



Need Some Fish — Rev. B (Otariinae) — EN

This project is to build an automatic, electrical aquarium from scratch.

Extra components (mechanics / assembly)

- **608zz bearing (Code 210046-0) (2x)**
- **Small screw M3×8 stainless steel A2 – 20 pcs**
- **Silicone glue, 50 g, transparent (aquarium) – Tekbond**

Materials and structure

- We will need some sensors and components.
- We need **high water resistance** in all connections.
- The structure will be in **3D printed parts** (bottom + top).
- The transparent middle section of the aquarium, between the two 3D parts, will be made of **acrylic (PMMA)** to fit into the printed pieces.
- We will also use pumps, servos, and internet connectivity.

External structure (outside the water)

- On the bottom (3D part), behind the aquarium, there will be a hidden **external 3D bay/compartment** to house the **entire electrical system**.
- This bay will be used to organize:

Removable bay (drawer) + printed rail

- **Position:** back, bottom, **hidden**.
- **Removal:** **100% removable** (all electrical parts live in the bay).
- **Suggested material:** **PETG**.
- **Target width:** about **40 cm** (height can be whatever fits, leaving clearance for cables and connectors).

Rail architecture (recommended)

- Use **two parallel rails** (left + right) integrated into the aquarium 3D part.
- The bay inserts from the back and slides until it hits a stop.
- Rail profile:
 - Preferred: **light dovetail (trapezoidal)** to prevent dropping and reduce play.
 - Simpler alternative: **U-channel + slider tab** (easier, but tends to have more play).

Locking at end of travel (so it does not slide out by itself)

- Mechanical stop at the end of the rail.
- One retention point (pick one):
 - **Snap-fit clip** at the front of the bay.
 - **1 retention screw** (M3/M4).
 - **Magnets + stop**.

Important details (so nothing goes wrong)

- **Print clearance:** start around **0.4 mm per side** and tune per printer/material.
- **Anti-twist:** two rails + a front lip (or center guide) so the bay does not rotate when pulling.
- **Handle/grip:** cutout or handle to pull it out without snagging cables.

- **Cable strain relief:** internal zone to create a loop so connectors are not pulled.
- **Sealed pass-through:** use a **cable gland (prensa cabo)** at the bay exit.
- **Ventilation:** if the PSU and relays heat up, add vents that are protected from splashes.

Internal bay layout (medium weight)

- Split into two levels or zones:
 - **AC / mains power** (input, fuse, PSU) with strong insulation and secure mounting.
 - **Low voltage** (12 V, WAGO, distribution, relays, connections) with easy access.
 - (Optional) An internal cover to protect terminals from accidental touch.
 - the AC → DC power supply
 - fused power strip
 - modules (relays, converters, etc.)
 - connections and power distribution for pumps, LEDs, and sensors

Completely made in 3D, it is 60 cm wide, and dovetailed only.

Cable and sensor routing

- On the top, we will leave **holes/channels** for:
 - sensors that go inside the water
 - LED wires from the lid
 - any other cables that need to go down into the electrical bay

Control boards

- We will use **two boards: Flux (RP2040) + ESP32 (factory)**.
- **Important change: Flux has no connectivity.** So **Wi-Fi/BLE and all communications** are handled by the **ESP32**.
- The **Flux (my own devboard)** will handle:
 - **RTC (Real Time Clock)**

- **Micro SD slot**
- main control / IO as needed.
- The **ESP32** will be used as the connectivity module and integration with the internet/app.

Important notes (assembly)

- Expect a lot of soldering and electrical tape, especially around the **relay module**, etc.

But since the aquarium runs on low voltage, the power supply section is separate, and 110 V does not go through our PCB

Electrical safety / power

- The mains (110 V) enters a **fused strip** (protection).
- We use an **AC → DC power supply** to convert **110 V to 12 V**, which is the aquarium standard.
- **The entire aquarium runs on low voltage (12 V)** to reduce risk.

