

Aquabiolabs Multi-Tank Systems

Multi-Tanks systems feature numerous small rearing tanks (9-L).

These control-integrated units cover a wide range of key experimental factors, such as:

- Very cold water: water chilled down to 2°C;
- Hypoxia: dissolved oxygen maintained down to 1 mg/L in rearing tanks;
- Creation of temperature shocks: rapid increase or decrease in water temperature;
- Parasitology studies: Filtration down to the micron level (e.g. for bio-containment studies).

Flexibility

Many tank configurations can be laid out to meet most requirements;

Flexible tubing enables configuration changes quickly and easily;

The system can operate with fresh and seawater;

The Enviro-Monitron systems enable precise control over water parameters, such as:

- Water temperature (cooled or heated at specified rates)
- Dissolved oxygen manipulation
- Photoperiod simulation
- Water make-up volume

Systems Designed for CDRF:

The Multi-Stress Unit

A research unit composed of up to two independent recirculating systems. Each system has a Filtration Module (biofilter, cartridge filter, heat exchanger, etc.) and a Habitat Module (9 L polycarbonate tanks & plumbing).

The system accommodates six 9 liters tanks per shelf. Each shelf has a row of LEDs and removable opaque insulation (isolates from room lighting). This unit is made to accommodate salinity and hypoxic control.

Upgradable to accommodate a third tank shelf and complete recirculating system.



Recommended Operating Conditions

Design Specifications	Operating Parameters
Maximum biomass density	15 g/L
Maximum biomass per shelf	842 g
Maximum feeding rate per 9L tank per day (dry feed)	2.8 g dry food / day (2% fish mass / day)
Maximum feeding rate per shelf per day (dry feed)	16.8 g dry food / day (2% fish mass / day)

Design Specifications

Parameter	Specification
Filtration module flow (lpm)	13
Habitat flow (lpm)	8
Water turnover per hour in tanks	8.6
System temperature (°C)	5 – 30
Room temperature (°C)	20
Water flushing rate (% of the total unit volume per day)	5 to 100
Filtration module volume (L)	18
Actual Habitat volume (L)	60 (6 x 9.35 L tanks + pumps and plumbing)
Total volume per unit (L)	78
Glycol volume (L)	8
Monitoring and control	Temperature, water make-up & photoperiod
Water make-up flow (lpm)	0.235
Degassing tower (CO ₂ mg/l)	≤ 12
Biofilter (NH ₃ mg/l)	Cold water: ≤ 0.0125; warm water: ≤ 0.02
Biofilter (NO ₂ mg/l)	≤ 0.2
Biofilter (NO ₃ mg/l)	≤ 13

Semi-Open Multi-Tank System

This Multi-tank system can be operated under semi-open conditions so plankton carried by natural sea water remains present to feed the marine invertebrates housed within the unit. The water is introduced in the system as a constant make-up flow. Consequently, no solid filtration, biofiltration or chemical treatments will be used in this unit as these may remove the plankton. The water exchange rate (up to 200% v/v water change per day) can be adjusted to maintain optimal rearing conditions. This system consists of a Habitat module, plus the necessary equipment required to pump and chill the water. The water chilling control precision is $\pm 0.3^{\circ}\text{C}$. This tank unit is equipped with standard control & monitoring systems along with a row of LEDs above each shelf for photoperiod control (one photoperiod for the whole unit). This multi-tank unit is equipped with 24 x 9.4 liter tanks (optional: can accommodate up to 64 x 1.5 liter tanks or 48 x 2.8 liter tanks). The Habitat Module has an opaque insulation (isolates from room lighting).



Recommended Operating Conditions

Design Specifications	Operating Parameters
Maximum biomass density	6 g/L
Maximum biomass per system	4524 g
Maximum feeding rate per day (dry feed)	45.25 g dry food / day (1% fish mass / day)
Corresponding value in g N-NH ₄ /day (N-NH ₄ ≈ 3.5% feed / d (mg))	1.58 g N-NH ₄ / day
Corresponding value in g NH ₄ Cl / day (NH ₄ Cl: 53.5/14 x g N-NH ₄).	1.58 g x (53.5/14) = 6.05 g NH ₄ Cl

Design Specifications

Parameter	Specification
Maximum water flow (lph)	2000
Total water rearing tanks flow (lph)	1440
Water turnover per hour in tanks (9.4 L tanks)	6.4
System temperature (°C)	4 – 19
Room temperature (°C)	20
Maximum water flushing rate (% of the total unit volume per day)	200 at 4 °C
Monitoring and control	Temperature, water make-up and photoperiod
Sump volume (L)	44
Habitat volume with 24 x 9.34 L tanks (L)	224
Total volume of the unit (L)	268
Water make-up flow (lpm)	11.16
Degassing tower (CO ₂ mg/l)	≤ 15
Degassing tower air inlet (m/s)	0.04 to 0.08
Degassing tower air inlet (scm)	6 to 12

Arctic Six-Pack Units

This research unit is composed of six independent 35-L insulated aquaria with individual filtration and temperature controls ($5-30^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$; ambient temperature 20°C) housed on a plastic frame resistant to seawater corrosion. Water chilling via a central compressor (located on the top shelf of the fish habitat) and is automatically controlled by a glycol valve for each aquarium. The system can operate on closed (5% water exchange v/v per day) or semi open hydraulic mode (100 % water volume exchange v/v per day). The system has photoperiod control in each tank with automatic light ramping and circadian rhythm simulation (one cycle for all tanks). Each shelf has a row of LEDs.





Recommended Operating Conditions

Design Specifications	Operating Parameters
Maximum biomass density	15 g/L
Maximum biomass per aquaria	525 g
Maximum feeding rate per aquaria per day (dry feed)	11 g dry food / day (2% fish mass / day)

Design Specifications

Parameter	Specification
Filtration module flow (lpm)	350
Water turnover per hour in tanks	10
System temperature (°C)	5 – 30
Room temperature (°C)	20
Water flushing rate (% of the total unit volume per day)	5 to 100
Filtration module volume (L)	2
Actual Aquaria volume (L)	35
Total volume aquaria (L)	37
Glycol volume (L)	8
Monitoring and control	Temperature, water make-up & photoperiod

Water make-up flow (lpm)	0.024
Biofilter (NH ₃ mg/l)	Cold water: ≤ 0.0125 ; warm water: ≤ 0.02
Biofilter (NO ₂ mg/l)	≤ 0.2
Biofilter (NO ₃ mg/l)	≤ 13