



Filament Drybox with Rosahl RS1 Electric Dehumidifier Membrane



ERIK3DP

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updated 2. 9. 2024 | published 2. 9. 2024

Summary

Build a filament drybox from a cereal box with Rosahl RS1 dehumidifier membrane without the need for any desiccant.



4.83 hrs



1 pcs



0.20 mm



0.40 mm



PLA



52 g



Prusa MINI /
MINI+

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Tags: [drybox](#) [filamentdrybox](#) [rs1](#) [rosahl](#)

This is a filament drybox for a single spool based on a cereal box. It does not require any desiccant but leverages a Rosahl electric dehumidifier membrane. The original cover plug of the cereal box is replaced by a 3D printed plug which carries the RS1 membrane, a PTFE tube outlet and a USB-C power supply module.

Operation Principle

Rosahl dehumidifiers are based on a solid-state polymer membrane. When supplied with a 3V DC voltage, moisture on one side is being decomposed into Hydrogen ions and Oxygen, the Hydrogen ions pass the membrane and recombine with air Oxygen to moisture again on the other side and get discharged. The Rosahl dehumidifiers are compact, work fully maintenance-free and the power consumption is very low.

With an applicable air volume of 5 liters the Rosahl RS1 membrane is suitable for storage of single filament spools e.g., in 4 litre "cereal boxes". With pre-dried filament spools (especially spools made of cardboard contain quite high moisture) a continuous storage at approx. 15% rH and less is achievable.

Printing

All parts can be printed in PLA without supports needed. The cover plug as well as the USB-C module cover has to be printed upside-down. The spool rollers in the bottom of the box consist of a bottom frame plus the axis with ball bearings plus a hygrometer. The axis have to be printed vertically and might require some raft for better adhesion to the print bed. I also added a plug for the PTFE tube when not in use.

I printed everything on a Prusa Mini+ in Overture PLA Professional. A .3mf file with all parts is available plus a pre-sliced .bgcode file.

Assembly

The RS1 membrane comes with a gasket and has to be mounted into the cover plug with two M2.5x12 screws plus nuts/washers.

Solder two cables to the bottom side of USB-C power supply module. Those cables go through a mounting hole of the cover plug with a sealing ring, see pictures. The power supply module is held in place with its cover and is mounted with two M3x20 screws plus nuts/washers. The PTFE plug goes into the remaining hole with its washer into the recess of the bottom of the cover plug. Now the fully mounted cover plug replaces the original cover lid of the cereal box.

The spool rollers fit into the bottom of the cereal box. Each axis takes four standard 608 ZZ ball bearings. If wanted, a hygrometer can be added to the spool roller frame for monitoring the humidity level.

Parts Needed

The Rosahl RS1 dehumidifier is available [here](#), same for the USB-C power supply module [here](#).

- Standard PTFE tube connector with 10mm thread: <https://www.amazon.de/gp/product/B07SKX5P9P/> and washers: <https://www.amazon.de/gp/product/B01DF2SIFI/>
- Sealing ring for cable feedthrough (10/6mm outer/inner diameter, 2mm width): <https://www.amazon.de/gp/product/B07JGCGQGT/>
- Standard 680 ZZ ball bearings (22mm outer diameter, 8mm bore, 7mm width): <https://www.amazon.de/gp/product/B08K936Y1Z/>
- (optional hygrometer: <https://www.amazon.de/gp/product/B0BXRDWYG2/> Note: This hygrometer seem to be no longer available at Amazon, see below for alternative.)
- alternative hygrometer: <https://www.amazon.de/gp/product/B0CH7XS97M/> (This showed good performance compared to a quality temp/hum data logger even at low humidity levels around 15%RH! Make sure to print the new base part with mating bracket for this one: Spool_Base_Hygro_new.stl!)
- 4l cereal storage box: <https://www.amazon.de/gp/product/B08CKB2B12/>

You can get a kit with the RS1, USB-C module and all necessary components (except for the cereal box) [here](#).

Comments

Yeah, the Rosahl membranes are not cheap but they are crazy efficient when it comes to power consumption with less than 0.5W continuously. I leave them running 24/7 without the need for ever re-drying a spool in a conventional filament drying or oven which would require significantly more power.

Update

09/02/2024: I added a new base part which has a bracket for an alternative hygrometer, since the original seem to be no longer available on Amazon. The alternative hygrometer worked quite well in my tests compared to a decent temp/hum data logger even down to around 15%RH.

Model files



single_drybox_all_parts.3mf



cover_plug.stl



spool_base_hygro.stl



spool_roller.stl



usb-c-cover.stl



ptfeplug.stl



spool_base_hygro_new.stl

Print files



single_drybox_all_parts_04n_02mm_pla_mini_4h50m.bgcode

⊗ PLA ⊕ 0.40 mm ≡ 0.20 mm ⌚ 4.83 hrs ⚖ 52 g 🖨 Prusa MINI / MINI+

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