Components controlled via GPIO

- Fused strip (before the PSU) powers 110 V loads and feeds the PSU
 - **Filtro de linha com protetor contra surtos (DPS) - 127/220 volts - 10 amperes - 5 tomadas - 3 pinos - iCLAMPER Energia 5 - LCF - Transparente**
- Internal filter (via **relay module**)
 - **Filtro Interno Ipf 408 Aquario Pequeno 30 Litros Aleas 127V**
- LED strip (in the lid, **outside the water** and well insulated)
 - **Fita LED MK 10W/m COB IP65**
 - *Warning:* IP65 helps against splashes/humidity but **is not for immersion**. Because it is near water, prefer **extra insulation** (profiles/covers, good sealing, and cable glands) and avoid exposed splices.
- Temperature sensor (waterproof)
 - **DS18B20**

- Water pH sensor
 - **Módulo Sensor + Ph Eletrodo Sonda Bnc**
- Turbidity sensor
 - **Sensor De Turbidez Arduino Para Monitoramento Dágua**
- Flow sensor
 - **YF-S201**
- Water level sensor (to prevent dry-running pump)
 - **Sensor De Nível De Água E Chuva Para Arduino - Minymix**
- Leak sensor (at the base, outside the aquarium)
 - **Sensor de vazamento de água Velds (WiFi, Notificação Instantânea, Alarme de 85dBa, Baixo Consumo) - VDS SVAW**
- Stepper motor (drives the rotary food dispenser)
 - **Motor De Passo Nema 17 1.3a 2,8 Kg Cnc Laser Impressora 3d**
- Main switch (cuts all power; placed before pump and PSU on 110 V; needs good insulation; be careful)
 - **Módulo Interruptor Bipolar Simples 25 A Inova Pro Class Alumbra**
- AC → DC power supply
 - **FONTE BLINDADA FC FONTES 12V 10A 120W IP67 FC1210BN**
- Adapter, power strip → PSU
 - **Cabo De Força Rabicho 2p + T 2,50mm Plugue 10a 1,50 Metro 127/220v**
- Consumables and general assembly
 - **Abraçadeira de nylon**
 - **Prensa-cabo**
 - **Terminais ilhós**
 - **Conectores WAGO**
 - **Fusíveis sobressalentes**
 - **Fios com bitola adequada**

- **Tubo termo-retrátil**
- **Silicone neutro próprio para aquário**

Food dispenser (top lid)

- On the top, a 3D printed **bowl/reservoir** will fit into a hole above the dosing lid.
- The reservoir will have its own **cap** to keep food from getting humid.
- Food stays isolated until the **rotary doser (3D printed)** releases a portion, then it falls into the aquarium.
- The doser is driven by a **stepper motor** for fine portion control and to avoid jamming.

PCB / connections

- PCB is ready, with multiple **pin headers**.
- Resistors and protections are designed to connect component pins, relays, etc. directly to the **Flux DevBoard**.

Power input and protection

- **Main input: 1x 2-way terminal block (12V_IN)**
- **Fuse/Polyfuse (PTC)** on the 12 V input
- **Reverse polarity protection** on the 12 V input
- **2x USB-A ports** to power both boards (Flux + ESP32)
 - Power via **DC-DC buck 12 V → 5 V**
 - **Polyfuse (PTC)** on 5 V (per port or overall)

12 V outputs (high current / thicker wire)

1. **1x 2-way terminal block – LED 12 V**
2. **1x 2-way terminal block – AUX 12 V (spare)**

Stepper motor (feeder)

- **DRV8825 driver** (on the PCB as a component)

- Motor connector: **JST-XH 4-pin** (preferred)

Sensor headers

- **DS18B20 (waterproof)**: 1× 3-pin header (V/G/D)
- **YF-S201 (flow)**: 1× 3-pin header
- **Level sensor (Minymix)**: 1× 3-pin header
- **Turbidity**: 1× 3-pin header
- **pH module**: 1× 3 or 4-pin header (depends: AO/DO)
- **I2C expansion**: 1× 4-pin header (V/G/SDA/SCL)

Board-to-board connectors

- **Flux ↔ WhaleShark (control)**: 1× **2×8 header (16 pins)**
- **ESP32 ↔ WhaleShark (communication)**: 1× **2×6 header (12 pins)**

Power chain:

Tomada Quarto(110V) → Filtro de Linha(Sistema 110V) → Fonte AC DC(Terminal block) → **12V** → Terminal block do PCB → Headers pins e Terminal Blocks → Sensores/Relay da Bomba/Fita de led/Motor de Passo

Names

Project: **SeaLion**

Edition: **Otariinae**

PCB: **WhaleShark**