

Camera Display Cabinet with Controlled Relative Air Humidity

Objective

Design a cabinet to be hang on a living room wall, with classy furniture style, able to house and display around 30 vintage cameras, and to control relative humidity to recommended levels for cameras ~ 40% RH.

Features

- Double paneling MDF with external panels Regular Melamine MDF 25mm in wooden finish, and internal paneling in humidity resistant MDF (green) 18mm painted in PU Automotive gloss off-white paint.
- External maximum dimensions 2180mm wide, 350mm deep, 600mm tall
- Two glass shelves, making three rows to display cameras. Shelves leave a 10cm space to the side walls, and a 5cm space to the front door, for air circulation
- A 120mm silent Noctua Fan positioned on the left side bottom ensure internal air mixing
- Glass door with aluminum frame. Door will be sealed against the MDF internal panels by use of EPDM gaskets to ensure sealing of the cabinet
- Door will be one piece of glass, open swinging to the top.
- There will be a Rosahl module on the righ wall (not sure is M-5J1R or M-7J1R)
- The external right end of the cabinet is in dark-black wooden MDF, removable, with empty floor panel, slotted top and front, and with a large square open on the right panel to ensure ventilation. Within this cover will be the control hardware (ESP32, RH and Temp sensors, etc, the regulated PSU recommended by Rosahl and the venting hole of the M-series membrane following Rosahls manual specs (55x55 for M-5J1R and 75x75 for M-7J1R)

Conditions of Use and Specs

Historic monthly averages (Campinas Aeroporto / Viracopos area climate)

Month	Avg Temp C	Avg RH %	Month	Avg Temp C	Avg RH %
Jan	25	77	Jul	19	69
Feb	24	77	Aug	20	64
Mar	23	76	Sep	22	66
Apr	23	74	Oct	23	70
May	20	75	Nov	23	72
Jun	19	73	Dec	24	74

Location of use

City of Campinas, State of São Paulo, Brazil (Viracopos Airport VCP area climate)

Historic monthly averages used

monthly mean temperature + RH table (12 months)

Worst typical months for sizing

Jan–Mar

Design “typical peak” margin

monthly means + ≈ +3 °C (T) and ≈ +2 °C (dew point)

No A/C

room sheltered from direct sun; dry/sound walls; no infiltrations

Cabinet free air volume

exact 332L but considered ~0.4–0.45 m³ for calculations

Target internal conditions

40–45% RH, nominal 25 °C

Door opening worst case

1× per day, most common case is several days (full week) without opening. Door sealed with EPDM Gasket against MDF

Moisture load assumption

~3–5 g/day typical, ≤10 g/day conservative(order-of-magnitude)

