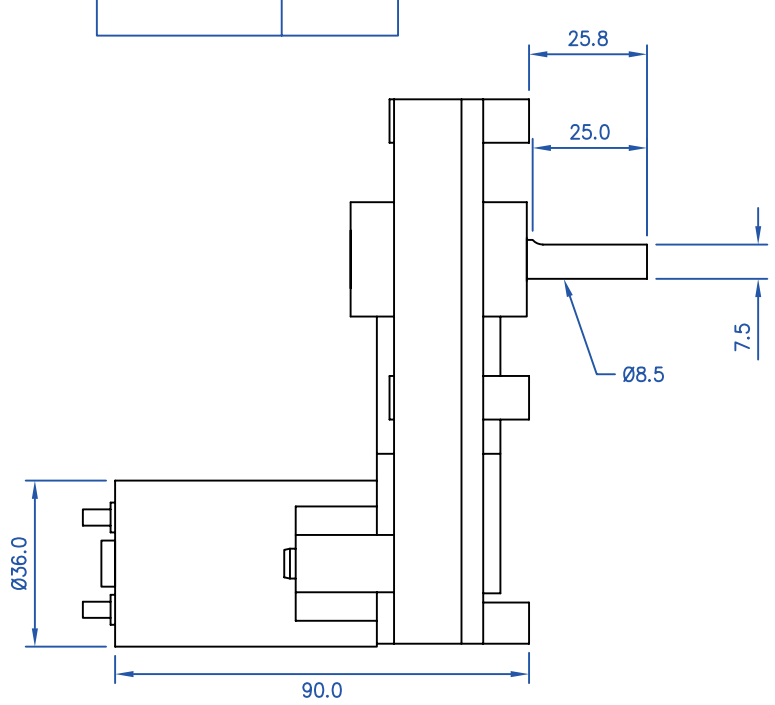
The following is a table of general processing temperatures. Notice that the processing temperature may not be the same as the melt temperature.Temperatures will vary based on: humidity, ambient temperature and chemical composition of the polymers.

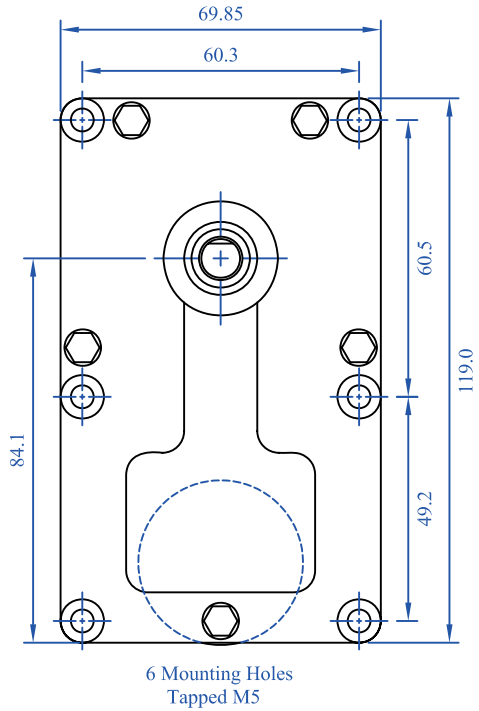
	MFR	Density [g/cm3]	T [°C]	Speed [rpm]
PLA	6	1,3	180 (+/-10)	5
ABS	19	1,04	200 (+/-10)	6
HIPS	4	1.04	180 (+/-10)	6
TPU	-	1,22	190 (+/-10)	8
T45 (pc+abs)	4	-	180 (+/-10)	6

NOTE: The temperature ranges in the chart are approximate. It will require some trial and error to determine the right processing temperatures. Keep notes of actual temperature settings with different types of plastics, along with other operational notes, to develop a procedure that works well in your situation.


GND
CST
VCC
TX
RX
DTR
SCL
SDA
VCC
GND
CLK
DT
SW
VCC
GND
ON
+12V
GND
+12V
GND
+12V
GND
+12V
GND
TC-K -
TC-K +
GND
+12V
GND
+12V
POWER-IN
ICSP
ENCODER
LCD
SERIAL PROGRAMMER
Felfilino
OPEN-SOURCE
FILAMENT EXTRUDER
BRAIN
FAN
MOTOR
TC-K
HEATER
HEATER
HEATER
50mm
100mm

APPROVED	
SIGNATURE	DATE





TECHNICAL DATA

Motor Type – 555 Series
Voltage – 12v DC

Motor Resistance at 21°C. –
2 Ohms

Input Power at 12v DC –
3.20 Watts

Nominal Current at 12v DC –
0.300 Amps

Stall Current at 12v DC –
2.191 Amps

Output torque at 12v DC –
23Nm

Thermal Protection –
No Thermal Protection

Duty Cycle – Continuous

No Load Speed at 12v DC –
8rpm.

Output Shaft Rotation when viewed from front – CW/CCW.

Temp Heat Rise –
21°C – 65°C / 5hrs

Dimensions in mm

MELLOR ELECTRICS Ltd BLACKBURN ENGLAND	DESCRIPTION T3 DC 8rpm 12v DC 555 Series	DRAWN	LC	26/03/15
	CUSTOMER SOFTING ITALIA	PART No FBDseries		

Marking:

Felfil Evo is a product complying with the 2014/30 EU Directive and the Harmonized Standard EN 61326-1: 2013.

On its case is reported the serial number of the product #EBxxxx along with CE and RAEE marks.

Contacts:

Felfil s.r.l.
VAT number: 11482100010
Corso Castelfidardo 30/A, 10129 Torino, Italy
support@felfil.com

Please be sure to download always the latest version of this manual from: **felfil.com**
Manual revision: 1.0
Last revision date: 24 october 2017