New Mounting Cover for Rosahl MDL-3 Dehumidifier Membrane for Filament Dryboxes or Bambu Lab AMS

ERIK3DP

VIEW IN BROWSER

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Summary

Build a multiple spool filament storage drybox with the MDL-3 Rosahl dehumdifier membrane or mount it to Bambu Lab AMS.

3D Printers > Accessories

Tags: `drybox` `filamentdrybox` `bambulab` `ams` `x1c` `p1p` `p1s` `rosahl` `mdl3`

This is the new mounting cover/case for a Rosahl MDL-3 electric dehumidifer membrane as alternative to the original (https://www.printables.com/model/932682-mounting-cover-for-rosahl-mdl-3-electric-dehumidif) and uses an off-the-shelf rubber gasket compared the o-ring of the original one.

It can be used for a filament drybox of around 50-80l for multiple spools or can be mounted to the Bambu Lab AMS. Along with a USB-C power supply module it's a convenient and low power consumption dry storage solution.

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 mainenance-free and the power consumption is very low.

The Rosahl MDL-3 membrane is suitable for storing multiple filament spools in a large storage box of around 50-80l or Bambu Lab AMS. With pre-dried filament spools (especially spools made of cardboard contain quite high moisture) a continous storage at approx. 15% rH and less is achievable.

Bambu Lab AMS

I found that the Bambu Lab AMS is not as well sealed as the manufacturer states. Compared to a 50l storage box with gasket, where I achieved <10% of end humidity inside, the AMS could get down to like 14%, which is still considered a proper humidity level, see picture of a real measurement.

The Bambu Lab AMS sitting on top of the P1P/P1S/X1C printer gets passively heated a bit during print operation and hence further reduces relative humidity inside the AMS and makes the MDL-3 even more efficient!

Printing

All parts can be printed without any supports. I printed with Overture PLA Professional on a Bambu Lab P1S. A .3mf file is available along with the STL models. The back plate has a small chamfer on one side, so best to place that side down to the print plate, especially when using a textured plate.

Assembly/Mounting

The mounting cover is made of a front frame for the MDL-3 and a USB-C power supply module. The sealing against the inside of the box is achieved by a rectangluar rubber gasket (link below), hence there is no need for printing a gasket with flexible filament. A backplate can be mounted against the inside to ensure a tight fit of the gasket in case the box wall material is flexible which is the case for most storage boxes. If used on e.g. a Bambu Lab AMS it might not be needed.

Note: It is generally beneficial to mount the membrane as top as possible to the enclosure/box as dry air has slightly higher specific weight that humid air and hence will sink down in the enclosure.

First step should be using the front cover upside-down on the desired mounting position and mark the six screw holes and the cut-out of the MDL-3 membrane area to the box wall. Drill the mounting holes with a 3.5mm wood drill (as those have a center dip and won't drift away during drilling). The cut-out for the membrane can be "dremel'ed" into the wall with a cutting disk. It works best if four 3.5mm hole are drilled into the corners of the cut-out first as end-points for the Dremel cutting. This also reduces the risk of cracks during cutting. For the Bambu Lab AMS I would recommend to drill rows of holes along the outline of the membrane area and then use a round file from hole to hole to cut out the area. Then use a flat file to clean the edges. This will avoid cracks of the AMS.

When mounting the gasket frame, first wrap the rubber ring around the inner bezel and then push both into the outer one. The MDL-3 membrane lays down flat in the front cover and then the gasket frame is pushed onto it on four mounting pegs, see picture. No screws required for this step. Make sure use the proper orientation of the MDL-3 as shown in the pictures!

I would not recommend to directly solder cables to the MDL-3 membrane contacts, since they do not solder/wet well and would hence require quite some heat for doing so which might introduce thermal stress to the membrane. Better is using 2.8mm flat-connectors (link below) to the cables from the power supply module. Plus and minus of the membrane power supply contacts are indicated on the back of the front cover, make sure use the correct polarity when connecting the membrane to power.

Now the assembled front cover can be mounted with six M3x20 screws (length depends on the thickness of the box wall and whether the backplate is being used) along with the backplate if used.

I added a separate mounting bracket for a standard hygrometer, which can be sticked to a box wall with double sided tape. Best is to place the hygrometer in the lower area of the box. There exist lower cost hygrometers but most of them struggle with measuring at low humidity levels. This one showed good performance down to around 15%RH compared to a decent temp/hum data logger. In the AMS no bracket is needed and the hygrometer can by just placed in the front center between the two filament guides (it has a hinged stand).

Parts Needed

- Rosahl MDL-3 membrane is available here.

- USB-C power supply module is available here.
- Rubber gasket: https://www.amazon.de/dp/B00HYXRAR2
- 50l storage box: https://www.amazon.de/gp/product/B0CLDT4815/ or 70l storage box: https://www.amazon.de/gp/product/B0CLGRH8V4/ (I prefer these over commonly used Ikea Sample or similar because they come with a decent gasket) Or mount it to a Bambu Lab AMS!
- M3x20 screws, nuts, washers (any can be used, length depends on your storage box' wall thickness)
- 2.8mm flat-connectors for MDL-3 membrane contacts: https://www.amazon.de/gp/product/B07MHBXJJK/
- optional hygrometer: https://www.amazon.de/dp/B0CH7XS97M

If the rubber gasket or the hygrometer is not available in your region, a full kit with the MDL-3 membran, USB-C power supply, gasket and all necessary parts (screws, washers, nuts, flat connectors) for assembly is available here.

Comments

Yeah, the Rosahl membranes are not cheap but they are crazy efficient when it comes to power consumption with less than 4W continously. 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.

Model files

mdl3_cover_new.stl

mdl3_gasket_new.stl

mdl3_backplate_new.stl

hygrometer_bracket.stl

mdl3_dehumidifier_case.3mf

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