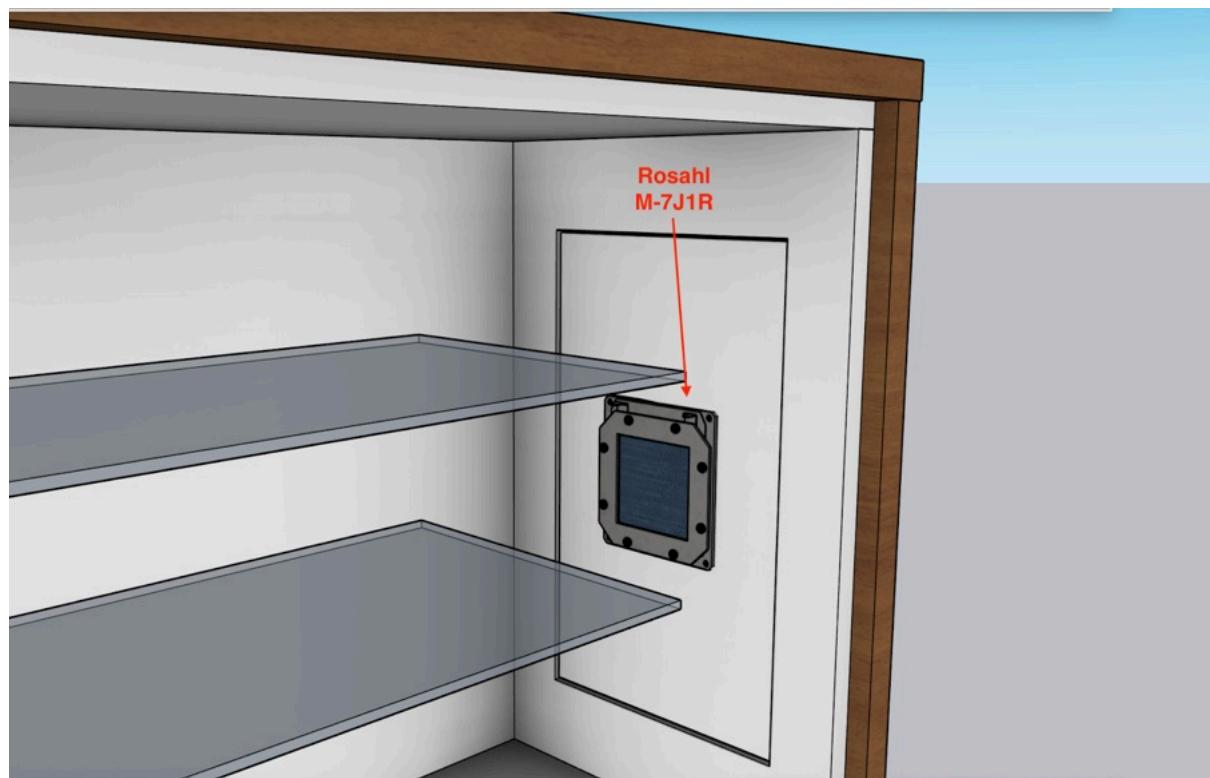
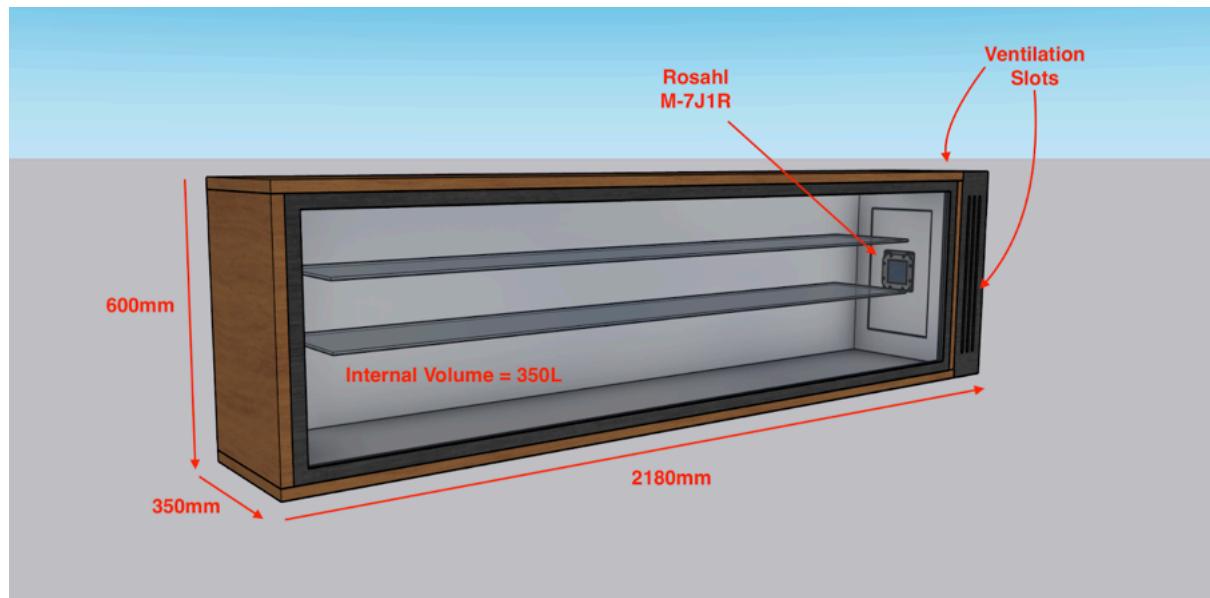
Control intent

