# Need Some Fish — Rev. A (Otariinae) — EN

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

## 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**.

**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**

- **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 **prensa-cabos** at the bay exit.

- **Ventilation:** if the PSU and relays heat up, add vents that are protected from splashes.

**Internal 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 internal cover to protect terminals from accidental touch.

- The bay will organize:

  - the AC → DC power supply

  - fused power strip

  - modules (relays, converters, etc.)

  - connections and power distribution for pumps, LEDs, and sensors

## 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. **1× 2-way terminal block – LED 12 V**

2. **1× 2-way terminal block – Pump 12 V** *(if using a 12 V pump; if using 127 V via relay, this is not needed)*

3. **1× 2-way terminal block – AUX 12 V**

**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):** 1x **2×8 header (16 pins)**

- **ESP32 ↔ WhaleShark (communication):** 1x **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**