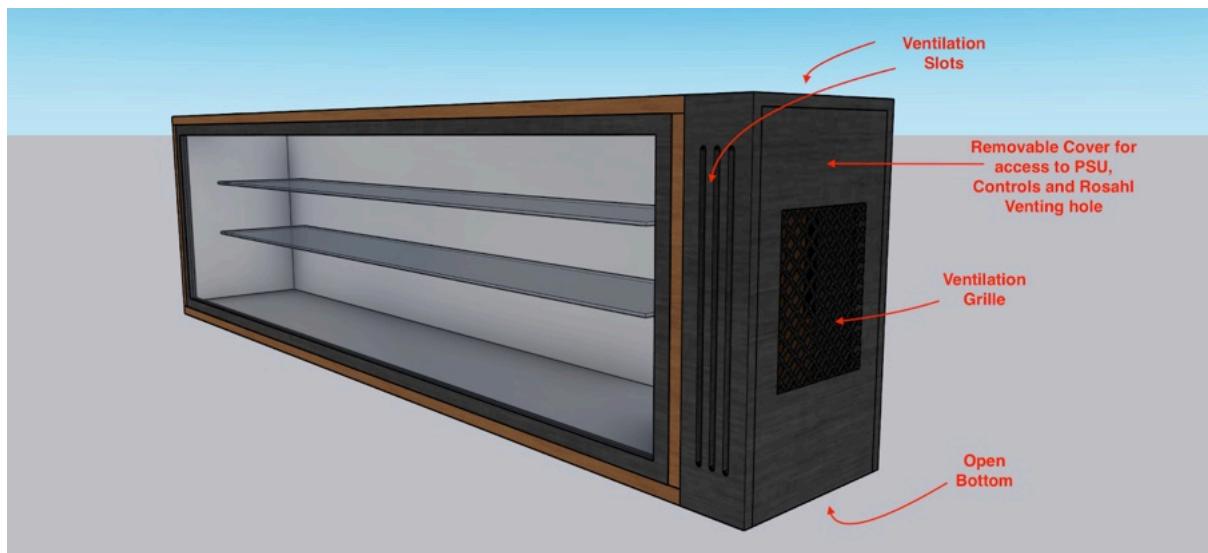
on-demand drying (act only when RH rises above target), then rely on sealing to hold

Thermal options considered

Rosahl M-5J1R (~8 g/day @ 30 °C/60% RH) and M-7J1R (~16 g/day @ 30 °C/60% RH)

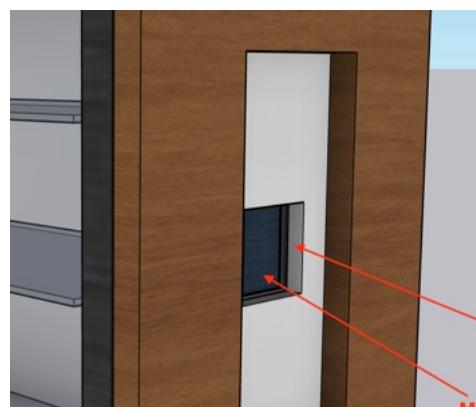
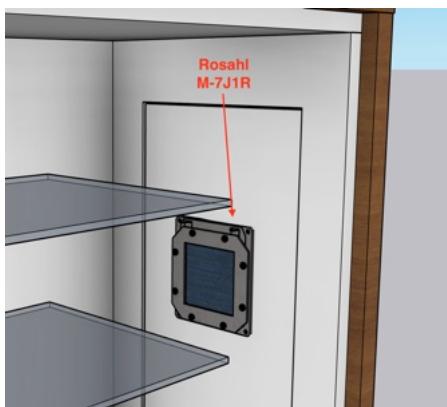
Sketches of the Project from Sketchup





Questions for Rosahl

1. Considering the design, features and specifications, will the M-5JR1 be enough with a good margin to spare, or should I go for M-7JR1 instead?
2. I read on Rosahl documentation that the life-span os of several years, and counting only the time in which the membrane power is turned on. If I would be using M-7J1R, and considering the design is to hold the low HR due to sealing, will it last longer than M-5J1R in principle (I understand it is hard to be precise, so the answer is in principle)
3. Looking at the detail of the outside right panel, I will install the M-series module according to the manual instructions, being, it will be bolted using the sealing gasket to the inside wall of the internal panelling of the cabinet. Due to the 18mm of the MDF in that area and considering that the external panelling will have a larger cutout, would the MDF around the venting hole be an issue? Check the drawings below.



4. Can you recommend a PSU model for M-5J1R and M-7J1R? I would be using my own sensor and control hardware, ESP32 module programmed to read RH sensors that would power on or off the PSU. The output of the PSU would go straight to the membrane, I understand the membrane needs stable and precise Voltage. I would be using MOSFET switches from the ESP32 to control the on/off status of the input to the PSU, based on RH level.
5. I am planning to use internal panels of Humidity resistant MDF, painted with PU Automotive paint. I understand that ensures a good sealing. I read that vapours are bad for the membranes, is PU paint, once dry and settled, potentially harmful to the membrane? I plan to leave the furniture dry completely some weeks before installing the Rosahl module.
6. Can you send me the specs and if possible links to order the proper terminal and cables to hook on the membrane terminals?
7. Does it seem, from all this, that my cabinet will work as a humidity controlled environment for cameras? This is all new for me, I have never heard before of such a thing as solid state polymer membrane dehumidifier. Just a sanity-check answer as this is a considerable investment for me. Am I missing any important other aspects on the project?

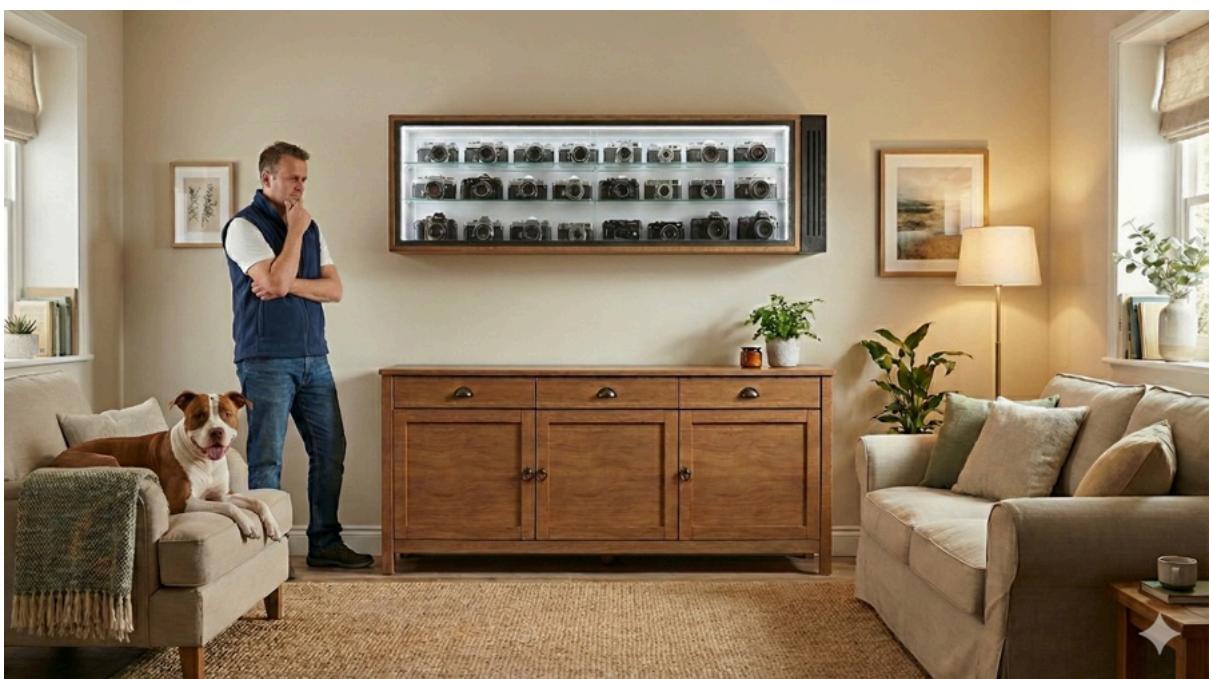
I really appreciate and thank you for your time helping me with my questions.

Photo Realistic Renders of the Cabinet









References

<https://www.youtube.com/watch?v=n7EWexck8NE&list=PLwrFEDnNKeADNtaNkRLMjemMuB4ifnTZK>

<https://www.youtube.com/watch?v=Vabq-s62IVM&list=PLwrFEDnNKeADNtaNkRLMjemMuB4ifnTZK&index=5>

<https://www.youtube.com/watch?v=-Fhlwy9UI7Q&list=PLwrFEDnNKeADNtaNkRLMjemMuB4ifnTZK&index=2>

<https://www.youtube.com/watch?v=WFZUDYT1SSA&list=PLwrFEDnNKeADNtaNkRLMjemMuB4ifnTZK&index=3>